

Global Warming Awareness, Climate Change Awareness, and Climate Emergency Action

A Survey: 1961-2020
240 highlights from reports, articles, books, etc.

featuring milestones in awareness and action
with in-depth looks at some key organizations
bringing into focus pathways
for achieving Zero Carbon ASAP



(316 pages; November, 2020)
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Foreword

During the three to eight decades of unprecedented cultural transformation needed to achieve, and adjust to, Zero Carbon economies, it is very likely many serious blind spots will be discovered--issues which are far from being fully appreciated now, and issues which are serious enough to cripple our best efforts, if not remedied (Ex: most of us do not have a clear idea of what is necessary to achieve Zero Carbon for a town of 10,000 people.) (SP)

“... there are truths which none can be free to ignore, if one is to have that wisdom thru which life can become useful. These are the truths concerning the structures of the good life, and the factual conditions by which it may be achieved....” (“General Education in a Free Society” The Harvard Committee, 1945)

If many people can learn to find contentment and quality of life while consuming much less material goods and ecological services, this limiting of desires at the “root” will save much trouble trying to respond to the symptoms (of unrestrained, or unexamined desires) as they materialize worldwide. This is one of the benefits of spiritual teachings which often gets overlooked. (SP)

“Were I to have the least bit of knowledge, in walking on a Great Road, it’s only going astray that I would fear. The Great Way is very level; but people greatly delight in tortuous paths.” (Lao Tzu)

Introduction

This paper is a collection of 240 highlights from reports, articles, books, etc. on the subjects of Global Warming, Climate Change, and Climate Emergency Action.

This collection was made because there is way more than enough evidence for everyone living on Planet Earth to be alarmed, and for everyone to know we need an unprecedented cultural transformation to avoid catastrophic consequences.

And yet... there are still many people who are not only not helping the cultural transformation to succeed in limiting Global Warming to 1.5°C (which still can be accomplished), but actually making the problems worse.

Hopefully, this paper will be helpful to educators and journalists, as part of their efforts to remove doubt about why we need to have such an unprecedented cultural transformation, and

- a) how much we need to be learning to so that we can be part of the solutions
- b) how much we need to be making best use of the knowledge and skills each one of us has
- c) how much we need to be on the same side, helping each other

Fair Use for Educational Purposes

As readers will find, the highlights from reports, articles, books, etc. include excerpts, quotes, graphs, charts, tweets, and etc.--many of which are copyrighted intellectual property. And yet there is no mention here of efforts to seek permission, from the owners of such copyrights, to use such excerpts in this paper. Why? Because due to the educational purpose of this paper (the paper is free and accessible to all who wish to read it); the emergency circumstances, and the complexity of the subject matter; and the acknowledgements made in the source references accompanying the excerpts--I believe the use made in this paper of such excerpts will likely be regarded by the copyright owners as helpful to the larger cause, rather than an infringement of their rights. For those people who wish to read more on the subject of "Fair Use", here are two links: an [overview of "fair use" by the U.S. Copyright Office](#), and the [Wikipedia webpage for "fair use"](#).

The Criteria for Choosing Entries for This Survey

My own research into critical challenge assessments and solutions has taken place over decades, and so has my efforts at seeking out people doing similar work to explore possible collaboration. By this process, over a long period of time, I have become familiar with many of the reports, articles, books, etc. in this paper. I have also been on the Twitter Platform since 2011. I have done many careful searches through other people's follow lists to find people I thought would be good sources to learn from; and I have made lists, which are a helpful way to focus a timeline of tweets on a specific subject area. Also, in an October-November 2013 compendium kind of appeal ["Invitation Package to Possible Board of Advisors"](#) (589 pages), I included a 28 point timeline of warnings about Global Warming, from 1988 to 2013, on pages 273-301. Each entry includes excerpts from the resource cited.

For this survey, I was hoping to include some entries on the history of awareness in Global Warming and Climate Change research, many entries of articles and websites describing findings from research, and many entries describing work being done by key organizations and individuals in the area of Climate Emergency Action. Often, trying to find a good example or explanation of one topic lead to a very good example or explanation of another topic.

Even so, my choices have been limited as English is my only language--and I made an effort to choose sources which may already be known to many readers in the United States.

In the future, if there is interest in making a more thorough survey, such researchers are welcome to use this paper as a starting point.

Legal Format for Page Size

There may be some awkwardness created by the use of the legal format for page size (8 1/2" X 14"); however, that choice was necessary for this low budget project... so that the imported images (graphs, charts, etc.) could fit more easily into their context. Thus, this paper may be less print-friendly, and more likely to be accessed and read online.

Special Sections

There are eight special sections in this paper, which were made to accommodate either multi-year subjects, or subjects which merited special attention.

The eight special sections are:

	(which begins on)
IPCC	p. 40
Climate Emergency Action in Higher Education	p. 66
Motor Vehicles	p. 140
Emergency Relief; Displacements; Safe Water, Sanitation	p. 159
Plastic Pollution--A Cautionary Tale	p. 203
Gender Equality	p. 246
Why Rich People Use So Much More Energy	p. 248
Sunrise Movement and the Green New Deal	p. 286

(Note: Multi-year sections may also occur with entries about organizations, as highlights from the organizations activities extend over a period of time.)

Commentary

In the "Foreword", and by commentary in a few places in this paper, indicated by [(Commentary--SP), I have brought forward some of my own viewpoints. Specifically, I have included my view that it makes more sense to downsize and use less material goods and ecological services than to carry into the future habitats, industry, conveniences, and mobility which are not appropriate to achieving Zero Carbon, or achieving sustainability (though this is being attempted). As these subjects have been carefully thought through by many people with decades of experience in their fields, I believe it is worth repeating (from the "Foreword"), that--

During the three to eight decades of unprecedented cultural transformation needed to achieve, and adjust to, Zero Carbon economies, it is very likely many serious blind spots will be discovered--issues which are far from being fully appreciated now, and issues which are serious enough to cripple our best efforts, if not remedied (Ex: most of us do not have a clear idea of what is necessary to achieve Zero Carbon for a town of 10,000 people).

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November 14, 2020

Global Warming Awareness, Climate Change Awareness, and Climate Emergency Action

A Survey: 1961-2020

240 highlights from websites, reports, books, articles, etc.

1) World Population

“1 billion in 1804

2 billion in 1927 (123 years later)

3 billion in 1960 (33 years later)

4 billion in 1974 (14 years later)

5 billion in 1987 (13 years later)

6 billion in 1999 (12 years later)

7 billion in 2011 (12 years later)”

[From the “World Population Milestones” webpage at the website for “Information Please” (at <https://www.infoplease.com/world/population/world-population-milestones>) (Source: United Nations Population Division)]

2) Measurements “Keeling Curve” (Charles David Keeling) (1961)

a) “The Keeling Curve is a graph of the accumulation of carbon dioxide in the Earth's atmosphere based on continuous measurements taken at the Mauna Loa Observatory on the island of Hawaii from 1958 to the present day. The curve is named for the scientist Charles David Keeling, who started the monitoring program and supervised it until his death in 2005.

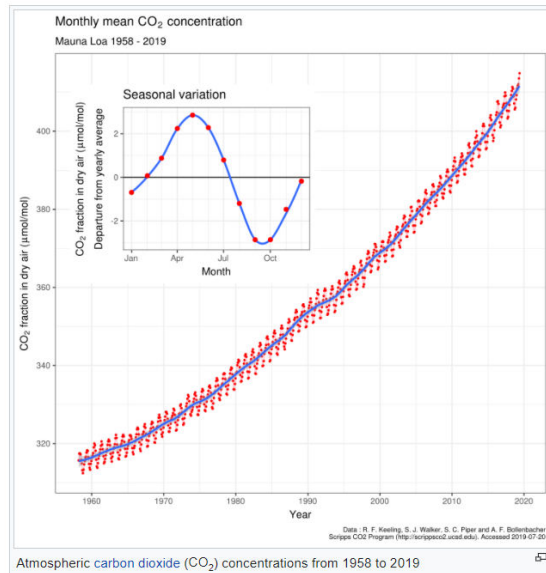
“In 1961, Keeling produced data showing that carbon dioxide levels were rising steadily in what later became known as the ‘Keeling Curve’.”

“The data collection started by Keeling and continued at Mauna Loa is the longest continuous record of atmospheric carbon dioxide in the world and is considered a reliable indicator of the global trend in the mid-level troposphere.”

[From the Wikipedia webpage for “Charles David Keeling” (at https://en.wikipedia.org/wiki/Charles_David_Keeling) (paragraphs 1, 5, and 7)]

b) “Keeling's measurements showed the first significant evidence of rapidly increasing carbon dioxide (CO₂) levels in the atmosphere. According to Dr. Naomi Oreskes, Professor of History of Science at Harvard University, the Keeling curve is one of the most important scientific works of the 20th century. Many scientists credit the Keeling curve with first bringing the world's attention to the current increase of CO₂ in the atmosphere.”

c) Keeling Curve



[From the Wikipedia webpage for “Keeling Curve” (at https://en.wikipedia.org/wiki/Keeling_Curve) (paragraph 2, and graph)]

3) Paper “Thermal Equilibrium of the Atmosphere with a Given Distribution of Relative Humidity” (Syukuro Manabe and Richard T. Wetherald) (May, 1967)

“The Manabe and Wetherald paper is considered by many as a pioneering effort in the field of climate modelling, one that effectively opened the door to projecting future climate change.”

“... first to represent the fundamental elements of the Earth’s climate in a computer model, and to explore what doubling carbon dioxide (CO₂) would do to global temperature.”

“Professor Steve Sherwood, expert in atmospheric climate dynamics at the University of New South Wales and another lead author on the clouds and aerosols chapter, says... ‘[The paper was] the first proper computation of global warming and stratospheric cooling from enhanced greenhouse gas concentrations, including atmospheric emission and water-vapour feedback’.”

[From article “The most influential climate change papers of all time” (Roz Pitcock) (July 7, 2015) at the Carbon Brief website (at <https://www.carbonbrief.org/the-most-influential-climate-change-papers-of-all-time>) (in the Section “Winner: Manabe & Wetherald (1967)”, paragraphs 3, 2, 4, and 6)]

4) Report “The Limits to Growth” (The Club of Rome) (1972)

a) “A pioneering report, The Limits to Growth, published in 1972, marked a turning point in thinking about the environment, selling some 30 million copies in 30 languages. The two-year study behind the report took place at the Massachusetts Institute of Technology at the request of the Club of Rome, an international group of distinguished business people, state officials, and scientists founded by Aurelio Peccei, a former Fiat executive and president of Olivetti. Their concerns about the consequences of unrestrained growth in global population, resource consumption, and pollution led them to contact Jay

W. Forrester, a professor in management at MIT, who had developed a method for analyzing the behavior of complex systems by means of simple simulation models. Forrester accepted the challenge and assembled a team of young experts, headed by Dennis Meadows. Meadows and his team constructed a model, known as World3, to keep track of the development of the study's central parameters and their interactions."

[From article "The History of The Limits to Growth" by Jørgen Stig Nørgård, John Peet, and Kristín Vala Ragnarsdóttir (March, 2010) in the Solutions Journal (at <https://www.thesolutionsjournal.com/article/the-history-of-the-limits-to-growth/>) (paragraph 1)

b) From the book "The Limits to Growth" at Internet Archives (at <https://archive.org/details/limitstogrowthr00mead>)

"The intent of the project is to examine the complex of problems troubling men of all nations: poverty in the midst of plenty; degradation of the environment; loss of faith in institutions; uncontrolled urban spread; insecurity of unemployment; alienation of youth; rejection of traditions values; and inflation and other monetary and economic disruptions. These seemingly divergent parts of the 'world problematique', as The Club of Rome calls it, have three characteristics in common: they occur to some degree in all societies; they contain technical, social, economic, and political elements; and, most important of all, they interact." (from "Foreword", p. 10)

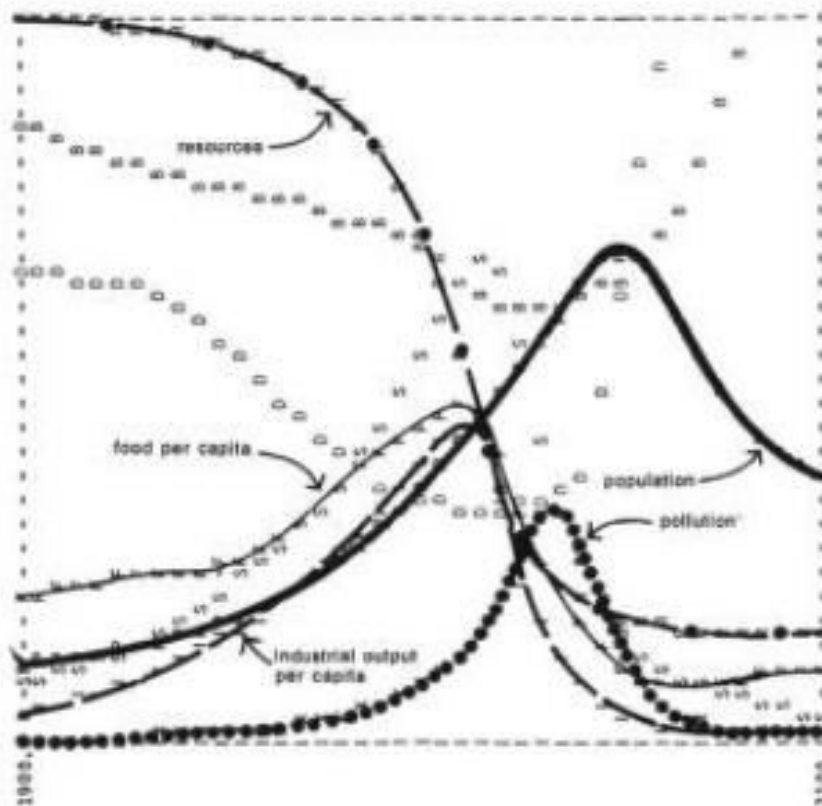
"Our world model was built specifically to investigate five major trends of global concern—accelerating industrialization, rapid population growth, widespread malnutrition, depletion of nonrenewable reserves, and a deteriorating environment. These trends are all interconnected in many ways, and their development is measured in decades or centuries, rather than in months or years. With the model we are seeking to understand the causes of these trends, their interrelationships, and their implications as much as one hundred years into the future." (from "Introduction", p. 21)

"Virtually every pollutant that has been measured as a function of time appears to be increasing exponentially." (in subsection "Exponentially Increasing Pollution", p. 71)

"At present, about 97% of mankind's industrial energy production comes from fossil fuels (coal, oil, and natural gas). When these fuels are burned, they release, among other substances, carbon dioxide (CO₂) into the atmosphere. Currently, about 20 billion tons of CO₂ are being released from fossil fuel combustion each year. As figure 15 shows, the measured amount of CO₂ in the atmosphere is increasing exponentially, apparently at a rate of 0.2 percent each year. Only about one half of the CO₂ released from burning fossil fuels has actually appeared in the atmosphere—the other half has apparently been absorbed, mainly by the surface water of the ocean. If mans energy needs are someday supplied by nuclear power instead of fossil fuels, this increase in atmospheric CO₂ will eventually cease, one hopes before it has any measurable ecological or climatological effect." (p. 71 and 73)

"Carbon dioxide, thermal energy, and radioactive waste are just three of the many disturbances man is inserting into the environment at an exponentially increasing rate." (p. 78)

Figure 35 WORLD MODEL STANDARD RUN



The "standard" world model run assumes no major change in the physical, economic, or social relationships that have historically governed the development of the world system. All variables plotted here follow historical values from 1900 to 1970. Food, industrial output, and population grow exponentially until the rapidly diminishing resource base forces a slowdown in industrial growth. Because of natural delays in the system, both population and pollution continue to increase for some time after the peak of industrialization. Population growth is finally halted by a rise in the death rate due to decreased food and medical services.

(from p. 124)

"The behavior mode of the system shown in Figure 35 is clearly that of overshoot and collapse." (p. 125)

"The exact timing of these events is not meaningful, given the great aggregation and many uncertainties in the model. It is significant, however, that growth stopped well before 2100. We have tried in every doubtful case to make the most optimistic estimates of unknown quantities, and we have also ignored discontinuous events such as wars or epidemics, which might act to bring an end to growth even sooner than our model would indicate. In other words, the model is biased to allow growth to continue longer than it probably can continue in the real world. We can thus say with some confidence that, under the assumptions of no major change in the present system, population and industrial growth will certainly stop within the next century, at the latest." (p. 126)

c) From Commentary at the end of the book "The Limits to Growth" by the Executive Committee of The Club of Rome [From the book "The Limits to Growth" at Internet Archives (at <https://archive.org/details/limitstogrowthr00mead>)]

"We are unanimously convinced that rapid, radical redressment of the present unbalanced and dangerously deteriorating world situation is the primary task facing humanity."

"Our present situation is so complex and is so much a reflection of man's multiple activities, however, that no combination of purely technical, economic, or legal measures and devices can bring about substantial improvement. Entirely new approaches are required to redirect society towards goals of

equilibrium rather than growth. Such a reorganization will involve a supreme effort of understanding, imagination, and political and moral resolve. We believe that the effort is feasible and, we hope that this publication will help to mobilize forces to make it possible.” (p. 193)

“We believe in fact that the need will quickly become evident for social innovation to match technical change, for radical for radical reform of institutions and political process at all levels, including the highest, that of world polity. We are confident that our generation will accept this challenge if we understand the tragic consequences that inaction may bring.” (p. 193-194)

“We affirm finally that any deliberate attempt to reach a rational and enduring state of equilibrium by planned measures, rather than by chance or catastrophe, must ultimately be founded on a basic change of values and goals at individual, national, and world levels... Only real comprehension of the human condition at this turning point in history can provide sufficient motivation for people to accept the individual sacrifices and the changes in political and economic power structures required to reach an equilibrium state.” (p. 195)

d) “How was it possible to derail the “Limits to Growth” debate to the extent that the book and its message were essentially ignored (or, arguably, covered up) for decades?”

i) “One reason is that a book that hints at the necessity of curbing economic growth is very unwelcome to those who have a large stake in the status quo. This applies at the financial level, where LtG challenges many commercial interests in growth; at the political level, where governments fear dwindling tax revenue for public spending; and among professional mainstream economists, who instinctively resist a change in the paradigm of eternal growth and who have rarely addressed the question of how to plan for a steady-state economy in an orderly way.”

ii) “Until now, growth has not, as often promised, been used to reduce inequalities but rather to sustain a substantial gap between rich and poor, without having to deal with too much social unrest. By arguing that the economic cake cannot grow infinitely, ‘Limits to Growth’ added moral legitimacy to those demanding more equality, both within nations and globally.”

[From article “The History of The Limits to Growth” by Jørgen Stig Nørgård, John Peet, and Kristín Vala Ragnarsdóttir (March, 2010) in the Solutions Journal (at <https://www.thesolutionsjournal.com/article/the-history-of-the-limits-to-growth/>) (i) in the section “Derailing the Debate”, paragraph 1; ii) in the section “Better Global Distribution”, paragraph 1)]

5) Organization “Worldwatch Institute” (founded 1974)

https://en.wikipedia.org/wiki/Worldwatch_Institute

a) “The mission of the Institute reads: Through research and outreach that inspire action, the Worldwatch Institute works to accelerate the transition to a sustainable world that meets human needs. The institute's top mission objectives are universal access to renewable energy and nutritious food, expansion of environmentally sound jobs and development, transformation of cultures from consumerism to sustainability, and an early end to population growth through healthy and intentional childbearing.”

“The Worldwatch Institute aims to inform policymakers and the public about the links between the world economy and its environmental support systems. Research conducted by the institute is integrative or interdisciplinary and global in scope.”

[From the Wikipedia webpage “Worldwatch Institute” at https://en.wikipedia.org/wiki/Worldwatch_Institute (from the section “Mission”, paragraphs 1-2)]

b) “Worldwatch's priority programs include:

--Building a low-carbon energy system that dramatically reduces the use of fossil fuels and lowers greenhouse gas emissions.

--Nourishing the Planet researches methods that create a sustainable food production system that provides a healthy, nutritious diet for all while sustaining the land, water, and biological resources on which life depends. The project resulted in the Worldwatch Institute's flagship publication, State of the World 2011: Innovations that Nourish the Planet.

--Transforming economies, cultures, and societies that meets human needs, promotes prosperity, and is in harmony with nature.”

“Worldwatch also monitors human health, population, water resources, biodiversity, governance, and environmental security.”

[From the Wikipedia webpage “Worldwatch Institute” at https://en.wikipedia.org/wiki/Worldwatch_Institute (from the section “Mission”, paragraphs 3-4)]

c) “Milestones

1974—The institute was founded by Lester Brown.

1975—The first Worldwatch Paper was published.

1984—First State of the World published.

1988—World Watch Magazine was launched.

1992—Vital Signs, Worldwatch's third annual series, was premiered.

2000—Christopher Flavin became President of Worldwatch in October.”

[From the Wikipedia webpage “Worldwatch Institute” at https://en.wikipedia.org/wiki/Worldwatch_Institute (from the section “History”)]

d) State of the World publications were provided for the years 1984-2017, and included:

“State of the World 2004: Special Focus: The Consumer Society ISBN 0-393-32539-3

State of the World 2005: Redefining Global Security ISBN 0-393-32666-7

State of the World 2006: Special Focus: China and India ISBN 0-393-32666-7

State of the World 2007: Our Urban Future ISBN 978-0-393-32923-0

State of the World 2008: Innovations for a Sustainable Economy ISBN 978-0-393-33031-1

State of the World 2009: Into a Warming World ISBN 978-0-393-33418-0

State of the World 2010: Transforming Cultures: From Consumerism to Sustainability ISBN 978-0-393-33726-6

State of the World 2011: Innovations that Nourish the Planet ISBN 978-0-393-33880-5

State of the World 2012: Moving Toward Sustainable Prosperity ISBN 978-1-61091-037-8

The Path to Degrowth in Overdeveloped Countries, Chpt. 2.

State of the World 2013: Is Sustainability Still Possible? ISBN 978-1-61091-449-9

State of the World 2014: Governing for Sustainability ISBN 1610915410

State of the World 2015: Confronting Hidden Threats to Sustainability ISBN 978-1-61091-610-3

State of the World 2016: Can a City Be Sustainable? ISBN 9781610917551

State of the World 2017: Earth ED: Rethinking Education on a Changing Planet ISBN 9781610918428”

[From the Wikipedia webpage for “State of the World” (book series) [at [https://en.wikipedia.org/wiki/State_of_the_World_\(book_series\)](https://en.wikipedia.org/wiki/State_of_the_World_(book_series))] (in the “Editions” section)]

e) From report “State of the World 2004--Special Focus: The Consumer Society”

i) “... In the pages that follow, the authors have shown how in everything from our use of energy and water to our consumption of food we can make choices that will improve our health, create jobs, and reduce pressures on the world’s natural ecosystems.”

“To accomplish this goal, we have interspersed the chapters in State of the World 2004 with short articles on a variety of everyday products--from computers to chickens and cans of soda--in order to allow readers to see common goods in a new light. In addition, we have pointed to many cases in which consumers are banding together to purchase goods such as sustainably grown wood products, organic cocoa, and ‘fair-trade’ coffee. Although most of these movements are tiny compared with the larger consumer economy, they are growing rapidly and could soon become a powerful force in many markets.”

[From report “State of the World 2004--Special Focus: The Consumer Society” (Worldwatch Institute) (2004) at the website of Green Economics (at <http://www.greeneconomics.net/StateOfWorld-2004.pdf>) (in section “Preface”, p. xix, paragraphs 1 and 2)]

ii) “Everything we consume or use--our homes, their contents, our cars and the roads we travel, the clothes we wear, and the food we eat--requires energy to produce and package, to distribute to shops or front doors, to operate, and then to get rid of. We rarely consider where this energy comes from or how much of it we use--or how much we truly need.” (p. 25, paragraph 1)

“The energy invested in a particular thing during its life, from cradle to grave, is called the ‘embodied energy’ of that object. The amount of embodied energy that an item contains depends greatly on the technology used to create it, the degree of automation, the fuel used by and the efficiency of a particular machine or power plant, and the distance the item travels from inception to purchase. The value differs considerably from place to place, and even from house to house.” (p. 36, paragraph 5)

“As with houses, large amounts of energy are required to assemble our automobiles, to construct and operate the manufacturing plants, and to fabricate the various inputs that make up a car. Most of the energy use associated with making a vehicle is for the manufacture of steel, plastic, glass, rubber, and other material inputs. The larger a vehicle, the more energy required, adding further significance to the trend toward larger cars and SUVs. And once we take a car on the road, its requirements extend to all the energy needed to construct and maintain the highways and bridges we travel, the parking lots, the auto dealers and parts stores, and the many fueling stations needed to keep it running. In total, the energy use associated with a car can be 50–63 percent higher than the direct fuel consumption of the vehicle over its lifetime, and the environmental impacts are also enormous.” (p. 36-37, paragraph 7)

“But the largest share of energy use associated with vehicles is driving them. To run our vehicles we extract petroleum from the earth, transport it to convenient locations, and refine it into useful fuel.

Petroleum refining is one of the world's most energy demanding industries--and the most energy-intensive in the United States. In 1998, petroleum refining accounted for 8 percent of total U.S. energy consumption." (p. 37, paragraph 1)

"By supporting items and processes that have lower embodied energy, as well as the companies that produce them, consumers can significantly reduce society's energy use." (p. 37, paragraph 6)

[From report "State of the World 2004--Special Focus: The Consumer Society" (Worldwatch Institute) (2004) at the website of Green Economics (at <http://www.greeneconomics.net/StateOfWorld-2004.pdf>) (in Chapter 2 "Making Better Energy Choices" by Janet L. Savin]

[Commentary--by SP:

--"... every article in the bazaar has moral and spiritual values attached to it... hence it behooves us to enquire into the antecedents of every article we buy.... (Yet this) is an arduous task, and it becomes almost impossible for ordinary persons to undertake it when the article comes from far off countries. Therefore, it is that we have to restrict our purchase to articles made within our cognizance. This is the moral basis of Swadeshi." (from paragraph 6 on p. 72-73)

--"If we feel it is beyond us to guarantee the concomitant results of all our transactions, it necessarily follows that we must limit our transactions to a circle well within our control. This is the bed rock of swadeshi... The smaller the circumference, the more accurately can we gauge the results of our actions, and (the) more conscientiously shall we be able to fulfill our obligations as trustees." (p. 60, paragraph 3)

(From the book "Why the Village Movement?" by J.C. Kumarappa at the website archive.org--at <https://archive.org/details/in.ernet.dli.2015.118819/mode/2up>)]

iii) "It would be foolish to underestimate the challenge of checking the consumption juggernaut. Few forces are as powerful or widespread. But as the costs of unbridled consumption become clear, we believe that the innovative responses described in these pages will also catch on at an accelerating pace. In the long run, it will become apparent that achieving generally accepted goals--meeting basic human needs, improving human health, and supporting a natural world that can sustain us--will require that we control consumption rather than allow consumption to control us."

[From report "State of the World 2004--Special Focus: The Consumer Society" (Worldwatch Institute) (2004) at the website of Green Economics (at <http://www.greeneconomics.net/StateOfWorld-2004.pdf>) (in section "Preface", p. xix, paragraph 5)]

f) From "State of the World 2009: Into a Warming World" (at archive.org)

i) "The Worldwatch Institute's State of the World reports have evolved into a remarkable source of intellectual wealth that provides understanding and insight not only on the physical state of this planet but on human systems as they are linked with ecosystems and natural resources around the world. It is especially heartening that the focus of 'State of the World 2009' is on climate change."

"The contents of this volume are of particular interest as they are based on the findings of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) and provide a comprehensive overview of the policy imperatives facing humanity as we come to grips with this all-important challenge confronting the world today."

[From report “State of the World 2009: Into a Warming World” (Worldwatch Institute) (2009) at the website of archives.org (the Internet archives) (at <https://archive.org/details/stateofworld20090000unse>) (from the “Foreword” section by R.K. Pachauri Director General, The Energy and Resources Institute; Chairman, Intergovernmental Panel on Climate Change--paragraphs 1 and 2)]

ii) “As the 1990s came to an end the world appeared to be moving to tackle the largest and most complex problem humanity has ever faced. But fossil fuel interests mobilized a counterattack--pressuring governments and creating confusion about the science of climate change. Taking advantage of the inevitable uncertainties and caveats contained in leading climate assessments, a handful of climate skeptics--managed to position climate change as a scientific debate rather than a grim reality. The climate change skeptics had their greatest influence in the United States, putting it at loggerheads with the European Union, which since the early 1990s has been the strongest advocate of action on climate change. In November 2000, in the waning days of the Clinton administration, climate negotiators met in The Hague with the intention of finalizing details of the Kyoto Protocol—which in principle had been agreed to three years earlier. Two weeks of intense discussions concluded with an agonizing all-night session that ended in failure. Distrust and miscommunication between American and European negotiators were at the heart of this historic diplomatic failure--a failure that became more significant a short time later when the U.S. Supreme Court decided that Al Gore would not be the next President of the United States.”

“In the months that followed, many remained optimistic: before his election, President George W. Bush had indicated his support for addressing the climate problem and working cooperatively with other countries. Two months later--under heavy pressure from Vice President Cheney and the oil industry--he executed an abrupt U-turn, rejecting the Kyoto Protocol outright and throwing negotiations into a tailspin. Europe, Canada, Japan, and Russia were shocked into completing and ultimately ratifying the Kyoto Protocol in the coming years, but time and political momentum had been lost. More significantly, the unilateral actions of the U. S. government deepened North-South fissures on climate change--a divide that has now become the largest obstacle to progress.”

[From report “State of the World 2009: Into a Warming World” (Worldwatch Institute) (2009) at the website of archives.org (the Internet archives) (at <https://archive.org/details/stateofworld20090000unse>) (in Chapter 1 “The Perfect Storm”, in section “Fiddling While the World Burns”, p. 6-7 paragraphs 4-6)]

g) From report “State of the World 2016: Can a City Be Sustainable?”

i) From “Foreword” by Eduardo da Costa Paes, Mayor of Rio de Janeiro and Chair of the C40 Cities Climate Leadership Group

“Cities are synonymous with civilization--in fact, they are the foundation of it. They have always been the major arenas within which high human culture has evolved and flourished, and, since the beginning of the scientific age, they also have been the engines of our expanding knowledge of the planet, its ecosystem, and our place within them. Cities rightly stand as beacons of hope and inspiration to millions and will continue to grow in the coming decades as people on every continent migrate to urban environments seeking better lives.”

“Cities are where most people now live, and will live in the coming decades. Moreover, because they offer access to all the best that human civilization has achieved, cities are where most people *want* to live.”

[From report “State of the World 2016: Can a City Be Sustainable?” at the Amazon website (at <https://www.amazon.com/Can-City-Sustainable-State-World/dp/1610917553>) (via “Look Inside” feature: in “Foreword” by Eduardo da Costa Paes, p. xxi, paragraph 1, and p. xxii, paragraph 6)]

ii) From introductory chapter “World’s Cities at a Glance” by Gary Gardner

“An estimated 1 billion people will become part of the global ‘consuming class’ by 2025. They are expected to inject \$20 trillion of additional spending annually into the global economy.” (Gardner’s source reference: ‘Dobbs et al., *Urban World: Cities and the Rise of the Consuming Class*’)

[From report “State of the World 2016: Can a City Be Sustainable?” at the Amazon website (at <https://www.amazon.com/Can-City-Sustainable-State-World/dp/1610917553>) (via “Look Inside” feature: in introductory chapter “World’s Cities at a Glance” by Gary Gardner; p. xxix, paragraph 1)]

iii)

Table 2–4. Metabolic Profiles of Hunter-Gatherers, Agrarian Society, and Industrial Society

Dimension	Hunter-Gatherers	Agrarian Society	Industrial Society
Energy use per capita (gigajoules per person per year)	10–20	40–70	150–400
Materials use per capita (tons per person per year)	0.5–1	3–6	15–25
Population density (people per square kilometer)	0.025–0.115	Up to 40	Up to 400
Agricultural share of population (percent)	—	More than 80	Less than 10
Biomass share of energy use (percent)	More than 99	More than 95	10–30

Source: See endnote 26.

Table 2–5. Relative Contribution of Population, Affluence, and Technology to Environmental Impact Over History

Period	Increase in Environmental Impact	Distribution
1 BCE through 1500 BCE	5-fold	Population and affluence were roughly equally responsible.
From 1500 BCE to present	10-fold	Affluence is responsible for about three times more impact than population growth. Technology increased impact by a factor of 1.5.

Source: See endnote 31.

“In sum, the challenge is huge. To accommodate all of the people in the world who seek an industrial-level urban life will require large reductions in materials use compared to the business-as-usual path. And if technology is to contribute to the solution, strict parameters around its use will be needed to ensure that it does, in fact, help to reduce humanity’s footprint overall. Industrial ecology scientists have calculated that 4- to 10- fold reductions in the material and energy footprint of industrial nations are technically possible, which would go a long way toward meeting the reductions required. But no society is gearing up to achieve such reductions, and more will need to transition to reductions in consumption.”

[From report “State of the World 2016: Can a City Be Sustainable” at the Amazon website (at <https://www.amazon.com/Can-City-Sustainable-State-World/dp/1610917553>) (via “Look Inside” feature: in section “Cities as Human Constructs”, in chapter “Cities in the Arc of Human History: A Materials Perspective” (by Gary Gardner), p. 22, Table 2-4; p. 24, Table 2-5 and paragraph 1)]

h) Significant Quote from Christopher Flavin (former President of Worldwatch Institute)

“It would be foolish to underestimate the challenge of checking the consumption juggernaut.”

[From report “State of the World 2004--Special Focus: The Consumer Society” (Worldwatch Institute) (2004) at the website of Green Economics (at <http://www.greeneconomics.net/StateOfWorld-2004.pdf>) (in section “Preface”, p. xix, paragraph 5)]

i) “... Worldwatch.org is unreachable as of January 2020.”

[From the Wikipedia webpage for “Worldwatch Institute” (at https://en.wikipedia.org/wiki/Worldwatch_Institute) (paragraph 2)]

6) Briefing Paper “The Greenhouse Effect” (James Black; Exxon’s Products Research Division) (1977)

“James Black, working under Exxon’s Products Research Division, writes an internal briefing paper called ‘The Greenhouse Effect’ following from a 1977 presentation to Exxon’s management committee. The paper warns that human-caused emissions could raise global temperatures and result in serious consequences.”

“‘Present thinking holds that man has a time window of five to ten years before the need for hard decisions regarding changes in energy strategies might become critical,’ Black writes in his summary of the presentation.”

[in “Summary” of “The Greenhouse Effect” (at <file:///C:/Users/Owner/Downloads/James%20Black%201977%20Presentation.pdf>) (p. 2, last paragraph) (source of this document <https://insideclimatenews.org/documents/james-black-1977-presentation>)]

[Original source reference for quotes above from webpage “Exxon’s Climate Denial History: A Timeline” at the website of Greenpeace (see <https://www.greenpeace.org/usa/global-warming/exxon-and-the-oil-industry-knew-about-climate-change/exxons-climate-denial-history-a-timeline/>)]

7) The First World Climate Conference (Geneva) (February 1979)

“The First World Climate Conference was held on 12–23 February 1979 in Geneva and sponsored by the WMO (World Meteorological Organization). It was one of the first major international meetings on climate change.... The Conference led to the establishment of the World Climate Programme and the World Climate Research Programme. It also led to the creation of the Intergovernmental Panel on Climate Change (IPCC) by WMO (World Meteorological Organization) and UNEP (United Nations Environment Programme) in 1988.”

[From the Wikipedia webpage for “World Climate Conference” (at https://en.wikipedia.org/wiki/World_Climate_Conference) (see Section “Conferences”)]

8) Briefing Material “CO² Greenhouse Effect: A Technical Review” (M.B. Glaser, Manager, Environmental Affairs Programs, Exxon) (November 1982)

“The ‘greenhouse effect’ is not likely to cause substantial climatic changes until the average global temperature rises at least 1°C above today’s levels. This could occur in the second to third quarter of the next century. However, there is concern among some scientific groups that once the effects are measurable, they might not be reversible and little could be done to correct the situation in the short term. Therefore, a number of environmental groups are calling for action now to prevent an undesirable future situation from developing.”

[From the “Summary” of “CO² Greenhouse Effect: A Technical Review” (at <https://insideclimatenews.org/sites/default/files/documents/1982%20Exxon%20Primer%20on%20CO2%20Greenhouse%20Effect.pdf>) (p. 2, second to last paragraph)]

[Original source reference for “Briefing Material”: webpage “Exxon’s Climate Denial History: A Timeline” at the website of Greenpeace (see <https://www.greenpeace.org/usa/global-warming/exxon-and-the-oil-industry-knew-about-climate-change/exxons-climate-denial-history-a-timeline/>)]

9) Organization “Green America” (founded 1982)

a) “Green America is a national, 501(c)(3) not-for-profit, membership organization founded in 1982. We went by the name “Co-op America” until January 1, 2009.”

[From the webpage “Our Story” at the Green America website (at <https://www.greenamerica.org/our-mission>) (paragraphs 1)]

b) From the webpage “Our History”

“In 1982, a small group of people got together, united by a belief that we could create an economy that works for people and the planet--and Co-op America, now called Green America, was born.”

“This visionary group of individuals bravely put forth a revolutionary idea to Americans: ‘Every time you spend or invest a dollar, it goes to work in the world. Too often, it goes to support institutions and corporations that perpetuate injustice, pollute the environment, and destroy communities. But we can change that. We can use economic power to push for socially and environmentally responsible businesses ... and put our society on a more sustainable path.’”

[From the webpage “Our Story”, in the subsection “Our History”, at the Green America website (at <https://www.greenamerica.org/our-mission>) (paragraphs 1 and 2)]

c) From the webpage “Our Story”

Our Mission

“Green America harnesses economic power—the strength of consumers, investors, businesses, and the marketplace—to create a socially just and environmentally sustainable society.”

Focus

“We focus on these four areas for system transformation, insisting on social justice and environmental health across all sectors. We believe if we can get these right, the rest of the economy will follow:

Climate and clean energy
Sustainable food and agriculture
Responsible investing
Fair labor”

Our Powerful Strategic Areas

“Consumer Education and Mobilization

Theory of Change: Consumers are the pressure point for economic change-- it always starts with the customer demanding change”

Green Business Network

“Theory of Change: Small businesses are the innovators and job creations-- a green economy requires a vibrant small green business sector. Learn more: <http://www.greenbusinessnetwork.org/> “

Center for Sustainability Solutions

“Theory of Change: Direct engagement with major supply chain players for solutions at scale-- consumers demand the change, green businesses prove it can be done, and major players bring it to scale for system transformation. Learn more: <http://www.centerforsustainabilitysolutions.org/> “

[From the webpage “Our Story”, in the subsections “Our Mission”, “Focus”, and “Our Powerful Strategic Areas” at the Green America website (at <https://www.greenamerica.org/our-mission>)]

d) Green America Center for Sustainability Solutions

i) “The Green America Center for Sustainability Solutions brings diverse stakeholders from the entire supply chain or system into each Innovation Network to solve the problems no one business, organization or individual can solve alone.”

“For example, in agriculture supply chains, everyone from seed breeders and farmers to grain traders and transporters to food manufacturers, distributors and retailers to investors and policy makers to academic experts and NGO advocate to the people who eat the food.”

“We organize each Innovation Network around a powerful vision of what's possible. Rapidly mapping system dynamics, we develop, test and deploy pragmatic solutions to shift systems toward audacious sustainability goals.”

[From the “About the Center” webpage at the website for Green America Center for Sustainable Solutions (at <http://www.centerforsustainabilitysolutions.org/about-center>) (in the section “About Our Organization”, paragraphs 1-3)]

ii) From webpage “Building Innovation Networks”

Building an Innovation Network

“Our Innovation Network methodology is based on Green America’s 30+ years of experience in leading collaborative innovation in sustainability.”

“It starts with employing a unique and systematic method for identifying stakeholders or key initiators with the highest potential to change systems.”

“A team comes together and sets goals that are big enough to be meaningful but not so big that they seem unfathomable. The real strength is the group’s ability to move extremely quickly, simultaneously analyzing the system while prototyping initiatives.”

Our Systematic Approach

“The whole system participates in creating market-based solutions but people are always at the ‘center’.”

“Our systematic approach to reframing key tensions that commonly pull stakeholders apart is a crucial source of innovation.”

“Essentially, our collaborative methodology is what sets the Center apart.”



[From the webpage “Building Innovation Networks” at the website of for Green America Center for Sustainable Solutions (at <http://www.centerforsustainabilitysolutions.org/about-building-an-innovation-network>) (paragraphs 1-6 and graphic)]

e) About Boycotts

(Editor’s Note--SP)

When Green America was still Co-op America (pre 2009), they published a resource titled “Co-op America’s Boycott Organizer’s Guide” (No publication date listed).

We are now at a critical time for transforming local economies, national economies, and international economies, as part of working towards achieving Zero Carbon economies ASAP. While it would be preferable for businesses and economies to proactively change their products and supply chains, it may be necessary at times to apply the pressure of a boycott, to create a positive tipping point and move into a collaboration and cooperation phase.

Some material in this [“Co-op America’s Boycott Organizer’s Guide”](#) may be dated, but people who need a some ideas about initiating a boycott can surely benefit by looking through this very comprehensive resource.

10) Findhorn Foundation and Findhorn Ecovillage (Ecovillage origins, 1982)

a) Historical Timeline

[mostly from two sources:

Findhorn Foundation (Wikipedia) https://en.wikipedia.org/wiki/Findhorn_Foundation

Findhorn Ecovillage (Wikipedia) https://en.wikipedia.org/wiki/Findhorn_Ecovillage

i) “David Spangler became co-director of Education almost immediately after he arrived in 1970, which resulted in the gradual transformation into a centre of residential spiritual education with a permanent staff of over 100, and the establishment of the Findhorn Foundation in 1972.”

[from the Wikipedia webpage for “Findhorn Foundation”, in the section “The Founders; early history” (paragraph 5)]

ii) “The October 1982 Conference ‘Building a Planetary Village’ hosted by the Findhorn Foundation marked the beginning of serious attempts by the intentional community, which had existed at Findhorn since 1962 to demonstrate a human settlement that could be considered sustainable in environmental, social, and economic terms.”

“The term ‘ecovillage’ later came to be used to describe such experiments and in 1995 the first international conference of ecovillages, Ecovillages and Sustainable Communities for the 21st Century, was held in Findhorn.”

[From the Wikipedia webpage for “Findhorn Ecovillage”, in the section “Beginnings” (paragraphs 1-2)]

iii) “... from 1990 onwards a growing number of independent charities, businesses, small sister communities, independent practitioners and community bodies have grown up and significantly extended the size and diversity of ecological projects, some of which are listed below. As of 2005 the Ecovillage has around 450 members centred around The Park (the main campus on the southern edge of Findhorn), but also based at numerous locations in the nearby town of Forres and elsewhere in Moray. The project supports approximately 300 jobs in the Findhorn/Forres area and provides a total aggregate economic impact in excess of £5 million per annum in the Highlands of Scotland as a whole.”

[From the Wikipedia webpage for “Findhorn Ecovillage”, in the section “Beginnings” (paragraph 3)]

iv) “It is a founder member of the Global Ecovillage Network (GEN) (founded 1991) a non-profit organisation that links together a diverse worldwide movement of autonomous ecovillages and related projects.”

[from the Wikipedia webpage for “Findhorn Foundation”, in the section “Ecovillage” (paragraph 2)]

v) “In October 1998 the Ecovillage Project, together with other 100 leadership Initiatives ‘which are inspiring innovative action on Earth’, received Best Practice Designation from the United Nations Centre for Human Settlements--UNCHS (Habitat)(United Nations Centre for Human Habitats) and Dubai Municipality.”

[From the Wikipedia webpage for “Findhorn Ecovillage”, in the section “Awards, UN connections and critiques” (paragraph 1, bullet #2)]

vi) “The first milestone in the development of Gaia Education (see entry #25, p. 41 in this paper) was the launch of the innovative curriculum, Ecovillage Design Education, during the tenth anniversary conference of the Global Ecovillage Network at the Findhorn Ecovillage in October 2005.”

[From the webpage “History” at the Gaia Education website (at <https://www.gaiaeducation.org/about/history/>) (in the section “The Creation of Gaia Education”, paragraph 1)]

vii) “A new sustainable development training facility, CIFAL Findhorn was launched in September 2006. This is a joint initiative between The Moray Council, the Global Ecovillage Network, the Findhorn Foundation and UNITAR (United Nations Institute for Training and Research).”
[from the Wikipedia webpage for “Findhorn Foundation”, in the section “Relationships with other NGOs” (paragraph 2)]

b) “Over 10 years CIFAL Findhorn/Scotland has hosted over 100 seminars addressing policy development and technical issues related to climate change, renewable energies, biodiversity, low-carbon housing, SDGs, circular economy, green jobs, transition towns, local and bioregional food systems, hydrogen economy, sustainable islands and many other themes.”

[From the webpage “Low Carbon Presentations” at the Findhorn Ecovillage website (at <https://www.ecovillagefindhorn.com/index.php/ecovillage-findhorn/resources>) (paragraph 1) (Editor’s Note--SP) The most inspiring presentations from the above “over 100 seminars” are on this “Low Carbon Presentations” webpage]

c) Findhorn Foundation at the United Nations

“The Findhorn Foundation is a member of the Conference of Non-Governmental Organizations (CONGO), attends the Sustainable Development Committee meetings, and is a founding member of the following NGO groups active at the UN Headquarters in New York: The Earth Values Caucus, The Spiritual Caucus, and The NGO Committee on Spirituality, Values and Global Concerns.

[From the Wikipedia webpage for Findhorn Foundation (at https://en.wikipedia.org/wiki/Findhorn_Foundation) (in the section “Relationships with other NGOs”, paragraph 1)]

d) Findhorn Ecovillage as a Teaching Resource

“The Findhorn Ecovillage is a tangible demonstration of the links between the spiritual, social, ecological and economic aspects of life and is a synthesis of the very best of current thinking on human habitats. It is a constantly evolving model used as a teaching resource by a number of university and school groups as well as by professional organisations and municipalities worldwide.”

“The Findhorn Ecovillage--

is at the heart of the largest single intentional community in the UK

is a pioneering ecovillage that evolved at The Park from 1985

is a major centre for holistic learning serving thousands of visitors each year from around the world

has an ecological footprint that is around half the national (UK) average

features more than 100 ecologically-benign buildings

supplies energy from four wind turbines

boasts a biological Living Machine waste water treatment system

installed a 250kW biomass boiler in 2010 to serve the central Park area, reducing carbon emissions by around 80 tons a year

includes numerous solar water heating systems

is part of a comprehensive recycling system

is the publisher of the UK’s first technical guide to ecological housing

has a share-issuing community co-operative and a local currency
is served by a car-sharing club that includes zero-emissions electric vehicles”

[From the webpage “Ecovillage Findhorn: New Frontiers for Sustainability” at the website for Findhorn Ecovillage (at <https://www.ecovillagefindhorn.com/index.php/ecovillage-findhorn>) (paragraphs 1 and 4)]

e) From introduction to course offering “Applied Ecovillage Living”

“The Findhorn Foundation, community, and ecovillage has a long history of facilitating and teaching sustainability practices. During the programme, participants will engage with these resources and get to meet and learn from inspiring teachers and facilitators with wide-ranging experience and expertise. We will also have self-organised time where we explore arising topics and share perspectives from our different countries and cultures.”

“Together we will learn about:

Social tools for personal and group transformation, empowerment and community building
Urban and rural solutions for transitioning to a resilient society
Local organic food production and right livelihood
Comprehensive Permaculture design introduction
Renewable energy systems and energy efficiency models
Cooperative social economies and complementary currencies
Holistic decision-making processes, including nature and deep ecology
Earth restoration projects and biological waste water treatments
Ecological building and community design
Cultural and Spiritual diversity practices”

[From the webpage “Applied Ecovillage Living” at the website for Findhorn Foundation (at <https://www.findhorn.org/programmes/applied-ecovillage-living-2019/>) (paragraphs 3-4)]

f) Detailed overview of a course on “Ecovillage Design Curriculum” from an earlier CPCS Initiative document (no link now exists to this material)

“Gaia Education Design for Sustainability Incorporating Transition Towns Training
5 October - 8 November 2013”

“Presented by the Findhorn Foundation College in partnership with the Findhorn Foundation, Global Ecovillage Network and Gaia Education

“Based on the Ecovillage Design Curriculum - an official contribution to the United Nations Decade of Education for Sustainable Development

“You are invited to join this five-week comprehensive training based on the four core pillars of the Ecovillage Design Curriculum: the social, worldview, ecological and economic dimensions of sustainability.

“The Gaia Education curriculum draws on the experience and expertise developed in a network of some of the most successful ecovillages and community projects across the Earth.

“Design for Sustainability Training is an advanced training course based at the Findhorn Ecovillage providing a practical forum for learning and developing skills needed to work effectively with design for sustainability at all levels. The fifth week of the programme offers practice in facilitation skills, for personal growth, spiritual enrichment and sustainable social action.

“Facilitated by

May East - Chief Executive, Gaia Education

Jonathan Dawson - Head of Economics, Schumacher College

Michael Shaw - Director, Ecovillage International

Pracha Hutunuwatr - Director, Right Livelihood Foundation, Thailand

Jane Rasbash - Director, Gaia Education

Daniel Wahl - Research & Innovation, International Futures Forum
and Findhorn Ecovillage experts

“Social Design - Week 1: Oct 5 - Oct 11

Topics include--

Building Community & Embracing Diversity

Communication Skills and Feedback

Facilitation and Decision-Making Processes

Conflict Facilitation

Personal Empowerment and Leadership

Celebrating Life: Creativity and Art

“Ecological Design - Week 2: Oct 12 - Oct 18

Topics include--

Whole Systems Approach to Ecological Design & Bioregionalism

Water

Organic Agriculture and Local Food

Appropriate Technology: Energy

Green Building

“Economic Design - Week 3: Oct 19 - Oct 26

Topics include--

Shifting the Global Economy to Sustainability

How Money Works: Community Banks and Currencies

Right Livelihood

Social Enterprise

Legal and Financial Issues

“Worldview - Week 4: Oct 26 - Nov 1

Topics include--

Holistic Worldview

Listening to and Reconnecting with Nature

Awakening & Transformation of Consciousness

Personal Health, Planetary Health

Socially Engaged Spirituality and Bioregionalism

“Facilitation Skills and Empowerment - Week 5: Nov 2 - Nov 8

Topics include--

Practice in facilitation skills for personal growth

Spiritual enrichment

Sustainable social action”

[(Editor’s Note--SP) Unfortunately, the link for this overview of Ecovillage Design Curriculum no longer exists... however.... In Version 5 (2012) of “Ecovillage Design Education” (at <http://www.gaiaeducation.org/wp-content/uploads/2017/02/EDE-Curriculum-English.pdf>), the four sections of Ecovillage Design (Social Design, Ecological Design, Economic Design, and Worldview and the topics included in each, are presented in an overview on p. 1, and then explored in depth in the rest of the book.]

11) Report “The Greenhouse Effect” (Greenhouse Effect Working Group, Shell) (May, 1988)

a) “The confidential report, ‘The Greenhouse Effect,’ was authored by members of Shell’s Greenhouse Effect Working Group and based on a 1986 study, though the document reveals Shell was commissioning ‘greenhouse effect’ reports as early as 1981.”

[Quote above describing the report from the webpage “1988 Shell Confidential Report ‘The Greenhouse Effect’” at the website for Climate Files (“Hard to Find Documents All in One Place”) (at <http://www.climatefiles.com/shell/1988-shell-report-greenhouse/>) (paragraph 2)]

b) “Mainly due to fossil fuel burning and deforestation, the atmospheric CO₂ concentration has increased some 15% in the present century to a level of about 340 ppm. If this trend continues, the concentration will be doubled by the third quarter of the next century. The most sophisticated geophysical computer models predict that such a doubling could increase the global mean temperature by 1.3-3.3°C. The release of other (trace) gases, notably chlorofluorocarbons, methane, ozone and nitrous oxide, which have the same effect, may amplify the warming by predicted factors ranging from 1.5 to 3.5°C.”

“Mathematical models of the earth’s climate indicate that if this warming occurs then it could create significant changes in sea level, ocean currents, precipitation patterns, regional temperature and weather. These changes could be larger than any that have occurred over the last 12,000 years. Such relatively fast and dramatic changes would impact on the human environment, future living standards and food supplies, and could have major social, economic and political consequences.”

[From the “Summary” of the actual report ‘The Greenhouse Effect,’ by Shell’s Greenhouse Effect Working Group (at <http://www.climatefiles.com/shell/1988-shell-report-greenhouse/>) (p. 1, paragraphs 1 and 2)]

[Original source reference: article “Half a century of dither and denial--a climate crisis timeline: Fossil fuel companies have been aware of their impact on the planet since at least the 1950s” by Jonathan Watts, Garry Blight, Lydia McMullan and Pablo Gutiérrez (October 9, 2019) (at <https://www.theguardian.com/environment/ng-interactive/2019/oct/09/half-century-dither-denial-climate-crisis-timeline>) (see second entry for 1988)...]

[... which led to second source reference: article “Shell and Exxon's secret 1980s climate change warnings: Newly found documents from the 1980s show that fossil fuel companies privately predicted the global damage that would be caused by their products” by Benjamin Franta (September 19, 2018) at the Guardian website (at <https://www.theguardian.com/environment/climate-consensus-97-percent/2018/sep/19/shell-and-exxons-secret-1980s-climate-change-warnings>) (in paragraph 5: “Later that decade, in 1988, an [internal report by Shell](#) projected similar effects but also found that CO₂ could double even earlier, by 2030.” The above “internal report by Shell” link is the above link <http://www.climatefiles.com/shell/1988-shell-report-greenhouse/> .)]

12) Congressional Testimony on Climate Change (James Hansen) (June, 1988)

a) “James Edward Hansen (born March 29, 1941) is an American adjunct professor directing the Program on Climate Science, Awareness and Solutions of the Earth Institute at Columbia University. He is best known for his research in climatology, his 1988 Congressional testimony on climate change that helped raise broad awareness of global warming, and his advocacy of action to avoid dangerous climate change.”

[Biographical quote above from the Wikipedia webpage for “James Hansen” (at https://en.wikipedia.org/wiki/James_Hansen) (paragraph 1)]

b) “Altogether the evidence that the earth is warming by an amount which is too large to be a chance fluctuation and the similarity of the warming to that expected from the greenhouse effect represents a very strong case. In my opinion, the greenhouse effect has been detected, and it is changing our climate now.” (p. 2, paragraph 1 in below referenced complete statement)

[Complete “Statement of Dr. James Hansen, Director, NASA Goddard Institute for Space Studies” submitted for the record to the June 23, 1988 Hearing Before the Committee on Energy and Natural Resources of the United States Senate (at https://pulitzercenter.org/sites/default/files/june_23_1988_senate_hearing_1.pdf)]

13) Book “The End of Nature” (Bill McKibben) (1989)

a) “This impassioned plea for radical and life-renewing change is today still considered a groundbreaking work in environmental studies. McKibben's argument that the survival of the globe is dependent on a fundamental, philosophical shift in the way we relate to nature is more relevant than ever. McKibben writes of our earth's environmental cataclysm, addressing such core issues as the

greenhouse effect, acid rain, and the depletion of the ozone layer. His new introduction addresses some of the latest environmental issues that have risen during the 1990s. The book also includes an invaluable new appendix of facts and figures that surveys the progress of the environmental movement.”

“More than simply a handbook for survival or a doomsday catalog of scientific prediction, this classic, soulful lament on Nature is required reading for nature enthusiasts, activists, and concerned citizens alike.”

[Above quotes from the book description provided at the Amazon webpage for “The End of Nature” 2006 paperback edition (see <https://www.amazon.com/End-Nature-Bill-McKibben/dp/0812976088>)]

b) “Seventeen years ago, those of us who were convinced that the climate was warming fast were out on a limb. A sturdy limb--the fact that carbon dioxide trapped heat near the planet seemed irrefutable--but a limb nonetheless. All the studies and reports that cataloged the greenhouse effect fit neatly on my desk when I was writing this book; the science was still, in many ways, rudimentary. And so it was no surprise when that science, and the conclusions drawn from it, came under attack. That’s how science works--each hypothesis tortured to find its weakness. By now, the studies on global warming would fill an airplane hanger. Postdocs have tapped into tundra, overflowed rain forests, launched satellites, collected ancient pollen, counted tree rings, cored ice sheets, floated weather balloons, sent sound waves across entire oceans. Unlike the politicians, they really have worked overtime. And what have they learned? That the predictions of a decade ago were remarkably close to correct.”

[From new introduction written for 2006 paperback edition of The End of Nature (at <https://www.amazon.com/End-Nature-Bill-McKibben/dp/0812976088> (Using the “Look Inside” feature, the above quote is on p. xvi of the introduction, paragraph 1))]

14) Organization “United States Climate Action Network (USCAN)” (created 1989)

“USCAN was created in 1989 by groups working on global warming in response to the need for a forum for joint strategy development and advocacy to affect change in a coordinated way at the state and local level as well as at the United Nations and in Washington, DC.”

“USCAN is the largest US network of organizations focused on climate change. USCAN plays a critical role as the only network connecting organizations working on climate advocacy and policy development at all three levels of the debate: state/regional, federal, and international, all of which are becoming increasingly interdependent.”

“USCAN is an affiliate network of the Climate Action Network (CAN), a worldwide network of more than 400 Non-Governmental Organizations (NGOs) from 85 countries working to promote government, private sector and individual action to limit human-induced climate change to ecologically sustainable levels.”

[From the “About USCAN” webpage at the website for Climate Action Network International (at <http://www.climatenetwork.org/profile/member/climate-action-network-united-states-uscan>) (paragraphs 1-3)]

15) Organization “Ceres” (created 1989)

a) “In response to the Exxon Valdez oil spill in 1989, Ceres was founded by a group of forward-looking investors and environmentalists who had a vision for a better way of doing business. Led by Joan Bavaria, they began to re-evaluate the role and responsibility of companies as stewards of the environment and agents of economic and social change.”

[From the “About Us” webpage at the website for Ceres (at <https://www.ceres.org/about-us#:~:text=Sustainability%20is%20the%20bottom%20line,better%20way%20of%20doing%20business> (paragraph 2))]

b) One of Ceres current projects: “The Ceres Investor Network includes over 175 institutional investors, managing more than \$29 trillion in assets, advancing leading investment practices, corporate engagement strategies, and key policy and regulatory solutions. Some of our key investor coalitions and initiatives include the Global Investor Coalition on Climate Change, Climate Action 100+ and The Investor Agenda.”

[From the webpage “Ceres Investor Network on Climate Risk and Sustainability” at the website for Ceres (at <https://www.ceres.org/networks/ceres-investor-network>) (paragraph 1)]

16) Organization “Local Governments for Sustainability (ICLEI)” (founded 1990)

a) “ICLEI – Local Governments for Sustainability is a global network of more than 1,750 local and regional governments committed to sustainable urban development. Active in 100+ countries, we influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development.”

[From the “About” section of the “new ICLEI website” (at https://iclei.org/en/About_ICLEI_2.html) (paragraph 1)]

b) “ICLEI started with the idea that a single municipality has a significant impact.”

“ICLEI was conceived in 1989 when local government leaders met with a leading atmospheric scientist to discuss the depletion of the ozone layer. They pledged to establish local laws to phase out ozone-depleting chemicals and imagined an organization that could coordinate local government responses to global environmental problems.”

“ICLEI was then founded in 1990 by 200 local governments from 43 countries who convened for the first World Congress of Local Governments for a Sustainable Future at the United Nations headquarters in New York. Operations began in 1991 at the World Secretariat in Toronto, Canada, and the European Secretariat in Freiburg, Germany. The World Secretariat has since moved to Bonn, Germany.”

[From the “About” webpage at the “old ICLEI” website (at <http://old.iclei.org/index.php?id=8>) (in section “Our Development” (paragraphs 1 and 2))]

c) What we do

“ICLEI works at multiple scales, building connections across local, regional, national and global actors and policies. We create systems change, developing integrated solutions along five interconnected development pathways that transform urban areas.”

“ICLEI experts are on the ground, working alongside local and regional governments to anticipate and respond to complex challenges, from urbanization and climate change to ecosystem degradation and inequity. We invest in the capacity and knowledge needed to design solutions to these challenges and make decisions informed by data, scientific evidence and local realities and pressures.”

“ICLEI leads knowledge exchange and sparks city-to-city and city-to-region connections worldwide. Peer exchange and capacity building are at the heart of what we do.”

“At the national and global scales, we push for robust policies that reflect the interests of local and regional governments and apply global policy to sustainable urban development strategies at the subnational level.”

“ICLEI forms strategic alliances with international organizations, national governments, academic and financial institutions, civil society and the private sector. We create space for innovation and lead our partners to build new ways to support sustainable development at the urban scale.”

[From the “What We Do” section of the “new ICLEI website” (at https://iclei.org/en/what_we_do.html) (paragraphs 1-5)]

17) Organization “Global Ecovillage Network” (founded 1991)

a) “Hildur and Ross Jackson from Denmark established the Gaia Trust, a charitable foundation, in 1991. Gaia funded a study by Robert Gilman and Diane Gilman of sustainable communities around the world. The report, *Ecovillages and Sustainable Communities*, was released in 1991. The report found that although there were many interesting ecovillage projects, the full-scale ideal ecovillage did not yet exist. Collectively, however, the various projects described a vision of a different culture and lifestyle that could be further developed.”

“In 1991 the Gaia Trust convened a meeting in Denmark of representatives of eco-communities to discuss strategies for further developing the ecovillage concept. That led to the formation of the Global Ecovillage Network. In 1994 the Ecovillage Information Service was launched. In 1995, the first international conference of ecovillage members, entitled *Ecovillages and Sustainable Communities for the 21st Century*, was held at Findhorn, Scotland. The movement grew rapidly following this conference.”

[From the Wikipedia webpage “Global Ecovillage Network” at https://en.wikipedia.org/wiki/Global_Ecovillage_Network (in section “History”, paragraphs 1-2)]

b) About GEN

“The Global Ecovillage Network (GEN) catalyzes communities for a regenerative world. GEN is a growing network of regenerative communities and initiatives that bridge cultures, countries, and continents.”

“GEN builds bridges between policy-makers, governments, NGOs, academics, entrepreneurs, activists, community networks and ecologically-minded individuals across the globe in order to develop strategies for a global transition to resilient communities and cultures.”

“GEN is composed of 5 regional networks, and the youth arm, NextGEN, spanning the globe. The network is made up of approximately 10,000 communities and related projects where people are living together in greater ecological harmony.”

[From the “About GEN” webpage at the Global Ecovillage Network (at <https://ecovillage.org/about/about-gen/>) (paragraphs 1, 2, and 5)]

c) Our Work

“Through the sharing of best practices and innovative solutions and the honouring of deep-rooted traditional knowledge and local cultures, GEN builds bridges between policy-makers, academics, entrepreneurs and sustainable community networks across the globe in order to develop strategies for a global transition to resilient communities and cultures.”

“GEN is registered as an international charity in Scotland. It does its work through an International office in Findhorn, and through five regional networks: Oceania & Asia (GENOA), North America (GENNA), Latin America (CASA), Europe (GEN Europe), and Africa (GEN Africa). GEN Fertile Crescent is an emerging region from the Middle East.”

“GEN has consultative status within UN-ECOSOC (Economic and Social Council) and is a partner of the UNITAR-CIFAL initiative, which provides trainings in sustainable development to local governmental officials around the world.”

[From the “Our Work” webpage at the Global Ecovillage Network (at <https://ecovillage.org/our-work/>) (paragraphs 1-3)]

d) Strategic Goals of Our Work:

- “Increase the number and visibility of grassroots actions and ecovillage projects that are linked to GEN (e.g. as members, on interactive maps, through newsletters and conferences)
- Increase the number of individuals who support GEN (e.g. GEN Ambassadors, Friends of GEN, GEN Volunteers, GEN Staff, etc.)
- Share best practice and showcase the solutions implemented by ecovillage projects on the ground
- Offer pathways to sustainability (e.g. Ecovillage Transition) that are easy to implement and further develop education and programs that support this
- Create inspirational meetings and conferences to promote sustainable lifestyles and resilience worldwide
- Raise the profile of GEN internationally through pro-active political influencing (e.g. governments, AU, EU, UN)
- Build and strengthen strategic alliances with like-minded governmental and civil society organisations and socially responsible corporations
- Strengthen the organizational and financial base of GEN in order to adequately fund our work activities and staff”

[From the “Our Work” webpage at the Global Ecovillage Network (at <https://ecovillage.org/our-work/>) (in section “Strategic Goals of Our Work”, paragraphs 1-3)]

18) Book “Earth in the Balance: Ecology and the Human Spirit” (Al Gore) (January, 1992)

a) From the biography provided for the January, 1992 edition at Amazon:

“Gore was elected to the U.S. House of Representatives in 1976, 1978, 1980 and 1982 and the U.S. Senate in 1984 and 1990. He was inaugurated as the forty-fifth Vice President of the United States on January 20, 1993, and served eight years. During the Administration, Gore was a central member of President Clinton's economic team. He served as President of the Senate, a Cabinet member, a member of the National Security Council and as the leader of a wide range of Administration initiatives.”

“He is the author of the bestsellers Earth in the Balance, An Inconvenient Truth (Documentary; 2006), The Assault on Reason, and Our Choice: A Plan to Solve the Climate Crisis. He is the subject of an Oscar-winning documentary and is the co-recipient, with the Intergovernmental Panel on Climate Change, of the 2007 Nobel Peace Prize for “informing the world of the dangers posed by climate change.”

[From the “Earth in the Balance: Ecology and the Human Spirit Hardcover--January 1, 1992” webpage at the website of Amazon (at https://www.amazon.com/Earth-Balance-Ecology-Human-Spirit/dp/B0013SIX8Y/ref=sr_1_3?dchild=1&keywords=earth+in+the+balance&qid=1600629692&sr=8-3) (in the section “More About the Author”, just after “Product Details”; paragraphs 3 and 4)]

b) “It (the book ‘Earth in the Balance’) received the Robert F. Kennedy Center for Justice and Human Rights 1993 Book award given annually to a book that ‘most faithfully and forcefully reflects Robert Kennedy's purposes--his concern for the poor and the powerless, his struggle for honest and even-handed justice, his conviction that a decent society must assure all young people a fair chance, and his faith that a free democracy can act to remedy disparities of power and opportunity.’”

[From the Wikipedia webpage for “Earth in the Balance” (at https://en.wikipedia.org/wiki/Earth_in_the_Balance) (paragraph 4)]

c) from the chapter “Dysfunctional civilization” (in the book “Earth in the Balance”)

“We are used to thinking of addiction in terms of drugs or alcohol. but new studies of addiction have deepened our understanding of the problem, and now we know that people can become addicted to many different patterns of behavior—such as gambling compulsively or working obsessively or even watching TV constantly—that distract them from having to experience directly whatever they are trying to avoid. Anyone who is unusually fearful of something—intimacy, failure, loneliness—is potentially vulnerable to addiction because psychic pain causes a feverish hunger for distraction.”

(p. 220, paragraph 3)

“One of the most effective strategies for ignoring psychic pain is to distract oneself from it, to do something so pleasurable or intense or otherwise absorbing that the pain is forgotten. As a temporary strategy, this kind of distraction isn’t necessarily destructive, but dependence on it over the long term becomes dangerous, and finally some sort of addiction. Indeed, it can be argued that every addiction is caused by an intense and continuing need for distraction from psychic pain.”

(p. 220, paragraph 2)

“I believe that our civilization is, in effect, addicted to the consumption of the Earth itself... the froth and frenzy of industrial civilization mask our deep loneliness for that communion with the world that can lift our spirits, and fill our senses with the richness and immediacy of life itself.”

(p. 220-221, paragraph 3)

“The engines of distraction are gradually destroying the inner ecology of the human experience.”

(p. 242, paragraph 1)

[From the Google Books preview of “Earth in the Balance: Forging a New Common Purpose” (“The Groundbreaking Classic with a New Foreword by the Author”) (at

https://www.google.com/books/edition/Earth_in_the_Balance/FYfcAAAAQBAJ?hl=en&gbpv=0)]

19) Organization “Vermont Council on Rural Development” (founded 1992)

a) How We Work

“From community centered initiatives that build upon local, citizen based efforts, to policy councils that build collaboration between state, federal, nonprofit, and private sector leaders, VCRD has designed and implemented highly effective programming to identify and address key issues that impact rural life. VCRD is a neutral, nonprofit organization that brings Vermonters together across political lines and organizational boundaries to advance rural community and economic development throughout the state.”

“VCRD has developed a portfolio of community and policy action that includes:

--21 years of town-by-town community development strategic planning;

--8 Governor's Summits retreats, 9 statewide Rural Summit conferences, 3 national Rural Policy convenings;

--Policy council initiatives on agricultural viability, value added forest products development, the creative economy, the structure of the planning system, in-state energy development, the future of Vermont, advancing the Vermont working landscape, and advancing Vermont's Climate Change Economy;

--Strategic planning guidance to initiate creative economy plans in 12 cities and towns; and

--Facilitating over 50 town-wide assessment and aggregation projects to acquire broadband access.”

“VCRD has built a reputation for integrity as a neutral, non-partisan mediator of public processes, setting the framework for decisions by communities and by policy leaders, that lead to direct and practical results in addressing fundamental challenges at the local and state level.”

[From the “About VCRD” webpage at the website for the Vermont Council on Rural Development (at <https://www.vtrural.org/about>) (in the section “How We Work”, paragraphs 1-3)]

b) The Vermont Climate Economy Initiative

“VCRD is leading the VT Climate Economy Initiative with the premise that confronting climate change through innovative economic development can be a competitive strategy, one that will build national reputation, create jobs, and attract youth and entrepreneurship. We hosted a [2015 Summit](#) to launch the initiative, founded the [VT Climate Change Economy Council](#) to develop a [practical action plan](#), gathered input at [three public forums](#), and hosted a second [Summit](#) to set a campaign for action. In

2017, we convened the [Climate Economy Action Team](#) to advance and implement key objectives of the action plan, and launched the [Climate Economy Model Communities Program](#) to help communities build and implement plans that model state-of-the-art rural development in an age of climate change. In 2017, we also hosted the [cc:econ Catalysts of the Climate Economy National Innovation Summit](#), which brought together more than 500 entrepreneurs, business leaders, investors, and innovators from across the country interested in growing the climate economy.”

The Summits

“VCRD hosted three Climate Economy Summits to explore emerging opportunities that will allow us to build a national reputation, create jobs, and attract young people to our rural communities. The 2015 ‘Summit on Creating Prosperity and Opportunity Confronting Climate Change’ brought together over 400 participants to consider the impacts of climate change on Vermont and propose ways to advance the prosperity of the state while addressing them and served as the founding point of the Vermont Climate Change Economy Council. More about the 2015 Summit...”

“The 2016 ‘Vermont Climate Economy Summit: IDEAS to ACTION’ was held in February 2016. Over 420 participants reviewed “Progress for Vermont” - the Vermont Climate Change Economy Council (VCCEC) Action Plan - and considered strategies for implementation and the partnerships that are needed to move them forward. The Summit also served as a founding point for the Vermont Climate Economy Partnership uniting partners and friends working to advance Vermont's Climate Economy. More about the 2016 Summit...”

“The 2017 ‘Catalysts of the Climate Economy: National Innovation Summit’ was held in September 2017. More than 500 entrepreneurs, business leaders, investors, and innovators from across the country interested in growing the climate economy gathered in Burlington for the three-day Summit. More about the 2017 Summit...”

Regional Forums

“VCRD produced three regional forums across the state to look at stimulating green economic development. Each featured local business leaders who are implementing innovative strategies to reduce carbon emissions and address climate change. The forums generated a list of ‘[Ideas to Advance Vermont's Climate Economy](#)’ around how Vermont can grow jobs and nurture innovative business development in sectors ranging from clean energy to recycling, transportation systems, and thermal efficiency.”

[From the “Vermont Climate Economy Initiative” webpage at the website of the Vermont Council for Rural Development (at <https://www.vtrural.org/programs/climate-economy/about>) (from sections “The Vermont Climate Economy Initiative--History and Background”, “The Summits”, and “Regional Forums”.)]

c) About the Vermont Climate Economy Model Communities Program

“The **Vermont Climate Economy Model Communities Program** is designed to help communities build and implement priority actions that increase economic vitality and affordability in a time of climate change. The ultimate goal is to help communities model change by implementing energy efficiency, transportation system transformation, renewable energy generation, working lands development, and entrepreneurship and business incubation to spur economic progress. The Model Communities Program is led by the Vermont Council on Rural Development (VCRD), with partners including Efficiency Vermont,

Vermont utilities, and others. The Program has worked in Pownal, Middlebury, Randolph, Swanton, Marshfield/Plainfield, and Dorset. For 2020 we are launching a new leadership development program - Climate Catalysts - and will also provide concentrated community facilitation services with one selected community or region.”

“An application period is opening in January for the Climate Catalysts: Community Leadership Program. [Click here to learn more and for a link to the application.](#) “

“[Click here](#) to read a quick summary of the model communities program and profiles of our work in Pownal, Middlebury, and Randolph. And [click here](#) for a great overview posted at VLITE's webpage.”

[From the webpage “Climate Economy Model Communities Program” at the website of the Vermont Council for Rural Development (at <https://www.vtrural.org/model-communities>) (paragraphs 1-3)]

d) The Climate Catalysts Leadership Program

“The key ingredient in successful projects is an effective and persistent local champion. The Climate Catalysts Leadership Program supports the power of individuals and their communities to achieve transformational climate economy progress.”

“Facing the climate challenge means mobilizing at all levels of human organization.
→ Strong and inspirational leaders are key in unifying and sparking collective action.
With hundreds of tight-knit communities, Vermont is a place that can model unique, powerful, and replicable local actions for growing the climate economy.”

“The Climate Catalysts Program brings together local leaders from Vermont communities for a year-long process focused on building peer connections, strengthening leadership skills and providing project development support. Participants work on implementation of a local project as a focus of their program participation. The goal is to move projects from concept to reality while investing in leaders who provide multi-faceted service to their communities.”

“VCRD is supporting 2 cohorts of leaders in 2020. Each cohort includes a mix of new, emerging, and experienced leaders from a variety of large and small communities who have ideas for projects that are both ambitious and achievable. Participants receive training, peer connections, and consultative support as they develop and implements their projects.”

“In early 2020, an inaugural class of 12 local leaders was selected from a pool of 45 applicants. A first in-person session of the group was convened in February 2020 and remaining sessions moved online when the pandemic hit. Participants from this 1st cohort have adapted their work to the ever-changing circumstances. Monthly gatherings of the group are hosted on Zoom, and each participant has the opportunity for regular check-ins with VCRD staff.”

“VCRD is now recruiting a second cohort in 2020! (Application deadline is October 9th!)
The first three sessions will take place Thursdays from 10:30am-noon on Oct 22, Nov 19, and Dec 17.”

“Ideal candidates may come from all walks of life and have leadership experience ranging from decades to none-at-all. Participant's focus and project may be part of their paid work or something they are doing as an elected/appointed leader or as an unaffiliated volunteer. All we ask is that each participant have a deep commitment and time to dedicate to their project. Possible projects could include a neighbor-to-neighbor weatherization campaign, a community solar project, energy improvements at a school or municipal building, electrification of vehicle fleets, mowers, or heating systems, strengthening downtown, starting an energy committee and developing an energy action plan, hosting an e-bike lending library, modern wood heating projects, hosting a series of workshops, or whatever else participants imagine that grows the economy and tackles climate change.”

“To join the next class of Climate Catalysts launching in October 2020:
Click [HERE](#) to fill out a short application by October 9!”

“Learn more about the curriculum and program schedule, click here for a handout, and check out this webinar we hosted Sept 24 featuring three members of the current class sharing their project work through the pandemic...”

[From the webpage “Climate Catalysts: A Community Leadership Program” at the website for the Vermont Council on Rural Development (at <https://www.vtrural.org/climatecatalysts>)]

e) Community Leadership In Action: A Vermont Guide to Community Engagement, Project Development, & Resources

“In democracy, all citizens are called upon to lead. Where leaders step up, towns achieve great things. Motivated by a wonderful and binding patriotism of place, local leaders in all their diversity throughout Vermont are constructing a future, building momentum, and making democracy real. Today as much as any time in our recent history, Vermonters are working together to respond to crisis, and to rebuild the foundations of our communities and our state for a resilient future.”

“The [Community Leadership in Action Guide](#) is designed as a starting point with tips and strategies to help new, emerging, and veteran leaders frame local issues and move community and economic development projects forward. The first section - Tools for Community Leaders - includes tips to support leaders in bringing people together, running effective and efficient meetings, communicating with the public, dealing with conflict, welcoming diversity, setting action priorities, and strengthening other key skills. The second section - Advancing Community Projects - shares action step ideas on specific topics drawn from 20 years of VCRD Community Visits, along with recommendations from Vermont resource providers and community and economic development experts to support the work. The guide concludes with a list of resources and opportunities to build skills in leadership.”

“Nobody knows better the intricacies and particular issues facing a community than its residents, and we encourage local folks to grab the reins and use this tool as it is useful!”

[From the “Vermont Community Leadership Network” webpage at the Vermont Council for Rural Development website (at <https://www.vtrural.org/leadership/guide>)]

[(Editor’s Note--SP) There seems to be difficulties with using the above links from the Vermont Council for Rural Development--the message comes up “Unable to Open”. My best suggestion at this time is to search for the Vermont Council on Rural Development on “google”, and then go to the website from there. Not sure where the glitch is....”]

20) United Nations Conference on Environment and Development (Earth Summit)
(Rio de Janeiro, 3-14 June 1992)

a) "In Rio, 172 Governments--108 represented by heads of State or Government--adopted three major agreements to guide future approaches to development: Agenda 21, a global plan of action to promote sustainable development; the Rio Declaration on Environment and Development, a series of principles defining the rights and responsibilities of States; and the Statement of Forest Principles, a set of principles to underpin the sustainable management of forests worldwide. In addition, two legally binding instruments were opened for signature at the Summit: the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity. Moreover, negotiations began on the Convention to Combat Desertification, which was opened for signature in October 1994 and entered into force in December 1996."

[From the "Outcomes on Sustainable Development" webpage at the website for the United Nations (at <https://www.un.org/en/development/devagenda/sustainable.shtml>) (see third conference from the top)]

b) "The United Nations Framework Convention on Climate Change (UNFCCC) was adopted on 9 May 1992 and opened for signature on 4 June 1992 at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro (known by its popular title, the Earth Summit). *On 12 June 1992, 154 nations signed the UNFCCC, which upon ratification committed signatories' governments to reduce atmospheric concentrations of greenhouse gases with the goal of 'preventing dangerous anthropogenic interference with Earth's climate system'.*"

[From the Wikipedia webpage for "United Nations Framework Convention on Climate Change" (at https://en.wikipedia.org/wiki/United_Nations_Framework_Convention_on_Climate_Change) (in section "Treaty", paragraph 1)]

c) "The United Nations Climate Change Conference are yearly conferences held in the framework of the UNFCCC. They serve as the formal meeting of the UNFCCC Parties (Conferences of the Parties) (COP) to assess progress in dealing with climate change, and beginning in the mid-1990s, to negotiate the Kyoto Protocol to establish legally binding obligations for developed countries to reduce their greenhouse gas emissions."

[From the Wikipedia webpage for "United Nations Framework Convention on Climate Change" (at https://en.wikipedia.org/wiki/United_Nations_Framework_Convention_on_Climate_Change) (in section "Conference of the Parties", paragraph 1)]

d) "Before the 2015 United Nations Climate Change Conference, National Geographic Magazine added to the criticism, writing: 'Since 1992, when the world's nations agreed at Rio de Janeiro to avoid 'dangerous anthropogenic interference with the climate system,' they've met 20 times without moving the needle on carbon emissions. In that interval we've added almost as much carbon to the atmosphere as we did in the previous century.'"

[Quote from National Geographic from article "Fresh Hope for Combating Climate Change" (in the November, 2015 print version of the National Geographic, and at <https://www.nationalgeographic.com/magazine/2015/11/climate-change-issue-intro-essay/>) (paragraph 2)(Note: this article is behind a subscription \$2.99/mo. cancel anytime paywall)]

[Complete d) quote also at the Wikipedia webpage for “United Nations Framework Convention on Climate Change” (at https://en.wikipedia.org/wiki/United_Nations_Framework_Convention_on_Climate_Change) (in section “Commentaries and analysis”, see subsection “Criticisms of the UNFCCC Process”, paragraph 1)]

21) Gaia: At Atlas of Planetary Management (Dr. Norman Myers, Ed) (1993)

a) “Most scientists agree that human activities are changing the climate; the possible consequences range from the moderate to the destructive. Sea level rise would endanger coastal cities and productive lowlands; weather patterns might become more extreme; climate zones could shift, altering agricultural and biodiversity patterns. With the altered distribution of food and water, conflicts might ensue and mass migrations increase, from rural to urban areas, and from South to North. It is likely that the poor would suffer most as they have fewer options for response. The workings of Gaia’s life-support systems remain largely mysterious. What we do know inspires admiration for an organism that has survived enormous changes in chemistry and species in the past (including volcanism and meteorite impact). Similar catastrophic effects could possibly be associated with climate change, notably the rapid melt of the West Antarctic ice sheet and the release of vast stores of frozen methane in the tundra. Should such events synchronize--an improbable scenario-- the short-term consequences for humanity would be severe. But the planet would most certainly cope. The human remedy is to act with prudence and in good time, to avoid pressing the world to the limits of human tolerance and adaptability.”

[From the book “Gaia, an Atlas of Planet Management” by Dr. Norman Myers at the website of the Internet Archive (archive.org) (at <https://archive.org/details/gaia00norm/page/112/mode/1up>) (on p. 112)]

b) From an interview with Dr. Norman Myers

[From the interview “The Journey of an Environmental Scientist: Conversation with Norman Myers” by Harry Kreisler (November 11, 1998) at the website for the Institute for International Studies at the University of California, Berkeley (at <http://globetrotter.berkeley.edu/people/Myers/myers-con0.html>) (“This interview is part of the Institute's ‘Conversations with History’” series, and uses Internet technology to share with the public Berkeley's distinction as a global forum for ideas.”--paragraph 1;

and the introduction to the interview: “Welcome to a Conversation with History. I'm Harry Kreisler of the Institute of International Studies. Our guest today is Dr. Norman Myers. Norman Myers is an environmental scientist who has been called the Paul Revere of the environmental movement. He is a Fellow at Green College, Oxford University; the Andrew D. White Professor at Large at Cornell University; and an advisor at the World Bank's Global Environment Facility. He is at Berkeley as the Charles M. and Martha Hitchcock Professor. Professor Myers has won many awards, including the Volvo Environment Prize and the United Nations' Sasakawa Prize. He has published more than 250 papers in professional journals, 300 popular articles in newspapers and magazines, and 15 books with sales of one million copies in 11 languages. He is the originator of the biodiversity hot-spot strategy that has generated over \$300 million for conservation activities.”)--

--(The excerpt below is from the section of the interview “Political Activism” (at <http://globetrotter.berkeley.edu/people/Myers/myers-con4.html>) (last two questions and responses)]

Kreisler: "So as the Paul Revere of the environmental movement, your horse isn't adequate to take the messages as far as you want. I'm curious here. If you look at your career, you had to work the Masai, in a sense. And by 'work' I mean in a political sense, to educate them about the issues that required change. As a consultant you're clearly a person who moves and speaks to important business groups, to political leaders, and as a teacher, students. Do you see differences in these groups in their response to convincing arguments about their environment?"

Myers: "Yes I do. There are very big responses. You see the business community, with some very notable exceptions I must say, tend to look just at the bottom line, the next quarter report. That's their time horizon. Politicians look to the next election, and who is to blame them; if I was a politician I think I'd do the same. And the marketplace says, in effect, that there's no future beyond ten years. Interest rates, discount rates, mean that there's no future after ten years. There you can think about today. I think about my children and my grandchildren, so I'm thinking about fifty years ahead, but then I won't be around in another fifty years. But the things we're doing to our planet will have an impoverishing impact for at least a thousand years, and in some cases five million years. So I find it very, very difficult to stretch my mind like that. Arnold Schultz, where are you? Come and help!"

"At the same time, I think that we can squeeze through this bottleneck with reduced losses, let's say. We are going to lose a lot, but we could also win a lot, we could still save a lot. I am struck how politicians can sometimes get off their butts and do something. For instance, I would not have taken on a bet ten years ago that by the year 2000 we'd get rid of the Berlin Wall and the Cold War and the Soviet Union, and we'd have peace in South Africa, peace in Northern Ireland, possibly peace in the Middle East. I would never have taken a bet like that. Some people say, "Well, you can't change people's consumption patterns" for instance -- we have to get people off fossil fuels or we'll have a globally warmed climate. People say you can't change consumption patterns. In the last ten years, sixty million Americans have given up smoking. That's like a social earthquake overnight. There's no limit to what we can do if we really want to get on with it."

Kreisler: "Would it require a cataclysm, some horrible event, a sinking of a supertanker or something, or something in nature itself, to wake us up?"

Myers: "Well, you know we aren't very good at planning, whether we're politicians or individual citizens. We tend to wait for the morning's mail to see what problems it has brought and then deal with them. And that is purely reactive. Why can't we anticipate the morning's mail and anticipate these problems? We've got lots of signs that tell us what's going to fall out of the sky onto our heads, why can't we anticipate? And I do wonder about this myopia. It's not so much ignorance, it's ignore-ance. It's like that line from the Dire Straits song, 'Denial is not just a river in Egypt.' We don't want to think about the future like that. And yet we undoubtedly have the capacity to squeeze through this bottleneck."

"Can I tell you what does inspire me is the thought that we live in a time altogether unprecedented. For the first time in human history, entire segments of the global ecosystem face terminal threat. We're about to lose all tropical forests within the next three or four decades. We might lose savannas. We might screw up the climate, and so on. And these are problems which have never arisen before. But we still have it in our hands, we still have time to do a great deal to turn those appalling problems into magnificent opportunities. We can still do it if we really want to. Do we really want to? Well, I think of what politicians have done and those Americans giving up smoking. We could do it. We're the only generation that has had to face a challenge of this sort. No generation of the past has had to because the problems weren't there. And no generation of the future will ever have our glorious chance because, if we don't fix this problem, or today's students don't, people in the future will have nothing left to do but to pick up the pieces off the floor that we pass on to them. So it's in our hands. And I think it's a magnificent opportunity, a great challenge. Sure it's a super-scale challenge, altogether unprecedented. If we measure up to it we can feel like giants of the human condition. A marvelous time to be alive."

22) Article “Energy and Permaculture” (David Holmgren) (April, 1994)
(and the 12 Principles of Permaculture)

a) About David Holmgren

“David Holmgren is best known as the co-originator with Bill Mollison of the permaculture concept following the publication of Permaculture One in 1978. Within the international and growing permaculture movement, David is respected for his commitment to presenting permaculture ideas through practical projects and teaching by personal example, that a sustainable lifestyle is a realistic, attractive and powerful alternative to dependent consumerism. As well as constant involvement in the practical side of permaculture, David is passionate about the philosophical and conceptual foundations for sustainability, the focus of his seminal book Permaculture: Principles and Pathways Beyond Sustainability. This book has been significant influences on the development of Transition Initiatives around the world. More recently his Future Scenarios work has seen him recognised as a significant thinker about the ‘Energy Descent future.’ After a decade of significant international travel, David is no longer flying but continues to do some international presentations by skype and pre-recorded video including receipt of the recent award by Italian environmental organisation.”

[From the webpage “The People Behind Holmgren Design” at the website Holmgren Design: Permaculture Vision and Innovation (at <https://holmgren.com.au/people/>) (paragraphs 1-3)]

b) From the article “Energy and Permaculture”

i) “It should be possible to design land use systems which approach the solar energy harvesting capacities of natural systems while providing humanity with its needs. This was the original premise of the permaculture concept.”

ii) “In the last few hundred years we have dug millions of years worth of sunlight (fossil fuels) out of the ground to create global industrial culture and economy. The most productive sustainable systems imaginable may be able to provide for the needs of five or even 10 billion people. However they would never sustain large-scale cities, a global economy, and Western material affluence even if all the conventional energy conservation strategies were to be adopted. This is a bitter pill to swallow for Westerners raised on the notion of material progress. This does not mean that the energy conservation strategies promoted for years by Lovins and other energy optimists, and progressively being adopted, are not incredibly important. In fact they are essential to make best use of what we have.”

“The transition from an unsustainable fossil fuel-based economy back to a solar-based (agriculture and forestry) economy will involve the application of the embodied energy that we inherit from industrial culture. This embodied energy is contained within a vast array of things, infrastructure, cultural processes and ideas, mostly inappropriately configured for the “solar” economy. It is the task of our age to take this great wealth, reconfigure it, and apply it to the development of sustainable systems.”

[From the article “Energy and Permaculture” by David Holmgren (originally published by The Permaculture Activist April 29, 1994) at the website of Resilience (at <https://www.resilience.org/stories/1994-04-29/energy-and-permaculture/#:~:text=The%20permaculture%20strategy%20of%20using,solar%20energy%20is%20prec>

[isely%20adaptive.&text=The%20critical%20issue%20of%20the,net%20energy%20availability%20to%20humanity](#)) (i) from the section “Agriculture and Forestry”, paragraphs 2; ii) from the section “Mollison”, paragraphs 3-4)]

c) To Summarize... (from the “Energy and Permaculture” article)

To summarize...

- * Reduce, Reuse, Recycle (in that order).
- * Grow a garden and eat what it produces.
- * Avoid imported resources where possible.
- * Use labor and skill in preference to materials and technology.
- * Design, build, and purchase for durability and repairability.
- * Use resources for their greatest potential use (e.g. electricity for tools and lighting, food scraps for animal feed).
- * Use renewable resources wherever possible even if local environmental costs appear higher (e.g. wood rather than electricity for fuel and timber rather than steel for construction).
- * Use non-renewable and embodied energies primarily to establish sustainable systems (e.g. passive solar housing, food gardens, water storage, forests).
- * When using high technology (e.g. computers) avoid using state of the art equipment.
- * Avoid debt and long-distance commuting.
- * Reduce taxation by earning less.
- * Develop a home-based lifestyle, be domestically responsible.

[From the article “Energy and Permaculture” by David Holmgren (originally published by The Permaculture Activist April 29, 1994) at the website of Resilience (at <https://www.resilience.org/stories/1994-04-29/energy-and-permaculture/#:~:text=The%20permaculture%20strategy%20of%20using,solar%20energy%20is%20precisely%20adaptive.&text=The%20critical%20issue%20of%20the,net%20energy%20availability%20to%20humanity>) (from the last section)]

d) 12 Design Principles of Permaculture

“Twelve Permaculture design principles articulated by David Holmgren in his *Permaculture: Principles and Pathways Beyond Sustainability*:

1. *Observe and interact*: By taking time to engage with nature we can design solutions that suit our particular situation.
2. *Catch and store energy*: By developing systems that collect resources at peak abundance, we can use them in times of need.
3. *Obtain a yield*: Ensure that you are getting truly useful rewards as part of the work that you are doing.
4. *Apply self-regulation and accept feedback*: We need to discourage inappropriate activity to ensure that systems can continue to function well.
5. *Use and value renewable resources and services*: Make the best use of nature's abundance to reduce our consumptive behavior and dependence on non-renewable resources.
6. *Produce no waste*: By valuing and making use of all the resources that are available to us, nothing goes to waste.
7. *Design from patterns to details*: By stepping back, we can observe patterns in nature and society. These can form the backbone of our designs, with the details filled in as we go.

8. *Integrate rather than segregate*: By putting the right things in the right place, relationships develop between those things and they work together to support each other.
9. *Use small and slow solutions*: Small and slow systems are easier to maintain than big ones, making better use of local resources and producing more sustainable outcomes.
10. *Use and value diversity*: Diversity reduces vulnerability to a variety of threats and takes advantage of the unique nature of the environment in which it resides.
11. *Use edges and value the marginal*: The interface between things is where the most interesting events take place. These are often the most valuable, diverse and productive elements in the system.
12. *Creatively use and respond to change*: We can have a positive impact on inevitable change by carefully observing, and then intervening at the right time.”

[From the Wikipedia webpage “Permaculture” at <https://en.wikipedia.org/wiki/Permaculture> (in the section “Theory”, and in the subsection “Twelve Design Principles”)]

23) COP 3--Kyoto, Japan (December, 1997)

[Note: COP = Conference of the Parties (to the United Nations Framework Convention on Climate Change--UNFCCC)]

a) “COP 3 took place in December 1997 in Kyoto, Japan. After intensive negotiations, it adopted the Kyoto Protocol, which outlined the greenhouse gas emissions reduction obligation for Annex I countries, along with what came to be known as Kyoto mechanisms such as emissions trading, clean development mechanism and joint implementation. Most industrialized countries and some central European economies in transition (all defined as Annex B countries) agreed to legally binding reductions in greenhouse gas emissions of an average of 6 to 8% below 1990 levels between the years 2008–2012, defined as the first emissions budget period. The United States would be required to reduce its total emissions an average of 7% below 1990 levels; however Congress did not ratify the treaty after Clinton signed it. The Bush administration explicitly rejected the protocol in 2001.”

[From the Wikipedia webpage for “United Nations Climate Change conference” (at https://en.wikipedia.org/wiki/United_Nations_Climate_Change_conference) (in section “1997: COP 3, Kyoto, Japan”, paragraph 1)]

b) “The US signed the Protocol on 12 November 1998, during the Clinton presidency. To become binding in the US, however, the treaty had to be ratified by the Senate, which had already passed the 1997 non-binding Byrd-Hagel Resolution, expressing disapproval of any international agreement that did not require developing countries to make emission reductions and ‘would seriously harm the economy of the United States’. The resolution passed 95–0. Therefore, even though the Clinton administration signed the treaty, it was never submitted to the Senate for ratification.”

[From the Wikipedia webpage for the “Kyoto Protocol” (at https://en.wikipedia.org/wiki/Kyoto_Protocol) (in section “Ratification Process”, see subsection “Non-ratification by the United States”, paragraph 1)]

c) Graphic at the Wikipedia website for the “Kyoto Protocol”



[From the Wikipedia webpage for the “Kyoto Protocol” (at https://en.wikipedia.org/wiki/Kyoto_Protocol) (first graphic, right side of page)]

(Beginning a multi-year section--IPCC)

24) Reports from the Intergovernmental Panel on Climate Change (IPCC)
(1990, 1992, 1995, 2001)

a) “Created in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), the objective of the Intergovernmental Panel on Climate Change (IPCC) is to provide governments at all levels with scientific information that they can use to develop climate policies.”

[From the “About the IPCC” webpage at the website for the IPCC (at <https://www.ipcc.ch/about/>)]

b) Report “Climate Change: The IPCC 1990 and 1992 Assessments” (IPCC)

“We are certain emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface. The longer emissions continue at present day rates, the greater reductions would have to be for concentrations to stabilize at a given level.”

[From the report “Climate Change: The IPCC 1990 and 1992 Assessments” (see “Policymaker Summary of Working Group III (Formulation of Response Strategies)” (at https://www.ipcc.ch/site/assets/uploads/2018/05/ipcc_90_92_assessments_far_wg_III_spm.pdf) (p. 116, paragraph 2)]

c) Report “Climate Change 1995: The Science of Climate Change” (IPCC)

“... the underlying aim of this report is to provide objective information on which to base global climate change policies that will meet the ultimate aim of the FCCC--expressed in Article 2 of the Convention--of stabilization of greenhouse gases at some level that has yet to be quantified but which is defined as one that will ‘prevent dangerous anthropogenic interference with the climate system’.”

[From “Climate Change 1995: The Science of Climate Change” (“Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change-IPCC”) (see https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_sar_wg_I_full_report.pdf) (in “Preface”, paragraph 3)]

d) Report “Climate Change 2001: Synthesis Report” (IPCC)

“The successful implementation of greenhouse gas mitigation options would need to overcome technical, economic, political, cultural, social, behavioral, and/or institutional barriers that prevent the full exploitation of the technological, economic, and social opportunities of these options.”

[From “Climate Change 2001: Synthesis Report” (“Contribution of Working Groups I, II, and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change-IPCC”) (see “Summary for Policymakers” (at <https://www.ipcc.ch/site/assets/uploads/2018/03/spm.pdf>) (p. 24, paragraph 1)]

(End of multi-year section--IPCC)

25) Organization “Gaia Education” (founded 1998)

a) “Gaia Education was created by a group of educators called ‘GEESE’--Global Ecovillage Educators for a Sustainable Earth--who had been meeting over a series of workshops in order to formulate their transdisciplinary approach to education for sustainability.”

“The GEESE first met in 1998 in Fjorvang, Denmark where the common ground for the development of the ecovillage design curriculum was established. The first milestone in the development of Gaia Education was the launch of the innovative curriculum, Ecovillage Design Education, during the tenth anniversary conference of the Global Ecovillage Network at the Findhorn Ecovillage in October 2005.”

“Since 2006, Gaia Education has successfully supported the delivery of more than 300 programmes on six continents. Internationally, the number of four-week long intensives and other course formats are increasing steadily along with a sharp increase in the number of applicants and participants on these courses. These vocational courses are open to a diverse group of people with a wide range of professional and academic backgrounds who are interested in taking an active role in the sustainability transition.”

[From the webpage “History” at the website for Gaia Education at <https://www.gaiameducation.org/about/history/>) (paragraph 1; in section “The Creation of Gaia Education”, paragraph 1; and the last paragraph)]

b) From the preamble to the 116 page “Ecovillage Design Curriculum” document

“We live in a rapidly changing world that is transforming before our very eyes. Humanity is now being challenged as never before to grow in wisdom, maturity, and understanding. A plethora of deep and pressing concerns is calling for our immediate attention, concerns such as: Earth's environmental degradation, including the loss of precious topsoil and forest cover, the encroachment of deserts, the depletion of fisheries and aquifers, the loss of habitat and the extinction of species, etc.; the glaring and increasing disparity between rich and poor leading to exploitation, poverty, and the associated regimen of malnutrition and over-population; the disintegration of families, communities, even entire cultures; unrestrained urbanization resulting in social alienation, displacement, and feelings of disconnection with the natural world; the dimming of a sense of spiritual awareness and purpose; global warming and ozone depletion; etc. And now, looming on the horizon is “peak oil,” with its coming adjustments and retrofits, including the probability of ongoing conflict over access to the remaining energy reserves.”

“All of these problems are quite real and, by now, well-documented; but gaining awareness of the extent of the problems is only half the project of becoming educated these days.

“Amidst these intense challenges, and largely catalyzed by them, lies the prospect for tremendous growth in human potential and consciousness. People and communities all over the globe are coming together to reclaim responsibility for creating their own living situations – at local and regional levels. In the process, they are overcoming prior limitations and developing new talents, skills, knowledge and approaches. Paradoxically, many of the most innovative solutions rely on a timeless, perennial kind of wisdom that seems to have been disregarded recently. The potential for a refreshed, renewed, revitalized humanity goes hand-in-hand with meeting the challenges of our present Age.

“The Global Ecovillage Network (GEN) believes the most promising and effective way to deal with all these issues is through education not a typical education but a new kind of global education, specifically designed to meet the challenges and opportunities of the 21st century:

“This is an education where a thorough and objective assessment of the state of the planet is followed by regional, community, and place-based solutions;

an education that empowers individuals and communities with the knowledge for shaping their worlds and becoming more self-reliant;

an education that is universal in scope but local in application, directed toward preserving precious cultural diversity;

an education where investigating theory is followed by practical application;

an education that imparts useful and instrumental life-skills as part of the curriculum;

an education relevant to peoples of both developed and developing countries, rural and urban regions;

an education focused on the complexly interwoven, transdisciplinary issues pertaining to the transition to sustainable culture;

an education promoting and facilitating healthful planetary evolution;

an education exploring and expanding the perceived limits of human potential;

an education identifying and reconnecting all these essential considerations to a meaningful, dignified, high-quality life for all the world's people...

"This is the Ecovillage Design Education (EDE) – an education preparing the way for a sustainable future.

"The EDE is being introduced to the world at this time to complement, correspond with, and assist in setting a standard for the United Nations' "Decade of Education for Sustainable Development-- 2005-2014."

[From the preamble to the 116 page "Ecovillage Design Curriculum" document (accessible from the Rivendell Village website, at http://www.rivendellvillage.org/Ecovillage_Design_Education.pdf) (p. 2-3)

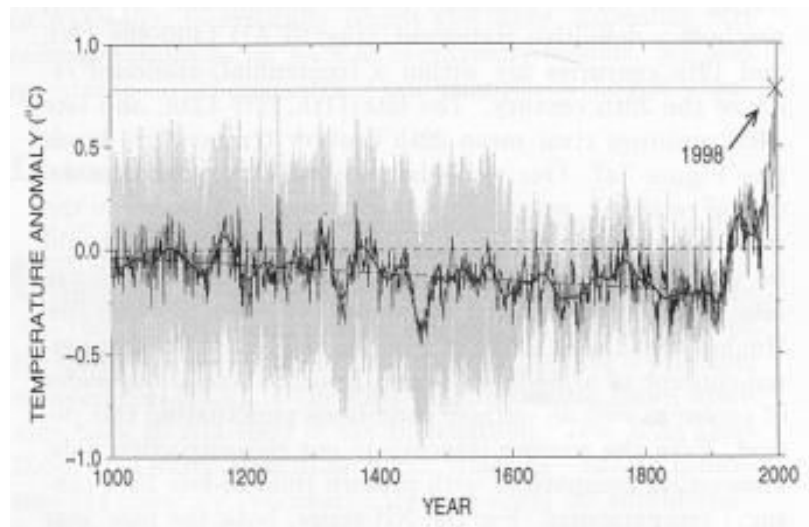
Note: This preamble is from an earlier version of the "Ecovillage Design Curriculum. In the current V5 version, a similar text can be found in the section "Why is Gaia Education Necessary?" on p.7 (at <http://www.gaiaeducation.org/wp-content/uploads/2017/02/EDE-Curriculum-English.pdf>) (Note: the download webpage for this V5 version, which has other languages besides English, is at <https://www.gaiaeducation.org/gaia-shop/free-downloads/>]

c) Additional Information Resource: "Design for Sustainability" brochure by Gaia Education is at https://issuu.com/gaia.education.library/docs/gaia_education_brochure_2018.

26) Article "Northern hemisphere temperatures during the past millennium: inferences, uncertainties, and limitations" (Michael E. Mann, Raymond S. Bradley, and Malcolm K. Hughes) (March, 1999)

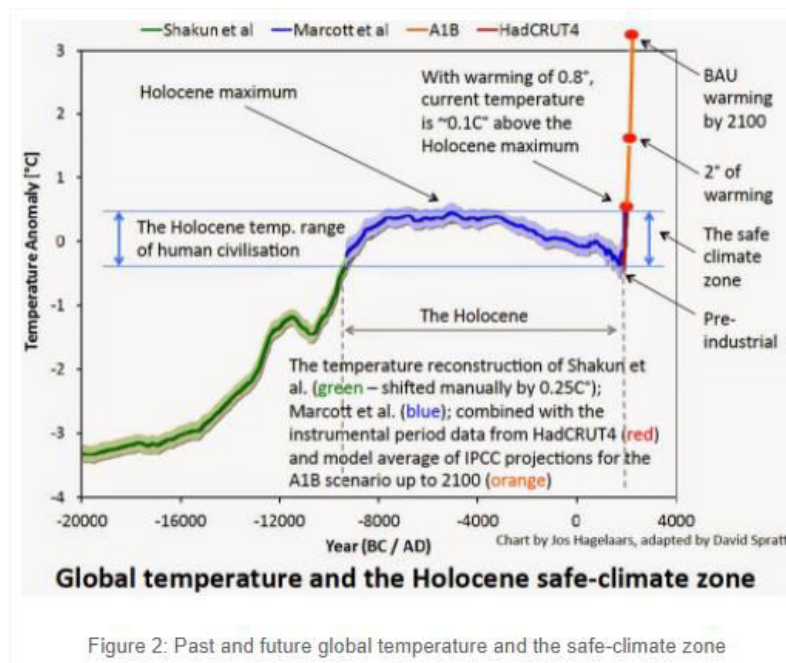
a) "Abstract. Building on recent studies, we attempt hemispheric temperature reconstructions with proxy data networks for the past millennium. We focus not just on the reconstructions, but the uncertainties therein, and important caveats. Though expanded uncertainties prevent decisive conclusions for the period prior to AD 1400, our results suggest that the latter 20th Century is anomalous in the context of at least the past millennium. The 1990's was the warmest decade, and 1998 the warmest year, at moderately high levels of confidence. The 20th century warming counters a millennial-scale cooling trend which is consistent with long-term astronomical forcing."

b) "Hockey stick" graph in article



[From article "Northern hemisphere temperatures during the past millennium: inferences, uncertainties, and limitations" by Michael E. Mann, Raymond S. Bradley, and Malcolm K. Hughes (March 15, 1999) in *Geophysical Research Letters* Vol. 26, No. 6, pages 759-762 and accessed at the Internet Archives website (at <https://web.archive.org/web/20110608023138/http://www.ltrr.arizona.edu/webhome/aprilc/data/my%20stuff/MBH1999.pdf>) (Abstract, and Figure 3)]

c) Below chart--from article "The real budgetary emergency and the myth of "burnable carbon"" (David Spratt) (May 22, 2014) at <http://www.climatecoded.org/2014/05/the-real-budgetary-emergency-burnable.html> (see also entry #96 p. 131, for further excerpts from this article)



27) Report "Towards a Sustainable America: Advancing Prosperity, Opportunity, and a Healthy Environment for the 21st Century" (The President's Council on Sustainable Development) (May, 1999)

a) "The President's Council on Sustainable Development was established on June 29, 1993 by Executive Order 12852. The Council adopted the definition of sustainable development as stated in the original Brundtland Commission report: development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The 25-member Council is a

groundbreaking partnership drawing leaders from industry, government, and environmental, labor and civil rights organizations, and is charged with developing bold, new approaches to integrate economic and environmental policies.”

“President Clinton appointed Jonathan Lash, President of World Resources Institute, and David Buzzelli, Vice President and Corporate Director of Environment, Health and Safety and Public Affairs at The Dow Chemical Company as Co-chairs of the Council. The Council's Executive Director is Molly Harriss Olson.”

[From the “Overview” section (at https://clintonwhitehouse1.archives.gov/White_House/EOP/pcsd/info/overview.html) of the archived PCSD website (https://clintonwhitehouse1.archives.gov/White_House/EOP/pcsd/index.html) (paragraphs 1-2)]

b) From subsection “Growing Concerns That Greenhouse Gas Emissions Could Impede Progress Towards a Sustainable Future”, in Chapter 2 “Climate Change”, of the complete document (link below)

“The possibility of change in the climate system is a concern because many aspects of human society rely on a stable climate. Most human infrastructure and institutions where to build, where to live, what to leave untouched assume that past patterns of temperature, precipitation, storm frequency and severity, and sea level are a reasonable surrogate for the future.”

“After decades of research, an increasing amount of evidence suggests that human emissions of heat-trapping greenhouse gases, including carbon dioxide, methane, and nitrous oxide, may be altering the natural rhythm of climate variability. *Atmospheric concentrations of these gases have increased over the last century in near lock-step with industrialization and rapid population growth.*

Figure 1 shows the trend for carbon dioxide; trends for the other trace gases are similar. Every year, more greenhouse gases are released into the atmosphere through the combustion of fossil fuels, land use changes, deforestation, and other activities than can be absorbed or destroyed by natural processes.”

“Many greenhouse gases stay in the atmosphere for decades to centuries. Because of the gases’ long atmospheric lifetime, both their concentrations and the rate at which those concentrations increase are important factors in determining the risk of climate change: the effects of today’s emissions on climate literally could be felt for generations to come.”

“Computer models used by the Intergovernmental Panel on Climate Change in its 1995 assessment report predict an average global warming of 1° to 3.5°C (1.8° to 6.5°F) by the year 2100 if emissions of greenhouse gases go unabated. The panel predicts that higher average temperatures and resulting changes in precipitation patterns, sea level, and ecosystems may have significant consequences. The local effects of this global phenomenon remain uncertain because of limitations in the models. Based on the body of emerging science on the regional impacts of climate change, beneficial and damaging effects could vary by region, and some sectors will gain new advantages and others be adversely affected. In addition, the possibility of surprises unanticipated, rapid, and nonlinear changes in the climate system that could have significant impacts cannot be ruled out given current scientific understanding.”

“The potential for climate change in the next century as a result of human activity poses particular challenges to our ability to achieve sustainable development. To address this growing concern, nations of the world have set in motion ambitious plans to protect the climate. Led by then President George

Bush, the United States joined over 170 other countries in signing the UN Framework Convention on Climate Change (UNFCCC), negotiated at the 1992 Earth Summit in Rio de Janeiro. The objective of the convention is to:

'achieve. . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.'

“As a first step, both developed and developing nations pledged to take steps to protect the climate on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Industrialized nations also voluntarily aimed to return their level of greenhouse gas emissions in the year 2000 to the level released in 1990. The United States was one of the first nations to ratify the convention.”

“Recent international agreements seek to build on existing commitments to achieve the convention’s objective. The 1997 Kyoto Protocol commits all nations to continue efforts to protect the climate. If the protocol enters into force and becomes a binding agreement among nations, industrialized nations would be required to reduce overall aggregate emissions of six greenhouse gases by at least 5 percent below 1990 levels in the 2008-12 time period; the U.S. obligation would be set at 7 percent below 1990 levels. Developing countries would not be obligated to reduce greenhouse gas emissions by a specified amount. Programs such as emissions trading, joint implementation, and the Clean Development Mechanism (CDM) are intended to provide flexibility to achieve these reductions both at home and abroad. To date, 84 nations, including the United States, have signed the protocol, and seven nations have ratified it, none of which is a large emitter of greenhouse gases.”

[Note: The US signed the Protocol on 12 November 1998, during the Clinton presidency. To become binding in the US, however, the treaty had to be ratified by the Senate, which had already passed the 1997 non-binding Byrd-Hagel Resolution, expressing disapproval of any international agreement that did not require developing countries to make emission reductions and "would seriously harm the economy of the United States". The resolution passed 95–0. Therefore, even though the Clinton administration signed the treaty, it was never submitted to the Senate for ratification.” (From the Wikipedia webpage “Kyoto Protocol” (at https://en.wikipedia.org/wiki/Kyoto_Protocol) (in section “Non-ratification by the United States”, paragraph 1)]

[Longer excerpt above from subsection “Growing Concerns That Greenhouse Gas Emissions Could Impede Progress Towards a Sustainable Future”, in Chapter 2 “Climate Change”, in “Towards a Sustainable America: Advancing Prosperity, Opportunity, and a Healthy Environment for the 21st Century” by The President’s Council on Sustainable Development)(at <https://clintonwhitehouse2.archives.gov/PCSD/Publications/tsa.pdf>) (May, 1999) (p. 13, paragraphs 1-5; p. 14, paragraphs 1-2)]

c) “In its advisory capacity, the Council has been the only presidential (or federal advisory) panel charged with recommending to the President policies across a full spectrum of economic, environmental, and social issues. The Council’s diverse and high-level membership, drawn from leadership throughout the public and private sectors, suggests that our recommendations have broad enough support to be implemented successfully.”

[From “Towards a Sustainable America: Advancing Prosperity, Opportunity, and a Healthy Environment for the 21st Century” by The President’s Council on Sustainable Development)(at <https://clintonwhitehouse2.archives.gov/PCSD/Publications/tsa.pdf>) (May, 1999) (in subsection “Unique Roles of the Council” in Chapter 1 “Introduction”; p. 3, paragraph 5)]

28) “Overview” of Report “Climate Change Impacts in the United States” (United States National Climate Assessment by U.S. Global Change Research Program) (the First National Climate Assessment) (2000)

“Climate variability and change do not occur in isolation, but in an evolving, dynamic social and economic context. This context is very likely to affect the character and magnitude of climate impacts. Socioeconomic conditions are important drivers of climate change, and also influence the way society responds to change. The prosperity and structure of the economy, the technologies available and in use, and the settlement patterns and demographic structure of the population, are all very likely to contribute to how and how much climate change will matter to Americans, and what they can and might wish to do about it.” (p. 30)

[From “Overview” of “Climate Change Impacts in the United States” (United States National Climate Assessment by U.S. Global Change Research Program) (the First National Climate Assessment) (2000) (at <https://data.globalchange.gov/assets/9a/aa/ec5b4bb3b895bc8369be2ddac377/nca-2000-report-overview.pdf>) (paragraph 1 on p. 30) (Note: There are links to documents associated with all three assessments (2000-2014) at <https://www.globalchange.gov/what-we-do/assessment/previous-assessments>)]

[see also the Wikipedia webpage for “National Climate Assessment” (at https://en.wikipedia.org/wiki/National_Climate_Assessment)]

29) Organization “The Global Reporting Initiative” (launched 2000)

“The Global Reporting Initiative (known as GRI) is an international independent standards organization that helps businesses, governments and other organizations understand and communicate their impacts on issues such as climate change, human rights and corruption.”

“Under increasing pressure from different stakeholder groups--such as governments, consumers and investors--to be more transparent about their environmental, economic and social impacts, many companies publish a sustainability report, also known as a corporate social responsibility (CSR) or environmental, social and governance (ESG) report. GRI’s framework for sustainability reporting helps companies identify, gather and report this information in a clear and comparable manner. First launched in 2000, GRI’s sustainability reporting framework is now the most widely used by multinational organizations, governments, small and medium enterprises (SMEs), NGOs and industry groups in more than 90 countries. In 2017, 63 percent of the largest 100 companies (N100), and 75 percent of the Global Fortune 250 (G250) reported applying the GRI reporting framework.”

[From the Wikipedia webpage for the “Global Reporting Initiative” (at https://en.wikipedia.org/wiki/Global_Reporting_Initiative) (paragraphs 1 and 2)]

30) Organization “Carbon Disclosure Project (CDP)” (founded 2000)

a) “Founded in 2000, CDP was the first platform to link environmental integrity and fiduciary duty. Now with the world’s largest, most comprehensive dataset on environmental action, the insights that CDP

holds empowers investors, companies, cities, and national and regional governments to make the right choices today to build a thriving economy that works for people and planet in the long term.”

“Each year CDP supports thousands of companies, cities, states and regions to measure and manage their risks and opportunities on climate change, water security and deforestation. We do so at the request of their investors, purchasers and city stakeholders.”

[From the “What we do” webpage at the CDP website (see <https://www.cdp.net/en/info/about-us/what-we-do>) (paragraphs 4 and 1)]

b) “We believe that improving corporate awareness through measurement and disclosure is essential to the effective management of carbon and climate change risk. We request information on climate risks and low carbon opportunities from the world’s largest companies on behalf of over 515 institutional investor signatories with a combined US\$106 trillion in assets and 147 major purchasers with over US\$4 trillion in procurement spend.”

[From the “Climate Change” webpage at the CDP website (see <https://www.cdp.net/en/climate>)(paragraph 1)]

31) Organization “Low Impact Living Initiative” (founded 2001)

a) “From “Our Story”

2001

“Lowimpact.org is founded as the ‘Low-impact Living Initiative’ (LILI--hence our lily logo), a not-for-profit organisation, by two members of Redfield Community. The community itself was founded in 1978 as a registered housing co-op with 18 acres, and by the late 90s had solar hot water, compost loos, straw-bale buildings, organic gardens, orchards, soft fruit, bees, sheep, chickens, natural paints, lime, wood stoves, and one member was experimenting with making biodiesel from waste cooking oil. We wondered if anyone else might be interested in learning about the things we were experimenting with. We started running courses in the things that we were doing.”

2010

“We stopped running our own courses and became a network of low-impact organisations and an information hub for our ever-growing range of topics. This includes a directory of low-impact businesses, plus introductory information, books, articles, links, courses, magazines, products & services and specialist advisors to answer queries on all our topics. We started to develop our programme of online courses.”

[From 2001 section and 2010 section of “Our Story” at the website of lowimpact.org (at <https://www.lowimpact.org/about/our-story/>)]

b) What low-impact looks like (13 Topics)

“The ‘impact’ we’re talking about is human impact on nature and on each other, which can be illustrated by comparing our high-impact culture with what we’d like to see instead.”

[From the webpage “What low-impact looks like” at the website of lowimpact.org (at <https://www.lowimpact.org/our-message/>) (paragraph 1)]

c) Low-impact topics (very useful and comprehensive resource)!!

→ “Browse the categories below for 220+ topics that you can get involved with. Constantly updated information, books, magazines, articles, videos, advice, courses, products & services, links to useful websites and more.”

[From the “Low-impact Topics” section at the website of lowimpact.org (at <https://www.lowimpact.org/topics/>)]

d) Books

“We provide practical, down-to-earth books stuffed with great information and written by specialists we know and trust. We aim to produce books on as many of our topics as possible. You’ll love them! Our books are sold via our partner, the [Centre for Alternative Technology](#) (CAT).”

“The range currently includes compost toilets, timber for building, gasification, food smoking, wind and solar electricity, how to build a wind pump, herbal remedies, solar hot water, how to spin (just about anything), natural soap-making, heating with wood, essential oils and skin-care products, as well as the Knit 1 Bike 1 book detailing a knitting tour of Scotland by bike and charming colouring book The Loveliest Loo.”



[From the “Shop” section of the lowimpact.org website (at <https://www.lowimpact.org/shop/>)]

[(Editor’s Note--SP) With a view to supplementing the excellent information in the “Low-impact topics” section of the lowimpact.org website (above), this is a good place to share information about the Appropriate Technology Library accessible from the Village Earth website....]

32) Resource “Appropriate Technology Library” (Village Earth) (a context entry)

[Note: “The Appropriate Technology Library consists of 1050 books on 29 subject areas of small scale, do-it-yourself technology. Originally developed by Volunteers in Asia (VIA) it was transferred to Village Earth: The Consortium for Sustainable Village-Based Development in 1993.”

“The Library was developed to be a low-cost and portable source of appropriate technology information for aid and relief workers around the world. Since its inception, it has been used in dozens of countries around the world.”]

[From the Wikipedia webpage for “The Appropriate Technology Library” (at https://en.wikipedia.org/wiki/The_Appropriate_Technology_Library) (paragraphs 1-2)]

a) All on 1 USB flash drive—

“The most comprehensive, compact, and cost effective appropriate technology and sustainable living resource in the world! The AT Library contains the full text and images from over [1050 of the best books](#) dealing with all areas of self-reliance, do-it-yourself technology – over 150,000 pages! Portable and easy to use on 1 USB drive. The AT Library is currently in use in over 74 countries worldwide.”

“The Appropriate Technology Library is 150,000 pages of full text and graphics from 1050 books covering all areas of village-level and do-it-yourself technology—all on 1 USB flash drive.”

“The AT Library gives you all the benefits of a comprehensive appropriate technology library in the palm of your hand. The AT Library gives you the knowledge to solve real-world problems such as: harvesting clean drinking water, making tools, growing your own crops, building and maintaining an irrigation system, preserving crops, reforesting a denuded watershed, starting a small fish hatchery, building a small-scale hydropower scheme, building and maintaining pumps, treating human and animal waste, utilizing solar energy, improving rural cookstove efficiency, constructing energy efficient structures, caring for the sick, non-formal education, preparing for a natural disaster — too many uses to list!”

“The AT Library is the complete text and graphics of each book, digitally scanned into Adobe PDF format, the industry standard for document storage and viewing. Each book is summarized and indexed in the Appropriate Technology Sourcebook, included with each library. This format is easy to use and navigate and can be read on virtually any computer operating system. It can also be used with the most basic hardware including low MHz laptops, tablets or smartphones.”

[From the “Publications” navigation choice at the website for “Village Earth” (at <https://www.villageearth.org/home-2/resources/appropriate-technology-library/>); paragraph 1 (at the top of the webpage); then paragraphs 1-3 in section “About the ATL” in the tab navigation at the bottom of the webpage]

b) A complete list of the 1050 books included in the AT Library is accessible on the webpage for the Appropriate Technology Library.

[at <https://www.villageearth.org/home-2/resources/appropriate-technology-library/>, scroll down to the bottom for another menu of tabs, and click on the tab “Books in AT Library”]

[(Editor's Note--SP) Here is a sampling of the titles included in the AT Library:

Technologies for Basic Needs, How to Make Twelve Woodworking Tools, Permaculture II, Animal Power in Farming Systems, Small Scale Solar Powered Irrigation Pumping Systems, Water-Pumping Devices, Compost Toilets, Hot Water, The Wind Power Book, Small Scale Hydropower Technologies, Low Cost Passive Solar Greenhouses, Low Cost Country Home Building, Small Scale Papermaking, etc.

c) History and Mission of Village Earth

“Village Earth helps reconnect communities to the resources that promote human well-being by enhancing social and political empowerment, community self-reliance and self-determination. We do this by strengthening intermediate and grassroots organizations through fiscal sponsorship, networking, training, research and advocacy.”

“Village Earth (originally called the Consortium for Sustainable Village-Based Development or CSVBD) was born at The International Conference on Sustainable Village-Based Development hosted by Dr. Maurice Albertson and Dr. Edwin & Miriam Shinn and held from September 28--October 2, 1993 at Colorado State University in Fort Collins, Co. The conference was attended by over 250 delegates from 40 different countries who came together to discuss how to make aid more effective at reaching the grassroots. More than 200 papers were submitted forming five volumes of Proceedings. By the end of the week-long conference, the organizers were given the mandate by the participants to form the CSVBD to promote the strategies developed during the conference. The CSVBD was officially incorporated as a U.S. Federally recognized 501(c)3 not-for-profit organization in 1995 and later renamed Village Earth.”

“The conference, as well as the roots of the Village Earth approach, were heavily influenced by Agenda 21 which came out of the United Nations Earth Summit, held in Rio de Janeiro on June 14, 1992. In particular, Village Earth drew from its recognition that poverty is not the problem, rather, lack of access to resources is the primary obstacle to building a better life for the majority of the world's poor. As such, the Village Earth Approach emphasizes the role of intermediary organizations who work to mobilize village leadership and planning and from that, develop linkages to resources institutions such as governments, single sector NGOs, universities and the private sector. This type of organization is commonly referred to as a Grassroots Support Organization or GSO.”

[From the “About” section at the website for “Village Earth” (at <https://www.villageearth.org/home-2/mission-and-history/>) (in the section “History and Mission of village Earth”, paragraphs 1-3)]

33) Book “A Prosperous Way Down: Principles and Policies” (Howard T. Odum and Elizabeth Odum) (June, 2001)

a) About the Authors

“Howard T. Odum was internationally renowned for his development of the science of systems ecology and as a pioneering voice in environmental science, ecology, and ecological engineering and economics.

“Elisabeth C. Odum is professor emeritus at Santa Fe Community College in Gainesville, Florida.”

[From the webpage “A Prosperous Way Down” at the website of the University Press of Colorado (at <https://upcolorado.com/university-press-of-colorado/item/1845-a-prosperous-way-down>) (paragraphs 5-6)]

b) “That the way down can be prosperous is the exciting viewpoint whose time has come. Descent is a new frontier to approach with zeal. The goal is to keep the economy adapted to its global biophysical basis. We have to abandon some of our useless diversions. If everyone understands the necessity of the whole society adapting to less, then society can pull together with a common mission to select what is essential. Presidents, governors, and local leaders can explain the problem and lead society in a shared mission. Millions of people the world over, if they see the opportunity, can be united in the common quest for a prosperous way down. The alternative is a world of selfish battles for whatever resources remain.”

(p. 4-5 of “Introduction”, paragraph 3)

c) “Instead of planning for descent, many writers, journalists, and political leaders encourage a continuation of the established public mind-set on growth that was okay for the time of expanding resource use. For some it is failings in their education; for others it is overfocus on the short range. Nearly six billion people are in denial, and for leaders to speak of a nongrowth period is viewed as political suicide. But the paradigm of growth is a shared global attitude that may switch all at once for all together when the truth becomes obvious through some galvanizing event. Or perspectives may shift gradually as books like this one circulate.”

(p. 9 in “Introduction”, paragraph 1)

d) “The summit for the global economy ahead is hidden by the surge of affluence in the wealthy sectors of a few countries. But downsizing is already occurring in many parts of the system. This is the start of the long process of reorganizing to form a lesser economy on renewable resources. If we do not understand the principles that are causing the decreases, we won’t plan the needed changes. Without a collective mission to adapt, we are more likely to stumble with delay, failures, fear, desperation, conflict, malaise, pestilence, environmental destruction, and collapse.”

(p. 8, paragraph 3)

[From Chapter 1 “Introduction to the Way Down” which is a download from the webpage “A Prosperous Way Down” at the website of the University Press of Colorado (at <https://upcolorado.com/university-press-of-colorado/item/1845-a-prosperous-way-down>) (at the very bottom of that webpage is a download for Table of Contents and Sample Chapter)]

34) European Heat Wave (2003)

a) “Daily numbers of deaths at a regional level were collected in 16 European countries. Summer mortality was analyzed for the reference period 1998–2002 and for 2003. More than 70,000 additional deaths occurred in Europe during the summer 2003. Major distortions occurred in the age distribution of the deaths, but no harvesting effect was observed in the months following August 2003. Global warming constitutes a new health threat in an aged Europe that may be difficult to detect at the country level, depending on its size.”

[From the Journal Article “Death toll exceeded 70,000 in Europe during the summer of 2003” in the journal “Comptes Rendus Biologies” Volume 331, Issue 2, February 2008, Pages 171-178) (at <https://www.sciencedirect.com/science/article/pii/S1631069107003770?via%3Dihub>) (in “Abstract”, paragraph 1)]

b) “In France, 14,802 heat-related deaths (mostly among the elderly) occurred during the heat wave, according to the French National Institute of Health. France does not commonly have very hot summers, particularly in the northern areas, but eight consecutive days with temperatures of more than 40 °C (104 °F) were recorded in Auxerre, Yonne in early August 2003. Because of the usually relatively mild summers, most people did not know how to react to very high temperatures (for instance, with respect to rehydration), and most single-family homes and residential facilities built in the last 50 years were not equipped with air conditioning. Furthermore, while contingency plans were made for a variety of natural and man-made catastrophes, high temperatures had rarely been considered a major hazard.”

[From the Wikipedia webpage for “2003 European heat wave” at the Wikipedia website (see https://en.wikipedia.org/wiki/2003_European_heat_wave) (in section “France”, paragraph 1)]

[Original reference to 2003 European Heat Wave was from the overview of climate change, years 900-2009 AD titled “Timeline: Climate Change” by Michael Marshall (September 4, 2006) (at <https://www.newscientist.com/article/dn9912-timeline-climate-change/#ixzz6YP1YfmNQ>)]

35) Report “Millennium Ecosystem Assessment” (March, 2005)

a) “The Millennium Ecosystem Assessment (MA) was called for by the United Nations Secretary-General Kofi Annan in 2000. Initiated in 2001, the objective of the MA was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being. The MA has involved the work of more than 1,360 experts worldwide.”

b) “The assessment findings were formally approved by the Board on March 23, 2005.”

[From “Overview of the Millennium Ecosystem Assessment” at the website of the Millennium Ecosystem Assessment (at <https://www.millenniumassessment.org/en/About.html>) (a) in section “What is the Millennium Ecosystem Assessment (MA)?”, paragraph 1); b) in section “When did the MA begin? How long did the assessment take?”, paragraph 1)]

c) What are the main findings of the MA?

i) “Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth.”

ii) “The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs in the form

of the degradation of many ecosystem services, increased risks of nonlinear changes, and the exacerbation of poverty for some groups of people. These problems, unless addressed, will substantially diminish the benefits that future generations obtain from ecosystems.”

iii) “The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals.”

iv) “The challenge of reversing the degradation of ecosystem while meeting increasing demands for services can be partially met under some scenarios considered by the MA, but will involve significant changes in policies, institutions and practices that are not currently under way. Many options exist to conserve or enhance specific ecosystem services in ways that reduce negative trade-offs or that provide positive synergies with other ecosystem services.”

“The bottom line of the MA findings is that human actions are depleting Earth’s natural capital, putting such strain on the environment that the ability of the planet’s ecosystems to sustain future generations can no longer be taken for granted. At the same time, the assessment shows that with appropriate actions it is possible to reverse the degradation of many ecosystem services over the next 50 years, but the changes in policy and practice required are substantial and not currently underway.”

[From “Overview of the Millennium Ecosystem Assessment” at the website of the Millennium Ecosystem Assessment (at <https://www.millenniumassessment.org/en/About.html>) (from section “What are the main findings of the MA?”, paragraphs 1-5)]

d) The Millennium Ecosystem Assessment in the news

i) “Many of the world's ecosystems are in danger and might not support future generations unless radical measures are implemented to protect and revive them, according to the most comprehensive analysis ever conducted of how the world's oceans, dry lands, forests and species interact and depend on one another.”

[From article “Report on Global Ecosystems Calls for Radical Changes: Earth's Sustainability Is Not Guaranteed Unless Action Is Taken to Protect Resources, Experts Say” by Shankar Vedantam (Washington Post Staff Writer) (March 30, 2005) at the website for the Washington Post (at <https://www.washingtonpost.com/wp-dyn/articles/A10966-2005Mar29.html>) (paragraph 1)]

ii) “Rich countries owe poor a huge environmental debt”

“The environmental damage caused to developing nations by the world's richest countries amounts to more than the entire third world debt of \$1.8 trillion, according to the first systematic global analysis of the ecological damage imposed by rich countries.”

“The study found that there are huge disparities in the ecological footprint inflicted by rich and poor countries on the rest of the world because of differences in consumption. The authors say that the west's high living standards are maintained in part through the huge unrecognised ecological debts it has built up with developing countries.”

“‘At least to some extent, the rich nations have developed at the expense of the poor and, in effect, there is a debt to the poor,’ said Prof Richard Norgaard, an ecological economist at the University of California, Berkeley, who led the study. ‘That, perhaps, is one reason that they are poor. You don't see it until you do the kind of accounting that we do here.’”

“Using data from the World Bank and the UN's Millennium Ecosystem Assessment, the researchers examined so-called ‘environmental externalities’ or costs that are not included in the prices paid for

goods but which cover ecological damage linked to their consumption. They focused on six areas: greenhouse gas emissions, ozone layer depletion, agriculture, deforestation, overfishing and converting mangrove swamps into shrimp farms.”

“Greenhouse emissions from low-income countries have imposed \$740 billion of damage on rich countries, while in return rich countries have imposed \$2.3 trillion of damage. This damage includes, for example, flooding from more severe storms as a result of climate change.”

“We know already that climate change is a huge injustice inflicted on the poor,’ said Dr. Neil Adger at the Tyndall Centre for Climate Change Research in Norwich, who was not involved in the research, ‘This paper is actually the first systematic quantification to produce a map of that ecological debt. Not only for climate change but also for these other areas.’”

[From article “Rich countries owe poor a huge environmental debt” by James Randerson (January 20, 2008) at the Guardian website (at <https://www.theguardian.com/science/2008/jan/21/environmental.debt1>) (paragraphs 1-4, 7, and 10)]

36) Organization “C40 Cities” (founded in October, 2005)

“Around the world, C40 Cities connects 97 of the world’s greatest cities to take bold climate action, leading the way towards a healthier and more sustainable future. Representing 700+ million citizens and one quarter of the global economy, mayors of the C40 cities are committed to delivering on the most ambitious goals of the Paris Agreement at the local level, as well as to cleaning the air we breathe.”





[From the “About” webpage at the website for C40 Cities (at <https://www.c40.org/about>) (paragraph 2, and infographic)]

b) Why Cities?

i) “In terms of size, cities occupy only two percent of the world’s landmass. But in terms of climate impact, they leave an enormous footprint. Cities consume over two-thirds of the world’s energy and account for more than 70% of global CO2 emissions. And with 90 percent of the world’s urban areas situated on coastlines, cities are at high risk from some of the devastating impacts of climate change, such as rising sea levels and powerful coastal storms.”

[From the “Why Cities?” section of the C40 Cities website (at https://www.c40.org/why_cities) (paragraph 2)]

ii)

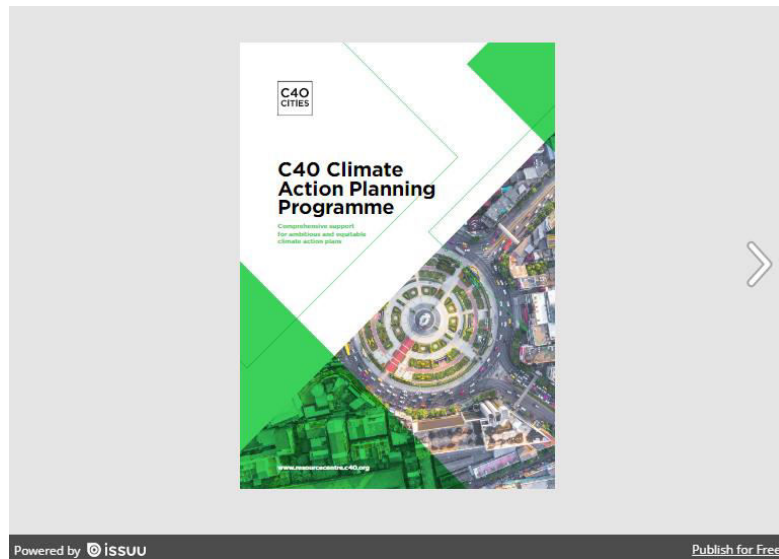
Cities are key in tackling global climate change

Implementing climate change responses today at the city scale will benefit future generations.



[From the webpage “Building low carbon, climate-resilient cities” at the City Climate Planner website-- a project of Green Business Certificate Inc. (GBCI) in partnership with World Resources Institute (WRI) and Local Governments for Sustainability (ICLEI)] (at <https://cityclimateplanner.org/>) (in section 2 “Why City Climate Planner?”)

c) “The C40 Climate Action Planning Programme provides comprehensive support to C40 cities to develop ambitious and equitable climate action plans in line with the objectives of the Paris Agreement. The technical assistance, delivered by C40 in partnership with expert city climate planners, covers a wide range of support including training, workshops, peer-to-peer collaboration, stakeholder engagement, planning tools, research and much more. Explore all our climate action planning tools and resources on this platform and see our brochure below for more information.” (31 page brochure below can be read at the below link, or downloaded for free)



[From the “What We Offer” webpage at the Climate Action Planning Resource Center section -- (which can be accessed from the “Measurement and Planning” section of the “Programmes” part of the C40Cities website at <https://www.c40.org/programmes>) – or at <https://resourcecentre.c40.org/what-we-offer>]

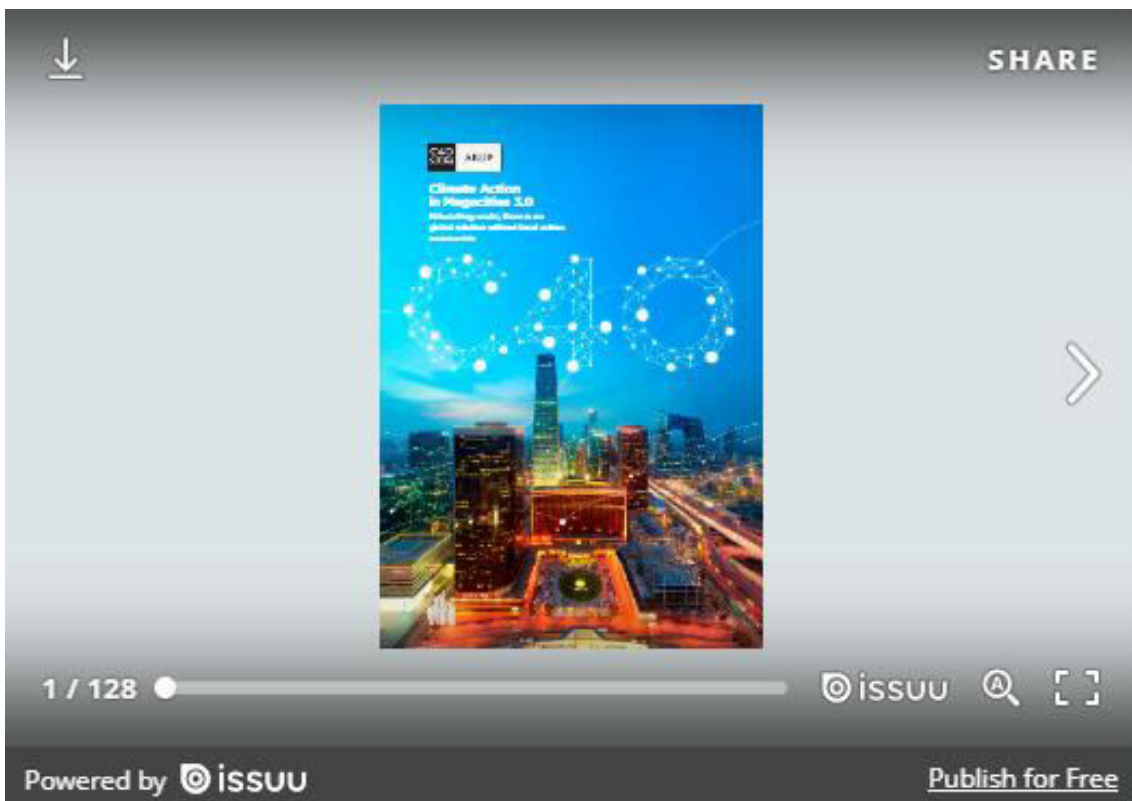
d) “Today, the C40 Cities Climate Leadership Group (C40) and research partner Arup released Climate Action in Megacities (CAM 3.0), a groundbreaking and definitive assessment of how the world’s leading mayors have taken on the urgent challenge of climate change.”

“CAM 3.0 presents major new insights into the current status, latest trends and future potential for climate action at the city level. Since the last major COP in Copenhagen, C40 cities have taken 10,000 climate actions – a doubling of actions in just six years – and have committed to reduce their CO2 emissions by 3 Gt CO2 by 2030, equivalent to the annual carbon output of India. Furthermore, decisions taken by global cities to invest in low carbon development over the next 15 years have the potential to avoid locking in a total of 45 Gt of CO2, or eight times the total current annual emissions of the United States.”

“For more information, visit the CAM 3.0 microsite [here](#).”

[From the blog post “From Copenhagen to Paris, cities and mayors are leading the way on climate action” (November 23, 2015) at the webpage “C40 Blog” at the website of C40 Cities (at https://www.c40.org/blog_posts/from-copenhagen-to-paris-cities-and-mayors-are-leading-the-way-on-climate-action) (paragraphs 2-3)]

[Note: The CAM 3.0 report can be read (see below) at https://www.c40.org/blog_posts/from-copenhagen-to-paris-cities-and-mayors-are-leading-the-way-on-climate-action or downloaded for free from the same link.]



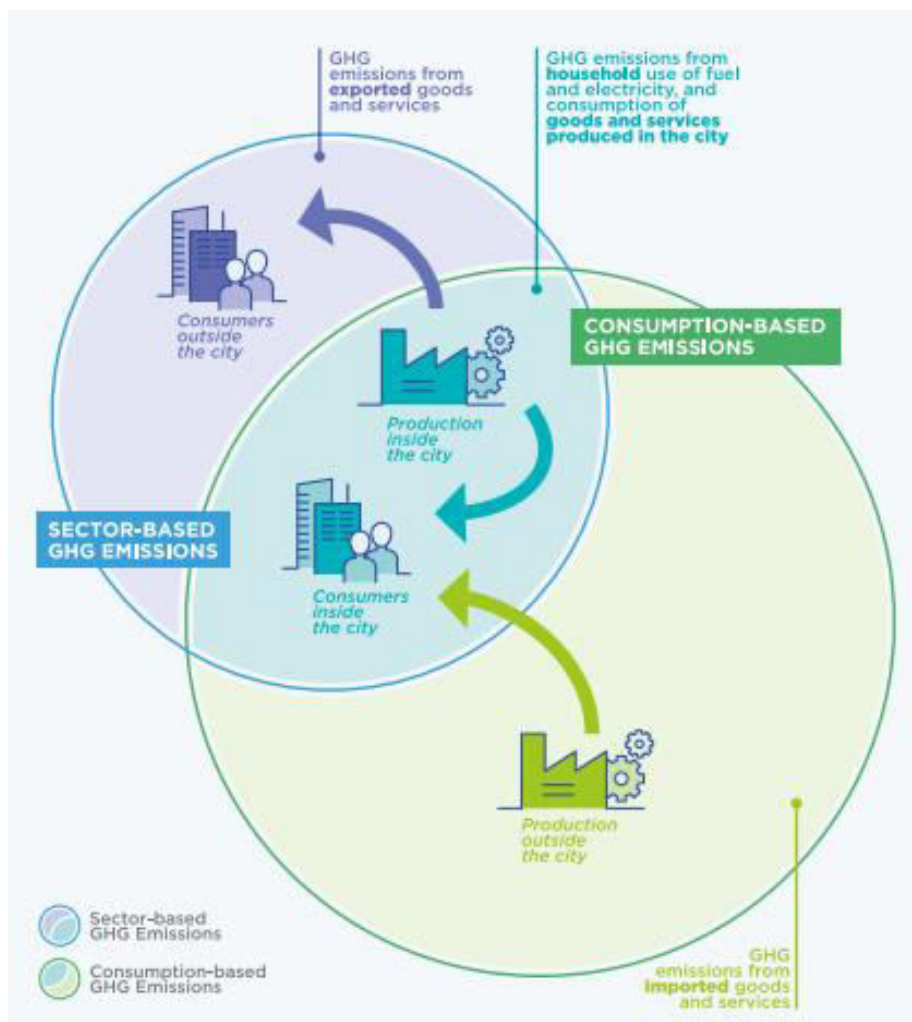
e) March 2018—“Consumption-Based GHG Emissions of C40 Cities”

i) This report presents the methodology and results of a study investigating the consumption-based greenhouse gas emissions (GHG) from 79 cities, carried out by the C40 Cities Climate Leadership Group (C40) in partnership with the University of Leeds (United Kingdom), the University of New South Wales (Australia), and Arup. (p. 2)

ii) “To support evidence-based climate action planning, many cities have developed sector-based GHG inventories using standards such as the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC).” (p. 3, paragraph 1)

“These focus primarily on GHG emissions from energy use within the city boundary, through direct combustion (scope 1) or the consumption of grid-supplied electricity, heating and/or cooling (scope 2), as well as GHG emissions from the treatment of waste. The vitality of cities, however, also gives rise to the production of significant quantities of GHG emissions outside their boundaries (scope 3).” (p. 3, paragraph 2)

“The consumption-based approach captures direct and lifecycle GHG emissions of goods and services (including those from raw materials, manufacture, distribution, retail and disposal) and allocates GHG emissions to the final consumers of those goods and services, rather than to the original producers of those GHG emissions.” (p. 4, paragraph 2)

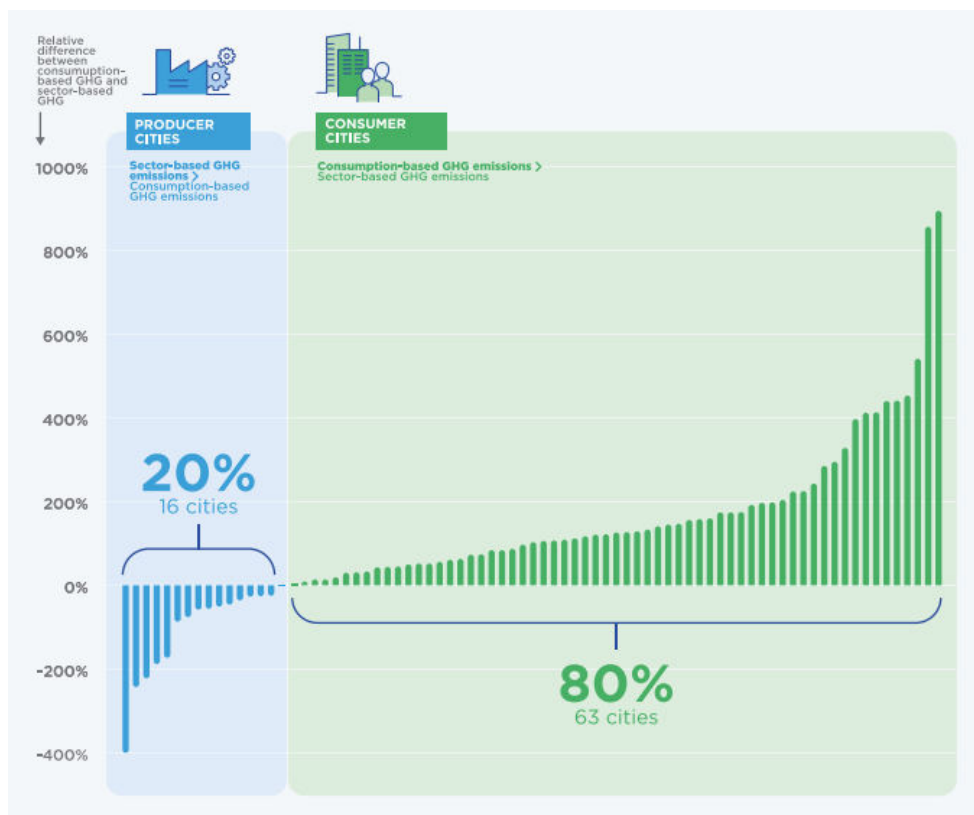


(p. 4, figure 2)

“In simple terms, therefore, a city consumption-based GHG inventory can be defined as the emissions arising within a city’s boundaries, minus those emissions associated with the production of goods and services exported to meet demand outside the city, plus emissions arising in supply chains for goods and services produced outside the city but imported for consumption by its residents.” (p. 4, sidebar to Figure 2)

“Total consumption-based emissions of the 79 C40 cities included in this study are 3.5 GtCO₂e (for the reference year 2011). This represents a 60% increase on the 2.2 GtCO₂e emissions estimated for the same cities using the GPC, and reflects the difference in GHG emissions embodied in imported and exported goods and services.... This shows that consumption activities by residents of C40 cities has a significant impact on the generation of GHG emissions beyond their boundaries.” (p. 8, from paragraphs 1 and 2)

“80% of the cities (63 out of 79) have larger consumption-based GHG emissions than sector-based GHG emissions. For 16 cities – mostly in South and West Asia, Southeast Asia and Africa – the reverse is true, with sector-based GHG emissions larger than consumption-based GHG emissions. These two groups are often referred to as “consumer” cities and “producer” cities respectively. Figure 4 (next page--p. 60) shows the relative difference between the two approaches. Over half of the cities have consumption-based GHG emissions at least twice the size of their sector-based GHG emissions. 16 cities, mostly in Europe and North America, have consumption-based GHG emissions at least three times the size of their sector-based GHG emissions.” (p. 9, paragraph 1)



(p. 9, Figure 4)

“While cities may not have much direct influence over the carbon intensity of power used in the manufacturing process of an imported product, or whether that product is transported by train or truck, as end users and centres of innovation and change, they do offer many opportunities to transform urban lifestyles into more sustainable ones to help reduce consumption-based GHG emissions. This can be achieved through a combination of resource productivity strategies and consumer policies, targeting carbon intensive consumption categories and lifecycle phases with the highest emissions, and supporting shifts in consumption to goods and services with lower emissions, including through public procurement.” (p. 15, paragraph 6)

[From the report “Consumption-Based GHG Emissions of C40 Cities” by C40 Cities (March, 2018) which can be accessed through either the “Consumption-Based GHG Emissions” subsection of the “Reducing GHG Emissions” subsection of the Climate Action Planning Resource Centre (at <https://resourcecentre.c40.org/>)---- or by going directly to the pdf file (at <https://www.c40.org/researches/consumption-based-emissions>)]

[(Commentary--by SP)--

“... as a result of high population densities, the enormous increase in per capita energy and material consumption made possible by (and required by) technology, and universally increasing dependencies on trade, the ecological locations of human settlements no longer coincide with their geographic locations. Twentieth century cities and industrial regions are dependent for survival and growth on a vast and increasingly global hinterland of ecologically productive landscapes.”

[from section “Appropriating Carrying Capacity and Ecological Footprints” (p. 204, paragraph 4)]

[From article “Revisiting Carrying Capacity: Area-Based Indicators of Sustainability” by William E. Rees-- which was published in the January 1996 issue of “Population and Environment” [17(3):195-215] [from downloaded file via ResearchGate website (at https://www.researchgate.net/publication/226184045_Revisiting_Carrying_Capacity_Area-Based_Indicators_of_Sustainability)]

“The energy invested in a particular thing during its life, from cradle to grave, is called the ‘embodied energy’ of that object. The amount of embodied energy that an item contains depends greatly on the technology used to create it, the degree of automation, the fuel used by and the efficiency of a particular machine or power plant, and the distance the item travels from inception to purchase. The value differs considerably from place to place, and even from house to house.” (p. 36, paragraph 5)

“By supporting items and processes that have lower embodied energy, as well as the companies that produce them, consumers can significantly reduce society’s energy use.” (p. 37, paragraph 6)

[From report “State of the World 2004--Special Focus: The Consumer Society” (Worldwatch Institute) (2004) at the website of Green Economics (at <http://www.greeneconomics.net/StateOfWorld-2004.pdf>) (in Chapter 2 “Making Better Energy Choices” by Janet L. Savin)]

--“... every article in the bazaar has moral and spiritual values attached to it... hence it behooves us to enquire into the antecedents of every article we buy... (Yet this) is an arduous task, and it becomes almost impossible for ordinary persons to undertake it when the article comes from far off countries. Therefore, it is that we have to restrict our purchase to articles made within our cognizance. This is the moral basis of Swadeshi.” (from paragraph 6 on p. 72-73)

--“If we feel it is beyond us to guarantee the concomitant results of all our transactions, it necessarily follows that we must limit our transactions to a circle well within our control. This is the bed rock of swadeshi... The smaller the circumference, the more accurately can we gauge the results of our actions, and (the) more conscientiously shall we be able to fulfill our obligations as trustees.” (p. 60, paragraph 3)

(From the book “Why the Village Movement?” by J.C. Kumarappa at the website archive.org--at <https://archive.org/details/in.ernet.dli.2015.118819/mode/2up>)]

(end of commentary)

f) June, 2019--“New Research Shows How Urban Consumption Drives Global Emissions” (Press Release)

“Strong action from mayors, business and citizens is driving down emissions created locally. But emissions from urban consumption of goods like food and clothing, along with materials used to construct urban buildings, are set to double without action.”

“Emissions due to consumption in high-income cities must be reduced by two-thirds in the next decade to avert the climate crisis.”

“**London, UK (12 June 2019)** – New ways of measuring the climate footprint of urban areas to include consumption – what urban business and citizens use, eat, and wear, and how these things are made and transported – show that actors in global cities have a greater influence over global emissions than we previously thought.”

“Research released today by C40 Cities finds that consumption-based emissions from nearly 100 of the world’s big cities already represent 10% of global greenhouse gas emissions. Without urgent action, those emissions will nearly double by 2050. The study reveals an incredible opportunity for cities and their citizens to contribute even more to the global effort to cut emissions and address the climate emergency.”

“The new research, [The Future of Urban Consumption in a 1.5°C World](#), was produced in partnership with Arup and the University of Leeds, and cautions that urban **consumption-based emissions must be cut by at least 50% by 2030** in order to maintain the possibility of keeping global temperature rise below 1.5°C.”

“The report explores six sectors where leaders, businesses, and citizens in the world’s cities can take rapid action to address consumption-based emissions: food, construction, clothing, vehicles, aviation, and electronics.”

“Food: Mayors, business, and citizens in C40 cities could together take actions to reduce consumption-based emissions from food by an average of 31-37% by 2030, depending on the target level, by moving to a plant-based diet, eating healthy quantities and avoiding waste.”

“Construction: ... Switching to lower-impact materials such as sustainable timber (as a part replacement for concrete) is needed for 90% of homes and 70% of offices being built.”

Clothing: ... interventions such as encouraging new clothing business models focused on recycling, upgrading, renting, and reuse of clothes. This would allow a reduction in new items of clothing to as low as 3 per person, per year, and reduce waste, costs, and impact. A 75% reduction in supply chain waste will also be needed to realise the full emissions reduction potential.”

“Vehicles: Mayors, business, and citizens in C40 cities could together take actions to reduce consumption-based emissions from private transport by 28% by 2030. This could be through interventions reducing and eventually nearly eliminating the need for car ownership....”

“Aviation: ... there must be an average 28% reduction in the number of flights across C40 cities.”

“Electronics: Mayors, business, and citizens in C40 cities could together take actions to reduce consumption-based emissions from electronics and consumer goods by 18% by 2030 by prolonging the lives of products (and) through interventions such as community workshops to repair electronics and appliances or ‘tool libraries’ where tools can be borrowed only when needed.”

[From Press Release “New Research Shows How Urban Consumption Drives Global Emissions” by C40 Cities (June 12, 2019) at the C40 Cities website (at https://www.c40.org/press_releases/new-research-shows-how-urban-consumption-drives-global-emissions) (introductory paragraphs 1 and 2; then paragraphs 1-3, 10, and 12-17)]

[(Commentary--by SP)--

If there is a necessity of downsizing and living lightly, it may be that a significant number of people who now live in cities would have a lower Carbon Footprint if they simply did not live in cities anymore, but moved to small towns and villages--“spreading out” their migration in such a way as to not overwhelm the ecosystems supporting such towns and villages.]

g) C40's Climate Action Planning Resource Centre (<https://resourcecentre.c40.org/>)

“C40's Climate Action Planning Resource Centre brings together a wide range of resources and tools to support city climate planners in the process of delivering action consistent with the objectives of the Paris Agreement. New resources and tools will be added as they become available.” (paragraph 4)

h) 10 Defining Moments in C40 History (January 29, 2015)

“2015 marks the 10-year anniversary of C40 Cities Climate Leadership Group. To celebrate these 10 Years of Results, we will be sharing our favorite lists of 10 throughout the year.”

“1. The Organization is Founded

In October 2005, then Mayor of London Ken Livingstone convened representatives from 18 megacities to forge an agreement on cooperatively reducing climate pollution. This agreement represents the launch of C40.

2. And Then We Were 40

By 2006, we had grown to 40 cities, and thus the name C40 was born. That year, Mayor Livingstone invited President Clinton's Climate Initiative (CCI) to become our implementing partner on world-class carbon reduction projects -- a partnership Mayor Miller of Toronto took forward when he became C40 Chair in 2008.

3. Mayors Collaborate

In 2007, New York City Mayor Michael R. Bloomberg hosted the second C40 Summit, bringing together 36 mayors from major global cities. Through a comprehensive program of interactive sessions, delegates shared best practices and identified collaborative projects all aimed at tackling climate change.

4. A Landmark Merger

C40 took the climate community by storm with the 2011 announcement of a formal merger between C40 and CCI's Cities Program, forged by President Clinton and then Mayor of New York City and C40 Chair, Michael R. Bloomberg, bringing significant resources and infrastructure to create a preeminent global climate action organization.

5. Social & Digital Debut

In 2011, C40 entered the global climate conversation with the launch of its C40 and National Geographic blogs, Twitter and Facebook channels. Today, there are myriad ways to connect with C40, the go-to place for news and insight on global cities taking climate action.

6. A Network of Networks

Connecting cities on topics of common interest became the organizing principal of the C40 in 2012. We now have more than 15 active working groups of global cities focused on critical issues including bus rapid transit and building energy efficiency.

7. Evidence is King

In February 2014, C40 Chair Mayor Paes unveiled the second edition of our Climate Action in Megacities report, showing action had doubled in two years among C40 members and establishing unequivocally the leadership role of cities on the world stage. This flagship research series provides a catalogue of city climate actions and mayoral powers across key sectors.

8. Nations Take Note

C40 is forging a new era of partnership between cities and national governments, most recently helping to launch a global Compact of Mayors, the world's largest cooperative effort of cities to fight climate change. Announced at UN Climate Summit in New York, the compact allows cities to contribute to strong, transparent and credible national GHG targets in the run up to Paris COP 21 and beyond.

9. On-the-Ground Support

In 2014, C40 launched a new programme to provide direct support to selected cities through a competitive application process. City Advisers are awarded to cities with the greatest potential to develop impactful climate initiatives, making gains that would otherwise not be possible. To date, City Advisers have been awarded to ten member cities.

10. A Fully Global Alliance

At C40 2014 Mayors Summit in Johannesburg, Mayor Paes became the first C40 chair from the Southern Hemisphere. Later that year, C40 welcomed Tshwane as its 70th member city – implementing a growth strategy that includes key megacities in Africa, China and India.”

[From blog post “10 Defining Moments in C40 History” (January 29, 2015) at the website of C40 Cities (at https://www.c40.org/blog_posts/10-defining-moments-in-c40-history) (whole blog post)]

37) Book “Plan B 2.0: Rescuing a Planet Under Stress and a Civilization in Trouble” (Lester R. Brown) (January, 2006)

“Our global civilization today is on an economic path that is environmentally unsustainable, a path that is leading us toward economic decline and eventual collapse,’ says Lester Brown in Plan B 2.0: Rescuing a Planet Under Stress and a Civilization in Trouble. “

“Environmental scientists have been saying for some time that the global economy is being slowly undermined by environmental trends of human origin, including shrinking forests, expanding deserts, falling water tables, eroding soils, collapsing fisheries, rising temperatures, melting ice, rising seas, and increasingly destructive storms,’ says Brown, President and Founder of the Earth Policy Institute, a Washington, D.C.-based independent environmental research organization.”

“Although it is obvious that no society can survive the decline of its environmental support systems, many people are not yet convinced of the need for economic restructuring.”

“If we fail to build a new economy before decline sets in, it will not be because of a lack of fiscal resources, but rather because of obsolete priorities,’ adds Brown. ‘The world is now spending \$975 billion annually for military purposes. A large segment of the U.S. 2006 military budget of \$492 billion, accounting for half of the world total, goes to the development and production of new weapon systems.

Unfortunately, these weapons are of little help in curbing terrorism, nor can they reverse the deforestation of the earth or stabilize climate.”

“The military threats to national security today pale beside the trends of environmental destruction and disruption that threaten the economy and thus our early twenty-first century civilization itself. New threats call for new strategies. These threats are environmental degradation, climate change, the persistence of poverty, and the loss of hope.”

“It is hard to find the words to express the gravity of our situation and the momentous nature of the decision we are about to make,” says Brown.”

[From Press Release (January, 2006) for “Plan B 2.0: Rescuing a Planet Under Stress and a Civilization in Trouble” by Lester R. Brown (Earth Policy Institute) (press release at <http://www.earth-policy.org/books/pb2/pb2pr>)]

38) Documentary “An Inconvenient Truth” (January, 2006)

a) “An Inconvenient Truth is a 2006 American concert/documentary film directed by Davis Guggenheim about former United States Vice President Al Gore's campaign to educate people about global warming. The film features a slide show that, by Gore's own estimate, he has presented over a thousand times to audiences worldwide.”

[From the Wikipedia webpage for “An Inconvenient Truth” (at https://en.wikipedia.org/wiki/An_Inconvenient_Truth) (paragraph 1)]

b) “In 2006, Nobel Laureate and former US Vice President Al Gore got the world talking about climate change with the Academy Award-winning film An Inconvenient Truth.”

“It was just the beginning of a climate revolution. Later that year, he founded what would become The Climate Reality Project to move the conversation forward and turn awareness into action all across the Earth.”

[From the “Who We Are” webpage at the website for Climate Reality (at <https://climaterealityproject.org/whoweare>) (paragraphs 1 and 2)]

c) “The result is over 21,000 Climate Reality Leaders mobilizing communities in 154 countries. Branches in 10 critical nations and regions around the Earth. 130 activist chapters (and growing) pushing for practical clean energy policies across the US.”

[From the “Our Mission” webpage at the website for Climate Reality (at <https://climaterealityproject.org/whoweare>) (paragraphs 5)]

39) Activism “The Royal Society (Britain’s pre-eminent scientific organization)” (September, 2006)

“The Royal Society, Britain’s preeminent scientific organization, writes a letter to Exxon, inquiring into the company’s promotion of uncertainty around climate change science. The letter comes after the

Royal Society meets with Exxon to discuss its funding of climate-denying groups. Exxon promised at a previous meeting with the Royal Society to stop the funding, but had not followed up after the meeting to explain how it would fulfill the pledge. Later that month, it is reported that Exxon has stopped funding the Competitive Enterprise Institute, a think tank that has actively undermined action on climate change.”

[From the article “Exxon’s Climate Denial History: A Timeline” at the website for Greenpeace (at <https://www.greenpeace.org/usa/global-warming/exxon-and-the-oil-industry-knew-about-climate-change/exxons-climate-denial-history-a-timeline/>) (see September, 2006)

40) Report “The Stern Review” (October, 2006)

a) “On 19 July 2005 the Chancellor of the Exchequer, Gordon Brown announced that he had asked Sir Nicholas Stern to lead a major review of the economics of climate change, to understand more comprehensively the nature of the economic challenges and how they can be met, in the UK and globally. The Stern Review was prepared by a team of economists at HM Treasury; independent academics were involved as consultants only. The scientific content of the Review was reviewed by experts from the Walker Institute.”

[From the Wikipedia webpage for “Stern Review” (at https://en.wikipedia.org/wiki/Stern_Review) (in section “Background”, paragraph 1)]

b) “The Stern Review on the Economics of Climate Change is a 700-page report released for the Government of the United Kingdom on 30 October 2006 by economist Nicholas Stern, chair of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics (LSE) and also chair of the Centre for Climate Change Economics and Policy (CCCEP) at Leeds University and LSE. The report discusses the effect of global warming on the world economy. Although not the first economic report on climate change, it is significant as the largest and most widely known and discussed report of its kind.”

[From the Wikipedia webpage for “Stern Review” (at https://en.wikipedia.org/wiki/Stern_Review) (paragraph 1 at the top of the page)]

c) “The Stern review was not released for regular peer-review, since the UK Government doesn't undertake peer review on commissioned reviews. Papers were published and presentations held, that outlined the approach in the months preceding the release.”

[From the Wikipedia webpage for “Stern Review” (at https://en.wikipedia.org/wiki/Stern_Review) (in section “Background”, paragraph 2)]

d) “...The Stern Review's main conclusion is that the benefits of strong, early action on climate change far outweigh the costs of not acting. The Review points to the potential impacts of climate change on water resources, food production, health, and the environment. According to the Review, without action, the overall costs of climate change will be equivalent to losing at least 5% of global gross domestic product (GDP) each year, now and forever. Including a wider range of risks and impacts could increase this to 20% of GDP or more, also indefinitely. Stern believes that 5–6 degrees of temperature increase is ‘a real possibility.’”

[From the Wikipedia webpage for “Stern Review” (at https://en.wikipedia.org/wiki/Stern_Review) (paragraph 2 in the first section at the top of the page)]

e) “The Stern Review attracted positive attention from several sectors. Pia Hansen, a European Commission Spokeswoman, said doing nothing is not an option, ‘we must act now’. Simon Retallack of the UK think tank IPPR said “This [Review] removes the last refuge of the ‘do-nothing’ approach on climate change, particularly in the US.” Tom Delay of The Carbon Trust said ‘The Review offers a huge business opportunity.’ Richard Lambert, Director General of the Confederation of British Industry, said that a global system of carbon trading is ‘urgently needed’. Charlie Kronick of Greenpeace said ‘Now the government must act and, among other things, invest in efficient decentralised power stations and tackle the growth of aviation.’”

[From the Wikipedia webpage for “Stern Review” (at https://en.wikipedia.org/wiki/Stern_Review) (in the section “Positive Critical Response”, paragraph 1)]

f) “Stern as an orthodox economist squeezes all matters and concepts into a narrow mathematical formalism which heterodox economists, such as Tony Lawson, point out fails to address economic and social reality.”

[From the Wikipedia webpage for “Stern Review” (at https://en.wikipedia.org/wiki/Stern_Review) (in the section “Ecological Economics Critique”, in paragraph 2)]

g) “Spash has argued that issues are suppressed and sidelined in a careful and methodical manner, with the pretense they have been addressed by ‘state of the art’ solutions. Meanwhile, the authors maintain allegiance to an economic orthodoxy which perpetuates the dominant political myth that traditional economic growth can be both sustained and answer all our problems.”

[From the Wikipedia webpage for “Stern Review” (at https://en.wikipedia.org/wiki/Stern_Review) (in the section “Ecological Economics Critique”, in paragraph 4)]

(Beginning a multi-year section--Climate Emergency Action in Higher Education)

41) Climate Emergency Action in Higher Education (a multi-year section)

a) Second Nature

“From its founding, Second Nature has worked to expand higher education’s ability to solve pressing sustainability challenges. Since 2006, that focus has been aimed at addressing the largest environmental challenge that civilization has faced: global climate change. This was the launch year of the **Presidents’ Climate Leadership Commitments**, now the longest standing voluntary carbon reduction program in the world, and through it the **Climate Leadership Network** of over 600 universities and colleges formed.”

[From the “Mission” webpage of the website for Second Nature (at <https://secondnature.org/mission/>) (paragraph 4)]

b) American College & University Presidents’ Climate Commitment (ACUPCC)

“In late 2006, twelve visionary college and university presidents initiated the American College & University Presidents’ Climate Commitment (ACUPCC). They were motivated by their conviction that higher education had the capacity and responsibility to lead on climate and sustainability action for the sake of their students and society.

“The twelve founding signatories of the ACUPCC were:

Loren Anderson, President Pacific Lutheran University
Michael Crow, President Arizona State University
Nancy Dye, President Oberlin College
Jo Ann Gora, President Ball State University
David Hales, President College of the Atlantic
Bernard Machen, President University of Florida
Gifford Pinchot III, President Bainbridge Graduate Institute
Kathleen Schatzberg, President Cape Cod Community College
Mary Spilde, President Lane Community College
Douglas Treadway, President Ohlone College
Darroch Young, Chancellor Los Angeles Community College District
Paul Zingg, President California State University, Chico

“These Founding Signatories worked with Second Nature, ecoAmerica, and AASHE to develop the Commitment, and in early 2007 they invited their peers across the nation to join this historic endeavor. By September 15, 2007, 336 institutions had joined the initiative as **charter signatories**. By Earth Day 2008, the ACUPCC was a national initiative with signatories in all 50 states and the District of Columbia. In 2009, Second Nature became the lead supporting organization for the ACUPCC with additional support from AASHE.”

[From the “History” section of the website for Second Nature (at <https://secondnature.org/history/>) (paragraphs 1-5)]

c) 350.org

i) “350.org was founded by American environmentalist Bill McKibben and a group of students from Middlebury College in Vermont. Their 2007 ‘Step It Up’ campaign involved 1,400 demonstrations at famous sites across the United States.”

[“McKibben is an American environmentalist and writer who wrote one of the first books on global warming for the general public (see entry for “The End of Nature”), and frequently writes about climate change, alternative energy, and the need for more localized economies.”]

[From the Wikipedia webpage “350.org” (at <https://en.wikipedia.org/wiki/350.org>) (in the section “Origins”, in paragraphs 1-2)]

ii) “350.org is an international environmental organization addressing the climate crisis. Its stated goal is to end the use of fossil fuels and transition to renewable energy by building a global, grassroots movement.”

“The 350 in the name stands for 350 ppm (parts per million) of carbon dioxide, which has been identified as the safe upper limit to avoid a climate tipping point. As of 2019, the current level has reached 415 ppm.”

“Through online campaigns, grassroots organizing, mass public actions, and collaboration with an extensive network of partner groups and organizations, 350.org has mobilized thousands of volunteer organizers in over 188 countries. It is one of the many organizers of the Global Climate Strike from September 20 to 27, 2019 which evolved from the Fridays for Future movement.”

[From the Wikipedia webpage “350.org” (at <https://en.wikipedia.org/wiki/350.org>) (in the first section, paragraph 1-3)]

iii) “350.org runs a variety of campaigns, from the local to the global scale.”

Fossil fuel divestment

“The fossil fuel divestment campaign, also known as ‘Fossil Free’, borrows activist tactics from other social movements, notably the successful movement against apartheid in South Africa. Since its inception in 2012, over 1110 institutions with more than US\$11 trillion in assets under management have committed to divest from fossil fuels. 350.org explains that the reasoning behind this campaign is simple: ‘If it is wrong to wreck the climate, then it is wrong to profit from that wreckage.’ 350.org states their demand as the following ‘We want institutions to immediately freeze any new investment in fossil fuel companies, and divest from direct ownership and any commingled funds that include fossil fuel public equities and corporate bonds.’”

“The campaign has grown from colleges and universities around the United States to now include other kinds of public and private institutions, such as the City of New York, major Japanese banks, development banks, religious institutions and more. Campaigns for divestment are active and growing around the world.”

Keystone XL pipeline

“350.org has named the Keystone XL pipeline as a critical issue and turning point for the environmental movement, as well as for President Obama's legacy. NASA climatologist James Hansen labeled the Keystone XL pipeline as ‘game over’ for the planet, and called the amount of carbon stored in Canadian bitumen sands a ‘fuse to the largest carbon bomb on the planet.’”

[From the Wikipedia webpage “350.org” (at <https://en.wikipedia.org/wiki/350.org>) (in the section “Campaigns”, paragraph 1-4)]

International Day of Climate Action

“An ‘International Day of Climate Action’ on October 24, 2009, was organized by 350.org to influence the delegates going to the United Nations Framework Convention on Climate Change meeting in December, 2009 (COP15). This was the first global campaign ever organized around a scientific data point. The actions organised by 350.org included gigantic depictions of the number “350”, walks, marches, rallies, teach-ins, bike rides, sing-a-thons, carbon-free dinners, retrofitting houses to save

energy, tree plantings, mass dives at the Great Barrier Reef, solar-cooked bake-outs, churches bell ringings, underwater cabinet meetings (Maldives), and armband distributions to athletes. The organization reported that over 5,200 synchronized demonstrations occurred in 181 countries on the day. The group reports that they organised the world's "most widespread day of political action" on Saturday October 24, 2009, reporting 5,245 actions in 181 countries."

[From the Wikipedia webpage "350.org" (at <https://en.wikipedia.org/wiki/350.org>) (in the section "Campaigns", paragraph 9)]

Global Climate Strike

"350.org is one of the leading organizers of the Global Climate Strike, September 20–27, 2019. Strike actions are planned in more than 150 countries. Worn by a broad coalition of NGOs, unions and social movements, the strikes were inspired by the school strikes of the Fridays For Future movement. Also supported is the digital climate strike, which calls for a shutdown or 'go green' of websites with redirection to coverage of the physical mobilizations.

"The aim of the Global Climate Strike is to draw attention to the emergency climate crisis and to create pressure on politics, the media and the fossil fuel industry."

"Over 7.6 million people across 185 countries participated in this mass mobilization event, making the Global Climate Strike the largest climate mobilization in history."

[From the Wikipedia webpage "350.org" (at <https://en.wikipedia.org/wiki/350.org>) (in the section "Campaigns", paragraphs 15-17)]

d) UC3 (University Climate Change Coalition)

"For North American research universities committed to climate action and cross-sector collaboration, UC3 is a collaborative coalition that leverages relationships and expertise to accelerate local climate solutions and build community resilience."

"Moving into the third year since the launch of the UC3 at the 2018 Higher Education Climate Leadership Summit, the Coalition has matured and refined its role as an accelerant of place-based climate solutions and leading voice on the urgency of emissions mitigation and climate resilience actions. This strategic plan represents an updated vision and trajectory for the Coalition, building upon its successes and lessons learned over the past two years from cross-sector forums, internal collaborations, and partnerships with local and regional stakeholders."

"In just two years of being in existence, the University Climate Change Coalition (UC3) has taken major action in creating climate solutions to help local communities achieve their climate goals and accelerate the transition to a low-carbon future."

"You can learn more about the work that has been done, and the accomplishments achieved thus far over the first two years, [here](#)."

[From the webpage "About University Climate Change Coalition" at the website of Second Nature (at <https://secondnature.org/about-uc3-2/>) (in section "Overview", paragraph 1; in section "Strategic Plan", paragraph 1; and in section "2019 UC3 Impact Report", paragraphs 1 and 2)]

e) Organization “Association for the Advancement of Sustainability in Higher Education (AASHE)”
(Launched 2005)

i) In 2004, EFS West held the first North American Conference on Sustainability in Higher Education in Portland, Oregon. The success of this conference and increasing demand for EFS West’s resources led it to transition from a regional network to an independent higher education association serving all of North America – the Association for the Advancement of Sustainability in Higher Education. AASHE was officially launched in December 2005, serving as the first professional higher education association for the campus sustainability community in North America.

[From the “History of AASHE” webpage at the website for Association for the Advancement of Sustainability in Higher Education (AASHE) (at <https://www.aashe.org/about-us/aashe-history/>) (paragraph 2)]

ii) Milestones

“2005

AASHE officially launched in Portland, OR with two staff members. Judy Walton served as the first Executive Director.

2006

The AASHE Bulletin launched as a comprehensive listing of news, opportunities and resources related to higher education sustainability. By the end of the year, more than 250 stories were published, demonstrating the strength of our community.

AASHE held first its conference in Tempe, AZ, with over 650 attendees.

American College & University Presidents’ Climate Commitment (ACUPCC) was created with support from AASHE, Second Nature and ecoAmerica. Signatories to this commitment pledged to measure and report their greenhouse gas emissions, take immediate actions to reduce them, and develop and implement a plan to go climate neutral.

AASHE’s Campus Sustainability Achievement Awards and Student Sustainability Leadership Award were given for the first time.

2008

AASHE held its second conference in Raleigh, NC with more than 1,700 participants, more than double the attendance at its first conference.

The bi-annual Sustainability Staffing Survey was published serving as a standard reference for providing insights into salaries, funding, supervision, job satisfaction, challenges and more as well as increasing our understanding of the continuously growing career field of higher education sustainability.

2009

AASHE held a joint conference with Ball State University in Indianapolis and grew large enough to commit to an annual conference format.

The U.S. Green Building Council (USGBC) bestowed their prestigious Leadership in Non-Governmental Organization Sector award to AASHE, eco-America and Second Nature for the development of the American College & University Presidents’ Climate Commitment, which by that time had been signed by more than 700 college and university presidents.

2010

AASHE was recognized by the North American Association for Environmental Education as the Outstanding Service to Environmental Education Organization, Global Level.

2011

AASHE launched the international pilot for STARS to enable campuses outside of the U.S. and Canada to participate and report their sustainability data.

The first Sustainability Officer's Retreat was held in Nebraska City, NE.

2012

A new logo was introduced as a visual representation of how AASHE serves as the bridge toward sustainability in higher education.

A partnership between STARS, Sierra magazine and The Princeton Review is formed to help streamline sustainability reporting efforts.

2013

STARS 2.0 was launched, which includes a free basic access tier to provide an opportunity for new participants to try it out before making a financial commitment and make STARS more accessible to under-resourced institutions.

2014

STARS surpassed 500 ratings representing a significant increase in sustainability reporting and advancements in sustainability.

2015

AASHE celebrated its tenth anniversary, an important milestone for the higher education sustainability movement that provided the community a chance to reflect about how far it's come, what it's learned and where it's going.

2,337 attendees came together in Minneapolis, MN for the most attended conference ever.

AASHE granted its members voting rights, which allows members to elect a portion of the Board of Directors.

Colorado State University became the first institution to earn a STARS Platinum Rating, the highest rating available.

The American College in Greece became the first institution in Europe to earn a STARS rating.

The Green Gigawatt Partnership initiative began in an effort to catalyze at least one gigawatt of new green power in higher education by using long-term, large-scale, power purchase agreements.

The Sustainable Campus Index publication was introduced to recognize top-performing colleges and universities in 17 distinct aspects of sustainability, as measured by STARS.

AASHE celebrated Campus Sustainability Month throughout October for the first time to engage and inspire incoming students and other campus stakeholders to become sustainability change agents. The event builds on Campus Sustainability Day, which had been celebrated on the fourth Wednesday in October since 2003.

Sustainability Tracking, Assessment & Rating System (STARS) 1.0 launched providing institutions the opportunity to benchmark their sustainability efforts.

2016

The Campus Sustainability Hub, an online resource library that allows AASHE members to connect, share and learn about sustainability in higher education, was released to provide an ever-growing library of resources to AASHE members.

STARS 2.1 launched with new features including data auto-population, exemplary practice options and a pre-publication review process to make sustainability reporting easier.

2017

Affiliates program launched to encourage regional collaboration and networking

Mentorship program launched to connect campus sustainability practitioners with peers to share knowledge, cooperate on projects and advance the field of higher education sustainability.

AASHE's Centers for Sustainability Across the Curriculum organized a dozen of workshops reaching over 240 faculty in their first year.

AASHE releases *Beyond the Right Thing to Do: The Value of Sustainability in Higher Education*

AASHE receives grant from Goldman Fund to administer Turning the Page on Campus Paper Use initiative

Stanford University and University of New Hampshire become the second and third institutions to earn a STARS Platinum rating

2018

Launched AASHE Connect, a powerful resource where members can network, exchange knowledge and share solutions in real time.

Earned the 2018 GuideStar Gold Seal in recognition for our transparency about our goals, strategies, capabilities and progress.

Named the first organization working in the higher education sector to achieve JUST recognition.

Introduced the Lifetime Achievement Award, a new category for the AASHE Sustainability Awards.

Released of our Diversity, Equity and Inclusion statement, which reaffirms our resolve to advancing DEI as a core value.

Started a new partnership with ACTS that brings STARS to higher education institutions in Australasia.

Formed a partnership with the Green Guy, Eric Moncrief, to produce the College Sustainability Summit

Series. The podcast series aims to help hundreds of colleges share their sustainability stories nationwide.

Two additional institutions achieve a STARS Platinum rating.”

[From the “History of AASHE” webpage at the website for Association for the Advancement of Sustainability in Higher Education (AASHE) (at <https://www.aashe.org/about-us/aashe-history/>) (in the section “Milestones”)]

(Note: There are many links in the above timetable that were not carried over into this document, as they are easily accessible at <https://www.aashe.org/about-us/aashe-history/>)

iii) The Sustainability Tracking, Assessment & Rating System™ (STARS)

“In 2006, The Higher Education Associations Sustainability Consortium (HEASC) issued a call for AASHE to develop a campus sustainability rating system.”

“The Sustainability Tracking, Assessment & Rating System™ (STARS) is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance.”

“STARS® is intended to engage and recognize the full spectrum of higher education institutions, from community colleges to research universities. It encompasses long-term sustainability goals for already high-achieving institutions, as well as entry points of recognition for institutions that are taking first steps toward sustainability. STARS is designed to:

Provide a framework for understanding sustainability in all sectors of higher education.

Enable meaningful comparisons over time and across institutions using a common set of measurements developed with broad participation from the international campus sustainability community.

Create incentives for continual improvement toward sustainability.

Facilitate information sharing about higher education sustainability practices and performance.

Build a stronger, more diverse campus sustainability community.

Through participating in STARS, your institution can earn points toward a STARS Bronze, Silver, Gold, or Platinum Rating, or earn the STARS Reporter designation. Each seal represents significant sustainability leadership.”

iv) Spreadsheet with requirements for STARS program

<https://docs.google.com/spreadsheets/d/1bedljvBrhuNAXoPxYXV02a0oOpG9QnG9oFkqu3EwqOE/edit#gid=0> STARS requirements

v) “The Campus Sustainability Hub is a one-stop shop for AASHE members to access toolkits and resource collections about all aspects of sustainability in higher education, from academics to operations to governance.” (Hub can be browsed by sustainability topic or content type, or enter search terms)

f) Publications “The Princeton Review Guide to Green Colleges” (launched in 2010)

“NEW YORK, October 20, 2020 / — The Princeton Review® today released its 11th annual Guide to Green Colleges, a free resource that the education service company has published since 2010 for college applicants seeking schools with exemplary commitments to the environment and sustainability.”

“Accessible for free at www.princetonreview.com/green-guide, The Princeton Review Guide to Green Colleges, 2021 Edition profiles 416 colleges the company chose out of the 695 schools it surveyed for this edition.”

“Earning the #1 spot on the guide's Top 50 Green Colleges ranking list—and for the fifth consecutive year—is the College of the Atlantic in Bar Harbor, ME. Established in 1969, College of the Atlantic was the first college in the U.S. specifically founded to focus on the relationship between humans and the environment. In 2007, the school became the first carbon-neutral college in the U.S. It has since committed to becoming fossil fuel-free by 2030.”

“We are especially pleased to recommend these colleges during Campus Sustainability Month, the international celebration of sustainability in higher education,” said Rob Franek, Editor in Chief of The Princeton Review. “With robust offerings in environmental studies and initiatives that range from solar-powered residence halls to tray-less dining halls, these schools demonstrate their commitment to sustainability in a range of innovative ways. We recommend them highly to all students seeking to learn and live at a green college.”

“Franek noted that The Princeton Review has seen a high level of interest among college applicants and their parents in colleges with green practices, programs, and offerings. Sixty-six percent of the 12,845 respondents (college-bound teens and parents) to The Princeton Review's 2020 College Hopes & Worries Survey said that having information about a college's commitment to the environment would affect their (or their child's) decision to apply to or attend a school. A report on the survey findings is downloadable here.”

“The top 15 schools on The Princeton Review's ranking list of Top 50 Green Colleges for 2021 are:

College of the Atlantic (ME)
Oberlin College (OH)
Middlebury College (VT)
State University of New York—College of Environmental Science and Forestry
Pitzer College (CA)
Dickinson College (PA)
Chatham University (PA)
Cornell University (NY)
Whitman College (WA)
Colorado State University
University of California—Santa Cruz
Stanford University (CA)
University of California—Santa Barbara
Colby College (ME)

Portland State University (OR)

The list of top 50 colleges is viewable here. As a group, the top 50 schools have compelling statistics with respect to the levels of their commitment to sustainability. “

“Overall:

21% of their total food purchases are from local sources and/or organic

49% of their waste is diverted from incinerators or solid-waste landfills

98% offer a sustainability-focused undergraduate major or degree

100% have a sustainability officer

The school profiles in The Princeton Review Guide to Green Colleges present information on each school's use of renewable energy, its recycling and conservation programs, the availability of environmental studies in academic offerings, and career guidance for green jobs. The profiles also include information on the schools' admission requirements, cost, and financial aid.”

How Schools Were Chosen for the Guide

“The Princeton Review chose the 416 colleges based on its survey of administrators at 695 colleges in 2019–20 concerning their institutions' sustainability-related policies, practices, and programs. Survey topics ranged from academic offerings and campus initiatives to career preparation for ‘green’ jobs.”

“More than 25 survey data points were analyzed by The Princeton Review editors to tally Green Rating scores for the schools on a scale of 60 to 99. Colleges that earned a Green Rating of 80 or higher made it into the guide. Of the 416 schools in the 2021 edition, 393 are in the U.S., 22 are in Canada, and one is in Greece. The 416 schools are listed alphabetically in the guide and not ranked overall from 1 to 416. Colleges that earned a Green Rating of 99 made it onto The Princeton Review's earlier (August 2020) reported Green Honor Roll, as well as this guide. The Green Rating scores appear in the profiles of the schools in the guide on The Princeton Review website and in profiles of the schools in the 2021 editions of the Princeton Review books, The Best 386 Colleges (published August 2020) and The Complete Book of Colleges (published July 2020).”

How the Guide's Top 50 Green Colleges Ranking List Was Tallied

“The Princeton Review tallied the top 50 ranking list based on data from its surveys of administrators at the colleges for its Green Rating scores as well as its surveys of students attending the colleges. Ten data points from the administrator survey were factored into the tally for the ranking list and three from the student survey. Data from the student survey included student assessments of the influence of sustainability issues on their academic and campus experiences; administrator and student support for environmental awareness and conservation efforts; and the visibility and impact of student environmental groups on the campus.”

“Note: The Princeton Review Guide to Green Colleges released last year, on October 22, 2019, was the 2019 edition. This guide is presented as the 2021 edition to align the project with publishing protocols by which guides released after June in a calendar year are identified as editions for the upcoming year.”

[From the Press Release “The Princeton Review Has Released Its Guide to Green Colleges: 2021 Edition” (October 20, 2020) at the website of The Princeton Review (at <https://www.princetonreview.com/press/green-guide/press-release#:~:text=NEW%20YORK%2C%20October%2020%2C%202020,to%20the%20environment%20and%20sustainability>) (whole press release reproduced)]

g) Special Section on University and College Associations, and Student Associations
(Twitter Profiles)

International Association of Universities (IAU)

@IAU_AIU

International Association of Universities

#IAUat70 #higherEd #SDGs #Leadership #technology #IAUSDGs @IAU_HESD

IAU HESD

@IAU_HESD

@IAU_AIU 2nd account on HESD #HigherEd and #Research for #Sustainabledevelopment
#SDGs #Universities #IAUSDGs #IAUCLUSTERSDGs #IAUat70

Hillegje van't Land, PhD

@VantlandH

Secretary General, International Association of Universities (IAU) @iau_iau; @iau_hesd; #HigherEd;
#HEpolicy&research; #HESD; #internationalisation; #leadership @IDEAPhD

Eco-Schools Global

@EcoSchoolsInt

Eco-Schools is the largest #sustainable #schools #ESD programme in the world, supporting #SDGs.
Owned and run by FEE International @FeelInt #GreenFlag

IIEglobal

@IIEglobal

IIE is among the world's largest and most experienced international education organizations, committed
to serving participants, sponsors and donors since 1919.

AASHE

@AASHENews

An association of (U.S.) colleges and universities that are working to create a sustainable future.

International Universities Climate Alliance

@unisforclimate

Follows you

The International Universities Climate Alliance represents the leading research universities in climate
research.

Global Alliance of Universities on Climate

@GAUC_News

gauc.net

IntentionalEndowment

@IntentEndowment

Intentional Endowments Network: #higherEd & foundation endowments pursuing #ESG &
#sustainability investing. Managed by @georgesdyer

ISCN Secretariat

@ISCNSecretariat

The International Sustainable Campus Network is a non-profit association of global colleges & universities working to integrate sustainability into all they do

UNU Institute for Advanced Study of Sustainability

@UNUIAS

A research & teaching institute of the United Nations University, dedicated to advancing global efforts on sustainability.

GreenSchoolsAlliance

@GreenSchoolsAll

Connecting and supporting champions who are creating #healthy and #sustainable #schools.
#GreenSchoolsChat Contact Number: 413-749-5267

Gaia University

@Gaia_University

The University for World Changers. Transformative Action Learning Degrees for Ecological and Social Regeneration.

Universitas 21

@u21news

Bringing leading global research universities together.

The EAIE

@TheEAIE

We are a member-led organisation supporting international higher education professionals through training, conferences and knowledge sharing. #highered #intled

The Guild

@guildeu

A network of 20 research-led universities in 15 countries dedicated to excellence in research, education and innovation across Europe. Established in 2016.

German U15

@German_U15

German U15 - an association of 15 leading research universities - news from our universities & tweets about developments in higher education in Germany

IARU

@IARUnews

The International Alliance of Research Universities (IARU) is a collaboration between eleven of the world's leading research-intensive universities.

ACE

@ACEducation

The major coordinating body for the (U.S.) nation's colleges & universities, representing nearly 1,800 higher ed leaders.

EUA

@euatweets

EUA, the European University Association, is the representative organisation of Europe's #universities with 850 members in 48 countries. #HigherEducation

Universities UK
@UniversitiesUK
The voice of UK universities

The Association of Commonwealth Universities
@The_ACU
The ACU is dedicated to building a better world through higher education. Join our unique network of over 500 universities in 50 countries!

Ashoka U
@AshokaU
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h) Special Section: Additional Notes on Divesting

i) "Today, 985 institutional investors with \$6.24 trillion in assets under management have committed to divest from fossil fuels, up from \$52 billion four years ago" (September, 2018)

"2018 is a year of many firsts for the Divestment Movement..."

--"Earlier this year, Mayor Bill de Blasio and Comptroller Scott Stringer announced a plan to divest New York City's \$189 billion pension funds from fossil fuel companies within five years. This announcement follows similar actions in Berlin, Paris, Copenhagen, New Zealand and Sydney in previous years."

--"In July, Ireland became the first nation in the world to divest."

--"The leaders of the American Medical Association pledged to fossil fuel divestment for the organization's assets, but also to help guide all organizations and all health professionals' investments towards divestment." (Dr. Todd Sack, member of the AMA and Board of Physicians for Social Responsibility)

[From article "Global Fossil Fuel Divestment Movement Reaches \$6.24 Trillion in Assets Under Management, 120x Increase From Four Years Ago, Report Says" (Cision PR Newswire; September 11, 2018) (at <https://www.prnewswire.com/news-releases/global-fossil-fuel-divestment-movement-reaches-6-24-trillion-in-assets-under-management-120x-increase-from-four-years-ago-report-says-300710204.html>) (in paragraphs 1 and 3)]

ii) Commitments so far (accessed September 21, 2020)

- 1,246 Organisations
- 58,000 Individuals
- \$14.1 trillion combined assets

A full list of organizations that have said they have or will DivestInvest is available to download [here](#).

[From the homepage for the website Divest Invest (<https://www.divestinvest.org/>) (3rd section)]

iii) "Diversified Sectors for Climate Solutions Investing"

"Signatories commit to investing in 'climate solutions, broadly defined.' Climate solutions include renewable energy, climate justice initiatives, resilient infrastructure, sustainable agriculture, water projects, and more. The options are diverse to reflect the fact that every sector of the economy must pivot to meet our existential challenge. Below is a summary chart that previews climate solutions at a glance."



[From information booklet “Divest-Invest Philanthropy: a Primer” at the website of Divest Invest (see section “About Us”, and subsection “Further Reading”)(at <https://www.divestinvest.org/about/>); in “Primer” (at <https://www.divestinvest.org/wp-content/uploads/2017/09/2017-DIP-Briefing-Case-Studies.pdf>) above quote and chart are from p. 23]

[(Editor’s Note--SP): see also

160) Article “Networks of 7,000 universities declare climate emergency” (Brendan O’Malley) (July, 2019) (p. 212 in this paper)]

(End of a multi-year section--Climate Emergency Action in Higher Education)

42) Interview with Albert Bates (Culture Change) (April, 2007)

a) “Albert Kealiinui Bates (born January 1, 1947) is an influential figure in the intentional community and ecovillage movements. A lawyer, author and teacher, he has been director of the Global Village Institute for Appropriate Technology since 1984 and of the Ecovillage Training Center at The Farm in Summertown, Tennessee, since 1994.”

“Bates has been a resident of The Farm since 1972. A former attorney, he argued environmental and civil rights cases before the U.S. Supreme Court and drafted a number of legislative Acts during a 26-year legal career. The holder of a number of design patents, Bates invented the concentrating photovoltaic arrays and solar-powered automobile displayed at the 1982 World's Fair. He served on the steering committee of Plenty International for 18 years, focusing on relief and development work with indigenous peoples, human rights and the environment. An emergency medical technician (EMT), he was a founding member of The Farm Ambulance Service. He was also a licensed Amateur Radio operator.”

“Bates has played a major role in the ecovillage movement as one of the organizers of the Global Ecovillage Network (GEN), and served as GEN's chairman of the board (from 2002 to 2003) and president (from 2003 to 2004). He was also the principal organizer of the Ecovillage Network of the Americas and served as its president (from 1996 to 2003). In 1994 he founded the Ecovillage Training Center, a "whole systems immersion experience of ecovillage living." He has taught courses in sustainable design, natural building, permaculture and technologies of the future to students from more than 50 nations.

[From the Wikipedia webpage for “Albert Bates” at the Wikipedia website (see https://en.wikipedia.org/wiki/Albert_Bates) (paragraphs 1, 2, and 4)]

b) “As a public interest attorney fighting deep well injection in Tennessee on behalf of a coalition of environmental groups, I only learned about climate change in the late 1970s because the security of future water resources were being argued openly in court.”

c) “What has happened is that after six years, 2500 scientists, 450 lead authors and 800 contributors in 130 countries have issued a definitive report that makes no bones about the fact that we are on the road to Hell on Earth, that we won't see the cool planet we had just 20 years ago for maybe 20,000 years more, maybe 200,000 years, if ever, and that there is a chance that nothing we can do can now stop Earth from being reduced to a lifeless desert world like Mars, perhaps even within the lifetime of some of those now alive; my granddaughter, for instance.”

d) “There is a message for our times that isn't seeming to be **coming through the mist quite as much as it should be**, and although others are voicing it also, and some much better than I can, I felt the pressing need to lend my voice and hopefully raise the volume to more of a chorus. And I think it is beginning to have some effect, although still far too little. I invite more people to also raise a voice. Some strong voices have been silent for a long time. This is not the time to be silent.”

[From “Culture Change Letter #157” titled “Albert Bates, guide for our post-petroleum, globally warmed future” (April 16, 2007) at the website of Culture Change (at <http://www.culturechange.org/cms/content/view/108/1/>) (paragraphs 1; under question #7, paragraph 2; under question #5, paragraph 2; under question #6, paragraph 1)]

43) Organization “Transition Network” (founded 2007)

a) History

“The terms transition town, transition initiative and transition model refer to grassroots community projects that aim to increase self-sufficiency to reduce the potential effects of peak oil, climate destruction, and economic instability. In 2006, founding of Transition Town Totnes, in the United Kingdom, became an inspiration for other groups to form.”

“In early 2007, the Transition Network UK charity was co-founded by permaculture educator Rob Hopkins, Peter Lipman and Ben Brangwyn to support these projects. It trains and supports people involved with the initiatives. It also disseminates the concepts of transition towns.”

“In 2008, the number of communities involved in the project had increased with many localities in the process of becoming ‘official’ Transition towns. This was also the year that the *Transition Handbook* was published.”

“The initiative spread and by May 2010 there were over 400 community initiatives recognized as official Transition towns in the United Kingdom, Ireland, Canada, Australia, New Zealand, the United States, Italy and Chile.”

From the Wikipedia webpage for “Transition town” at the Wikipedia website (at https://en.wikipedia.org/wiki/Transition_town) (paragraphs 1; in section “History”, subsection “Transition Network founded”, paragraph 1; in section “History”, subsection “2008 to present day”, paragraphs 1-2)]

b) As of November, 2020, there were 998 initiatives, and 28 hubs.

[From the webpage “Transition Network” at the website for Transition Initiative (at <https://transitioninitiative.org/>) (see totals in small box on left side)]

c) Key Publications

i) Kinsale Energy Descent Action Plan

“In 2004, (Rob Hopkins) became aware of the concept of **peak oil**, and set his students the task of applying permaculture principles to addressing this challenge. The output of this student project was the ‘Kinsale Energy Descent Action Plan’, which was uploaded to the college website. Much to the surprise of the authors, it was downloaded by interested parties around the world. In July 2005, Kinsale FEC hosted [Fuelling the Future](#), a conference on peak oil and solutions to it.”

[From the Wikipedia webpage for “Rob Hopkins” at the Wikipedia website (at https://en.wikipedia.org/wiki/Rob_Hopkins) (in section “Biography”, in subsection “Ireland (1996-2005)”, paragraph 3)]

ii) From “Designing Energy Descent Pathways: Unleashing Abundance as a Community Response to Peak Oil” by Rob Hopkins

“We saw the practicalities of the people trying to put the first building blocks in place, and their visions for how things might change. We began to envisage a 3-4 year process of community consultation, education and awareness-raising, combined with practical implementation of projects on the ground and the formulation of a timetables plan for making this transition. This plan became christened the Kinsale Energy Descent Action Plan. The idea was that this year’s second year students produce the first draft, which is then put out to the community for consultation, and then the following year’s students revise the document and update it. We felt that this would take about 3 years to produce something nearing a definitive document, although there would always need to be space allowed for the document to adapt to developments, to be ‘tweaked’.”

“We had brainstorming sessions on each of the different areas we identified for the Action Plan. These were Food, Youth & Community, Education, Housing, Economy and Livelihoods, Health, Tourism, Transport, Waste, Energy and Marine Resources. Future years may add new categories to this, but it seemed a good starting list. We made Mind Maps of the issues raised and possible solutions to them. We also invited speakers into the class who had a lot of knowledge on some of these topics.”

Kinsale 2021

“On Saturday February 12th 2005 we held an event in Kinsale called “Kinsale in 2021--Towards a Prosperous, Sustainable Future Together”, which took place at Kinsale Town Hall. The event was presented as a ‘community think-tank’ in order to hear the community’s ideas about how energy descent would affect the community and what might be done about it. Before the event we sent personal invitations to the people in Kinsale that we had identified as being the movers and shakers in the town, drawn from the sectors identified above. We also left the event open to the public and put posters up around the town. From the 60 people invited, about 35 turned up on the day. The event itself was opened by the Mayor of Kinsale, Mr Charles Henderson, who spoke of the importance of energy as an issue and how it affects all aspects of our lives and our economy. This was followed by a screening of ‘The End of Suburbia’.”

“After the film, Thomas Riedmuller, who teaches Community Leadership at Kinsale FEC, introduced the concept of Open Space Technology as a tool for facilitating such events. Open Space is based on the idea that the most productive discussion and idea sharing at any event happens during the tea breaks. Open Space is, in essence, a long tea break, where groups are formed to discuss certain issues, and everyone is free to move between discussion groups, based on the four principles of Open Space, whoever comes are the right people, whatever happens is the only thing that could have, whenever it starts is the right time, and when it’s over it’s over. Those assembled took to the Open Space model with great enthusiasm, and it was extremely productive. People were invited to identify the specific problems and issues that the film raised for them. These were then recorded on large sheets of paper and pinned up on the wall. These were then collated into subject areas, and each of these became the basis for a discussion group. The groups covered the following subjects, Food, Rebuilding Communities, Youth Group/Education, Business & Technology, Tourism and renewable energy.”

[From repost of article “Designing Energy Descent Pathways Unleashing Abundance as a Community Response to Peak Oil” by Rob Hopkins in the Transition Network blog, in a blog post titled “Updated Kinsale Article Posted by Popular Demand...” (March 6, 2006) (at <https://www.transitionculture.org/2006/03/06/updated-kinsale-article-posted-by-popular-demand/>) (in the section “Starting from Scratch”, paragraphs 1-2; in the section “Kinsale 2021”, paragraphs 1-2)

iii) Transition Handbook (2008)

“Central to the book is the concept of resilience. Resilience refers to the ability of a system, from individual people to whole economies, to hold together and maintain their ability to function in the face of change and shocks from the outside. The Transition Handbook argues that in our current efforts to drastically cut carbon emissions, we must also give equal importance to the building of resilience...a culture based on its ability to function indefinitely and to live within its limits, and able to thrive for having done so.”

“We need new stories that paint new possibilities where we see ourselves in relation to the world around us, that entice us to view the changes ahead with anticipation of the possibilities they hold, and that will, ultimately, give us the strength to emerge at the other end into a new, but more nourishing world.”

“What might environmental campaigning look like if it strove to generate this sense of elation rather than the guilt, anger and horror that most campaigning invokes? ...The Transition movement is an attempt to design abundant pathways down from the oil peak, to generate new stories about what might be waiting for us at the end of our descent, and to put resilience-building back at the heart of any plans we make for the future.”

“Unless we can create this sense of anticipation, elation and a collective call to adventure on a wider scale, any government responses will be doomed to failure, or will need to battle protractedly against the will of the people. Imagine if there were a way of creating that sense of positive engagement and new storytelling on a local, regional, or even a nation-wide scale. The Transition Handbook is an exploration of that potential, an immersion in the possibilities of applied optimism, and an introduction to a movement growing so fast that by the time you read the book it will be larger still...This book represents a new way of looking at what our future might hold, arguing that by taking a proactive response rather than a reactive one, we can still shape and form that future, within the rapidly changing energy context, in such a way that it ends up preferable to the present.”

[From an 8 page summary of the “Transition Handbook” accessible at the website of academia.edu (webpage for downloading 8 page pdf file is

https://www.academia.edu/2520200/The_Transition_Handbook_From_oil_dependency_to_local_resilience) (paragraphs 1-4)]

d) Campaign--

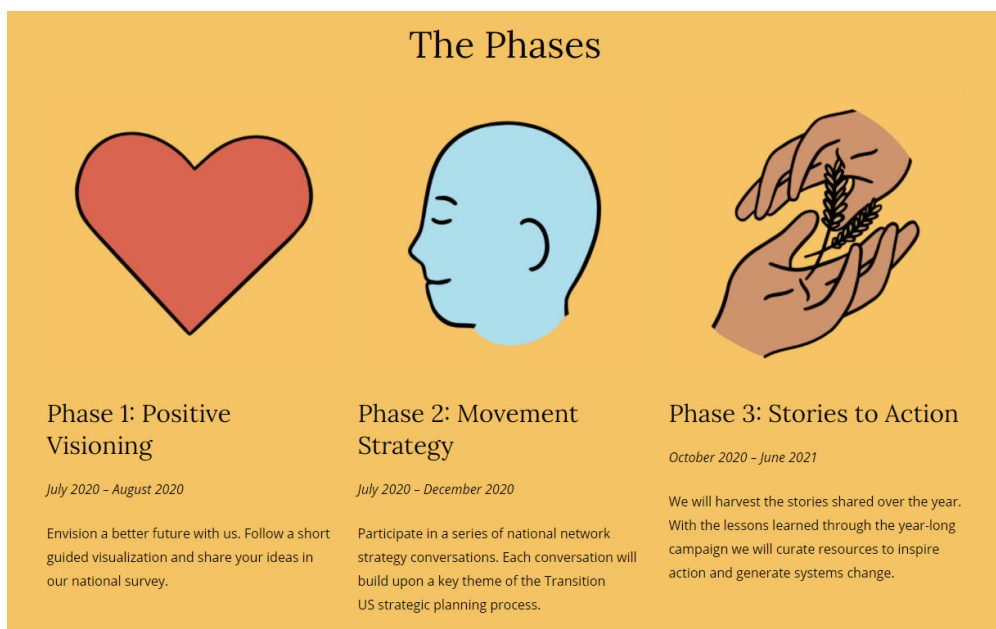
“From What Is to What If: Reimagining and Rebuilding Our World”



“Now, more than ever, it’s essential for us to come together to connect with each other, envision positive futures, rethink our national strategy, and take practical action to build community resilience everywhere.”

“To facilitate this process, Transition US is inviting all of our friends, supporters, partners, and members of hundreds local, regional, and national Transition Initiatives throughout this country to participate in a new campaign we’re calling ‘From What Is to What If: Reimagining and Rebuilding Our World.’”

“Named after [Transition Movement founder Rob Hopkins’ 2019 book](#) about ‘Unleashing the power of the imagination to create the future we want,’ this campaign will consist of three overlapping phases. Please click on the phases below to learn more and get involve—“



[From the webpage “From What Is to What If: Reimagining and Rebuilding Our World” at the Transition US website (at <https://www.transitionus.org/whatif/>) (paragraphs 1-4, and two poster-like graphics)]

e) Resources

i) “Here is a list of all the resources we have to help you do Transition.

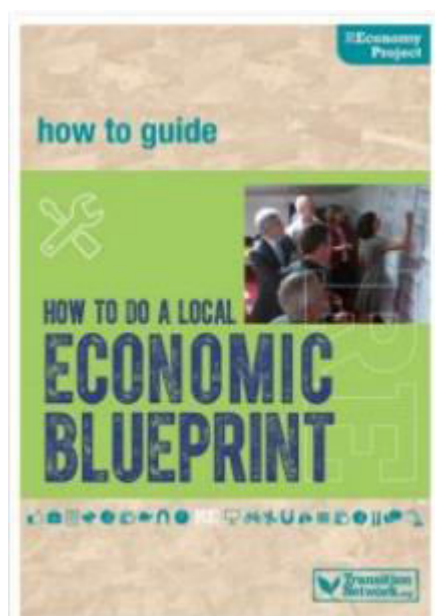
- [The Essential Guide to Doing Transition.](#)
- The [7 essential ingredients section](#) that has a range of resources to help you develop Transition.
- [Health Check activity](#) that helps you to see how well your group is doing.
- A [guide to developing a core group](#) once your Transition initiative is up and running.
- [Training courses](#) you can attend online or in person.”

“All these resources are great, but we also recommend that you contact the nearest Transition Group to you (if there is one) via our [map](#) and arrange to meet them for a chat about how they started Transition. You might also enjoy our film, ‘[In Transition 2.0](#)’, which gives a good overview of Transition. If you do start up a group please [create an initiative](#) to let us and everyone in the movement know you exist.”

[From the “How To Start” webpage at the Transition Network website (at <https://transitionnetwork.org/do-transition/starting-transition/how-to-start/>) (paragraphs 5-7)]

ii) “How to do an Economic Blueprint”

“The purpose of this ‘How to do an Economic Blueprint’ guide is to provide support for your community group as you pursue the Economic Blueprint process in your own community. It is designed to inform, guide and support you and your group through a self-facilitated process. We’ve broken it down into manageable steps to help make it easy – the short videos below are made to work alongside the guide.”



[From the webpage “Writing a Local Economic Blueprint” at the REconomy Project website (at <http://reconomy.org/resources-2/writing-a-local-economic-blueprint/>) (in the “Practicalities--Download our guide” section, paragraph 1 and image)]

f) Commentary from "The End of Growth" Richard Heinberg (September, 2011)

https://archive.org/stream/The_End_of_Growth-Adapting_to_Our_New_Economic_Reality/The_End_of_Growth-Adapting_to_Our_New_Economic_Reality_djvu.txt

Transition Towns

"Given the looming energy and environmental threats outlined in this book, it's evident that something like the following is called for. We need a grassroots movement that educates people about these challenges and helps them develop strategies to reduce their dependence on fossil fuels. It should aim to build community resilience, taking account of local vulnerabilities and opportunities. Ideally, this movement should frame its vision of the future in positive, inviting terms. It should aim to build a cooperative spirit among people with differing backgrounds and interests. While this movement should be rooted in local communities, its effectiveness would increase if it were loosely coordinated through national hubs and a global information center. The work of local groups should include the sharing of practical skills such as food production and storage, home insulation, and the development and use of energy conserving technologies. The movement should be non-authoritarian but should hold efficient meetings, training participants in effective, inclusive decision-making methods."

"That may sound like a tall order. But here's some good news: that movement already exists. It's called Transition Initiatives, and communities that have one of these initiatives often call themselves Transition Towns. The 'transition' that's being referred to is away from our current growth-based, fossil-fueled economy and toward a future economy that is not only sustainable but also fulfilling and interesting for all concerned."

"Transition Initiatives got their start in 2005 in Britain through the work of a Permaculture teacher named Rob Hopkins. In his Transition Handbook, Hopkins tells how he came up with the strategy, and sets forth a range of useful guidelines for groups. Nearly all of Rob's prose is saturated with irrepressible optimism:

'Transition Initiatives are not the only response to peak oil and climate change; any coherent national response will also need government and business responses at all levels. However, unless we can create this sense of anticipation, elation and a collective call to adventure on a wider scale, any government responses will be doomed to failure, or will need to battle proactively against the will of the people.... Rebuilding local agriculture and food production, localizing energy production, rethinking health-care, rediscovering local building materials in the context of zero energy building, rethinking how we manage waste, all build resilience and offer the potential of an extraordinary renaissance--economic, cultural and spiritual.'

"Hopkins is careful to call Transition a 'research project'; in a 'cheerful disclaimer' on the Transition website he points out that there is no guarantee of success, because what is being attempted is unprecedented."

"We truly don't know if this will work. Transition is a social experiment on a massive scale. What we are convinced of is this:

- if we wait for the governments, it'll be too little, too late
- if we act as individuals, it'll be too little
- but if we act as communities, it might just be enough, just in time."

“Hopkins lives in the old market town of Totnes in the southwest of England; with a population of 7,444, it is the most advanced of all Transition Towns. There, over 30 projects have started and nine themed groups meet regularly to discuss food, buildings and housing, arts, transport, and education, among other topics. In 2009, as a result of Transition efforts, Totnes was awarded a grant of £625,000 for a program called ‘Transition Streets,’ a street-by-street approach to energy efficiency, community building, and domestic micro-generation. Totnes now has its own local currency, as well as a Renewable Energy Society that is charged with owning and profitably running the renewable energy generating capacity of the region. The Totnes Food Hub is a co-operative, member-owned alternative food distribution system; members can order fresh food from local producers at affordable prices and have it delivered, ready for collection, to a convenient location in the center of town. Transitioners also host clothes swaps, based on the idea that most of us have in our closets new-ish clothes that we never wear and that others may be able to use. One of Transition Totnes's biggest accomplishments was the development of a town-approved Energy Descent Action Plan--a multi-decade staged plan for reducing dependence on fossil fuels in all significant areas (transport, food, home heating, etc.).”

“After the successful ‘unleashing’ of Transition Totnes in 2006, the idea spread rapidly (though the pace seems to have leveled off in the past year); there are now 350 recognized Transition Initiatives in over 30 countries, with about 80 in the US (and about 150 more groups in America now forming). A team of trainers travels the globe offering help in getting Initiatives started, and thousands of people in over a dozen countries have taken the two-day Transition Training.”

“In Whidbey, WA, the local Transition Initiative features a Local Economy Action Group (a community think tank for creating a sustainable economy on Whidbey Island), a Clean Energies Cooperative (that focuses on alternative-fueled transportation), a Whidbey Citizens Climate Lobby, a Local Food Action Group (with subgroups that map the island's food resources, glean and distribute surplus fruit, and prune trees for better yields), a bi-weekly discussion group on Alternative Building, and a support group for people who want to discuss how the economic crisis is impacting them.”

“There are limits and obstacles to the Transition strategy. In the worst instance, Transition can manifest as merely another talk shop for lefties and aging former hippies. However, Hopkins recognizes that it must be something very different from this if it is to succeed, and that Transition must address practical matters having to do with infrastructure and practical economics. In a recent essay he noted:

‘The infrastructure required for a more localized and resilient future, the energy systems, the mills, the food systems and the abattoirs, has been largely ripped out over the past 50 years as oil made it cheaper to work on an ever-increasingly large scale, and their reinstallation will not arise by accident. They will need to be economically viable, supported by their local communities, owned and operated by people with the appropriate skills, and linked together.’”

[From the book “The End of Growth” by Richard Heinberg (September, 2011) at the archive.org website (at https://archive.org/stream/The_End_of_Growth-Adapting_to_Our_New_Economic_Reality/The_End_of_Growth-Adapting_to_Our_New_Economic_Reality_djvu.txt) (approximately p. 481-486)]

44) Organization “Global Call for Climate Action” (founded 2007)

a) “In 2007, most people around the world hadn’t yet heard of climate change, nor did they know that countries had been negotiating for over a decade to find common ground and sign a global agreement

to solve it. That year, “Global Call to Climate Action” (GCCA) was born out of the realisation that public pressure around the world was needed in order to help push nations to agree to a viable plan.”

“In 2009, GCCA and its member organisations mobilised millions of people around the world in the run-up to the Copenhagen UN climate summit through the tckctck campaign. GCCA’s leadership role as catalyst, connector and facilitator continued through the 2015 Paris UN climate conference. Since then, as a silent partner, we have helped a community of over 470 climate campaigning organisations activate their supporters and align, aggregate and amplify their work.”

[From the webpage “Our History” at the website for Global Call for Climate Action (at <http://callforclimateaction.org/our-history/>) (paragraphs 1 and 2)]

b) “USCAN also is a partner of the Global Campaign on Climate Action (GCCA). GCCA is a bold new initiative, involving a growing number of national and global environmental and development groups, and focused on one goal: Rapid action to save the planet from dangerous levels of climate change. In 2009, GCCA launched the Tck, Tck, Tck campaign to gain a new climate agreement in Copenhagen. The Tck, Tck, Tck project includes the Union of Concerned Scientists, Pew Environment Group, Oxfam International, Greenpeace International, Christian Aid, World Council of Churches, World Wildlife Fund, 350, Avaaz, E3G, Global Humanitarian Forum, Global Call to Action against Poverty, and other leading NGOs in over thirty nations.”

[From the webpage “About USCAN” at the website for Climate Action Network International (at <http://www.climatenetwork.org/profile/member/climate-action-network-united-states-uscan>) (paragraph 4)]

45) Interview with Albert Bates (New Southerner) (May, 2007)

a) “Bates has been director of the Global Village Institute for Appropriate Technology since 1984 and The Farm's Ecovillage Training Center since 1994, where he has taught sustainable design, natural building, permaculture and restoration ecology to students from more than 50 nations.”

(Note: Interview was titled: “The Good News about Oil Depletion: Albert Bates discusses how life can be simpler and happier for generations to come”. Even so, the commentary provided by Mr. Bates is valuable and relevant to either oil depletion post carbon scenarios, or climate change Zero Carbon scenarios.)

b) “DB: How do local economies fit into this picture, and why is supporting local economies such a good thing, particularly for a world without oil or other natural resources?”

“AB: You might be getting your food from 3,000 miles away. You might be getting your shoes from Italy or your belt from Brazil. So you need to think about how these things come to you and how long a distance they travel. It might be more effective and efficient to have production locally, like belts and shoes in your town. You might find that there's a lot of time and money to be saved by repairing old things rather than buying new things.”

“I think that as we go through the coming years, life will actually become better. We'll find that we have more time for the kinds of things that we enjoy than we currently spend in traffic jams waiting to get to work. Or in various different pursuits that are necessary to produce an income to pay off a mortgage, to

pay back college loans and so forth. What we really need is to be able to garden and grow our own food and have our own local economies.”

c) “DB: Do you think it's possible for our current global economy and transportation system to survive in the face of oil depletion? Or is it inevitable that these systems will collapse and everyone will be forced to start over? How do you see this whole oil depletion situation panning out? What kind of scenario might we see, and when do you think it might start?”

“AB: It's very difficult to predict how this will all unfold because so little is known about what the actual resource in the ground is or how soon or how easily it can be brought to market. I see four possible scenarios. Plan A is business as usual, and to some extent that involves a global strategy of last one standing, the idea being that we will just dominate the world and take over whatever resources we need to feed ourselves. I don't think that's viable. That's not going to last. *Plan B is something you might hear from Al Gore or Amory Lovins or some of the advocates of green technology. I think Lester Brown is a good example of that. That you have technologies that will come along and enable us to maintain our lifestyle with very little change. I don't think that's very realistic either because that still assumes this exponential growth, which is never sustainable. So then Plan C is more like the Amish. It's curtailment. It's living more simply, using less resources. Plan D is what we're trying to avoid — that's the die-off.* It's nuclear war. It's the idea that James Lovelock propounds that the world is getting so hot in such a short amount of time that we'll soon become warring tribes fighting over the last habitable areas of the arctic. I don't foresee that either. I categorize myself as somewhere between Plan B and Plan C. I see us finding elegant ways to simplify, reduce our consumption and scale down.”

[From the webpage “New Southerner interview of Albert Bates” (introduction by interviewer David M. Buchanan) (May 4, 2007) (at <http://cantate-domino.blogspot.com/2007/05/new-southerner-interview-of-albert.html>) (under question #7, paragraphs 1 and 2; under question #9, paragraph 1)]

46) Report “Zero Carbon Britain: An Alternative Energy Strategy” (by the Center for Alternative Technology--Wales, UK) (June, 2007)

a) “zerocarbonbritain is a radical vision of Britain’s energy future, outlining bold policy drivers to reduce carbon emissions to zero within 20 years. What follows is a scenario demonstrating possible outcomes of these policies, using only existing and proven technologies. This report is the Centre for Alternative Technology’s considered response to the current understanding of the global climate.”

“Two things have changed in recent years.

i) The international scientific consensus on the causes and gravity of climate change has moved from ‘perhaps’ to ‘certainly’.

ii) A number of significant positive feedbacks have been identified in the climate system. Their effect is such that humanity’s greenhouse gas emissions will act merely as a trigger for much greater and more rapid climatic changes”

b) “The world now needs to move to net zero emissions as quickly as possible. It is the authors’ belief that if society is motivated to do so, an emergency action plan could achieve this globally within 20 years.”

c) “At each step, zerocarbonbritain’s approach is to seek the root cause of the problem and, in understanding the system’s dynamics, explore systems-based solutions. It is from this standpoint that these policy recommendations are derived.”

d) “Conversion from Fossil Fuels to Renewables (2007-2027) (the strategy)”

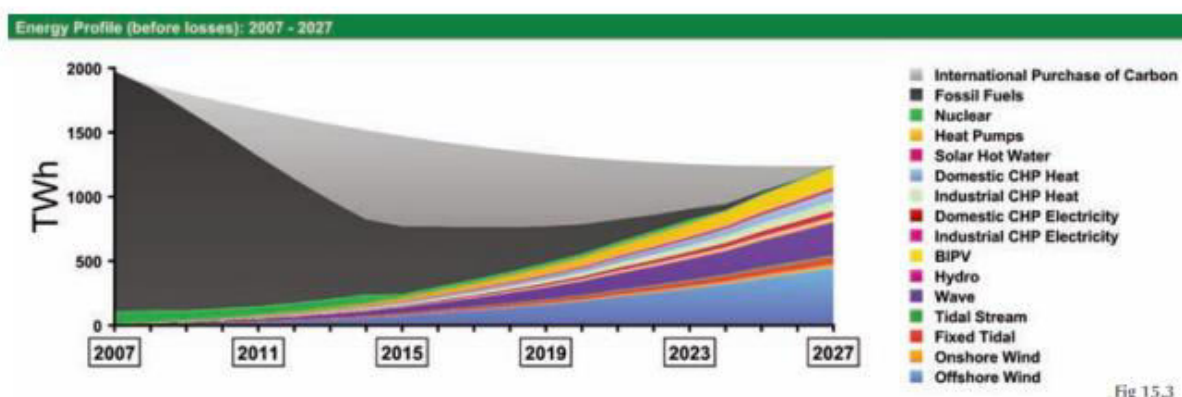


Fig 15.3

[From the report “Zero Carbon Britain: An Alternative Energy Strategy” (by the Center for Alternative Technology--Wales, UK) (June, 2007) [a] in section “Executive Summary”, p. 4, paragraphs 1 and 2); b) in section “Executive Summary”, in subsection “Mapping the Unthinkable”, p. 4, paragraph 3; c) in section “Chapter 1 History, in subsection “Conclusion”, p. 15, paragraph 4; d) in section “Executive Summary”, in subsection “Powering Down”, p. 8]

47) A View from Oil’s Peak Richard Heinberg

“Fossil fuels have delivered enormous economic benefits to modern societies, but we are now becoming aware of the burgeoning costs of our dependence on these fuels. The human community’s central task for the coming decades must be the undoing of its dependence on oil, coal, and natural gas in order to deal with the twin crises of resource depletion and climate chaos. It is surely fair to say that fossil fuel dependency constitutes a systemic problem of a kind and scale that no society has ever had to address before. If we are to deal with this challenge successfully, we must engage in systemic thinking that leads to sustained, bold action.”

[From MuseLetter #184 / August 2007 by Richard Heinberg (at richardheinberg.com) (at <https://richardheinberg.com/184-the-view-from-oil%E2%80%99s-peak>) (last paragraph)]

48) Teach-In “Confronting the Global Triple Crisis” (International Forum on Globalization, Institute for Policy Studies, with other co-sponsors) (September, 2007)

“The planet’s ecological systems are on the verge of catastrophic change for which few societies are prepared. So far, responses by governments to this emergency are inadequate, or counterproductive. We call it the ‘Triple Crisis,’ the convergence of three advancing conditions:

- a) Planet-wide climate chaos and global warming
- b) The end of the era of cheap energy (‘peak oil’)
- c) The depletion of many of the world’s key resources: water, timber, fish, fertile soil, coral reefs; and the expected extinction of 50% of the world’s species.”

“All are rooted in the same systemic problem—massive overuse of fossil fuels and the Earth’s resources; all driven by an economic ideology of hyper growth and consumption that’s beyond the limits of the planet to sustain.”

[From pre-conference brochure for “Teach In: Confronting the Global Triple Crises—Climate Change, Peak Oil (The End of Cheap Energy), and Global Resource Depletion and Extinction” (September 14-17, 2007 at The George Washington University Lisner Auditorium in Washington D.C.) Sponsored by The International Forum on Globalization (www.ifg.org) and The Institute on Policy Studies (with other co-sponsors) Brochure is at <https://www.yumpu.com/en/document/read/23284424/triple-crisis-full-schedule-international-forum-on-globalization>) (on p. 3, paragraphs 1-3)]

49) Nobel Peace Prize for 2007 (October, 2007)

“The Norwegian Nobel Committee has decided that the Nobel Peace Prize for 2007 is to be shared, in two equal parts, between the Intergovernmental Panel on Climate Change (IPCC) and Albert Arnold (Al) Gore Jr. for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change.

“Through the scientific reports it has issued over the past two decades, the IPCC has created an ever-broader informed consensus about the connection between human activities and global warming. Thousands of scientists and officials from over one hundred countries have collaborated to achieve greater certainty as to the scale of the warming. Whereas in the 1980s global warming seemed to be merely an interesting hypothesis, the 1990s produced firmer evidence in its support. In the last few years, the connections have become even clearer and the consequences still more apparent.”

“Al Gore has for a long time been one of the world’s leading environmentalist politicians. He became aware at an early stage of the climatic challenges the world is facing. His strong commitment, reflected in political activity, lectures, films and books, has strengthened the struggle against climate change. He is probably the single individual who has done most to create greater worldwide understanding of the measures that need to be adopted.”

[From the Press Release (dated October 12, 2007) for “The Nobel Peace Prize of 2007”--shared by the International Panel on Climate Change (IPCC) and Albert (Al) Gore (at nobelprize.org (the official website for the Nobel Prize) (see http://www.nobelprize.org/nobel_prizes/peace/laureates/2007/press.html) (paragraphs 1, 3, and 4)]

50) Report “Climate Change 2007: Synthesis Report (AR4)” (IPCC) (November, 2007)

a) “Risks to unique and threatened systems. There is new and stronger evidence of observed impacts of climate change on unique and vulnerable systems (such as polar and high mountain communities and ecosystems), with increasing levels of adverse impacts as temperatures increase further. An increasing risk of species extinction and coral reef damage is projected with higher confidence than in the TAR (Third Assessment Report, 2001) as warming proceeds. There is medium confidence that approximately 20 to 30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5 to 2.5°C over 1980-1999 levels. Confidence has

increased that a 1 to 2°C increase in global mean temperature above 1990 levels (about 1.5 to 2.5°C above preindustrial) poses significant risks to many unique and threatened systems including many biodiversity hotspots. Corals are vulnerable to thermal stress and have low adaptive capacity. Increases in sea surface temperature of about 1 to 3°C are projected to result in more frequent coral bleaching events and widespread mortality, unless there is thermal adaptation or acclimatisation by corals. Increasing vulnerability of indigenous communities in the Arctic and small island communities to warming is projected.”

“Risks of extreme weather events. Responses to some recent extreme events reveal higher levels of vulnerability than the TAR (Third Assessment Report, 2001). There is now higher confidence in the projected increases in droughts, heat waves and floods, as well as their adverse impacts.”

b) *“Contraction of the Greenland ice sheet is projected to continue to contribute to sea level rise after 2100. Current models suggest virtually complete elimination of the Greenland ice sheet and a resulting contribution to sea level rise of about 7m (22.96 feet) if global average warming were sustained for millennia in excess of 1.9 to 4.6°C relative to pre-industrial values.”*

c) *“There is high agreement and much evidence that with current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades.”*

“Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century (Table SPM.1, Figure SPM.5).”

[From “Climate Change 2007: Synthesis Report” (“Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change--IPCC”) (see “Summary for Policymakers” at https://www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr_spm.pdf) (a) p. 19, paragraphs 3 and 4); b) p. 12, paragraph 5); c) p. 7, paragraphs 1 and 3)]

51) Report “UN Human Development Report 2007/2008”

“Avoiding the unprecedented threats posed by dangerous climate change will require an unparalleled collective exercise in international cooperation.”

[From the “UN Human Development Report 2007/2008 Fighting Climate Change: Human Solidarity in a Divided World” United Nations Development Program In “Summary” of Complete Report (see http://hdr.undp.org/sites/default/files/hdr_20072008_summary_english.pdf (p. 19, in section “Avoiding Dangerous Climate Change: Strategies for Mitigation” paragraph 1)]

52) Organization “Global Covenant of Mayors for Climate and Energy” (originally formed as the Covenant of Mayors in 2008)

a) *“Since its launch in 2008, the Covenant of Mayors initiative has grown into the world’s largest city movement. It has secured the commitments of thousands of cities across six continents and more than*

120 countries, representing almost 10% of the world’s population. The initiative was first extended to counties neighbouring Europe to the East and the South and later to the countries of sub-Saharan Africa. In 2016, the Covenant of Mayors entered a major new phase of its history by joining forces with another city initiative, the Compact of Mayors.”

[From the “Global Covenant of Mayors” webpage at the website for Climate Alliance (at <https://www.climatealliance.org/activities/covenant-of-mayors/global-covenant.html#:~:text=Since%20its%20launch%20in%202008,10%25%20of%20the%20world's%20population>). (paragraph 1)]

b) “Our Mission is to serve cities and local governments by mobilizing and supporting climate and energy action in their communities by working with city/regional networks, national governments, and other partners.”

“Over 10,000 cities and local governments from more than 135 countries have already committed to taking action.”

[From “About Us” webpage of Global Covenant of Mayors (at <https://www.globalcovenantofmayors.org/about/>) (from “Section 2” (change in background), paragraphs 1 and 2)]

c) “The Board is co-chaired by European Commission Executive Vice President for the European Green Deal Frans Timmermans and former New York City Mayor Michael Bloomberg. Former UNFCCC Executive Secretary Christiana Figueres serves as Vice-Chair.”

[From “About Us” webpage of Global Covenant of Mayors (at <https://www.globalcovenantofmayors.org/about/>) (from “Section 4” (change in background) “Our Board”, paragraph 2)]

d) “The Founding Partners, to both the Compact of Mayors and the Covenant of Mayors, are:

European Committee of the Regions
European Commission
C40 Cities
ICLEI--Local Governments for Sustainability
Federene
UCLG--The Global Network of Cities, Local and Regional Governments
UN-Habitat
EuroCities
EnergyCities
CEMR--The Council of European Municipalities and Regions
Bloomberg Philanthropies
Climate Alliance

[From “About Us” webpage of Global Covenant of Mayors (at <https://www.globalcovenantofmayors.org/about/>) (from last section “Founding Partners”, paragraph 1)]

53) National Teach-In “Focus the Nation” (“... one of the largest teach-ins in U.S. history....”) (January, 2008)

“In January 2008, over 1900 universities, schools, and civic groups nationwide participated in what amounted to one of the largest teach-in in U.S. history, involving over a million people in an event designed to educate and engage Americans in a discussion of global warming solutions.”

[From the Wikipedia webpage for “Eban Goodstein” (at https://en.wikipedia.org/wiki/Eban_Goodstein) (in Section “Climate Education”, paragraph 3)]

54) Book “Plan B 3.0: Mobilizing to Save Civilization” (Lester Brown, Earth Policy Institute) (2008)

*“Implementing Plan B means undertaking several actions simultaneously, including eradicating poverty, stabilizing population, and restoring the earth’s natural systems. It also involves cutting carbon dioxide emissions 80% by 2020, largely through a mobilization to raise energy efficiency and harness renewable sources of energy. Not only is the scale of this save our-civilization plan ambitious, so is the speed with which it must be implemented. *We must move at wartime speed, restructuring the world energy economy at a pace reminiscent of the restructuring of the U.S. industrial economy in 1942 following the Japanese attack on Pearl Harbor. The shift from producing cars to planes, tanks, and guns was accomplished within a matter of months. One of the keys to this extraordinarily rapid restructuring was a ban on the sale of cars, a ban that lasted nearly three years.*”*

[From Lester Brown’s “Plan B 3.0: Mobilizing to Save Civilization” Published by Earth Policy Institute 2008 (at http://www.earth-policy.org/images/uploads/book_files/pb3book.pdf) (in section “Plan B--A Plan of Hope” p. 20, paragraphs 2-3)]

55) Report “Climate Code Red: The Case for a Sustainable Emergency” (February, 2008)

“It’s ‘now or never’ for truly radical action and heroic leadership. How much of our productive wealth we must devote to this life-saving action should not be calculated in tenths of a percent, but in how many %, and if necessary, in how many tens of %. During the last global mobilization, the 1939-1945 war, more than 30% , and in some cases more than half, of the economy was devoted to military expenditure (a table with statistics is provided)....”

*“At a rough calculation, \$300-400 billion invested in renewable energy and energy efficiency in Australia would allow us to close every coal-fired electricity generator; it would transform key industries, and the rail and transport, and provide a just transition for those economically displaced by the changes. Much of that investment in energy efficiency would be repaid in lower energy costs over time. An investment of that size would be just 3-4% of our total economic production for 10 years.... *Is it beyond a developed countries ability to identify 3-4% of total personal consumption and government expenditures and corporate activity that could reasonable be re-directed to this necessary task?*”*

[From "Climate Code Red: The Case for a Sustainable Emergency" by David Spratt and Philip Sutton Published February, 2008 by Friends of the Earth, Australia (complete version not currently accessible on the Internet; summary of key points at <http://www.climatecodedred.org/p/book.html>) (passages above can be confirmed through "looking inside" the book at https://www.amazon.com/Climate-Code-Red-emergency-action/dp/1921372206?ref_=nav_ya_signin& by using the feature "search inside the book" and using key words in the search)(note: must be signed in at Amazon to do this)]

56) Book "Six Degrees: Our Future on a Hotter Planet" (Mark Lynas) (2008)

"Six Degrees: Our Future on a Hotter Planet (358 pages), is a 2007 (2008 in USA) non-fiction book by author Mark Lynas about global warming."

"The first chapter describes the expected effects of climate change with one degree celsius (1°C) increase in average global temperature since pre-industrial times."

"The second chapter describes the effects of two degrees average temperature and so forth until Chapter 6 which shows the expected effects of an increase of six Celsius degrees (6 °C) average global temperature. The effects are also compared to paleoclimatic studies, with six degrees of warming compared back to the Cretaceous."

"Special coverage is given to the positive feedback mechanisms that could dramatically accelerate climate change. The book explains how the release of methane hydrate and the release of methane from melting permafrost could unleash a major extinction event. Carbon cycle feedbacks, the demise of coral, the destruction of the Amazon rainforest, and extreme desertification are also described, with five or six degrees of warming potentially leading to the complete uninhabitability of the tropics and subtropics, as well as extreme water and food shortages, possibly leading to mass migration of billions of people."

"A National Geographic Channel TV programme, 'Six Degrees Could Change The World' was produced after the book won the Royal Society Prize in 2008."

[From the Wikipedia webpage for "Six Degrees: Our Future on a Hotter Planet" (at https://en.wikipedia.org/wiki/Six_Degrees:_Our_Future_on_a_Hotter_Planet) (paragraphs 1-5)]

57) Letter to the New Education Secretary by Worldwatch Institute (December, 2008)
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"An Open Letter to the New Education Secretary"

"Worldwatch is pleased to publish this open letter from prominent education and environment leaders urging the newly nominated U.S. education secretary, Arne Duncan, to consider the importance of education in carrying out President-elect Barack Obama's environmental agenda. "

“Dear Mr. Duncan:

“Congratulations on your nomination. As you jump into the daunting challenge of bolstering our sagging education system, you have a powerful opportunity presented by the need to create a carbon-free economy.

“President-elect Obama has astutely perceived the linkages between climate change, economic stimulus, energy security, and job training by declaring that the transition to a green economy is his “top priority.” The missing link in this system is the critical role that education can play in quickly making the green economy a reality....

“Transforming our nation's economic, energy, and environmental systems to move toward a green economy will require a level of expertise, innovation, and cooperative effort unseen since the 1940s to meet the challenges involved.

“Creating millions of new green jobs through targeted investment and spending is one thing; filling those jobs with qualified candidates is quite another thing. This transition will require a massive job training (and retraining) effort on the part of business, government, and education if it is to scale up quickly.

“But green manufacturing workforce development programs are just one piece of what is needed; the green economy will not be driven by manufacturing workers alone. Architects, engineers, planners, scientists, business managers, financial experts, lawyers, entrepreneurs, political leaders, resource managers, and many others, as well as workers - not to mention environmentally literate consumers - will all be needed to drive the green economy.

“American workers, managers, and professionals at all levels and in all sectors must understand the foundations of a green economy as represented in leading environmental and sustainability education programs. These foundations call for redesigning the human economy to emulate nature: operating on renewable energy, creating a circular production economy in which the concept of ‘waste’ is eliminated because all waste products are raw materials or nutrients for the industrial economy, and managing human activities in a way that uses natural resources only at the rate that they can self-regenerate (the ideas embodied in sustainable forestry, fishing, and agriculture).

“To produce such a literate workforce and citizenry, America will need to make major new investments in our educational systems to implement the green economy and keep new green jobs from migrating out of America.”

“It has been well proven that an investment in education and innovation--in human capital--is without a doubt the best investment that can be made in long-term, across-the-board economic growth. Public investments in education for a green economy will more than pay for themselves, just as the post-Sputnik education programs did in the 1950s and ‘60s and the G.I. Bill did in the 1940s.”

“In addition, ‘Education for a Green Economy’ is a politically unifying strategy:

A serious commitment to global competitiveness and innovation appeals to a wide range of stakeholders: Americans concerned with security and energy independence, economic development, climate change, and the environment; blue-collar workers and citizens calling for increasing investment in new ‘green jobs’; parents, students, and teachers; clean technology and green venture capital firms; and the academic community.”

“Recent legislation authorizing investments to support sustainability programs in higher education, improve education in STEM fields (science, technology, engineering, and mathematics), and build healthy, high performance "green schools" (both K-12 and higher education) have passed with broad bipartisan support, but have yet to be significantly funded.”

“We, the undersigned, therefore respectfully urge you to support the following proposed Presidential agenda as it pertains to your department:

An Action Agenda for a Healthy, Just, and Sustainable Economy

- The President should announce a sweeping initiative to support education as a cornerstone of our new clean energy future. This initiative should be part of an economic stimulus package with a focus on green jobs and green education to help Americans of all ages, all backgrounds, and all walks of life transition to the green economy.
- The President should launch a series of White House Conferences on Creating Healthier, Greener Communities and Economies. Conference themes, co-sponsored with key federal agencies, would focus on building a more equitable and green economy, promote social equity, and support service learning to engage youth in greening local communities.
- Support a national goal of 100% of renovation and new school construction to meet "Green Schools" Standards by 2012. Declare a Department of Education policy to support a national goal that 100 percent of newly constructed or rehabilitated schools (both K-12 and higher education) to become "Green Schools" to lower energy costs and greenhouse gas emissions, and provide opportunities for formal and non-formal environmental education.
- Support legislation to direct 1% of climate change cap-and-trade revenues to education for a green economy. This comprehensive education bill would advance education for a green economy through major adjustments to K-12 education, school-to-work programs, higher education, professional re-education, and consumer and public education, in order to equip our American workforce and citizenry with the needed skills and knowledge to maximize environmental and economic gains in the transition to a green economy. Related legislation to significantly expand and improve environmental education in our public K-12 schools (the No Child Left Behind Act) should also be supported.
- Establish a strong record of funding existing education programs through the President's budget requests for the University Sustainability Program, environmental education programs at the Environmental Protection Agency, National Science Foundation and National Oceanic and Atmospheric Administration, and the new Energy Efficiency Grants and Loans program at the Department of Energy.
- Make new Administration appointments:
 - a. Senior Policy Advisor to the Secretary of Education, Education for a Green Economy
 - b. Senior Policy Advisor to the NOAA Administrator, Climate Change Education
 - c. Environmental Education Advisor, Council of Environmental Quality
 - d. Senior Policy Advisor to the Director of the US Peace Corps, Sustainability and Environmental Education
- Direct all federal resources agencies to develop and conduct "education for a green economy" and climate change literacy training for all personnel to familiarize them with challenges, needs, and appropriate responses for each agency.”

“One of the most hopeful signs for the future is the rapidly developing consensus that investment in a clean/green economy is the best way to improve national security, create millions of jobs, restore U.S. economic leadership, and stop large-scale climate disruption that could undercut modern civilization. It is time to reorient the education system to make this a reality-humanity is depending on us.”

With our best wishes for your success,

David E. Blockstein, Ph.D., Senior Scientist, National Council for Science and the Environment
Judy Braus, Senior Vice President of Education, National Audubon Society
Antony D. Cortese, Sc.D., President, Second Nature
Kevin J. Coyle, Vice President for Education, National Wildlife Federation
Brian A. Day, Executive Director, North American Association for Environmental Education
James L Elder, Ph.D., Director, Campaign for Environmental Literacy
Christopher Flavin, President, Worldwatch Institute
Judy Walton, Ph.D., Acting Executive Director, Association for the Advancement of Sustainability in Higher Education

[From editorial/commentary “OPINION: Letter to the New Education Secretary by Worldwatch Institute (December 19, 2008) at the website of the Worldwatch Institute (since January, 2020 Worldwatch Institute website has been unreachable... so alternate link at the website of Common Dreams (at <https://www.commondreams.org/newswire/2008/12/19/open-letter-new-education-secretary>) (whole letter)]

58) Organization “IRENA” (January, 2009)

a) “IRENA was officially founded in Bonn, Germany, on 26 January 2009. Its Founding Conference remains a significant milestone for world renewable energy deployment. Governments worldwide made clear their commitment to changing the global energy paradigm, with 75 states signing the IRENA Statute at the time.”

[From the webpage “History” at the website for the International Renewable Energy Agency (IRENA) (at <https://irena.org/history>) in Section “IRENA Founding Conference (Bonn, 26 January 2009)”, (paragraph 1)]

b) “The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international cooperation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.”

“With a mandate from countries around the world, IRENA encourages governments to adopt enabling policies for renewable energy investments, provides practical tools and policy advice to accelerate renewable energy deployment, and facilitates knowledge sharing and technology transfer to provide clean, sustainable energy for the world’s growing population.”

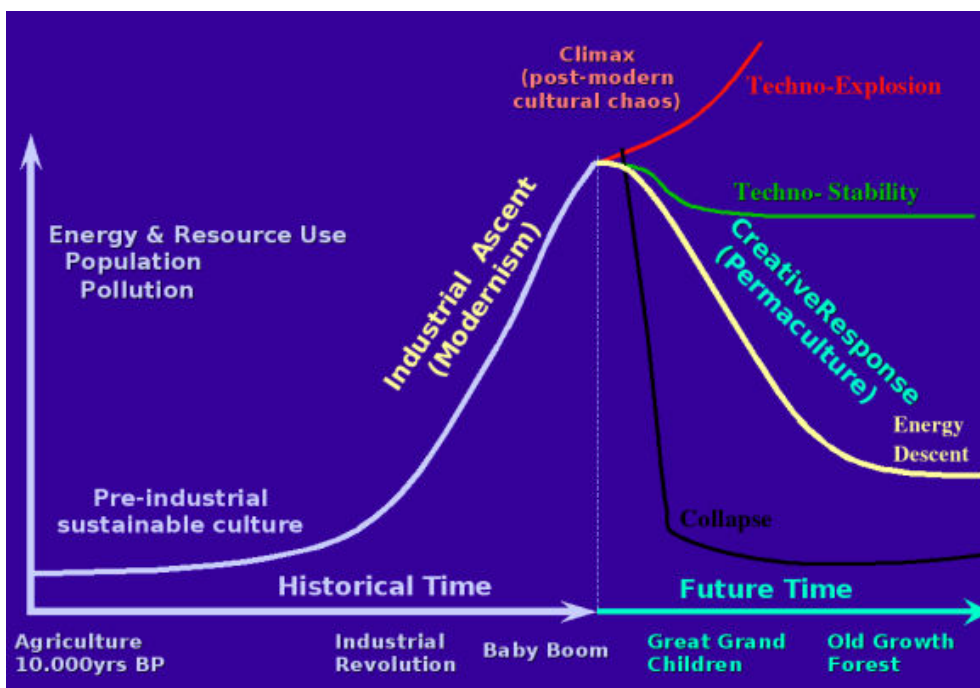
[From the webpage “About IRENA” at the website for the International Renewable Energy Agency (IRENA) (at <https://irena.org/aboutirena>) (paragraphs 1-2)]

59) Book “Future Scenarios Mapping the Cultural Implications of Peak Oil and Climate Change” (David Holmgren, co-originator of the Permaculture concept) (April, 2009)

“Four broad energy scenarios provide a framework for considering the wide spectrum of culturally imagined, and ecologically likely, futures over the next century or more.

“I’ve labeled these:

- Techno-explosion,
- Techno-stability,
- Energy Descent and
- Collapse



Four Energy Futures

“**Techno-explosion** depends on new, large and concentrated energy sources that will allow the continual growth in material wealth and human power over environmental constraints, as well as population growth. This scenario is generally associated with space travel to colonise other planets.”

“**Techno-stability** depends on a seamless conversion from material growth based on depleting energy, to a steady state in consumption of resources and population (if not economic activity), all based on novel use of renewable energies and technologies that can maintain if not improve the quality of services available from current systems. While this clearly involves massive change in almost all aspects of society, the implication is that once sustainable systems are set in place, a steady state sustainable society with much less change will prevail. Photovoltaic technology directly capturing solar energy is a suitable icon or symbol of this scenario.”

“**Energy Descent** involves a reduction of economic activity, complexity and population in some way as fossil fuels are depleted. The increasing reliance on renewable resources of lower energy density will, over time, change the structure of society to reflect many of the basic design rules, if not details, of pre-industrial societies. This suggests a ruralisation of settlement and economy, with less consumption of energy and resources and a progressive decline in human populations.

Biological resources and their sustainable management will become progressively more important as fossil fuels and technological power declines. In many regions, forests will regain their traditional status as symbols of wealth. Thus the tree is a suitable icon of this scenario. *Energy Descent* (like *Techno-explosion*) is a scenario dominated by change, but that change might not be continuous or gradual. Instead it could be characterised by a series of steady states punctuated by crises (or mini collapses) that destroy some aspects of Industrial culture.”

“**Collapse** suggests a failure of the whole range of interlocked systems that maintain and support industrial society, as high quality fossil fuels are depleted and/or climate change radically damages the ecological support systems. This collapse would be fast and more or less continuous without the restabilisations possible in *Energy Descent*. It would inevitably involve a major “die-off” of human population and a loss of the knowledge and infrastructure necessary for industrial civilization, if not more severe scenarios including human extinction along with much of the planet’s biodiversity.”

[From the webpage “Four Energy Futures” at the website for “Future Scenarios Mapping the Cultural Implications of Peak Oil and Climate Change” (at <https://futurescenarios.org/2-energy-futures/2-1-four-energy-futures/>)]

60) Article “Humanity's carbon budget set at one trillion tonnes” (April, 2009)

“If governments are to stick to their pledge to avoid ‘dangerous’ global warming--which most politicians and many scientists take to be no more than 2°C--the models come up with roughly the same answer. Humans must not inject more than 1 trillion tonnes of carbon into the atmosphere in total.”

“That, say teams led by Myles Allen of the University of Oxford and Malte Meinshausen of the Potsdam Institute for Climate Impact Research in Germany, will give us a 50:50 chance of limiting global warming to 2°C.”

“To improve the chances that the planet remains this side of 2°C, Meinshausen’s study suggests we should emit no more than 750 billion tonnes of carbon in total. The risk of exceeding 2°C would then drop from 50% to 25%.”

“Industrial activity since the mid-18th century means we have already emitted 500 billion tonnes of carbon--half of the 1-trillion-tonne budget. ‘At some point in the last few years, we released the 500-billionth tonne of carbon,’ says Allen. We can afford to dump only 250 billion tonnes more--or perhaps 500 billion tonnes, if we are willing to run the higher risk.”

“So how much longer have we got? Don’t let past emissions fool you, says Allen. ‘It took 250 years to burn the first 500 billion tonnes. On current trends we’ll burn the next 500 billion in less than 40 years.’”

[From article “Humanity's carbon budget set at one trillion tonnes” by Catherine Cahic at the website for the New Scientist (<https://www.newscientist.com/article/dn17051-humanitys-carbon-budget-set-at-one-trillion-tonnes/>) (paragraphs 2-6)]

61) Symposium “St. James Palace Memorandum” (Spring, 2009)

a) “The Nobel Laureate Symposium Series on Global Sustainability was initiated in 2007 at Potsdam and continued by the St James’s Palace Symposium in spring 2009. This Symposium series unites Nobel

Laureates of various disciplines, top-level representatives from politics and NGOs, and renowned experts on sustainability.”

[From the “St. James Palace Nobel Laureate Symposium” webpage at the website for Transcend Media Service at <https://www.transcend.org/tms/2009/06/st-james-palace-nobel-laureate-symposium/> (see last paragraph)]

b) The St. James Palace Memorandum (entire Memorandum):

The St James Palace Memorandum

“Action for a Low Carbon and Equitable Future” London, UK, 26 – 28 May 2009

“The St James’s Palace Memorandum calls for a global deal on climate change that matches the scale and urgency of the human, ecological and economic crises facing the world today. It urges governments at all levels, as well as the scientific community, to join with business and civil society to seize hold of this historic opportunity to transform our carbon-intensive economies into sustainable and equitable systems. We must recognize the fierce urgency of now.”

The Fierce Urgency of Now

“Climate risk avoidance, energy security, sustainable land use, population growth and equitable economic development constitute a key set of interacting challenges for humankind in the 21st century. The evidence is increasingly compelling for the range and scale of climate impacts that must be avoided, such as droughts, sea level rise and flooding leading to mass migration and conflict. The robust scientific process, by which this evidence has been gathered, should be used as a clear mandate to accelerate the actions that need to be taken. Political leaders cannot possibly ask for a more robust, evidence-based call for action.”

“In a time of financial and economic crisis, the participants of the St. James’s Palace Symposium emphasise that without directing current economic recovery resources wisely, and embarking on a path towards a low carbon economy, the world will have lost the opportunity to meet the global sustainability challenge. Decarbonising our economy offers a multitude of benefits, from addressing energy security to stimulating unprecedented technological innovation. A zero carbon economy is an ultimate necessity and must be seriously explored now.”

Milestones of the Great Transformation

“Building on the Potsdam Memorandum and the recent advances in the scientific understanding of climate change, the participants of the St James’s Symposium identified as key requirements an effective and just global agreement on climate change, low-carbon energy infrastructure and tropical forest protection, conservation and restoration.”

1) “Delivering an effective and just global agreement on climate change Firm political leadership is now crucial. Leadership is primarily required from developed countries, acknowledging their historical responsibility as well as their financial and technological capacity. However, all countries will need to implement low carbon development strategies. In this spirit of trust, every country must act on the firm assumption that all others will also act.”

“A long-term commitment under the United Nation Framework Convention on Climate Change (UNFCCC) is now urgently required. The global agreement in Copenhagen must include the following elements:

---Acknowledging the compelling evidence of science we should confine the temperature rise to 2 degrees Celsius to avoid unmanageable climate risks. This can only be achieved with a peak of global emissions of all greenhouse gases by 2015 and at least a 50% emission reduction by 2050 on a 1990 baseline. This in turn means that developed countries have to aim for a 25-40% reduction by 2020. A robust measure of assessing the necessary emission reductions is a total carbon budget, which should be accepted as the base for measuring the effectiveness of short-term (2020) and long-term (2050) targets;

---The creation of carbon prices adopted across large parts of the global economy combined with measures to lower the price of low carbon energy, especially in developing countries. Funds raised should be used to provide the necessary financial support for adaptation;

---The agreement must acknowledge the priority of developing countries to overcome poverty while ensuring sustainable development.”

2) “Delivering a low carbon energy infrastructure Decarbonising our society requires an increase in energy conservation and efficiency, and a revolution in our energy infrastructure now. The required technological innovations will not be achieved without an unprecedented partnership between government and business.”

“Actions in the following areas are needed:

---Clear policy frameworks aimed at fostering innovation and the demonstration, scale up and roll out of low carbon technologies including globally coordinated investment frameworks, linked to economic recovery, with the emphasis on ‘green growth’;

---Developed countries should commit to a significant increase in investments for research, development and deployment;

---Technology sharing and financial support, through mechanisms such as globally supported feed-in-tariffs for renewable energy, are required to help developing countries leapfrog to a low carbon economy;

---The establishment of ‘smart grids’--connecting renewable energy sources over large areas and implementing novel energy storage technologies.”

3) Delivering tropical forest protection, conservation and restoration

“Tropical forests provide the ecosystem services essential for human well-being and poverty alleviation. In addition deforestation and forest degradation are substantially contributing to climate change and global biodiversity loss at the genetic, species and landscape level. Both locally and globally, protecting boreal and tropical forest cover is an essential tool for mitigation of, and adaptation to, climate change. Without a solution to rainforest protection, there is no solution to tackling climate change.”

“An emergency package is needed now to provide substantial funding to tropical forest nations to help them halt deforestation and embark on alternative economic development paths, including:

---Accelerating a long-term UNFCCC agreement on halting deforestation and on forest restoration, including innovative financing mechanisms from public and private sources;

---Building capacity as well as mechanisms for verification and national governance structures that can support and reward the maintenance of rainforest regions. Developing countries need to take their own responsibility in tropical forest protection, conservation and restoration.”

The Contribution of Science

“The solutions to the extraordinary environmental, economic and human crises of this century will not be found in the political arena alone. Stimulated by the manifesto of Bertrand Russell and Albert Einstein, the first Pugwash gathering of 1957 united scientists of all political persuasions to discuss the threat posed to civilization by the advent of thermonuclear weapons. Global climate change represents a threat of similar proportions, and should be addressed in a similar manner. There should be an acceleration and integration of global sustainability studies, to encourage the active involvement of all scientists in these matters, championing the process of robust scientific study. All scientists should be urged to contribute to raising levels of public knowledge on these threats to civilization and engage in a massive education effort to popularize the principles in this Memorandum.”

“We know what needs to be done. We cannot wait until it is too late.”

“We cannot wait until what we value most is lost.”

[From the “St. James Palace Nobel Laureate Symposium” webpage at the website for Transcend Media Service at <https://www.transcend.org/tms/2009/06/st-james-palace-nobel-laureate-symposium/> (Spring, 2009)]

c) And from a news article about the St. James Palace Memorandum”

“World carbon emissions must start to decline in only six years if humanity is to stand a chance of preventing dangerous global warming, a group of 20 Nobel prize-winning scientists, economists and writers declared today.”

[FromTimesOnline article “Global warming must stay below 2C or world faces ruin, scientists declare” by Mark Henderson, (Science Editor) (May 28, 2009) (at <https://www.thetimes.co.uk/article/global-warming-must-stay-below-2c-or-world-faces-ruin-scientists-declare-p9zpv33bvcm>) (paragraph 1) (must register to see whole article)]

62) Organization “MIT Climate Colab” (September, 2009)

a) Beginnings

Summer 2007

“Harnessing Collective Intelligence to Address Global Climate Change, by Thomas W. Malone and Mark Klein, appears in the MIT journal Innovations, and lays out a broad vision for the Climate Collaboratorium.”

September 2009

“Inaugural moderators join the CoLab community and the system is launched. A White Paper is sent to the U.N. based on the outcomes of the 2009 CoLab contest.”

[From the “History of the Colab” webpage at the website for MIT Climate Colab (see <https://www.climatecolab.org/wiki/History+of+the+CoLab>) (see Sections “Summer, 2007” and “September, 2009”)]

b) Engagement

“Anyone can join Climate CoLab’s open community and participate:

“Submit actions. Do you have a practice or project that can contribute to meeting global climate goals? Submit your proposal into one of our open contests or workspaces.”

“Combine actions into integrated plans. Collect compatible proposals in an integrated proposal to suggest plans for how to meet climate goals. (Re-opening soon.)”

“Network, find collaborators, and help other members’ work. Find and collaborate with others on the platform interested in similar topics. You can comment on their proposals and even ask to join their team.”

“Support, share, and vote. Give a thumbs-up to the proposals you think are the best, and help them get recognition. During the voting period, you can help them win their contest’s Popular Choice Award.”

[From the “About the Project” webpage at the website for MIT Climate Colab (see <https://www.climatecolab.org/page/about>) (in Section “Engagement”)]

c) Contest Winning Projects from Previous Years



[From the webpage “Climate CoLab Contest Winners” at the website of MIT Climate CoLab (at <https://www.climatecolab.org/wiki/Climate+CoLab+Contest+Winners>)]

63) Article “More than 50 papers join in front-page leader article on climate change” (by Chris Tryhorn) (December, 2009)

More than 50 papers join in front-page leader article on climate change

Opinion piece to be published in 56 papers across 45 countries - including the Guardian, Le Monde and two Chinese papers

[In pictures: Climate change front pages](#)

[The papers that will carry the Copenhagen editorial](#)

[Ian Katz: How the editorial project came about](#)

[Jon Vidal: A perfect storm](#)



The Guardian has teamed up with more than 50 papers worldwide to run the [same front-page leader article calling for action](#) at the climate summit in Copenhagen, which begins tomorrow.

This unprecedented project is the result of weeks of negotiations between the papers to agree on a final text, in a process that mirrors the diplomatic wrangling likely to dominate the next 14 days in Copenhagen.

Fifty-six papers in 45 countries published in 20 different languages have joined the initiative, and will feature the leader in some form on their front pages.

[From the article “More than 50 papers join in front-page leader article on climate change” (by Chris Tryhorn) (December 9, 2009) at the website for the Guardian newspaper (UK) (see <https://www.theguardian.com/media/2009/dec/06/50-papers-leader-climate-change>) (paragraphs 1-3)]

64) Organization “Clean Cooking Alliance” (established 2010)

a) “No one’s life should be limited by how they cook. Yet globally, three billion people depend on polluting, open fires or inefficient stoves to cook their food, harming health, the climate, and the environment. Women and girls, who often spend hours cooking and collecting fuel, are disproportionately affected.”

“The Clean Cooking Alliance works with a global network of partners to build an inclusive industry that makes clean cooking accessible to the three billion people who live each day without it. Established in 2010, the Alliance is driving consumer demand, mobilizing investment to build a pipeline of scalable businesses, and fostering an enabling environment that allows the sector to thrive. Clean cooking transforms lives by improving health, protecting the climate and environment, empowering women, and helping consumers save time and money.”

“Achieving universal access to clean cooking solutions requires scaling up a range of technologies and business models. The Alliance’s work is built around three core pillars:

--Driving consumer demand for cleaner, more modern stoves and fuels by supporting behavior change and awareness-raising interventions;
--Mobilizing investment to build a pipeline of scalable businesses capable of delivering affordable, appropriate, high-quality clean cooking products; and
--Fostering an enabling environment for industry growth by advocating for effective and predictable policies, providing trusted, relevant data, and serving as the convener and champion of the clean cooking sector.”

[From the “About” webpage at the Clean Cooking Alliance website (at <https://www.cleancookingalliance.org/about/>) (paragraphs 1-3)]

b) Barcelona (Thomson Reuters Foundation) – “A global failure to provide about 4 billion people--half the world’s population--with access to clean, safe and affordable ways of cooking is costing \$2.4 trillion a year in damage to health, the climate and local economies, new figures show.”

“A report released by the World Bank and its partners this week said women bear the brunt of preparing food using harmful and polluting fuels--a blindspot for governments and business, despite a global goal to provide clean cooking for all by 2030.”

“The bulk of the cost of dirty cooking--\$1.4 trillion per year--comes from the health impacts of using smoky, high-emitting fuels such as wood, kerosene, charcoal and dung, it estimated.”

“‘Women bear a disproportionate share of this cost in the form of poor health and safety, as well as lost productivity,’ said Makhtar Diop, World Bank vice president for infrastructure.”

“The toll on women could rise during the coronavirus pandemic, he warned, as household air pollution from dirty fuels and stoves could make them more susceptible to COVID-19 and other respiratory diseases.”

“According to the World Health Organization, illnesses linked to indoor air pollution from cooking on open fires and inefficient stoves cause nearly 4 million premature deaths each year, mainly among women and children.”

“The World Bank report emphasized that funding for clean cooking efforts is falling far short, stagnating in the range of tens of millions of dollars per year when billions are needed to fix the problem.”

“It estimated that \$150 billion is required annually to reach universal access to cooking services using modern energy by 2030.”

“Van der Lans of the Clean Cooking Alliance said COVID-19 had ‘severely disrupted’ the progress of companies, researchers, investors and others working to advance clean cooking.”

“Governments could step in by designating clean cooking as an essential service, lowering costs for consumers by reducing equipment and energy tariffs and helping companies overcome supply chain disruptions, she added.”

[From article “Dirty secret: Half of world lacks clean cooking, at a huge cost” by Megan Rowling (September 25, 2020) at the Reuters website (at <https://www.reuters.com/article/us-global-energy-cooking/dirty-secret-half-of-world-lacks-clean-cooking-at-a-huge-cost-idUSKCN26G2GE>) (paragraphs 1-6, 21, 22, 31 and 32)]

65) Article “State of the Climate in 2009” (Special Supplement to the Bulletin of the American Meteorological Society) (June, 2010)

a) “As a guiding principle behind the inclusion of certain climatic events into this report, the Global Climate Observing System has identified Essential Climate Variables (ECVs, see GCOS 2003) (see appendix for a full list of abbreviations) necessary to support the United Nations Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change.”

[in “Introduction” to “State of the Climate in 2009” (Special Supplement to the Bulletin of the American Meteorological Society Vol. 91, No. 6, June 2010) (paragraph 3 on p. 514) (at https://www.google.com/books/edition/State_of_the_Climate_in_2009_Special_Sup/pATcqHd9N5kC?hl=en&gbpv=1)]

b) The Essential Climate Variables (ECVs) listed in Table 1.1

- i) “Atmospheric Surface--Air Temperature, Precipitation, Air Pressure, Surface Radiation Budget, Wind Speed and Direction, Water Vapor
- ii) Atmospheric Upper Air--Earth Radiation Budget (including solar irradiance), Upper Air Temperature (including MSU Radiances), Wind Speed and Direction, Water Vapor, Cloud Properties
- iii) Atmosphere Composition—Carbon Dioxide, Methane, Ozone, (and other long-lived greenhouse gases: Nitrous Oxide, Chlorofluorocarbons, Hydrochlorofluorocarbons, Hydrofluorocarbons, Sulphur Hexafluorides, Perfluorocarbons, Aerosol Properties
- iv) Ocean Surface--Sea Surface Temperature, Sea Surface Salinity, Sea Level, Sea State, Sea Ice, Current, Ocean Color (for biological activity), Carbon Dioxide Partial Pressure
- v) Ocean Subsurface--Temperature, Salinity, Current, Nutrients, Carbon, Ocean Tracers, Phytoplankton
- vi) Terrestrial—Soil Moisture and Wetness, Surface Ground Temperature, Subsurface Temperature and Moisture, Snow and Ice Cover, Permafrost, Glaciers and Ice Sheets, River Discharge, Water Use, Ground Water, Lake Levels, Albedo, Land Cover (including vegetation type), Fraction of Absorbed Photosynthetically Active Radiation (fAPAR), Leaf Area Index (LAI), Biomass, Fire Disturbance”

[in “State of the Climate in 2009” (Special Supplement to the Bulletin of the American Meteorological Society Vol. 91, No. 6, June 2010) (p. 516) (at https://www.google.com/books/edition/State_of_the_Climate_in_2009_Special_Sup/pATcqHd9N5kC?hl=en&gbpv=1)]

66) Report “State of the Climate in 2009” [National Oceanic and Atmospheric Administration (NOAA)]

“The 2009 State of the Climate report released today draws on data for 10 key climate indicators that all point to the same finding: the scientific evidence that our world is warming is unmistakable.”

“More than 300 scientists from 160 research groups in 48 countries contributed to the report, which confirms that the past decade was the warmest on record and that the Earth has been growing warmer over the last 50 years.”

“Based on comprehensive data from multiple sources, the report defines 10 measurable planet-wide features used to gauge global temperature changes. The relative movement of each of these indicators

proves consistent with a warming world. Seven indicators are rising: air temperature over land, sea-surface temperature, air temperature over oceans, sea level, ocean heat, humidity and tropospheric temperature in the 'active-weather' layer of the atmosphere closest to the Earth's surface. Three indicators are declining: Arctic sea ice, glaciers and spring snow cover in the Northern hemisphere."

"For the first time, and in a single compelling comparison, the analysis brings together multiple observational records from the top of the atmosphere to the depths of the ocean,' said Jane Lubchenco, Ph.D., under secretary of commerce for oceans and atmosphere and NOAA administrator. 'The records come from many institutions worldwide. They use data collected from diverse sources, including satellites, weather balloons, weather stations, ships, buoys and field surveys. These independently produced lines of evidence all point to the same conclusion: our planet is warming.'"

[From article "NOAA: Past Decade Warmest On Record According To Scientists In 48 Countries" at the website of the World Resources SimCenter (at <http://www.wrsc.org/story/noaa-past-decade-warmest-record-according-scientists-48-countries>) (paragraph 1, spread out into 4 paragraphs above)]

67) Book "Plan B 4.0: Mobilizing to Save Civilization" (Lester R. Brown, Earth Policy Institute) (October, 2009)

"The world's mountain glaciers have shrunk for 18 consecutive years. Many smaller glaciers have disappeared. Nowhere is the melting more alarming than in the Himalayas and on the Tibetan plateau where the ice melt from glaciers sustains not only the dry-season flow of the Indus, Ganges, Yangtze, and Yellow rivers but also the irrigation systems that depend on them. Without these glaciers, many Asian rivers would cease to flow during the dry season..."

"...Plan B aims to stabilize climate, stabilize population, eradicate poverty, and restore the economy's natural support systems. It prescribes a worldwide cut in net carbon emissions of 80 percent by 2020, thus keeping atmospheric CO2 concentrations from exceeding 400 parts per million. 'In setting this goal,' says Brown, 'my colleagues and I did not ask what would be politically popular but rather what would it take to have a decent shot at saving the Greenland ice sheet and at least the larger glaciers in the mountains of Asia.'"

[From the Press Release for "Plan B 4.0: Mobilizing to Save Civilization" by Lester R. Brown (October, 2009) at the website for the Earth Policy Institute (see <http://www.earth-policy.org/books/pb4/pb4pr>) (paragraphs 9 and 17)]

68) Report "Vision 2050" (World Business Council for Sustainable Development (WBCSD) (April 1, 2010)

a) "The Vision 2050 report lays out a pathway leading to a global population of some 9 billion people living well, within the resource limits of the planet by 2050. This work results from an 18-month combined effort with CEOs and experts, and dialogues with over 200 companies and external stakeholders in some 20 countries."

"The report spells out the 'must haves' – the things that must happen over the coming decade to make a sustainable planetary society possible. These include incorporating the costs of externalities, starting with carbon, ecosystem services and water, into the structure of the marketplace; doubling agricultural

output without increasing the amount of land or water used ; halting deforestation and increasing yields from planted forests: halving carbon emissions worldwide (based on 2005 levels) by 2050 through a shift to low-carbon energy systems and improved demand-side energy efficiency, and providing universal access to low-carbon mobility.”

[From the webpage “Vision 2050: The new agenda for business” at the website of the World Business Council for Sustainable Development (WBCSD) (at <https://www.wbcsd.org/Overview/About-us/Vision2050/Resources/Vision-2050-The-new-agenda-for-business>) (paragraphs 1-2)]

b) “The critical pathway includes:

- Addressing the development needs of billions of people, enabling education and economic empowerment, particularly of women, and developing radically more eco-efficient solutions, lifestyles and behavior
- Incorporating the cost of externalities, starting with carbon, ecosystem services and water
- Doubling of agricultural output without increasing the amount of land or water used
- Halting deforestation and increasing yields from planted forests
- Halving carbon emissions worldwide (based on 2005 levels) by 2050, with greenhouse gas emissions peaking around 2020 through a shift to low-carbon energy systems and highly improved demand-side energy efficiency
- Providing universal access to lowcarbon mobility
- Delivering a four-to-tenfold improvement in the use of resources and materials.”

[From the report “Vision 2050: The new agenda for business” at the website of World Business Council for Sustainable Development (WBCSD) (at <https://www.wbcsd.org/Overview/About-us/Vision2050/Resources/Vision-2050-The-new-agenda-for-business>) (the report can be downloaded from this report webpage... the above excerpt is from the first page of the “Executive Summary”, paragraph 6)]

69) Report “State of the Climate in 2010” [National Oceanic and Atmospheric Administration (NOAA)] (December, 2010)

“The year 2010 was marked by several notable extreme temperature events. During the beginning of the year, a strong negative Arctic Oscillation--a climate pattern which allows chilly Arctic air to slide south while warmer air moves north--brought snow storms and record cold temperatures to much of the Northern Hemisphere, including eastern North America, Europe, and Asia.... In contrast, warm air moving northward into Canada brought the country its warmest winter since records began in 1948. Among Canada's climate regions, the Arctic Tundra, Arctic Mountain and Fjords, and the Northwestern Forest all had their warmest winter on record.”

[From the “Global Climate Report--Annual 2010” webpage at the website of National Centers for Environmental Information section of the National Oceanic and Atmospheric Administration (NOAA) (at <https://www.ncdc.noaa.gov/sotc/global/201013>) (see Section “Regional Temperatures”, paragraph 2)]

[Note: at the above link, it is possible to find summary text for all of NOAA’s Global Climate Reports, from 2001-2020]

70) Book “World on the Edge “ (Lester R. Brown, Earth Policy Institute) (January, 2011)

“‘The new reality,’ says Brown, ‘is that the world is only one poor harvest away from chaos. It is time to redefine security. The principal threats to our future are no longer armed aggression but instead climate change, population growth, water shortages, spreading hunger, and failing states. What we now need is a mobilization to reverse these trends on the scale and urgency of the U.S. mobilization for World War II. The challenge is to quickly reduce carbon emissions, stabilize population, and restore the economy’s soils, aquifers, forests, and other natural support systems. This requires not only a redefining of security but a corresponding reallocation of fiscal resources from military budgets to budgets for climate stabilization, population stabilization, water conservation, and other new threats to security.”

[From the Press Release for “World on the Edge: How to Prevent Environmental and Economic Collapse” by Lester R. Brown (Earth Policy Institute) (at <http://www.earth-policy.org/books/wote/wotepr>) (second to last paragraph)]

71) Blog Entry “Fracking Culture” (Albert Bates) (June, 2011)

“And so, if you look at where are we now, we are right where Dennis and Dana Meadows said back in 1972 we would be in the Limits to Growth study. We are right at that spaghetti junction where all the lines converge with population and resources, food supply, energy, water and the rest. We’re at that point right now, in exactly the decade they predicted we would arrive here.”

“We have to somehow get through this collapsing passageway and into the next paradigm. And so what we do at the Ecovillage Training Center--what ecovillages around the world are all trying to do--is to provide models, transition pathways, to get us to that next step, to get us to where we are going. And some of that is food supply, some of that is energy, some is building materials and how we get our buildings, some of that is microeconomics, like complimentary currencies. Some of that is new methods of social networking and alternative education and midwifery and alternative health care and doing things in ways that we have known for hundreds of thousands of years and we need to get back to.”

[From a blog entry titled “Fracking Culture” by Albert Bates (June 30, 2011) at his blog titled “The Great Change” (see <http://peaksurfer.blogspot.com/>) (paragraphs 8-9) (Note: it will be necessary to use a “google” search with the title and author to find this entry)]

[Note: biographical information about Albert Bates can be found in the #40 entry, above]

72) Review of Book “The Global Warming Reader” (Edited by Bill McKibben) (September, 2011)

“Author Bill McKibben is a foremost authority on climate change and the machinations of those who so vehemently refute it. His latest book, The Global Warming Reader, is a well-chosen and arranged collection of climate-related writings by the likes of James Hansen, Al Gore and George Monbiot, which McKibben edits and introduces. Significantly, the book contains writings by Inhofe and his ilk as well, the better to understand ‘the lines of attack climate deniers have used over and over,’ in McKibben’s words...”

“...In addition to its exposé of skeptics, this book also offers a snapshot of recent developments in climate science. One of these, having to do with the role of the oceans, is ironic. Climate change is fundamentally about heat becoming trapped in the *atmosphere*, but it turns out that oceans may be a bigger driver than previously thought. Water has a high thermal inertia, meaning that it heats up more slowly than the air or land. And the growing temperature disparity between the sea and air seems to be driving much of the recent freakish weather. The oceans’ thermal inertia also means that atmospheric temperature will rise well beyond 2100 even if CO₂ concentrations are stabilized by then, because it will take many decades for an equilibrium temperature to be reached between the air and the sea.”

[From a review (by Frank Kaminski, Sept. 26, 2011) of “The Global Warming Reader” Edited and introduced by Bill McKibben (424 pp.) (September, 2011) at the Resilience website (paragraphs 3 and 7)(see <http://www.resilience.org/stories/2011-09-26/review-global-warming-reader-edited-and-introduced-bill-mckibben>)]

73) Article “World Headed for Irreversible Climate Change” (Fiona Harvey) (November, 2011)

“The world is likely to build so many fossil-fueled power stations, energy-guzzling factories and inefficient buildings in the next five years that it will become impossible to hold global warming to safe levels, and the last chance of combating dangerous climate change will be ‘lost forever’, according to the most thorough analysis yet of world energy infrastructure.”

“If the world is to stay below 2°C of warming, which scientists regard as the limit of safety, then emissions must be held to no more than 450 parts per million (ppm) of carbon dioxide in the atmosphere; the level is currently around 390 ppm. But the world’s existing infrastructure is already producing 80% of that ‘carbon budget’, according to the IEA’s analysis, published on Wednesday.”

“If current trends continue, and we go on building high-carbon energy generation, then by 2015 at least 90% of the available ‘carbon budget’ will be swallowed up by our energy and industrial infrastructure. By 2017, there will be no room for maneuver at all--the whole of the carbon budget will be spoken for, according to the IEA’s calculations.”

[From article “World Headed for Irreversible Climate Change” by Fiona Harvey. Posted on November 11, 2011 at the Energy Bulletin website (now the Resilience website) (paragraphs 1, 4, and 5) (at <http://www.resilience.org/stories/2011-11-11/world-headed-irreversible-climate-change-%E2%80%94-94-ia>)]

74) Commentary on “Durban Climate Conference” (Nov 28, 2011--Dec 11, 2011)

“Countries from around the globe agreed on Sunday to forge a new deal forcing all the biggest polluters for the first time to limit greenhouse gas emissions. A package of accords agreed after two weeks of United Nations talks in Durban, South Africa, extended the 1997 Kyoto Protocol--the only global pact enforcing carbon cuts -- allowing five more years to finalize a wider pact.”

“Countries also agreed on the format of a ‘Green Climate Fund’ to help poor nations tackle climate change. ‘We have made history,’ said South African Foreign Minister Maite Nkoana-Mashabane, who chaired the talks.”

“German media commentators beg to differ. Most argue that the best that can be said of the Durban agreement is that it kept global climate talks alive. Some even question whether the UN is the right forum for climate talks, since the so-called accords have produced only meager results, while the world's climate continues to heat up inexorably.”

[From article “The World from Berlin: The Durban Climate Agreement 'Is Almost Useless'” written and compiled by David Crossland (December 12, 2011) (paragraphs 2, 4 and 5) at the “SpeigelOnline” website (at <http://www.spiegel.de/international/world/0,1518,803158,00.html>)]

75) Organization “Global Challenges Foundation” (founded 2012)

a) “Since its inception in 2012, the Global Challenges Foundation initiates and supports a number of projects aligned with the goal to increase knowledge and raising awareness of the greatest global risks.”

“Throughout the course of its history, the Global Challenges Foundation has been present at conferences and their arrangements, supporting the publication of books and reports, funding research and education, organizing prize competitions, and an active voice in public debate. The focus of the foundation’s activities changes reflecting the progression of its work.”

“The Global Challenges Foundation publishes an annual report, Global Catastrophic Risks, in collaboration with the Future of Humanity Institute and Oxford Martin School, offering an overview of risks threatening over one billion people, and ways to better address those.”

[From the webpage “History” at the website for the Global Challenges Foundation (at <https://globalchallenges.org/about/history/>) (paragraphs 1 and 2; and in section “2016”, paragraph 2)]

b) From “Global Catastrophic Risks 2017” (Global Challenges Foundation)

“Discussions of climate change usually focus on limiting temperature rises to 1-3 °C above pre-industrial levels.” (p. 29, paragraph 1)

“The Paris Agreement came into force in October 2016, with national pledges falling woefully short-- setting the world on a 3.6°C temperature increase track.” (p. 35, paragraph 2))

“If climate change was to reach 3°C, most of Bangladesh and Florida would drown, while major coastal cities – Shanghai, Lagos, Mumbai – would be swamped, likely creating large flows of climate refugees. Most regions in the world would see a significant drop in food production and increasing numbers of extreme weather events, whether heat waves, floods or storms. This likely scenario for a 3°C rise does not take into account the considerable risk that self-reinforcing feedback loops set in when a certain threshold is reached, leading to an ever increasing rise in temperature. Potential thresholds include the melting of the arctic permafrost releasing methane into the atmosphere, forest dieback releasing the carbon currently stored in the Amazon and boreal forests, or the melting of polar ice caps that would no longer reflect away light and heat from the sun.” (p. 29, paragraph 1)

“There is strong scientific evidence today that large systems on Earth, such as the ocean circulation system, permafrost, ice sheets, rainforests and atmospheric circulation can abruptly shift when pushed across tipping points.” (p. 78, paragraph 3)

“The latest science shows that tipping points with potential to cause catastrophic climate change could be triggered at 2 °C global warming. These include the risk of losing all coral reef systems on Earth and irreversible melting of inland glaciers, Arctic sea ice and potentially the Greenland ice sheet. As well as the immediate risk to human societies, the fear is that crossing these tipping points would have major impacts on the pace of global warming itself.” (p. 83, paragraph 1)

[From the report “Global Catastrophic Risks 2017” at the Global Challenges Foundation (at <https://globalchallenges.org/wp-content/uploads/2019/07/Global-Catastrophic-Risks-2017.pdf>)]

76) Organization “Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)” (April, 2012)

a) “The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (often described as the ‘IPCC for biodiversity’) is an independent intergovernmental body established by States to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development. It was established in Panama City, on 21 April 2012 by 94 Governments. It is not a United Nations body. However, at the request of the IPBES Plenary and with the authorization of the UNEP Governing Council in 2013, the United Nations Environment Programme (UNEP) provides secretariat services to IPBES.”

[From the “About” webpage at the website for IPBES (at <https://ipbes.net/about>) (paragraph 1)]

b) Key Report Released (May, 2019)

From Article “Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’”

“Nature is declining globally at rates unprecedented in human history--and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely, warns a landmark new report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the summary of which was approved at the 7th session of the IPBES Plenary, meeting last week (29 April–4 May) in Paris.”

“The overwhelming evidence of the IPBES Global Assessment, from a wide range of different fields of knowledge, presents an ominous picture,” said IPBES Chair, Sir Robert Watson. “The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide.”

“The IPBES Global Assessment Report on Biodiversity and Ecosystem Services is the most comprehensive ever completed. It is the first intergovernmental Report of its kind and builds on the landmark Millennium Ecosystem Assessment of 2005, introducing innovative ways of evaluating evidence.”

“Compiled by 145 expert authors from 50 countries over the past three years, with inputs from another 310 contributing authors, the Report assesses changes over the past five decades, providing a comprehensive picture of the relationship between economic development pathways and their impacts on nature”

“The Report finds that around 1 million animal and plant species are now threatened with extinction, many within decades, more than ever before in human history.”

“Ecosystems, species, wild populations, local varieties and breeds of domesticated plants and animals are shrinking, deteriorating or vanishing. The essential, interconnected web of life on Earth is getting smaller and increasingly frayed,” said Prof. Settele. ‘This loss is a direct result of human activity and constitutes a direct threat to human well-being in all regions of the world.’”

[From the webpage “Media Release: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’” at the website for IPBES (at <https://ipbes.net/news/Media-Release-Global-Assessment>) (paragraphs 1, 2, 5, 6, 9, and 11)]

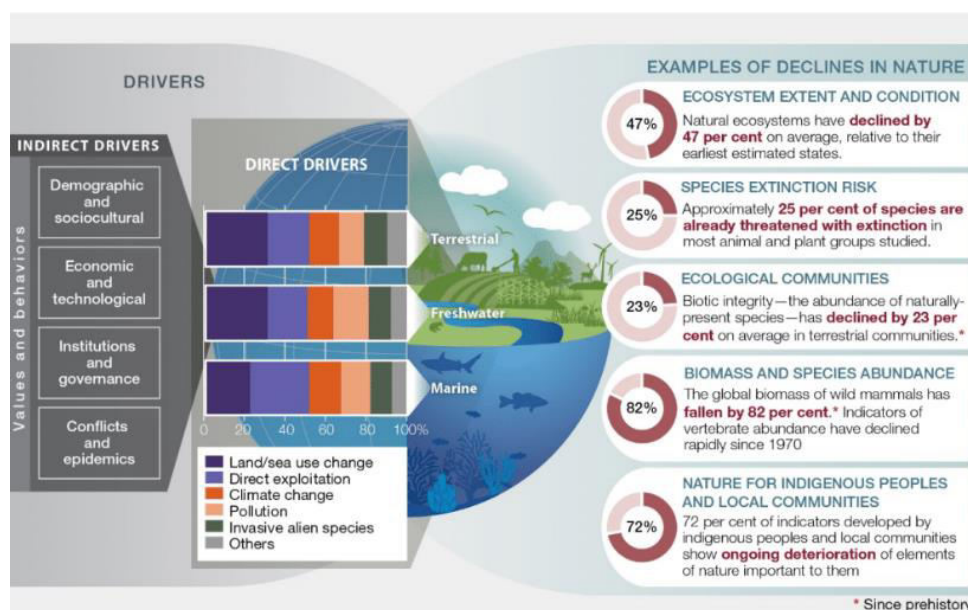
c) From the “Summary for Policymakers IPBES Global Assessment”

“Nature across most of the globe has now been significantly altered by multiple human drivers, with the great majority of indicators of ecosystems and biodiversity showing rapid decline.” (A4)(p. 3)

“Human actions threaten more species with global extinction now than ever before.” (A5)(p. 3)

“The rate of global change in nature during the past 50 years is unprecedented in human history. The direct drivers of change in nature with the largest global impact have been (starting with those with most impact): changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of alien species. Those five direct drivers result from an array of underlying causes—the indirect drivers of change—which are in turn underpinned by societal values and behaviours that include production and consumption patterns, human population dynamics and trends, trade, technological innovations and local through global governance. The rate of change in the direct and indirect drivers differs among regions and countries.” [(B) (“Direct and Indirect Drivers of Change Have Accelerated During the Past 50 Years”) (p. 3-4)]

From the “Background” section, (A4)(p. 12) (Figure 2)



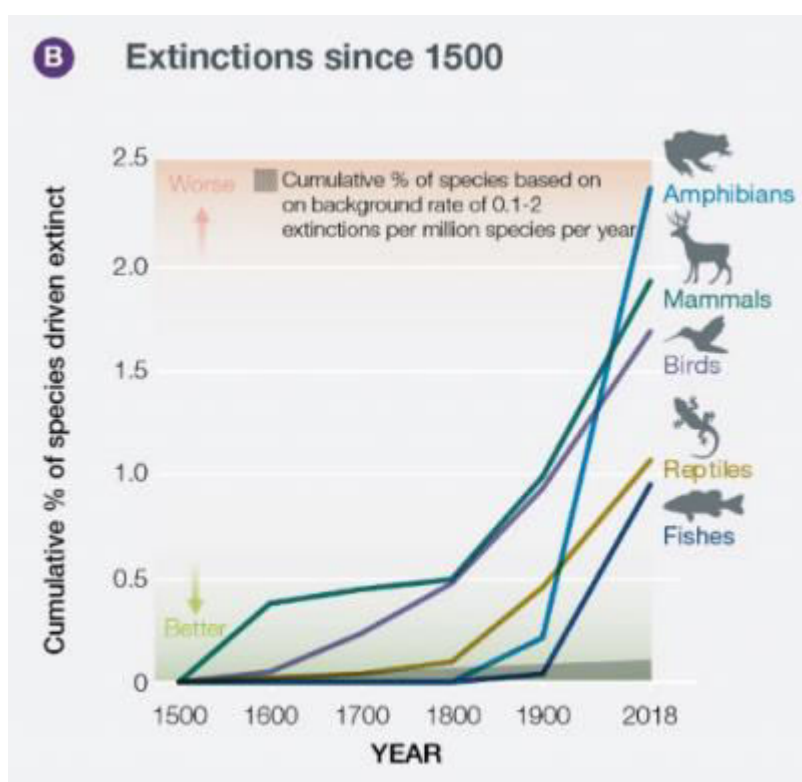
“Figure 2 Text. Examples of global declines in nature, emphasizing declines in biodiversity, that have been and are being caused by direct and indirect drivers of change. The direct drivers (land/sea use change; direct exploitation of organisms; climate change; pollution; and invasive alien species) result from an array of underlying societal causes. These causes can be demographic (e.g. human population dynamics), sociocultural (e.g. consumption patterns), economic (e.g. trade), technological or relating to

institutions, governance, conflicts and epidemics; these are called indirect drivers, and are underpinned by societal values and behaviors. The colour bands represent the relative global impact of direct drivers on (from top to bottom) terrestrial, freshwater and marine nature as estimated from a global systematic review of studies published since 2005. Land and sea use change and direct exploitation account for more than 50 per cent of the global impact on land, in fresh water and in the sea, but each driver is dominant in certain contexts. The circles illustrate the magnitude of the negative human impacts on a diverse selection of aspects of nature over a range of different time scales, based on a global synthesis of indicators.” (p. 12)

“Climate change is a direct driver that is increasingly exacerbating the impact of other drivers on nature and human well-being.” (B2) (p. 4)

“Climate change is projected to become increasingly important as a direct driver of changes in nature and its contributions to people in the next decades.” (C5) (p. 7)

“A key constituent of sustainable pathways is the evolution of global financial and economic systems to build a global sustainable economy, steering away from the current limited paradigm of economic growth.” (D10) (p. 9)



“Figure 3. A substantial proportion of assessed species are threatened with extinction and overall trends are deteriorating, with extinction rates increasing sharply in the past century.” (p. 14)

“Today, humans extract more from the Earth and produce more waste than ever before (well established).” (B10) (p. 16)

“Long-distance transportation of goods and people, including for tourism, have grown dramatically in the past 20 years with negative consequences for nature overall (established but incomplete).” (B17) (p. 18)

“Nature can be conserved, restored and used sustainably while simultaneously meeting other global societal goals through urgent and concerted efforts fostering transformative change.” (D) (p. 27)

[From the “Summary for Policymakers IPBES Global Assessment” (“Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services” Advanced Unedited Version 6 May, 2019) at the Dropbox Platform (at https://www.dropbox.com/sh/yd8l2v0u4jqtp3/AACpraYjOYWpTxAFv5H-2vrKa/1%20Global%20Assessment%20Summary%20for%20Policymakers?dl=0&preview=Summary+for+Policymakers+IPBES+Global+Assessment.pdf&subfolder_nav_tracking=1) (see specific source references above)]

77) Article “Game Over for the Climate” (James Hansen) (May, 2012)

“Canada’s tar sands, deposits of sand saturated with bitumen, contain twice the amount of carbon dioxide emitted by global oil use in our entire history. If we were to fully exploit this new oil source, and continue to burn our conventional oil, gas and coal supplies, concentrations of carbon dioxide in the atmosphere eventually would reach levels higher than in the Pliocene era, more than 2.5 million years ago, when sea level was at least 50 feet higher than it is now. That level of heat-trapping gases would assure that the disintegration of the ice sheets would accelerate out of control. Sea levels would rise and destroy coastal cities. Global temperatures would become intolerable. Twenty to 50 percent of the planet’s species would be driven to extinction. Civilization would be at risk.”

“...The concentration of carbon dioxide in the atmosphere has risen from 280 parts per million to 393 p.p.m. over the last 150 years. The tar sands contain enough carbon — 240 gigatons — to add 120 p.p.m. Tar shale, a close cousin of tar sands found mainly in the United States, contains at least an additional 300 gigatons of carbon. If we turn to these dirtiest of fuels, instead of finding ways to phase out our addiction to fossil fuels, there is no hope of keeping carbon concentrations below 500 p.p.m.—a level that would, as earth’s history shows, leave our children a climate system that is out of their control.”

[From article “Game Over for the Climate” by James Hansen (May 9, 2012) at the website of The New York Times (paragraphs 3 and 8)(see http://www.nytimes.com/2012/05/10/opinion/game-over-for-the-climate.html?_r=0) (Note: can be accessed with a free account)]

78) Article “Global Carbon Dioxide Emissions—Facts and Figures” (Robert Rapier) (July, 2012)

“Developing countries seek the same modern conveniences—dishwashers, televisions, computers, and cars—enjoyed by the developed world and which are currently powered mostly by fossil fuels. We can imagine that they can improve their standard of living without increasing their fossil fuel consumption, but what do we have to point to in order to show that it can be done?”

“It is a quandary, and I not only see no easy answer—I see no viable answer period that doesn’t involve shutting down development in developing countries. This is why I am extremely skeptical that carbon emissions will be reined in.”

[From article “Global Carbon Dioxide Emissions—Facts and Figures” by Robert Rapier (July 2, 2012) (at <http://www.energytrendsinsider.com/2012/07/02/global-carbon-dioxide-emissions-facts-and-figures/>) (from last two paragraphs)]

79) Article “McKibben Must Read: ‘Global Warming Terrifying New Math’” (Joe Romm) (July, 2012)

“The three key numbers are:

“The First Number: 2° Celsius [3.6° Fahrenheit]: The temperature rise we need to work as hard as possible to limit total warming to if we want to have our best chance of averting multiple catastrophes and amplifying carbon cycle feedbacks.”

“The Second Number: 565 Gigatons: Scientists estimate that humans can pour roughly 565 more gigatons of carbon ... into the atmosphere by midcentury and still have some reasonable hope of staying below two degrees.”

“The Third Number: 2,795 Gigatons: ‘This number is the scariest of all – one that, for the first time, meshes the political and scientific dimensions of our dilemma.... The number describes the amount of carbon already contained in the proven coal and oil and gas reserves of the fossil-fuel companies, and the countries (think Venezuela or Kuwait) that act like fossil-fuel companies. In short, it’s the fossil fuel we’re currently planning to burn.’”

[From July 24, 2012 article “McKibben Must Read: ‘Global Warming Terrifying New Math’” by Joe Romm at the Resilience website (originally published by Climate Progress July 24, 2012) (Resilience link is <http://www.resilience.org/stories/2012-07-24/mckibben-must-read-%E2%80%98global-warming%E2%80%99s-terrifying-new-math%E2%80%99>) (paragraph 3)]

80) Organization “UN Sustainable Development Solutions Network” (launched August, 2012)

a) “9 August 2012: UN Secretary-General Ban Ki-moon announced the launch of the Sustainable Development Solutions Network (SDSN), an independent global network of research centers, universities and technical institutions aiming to mobilize scientific and technical expertise for problem-solving in relation to sustainable development. The Network is headed by UN Special Advisor on Millennium Development Goals (MDGs) Jeffrey Sachs, and will begin work immediately.”

“SDSN is intended to promote integrated approaches to solving interconnected economic, social and environmental challenges, at local, national and global levels, and to help overcome problems of compartmentalization in technical and policy work. According to the UN press release, ‘governments often lack the timely information needed for long-term sustainable development strategies.’ The Network will connect universities and scientific research institutes, and draw on technology expertise in the private sector. Columbia University’s Earth Institute, of which Sachs is Director, will serve as the Network’s secretariat.”

[From the article “UN Launches Sustainable Development Solutions Network” (August 14, 2012) at the website SDG Knowledge Hub (project of IISD--International Institute for Sustainable Development) (at <http://sdg.iisd.org/news/un-launches-sustainable-development-solutions-network/>) (paragraphs 1-2)]

b) Our Work (on the topics of Climate and Energy)

“Critically, the Paris Agreement asks all countries to prepare by 2020 low-emission development strategies that chart out how emissions will fall through to 2050. SDSN has played an instrumental role in developing and popularizing the concept of long-term pathways through the Deep Decarbonization Pathways Project (DDPP). The Paris Agreement also emphasizes the central role of advances in low-emission technologies and their diffusion. The annual Low-Emission Solutions Conference (LESC) spearheaded by SDSN, the World Business Council for Sustainable Development (WBCSD) and ICLEI - Local Governments for Sustainability was launched at COP22 in Morocco and aims to advance the pace of development for key technologies. As scientist and engineers have demonstrated, we have the technologies and means to decarbonize our economy, it's up to nations, businesses, and cities to set on a course today for a carbon neutral tomorrow.”

[From the webpage “Climate and Energy” at the website for the Sustainable Development Solutions Network (at <https://www.unsdsn.org/climate-and-energy>) (in the subsection “Our Work”, paragraph 1) (Note: the link above does not seem to work if you click on it, but if you copy it and paste it into a browser address box, it works)]

c) SDG Academy

“The SDG Academy is SDSN's flagship education initiative. We bring together the world’s experts to create and deliver educational content on critical issues for the future of people and planet, including health, education, climate change, agriculture and food systems, and sustainable investment.”

“We firmly believe that education and knowledge is the first step towards achieving the SDGs. Our materials are global in nature, based on science, taught by experts in their fields, accessible online, created in partnership with SDSN members and other organizations from around the world, and built to scale, having reached hundreds of thousands of learners around the world!”

“Visit sdgacademy.org to explore our free online courses.”

[From the webpage “SDG Academy” at the website of the Sustainable Development Solutions Network (at <https://www.unsdsn.org/sdg-academy>) (paragraphs 1-2; third paragraph above is except from “box”) (Note: the link above does not seem to work if you click on it, but if you copy it and paste it into a browser address box, it works)]

81) Article “Sovereign Environmental Risk” [Achim Steiner (under-Secretary General, United Nations and Executive Director of United Nations Environmental Programme (UNEP) and Susan Burns (Founder of the Global Footprint Network)] (October, 2012)

“Until the global financial crisis erupted four years ago, sovereign bonds had traditionally been viewed as reliable, virtually risk-free investments. Since then, they have looked far less safe. And many observers within and outside the financial sector have begun to question the models upon which credit-rating agencies, investment firms, and others rely to price the risks tied to such securities....”

“...Studies such as the [The Millennium Ecosystem Assessment](#) and [The Economics of Ecosystems and Biodiversity \(TEEB\)](#), conducted on behalf of the G-8, have improved our understanding of the economic,

ecological, and social value of the goods and services provided by ecosystems, and have proposed better methods for pricing them. “

“Financial markets can no longer overlook how ecosystems and the multitrillion-dollar services and products that they provide--ranging from water supplies, carbon storage, and timber to the healthy soils needed for crop production--underpin economic performance.”

“Some might assume that bond markets are shielded from the effects of climate change, ecosystem degradation, and water scarcity. With more than \$40 trillion of sovereign debt in global markets at any given time, that is a very high-risk game.”

From article titled “Sovereign Environmental Risk” by Achim Steiner (under-Secretary General, United Nations and Executive Director of United Nations Environmental Programme) and Susan Burns (Founder of the Global Footprint Network) (October 27, 2012)--but referred to as a press release at the website of the United Nations Environment Programme (at <https://www.unenvironment.org/news-and-stories/press-release/sovereign-environmental-risk>) (paragraphs 1, 5, 3, and 6) ; first published at the Project Syndicate website (October 27, 2012)(see <http://www.project-syndicate.org/commentary/natural-resources-and-sovereign-credit-ratings-by-achim-steiner-and-susan-burns>)]

82) Report “Turn Down the Heat: Why a 4⁰ Warmer World Must Be Avoided” (for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics) (November, 2012)

[Note: 4°C (Celsius) warming = 7.2°F (Fahrenheit) warming]

“This report provides a snapshot of recent scientific literature and new analyses of likely impacts and risks that would be associated with a 4° Celsius warming within this century. It is a rigorous attempt to outline a range of risks, focusing on developing countries and especially the poor. A 4°C world would be one of unprecedented heat waves, severe drought, and major floods in many regions, with serious impacts on ecosystems and associated services.”

“Even with the current mitigation commitments and pledges fully implemented, there is roughly a 20 percent likelihood of exceeding 4°C by 2100. If they are not met, a warming of 4°C could occur as early as the 2060s.”

[From Executive Summary of Report “Turn Down the Heat: Why a 4⁰ Warmer World Must Be Avoided”--for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics (November, 2012) (at <http://documents1.worldbank.org/curated/en/865571468149107611/pdf/NonAsciiFileName0.pdf>) (on p. xiii, paragraphs 1 and 2)]

83) Article “World Energy Report 2012: The Good, The Bad, and The Really, Truly, Ugly” (Michael T. Klare) (November, 2012)

“...For all the talk of the need to increase reliance on renewable sources of energy, fossil fuels--coal, oil, and natural gas--will continue to provide most of the additional energy supplies needed to satisfy soaring world demand. ‘Taking all new developments and policies into account,’ the IEA reported, ‘the world is still failing to put the global energy system onto a more sustainable path.’ In fact, recent developments seem to favor greater fossil-fuel reliance....”

“...In many regions, notes the IEA report, the continued dominance of fossil fuels is sustained by government policies. In the developing world, countries commonly subsidize energy consumption, selling transportation, cooking, and heating fuels at below-market rates. In this way, they hope to buffer their populations from rising commodity costs, and so protect their regimes from popular unrest. Cutting back on such subsidies can prove dangerous, as in Jordan where a recent government decision to raise fuel prices led to widespread riots and calls for the monarchy’s abolition. In 2011, such subsidies amounted to \$523 billion globally, says the IEA, up almost 30% from 2010 and six times greater than subsidies for renewable energy....”

“Of all the findings in the 2012 edition of the *World Energy Outlook*, the one that merits the greatest international attention is the one that received the least. Even if governments take vigorous steps to curb greenhouse gas emissions, the report concluded, the continuing increase in fossil fuel consumption will result in ‘a long-term average global temperature increase of 3.6 degrees C.’”

“This should stop everyone in their tracks. Most scientists believe that an increase of 2 degrees Celsius is about all the planet can accommodate without unimaginably catastrophic consequences: sea-level increases that will wipe out many coastal cities, persistent droughts that will destroy farmland on which hundreds of millions of people depend for their survival, the collapse of vital ecosystems, and far more. An increase of 3.6 degrees C essentially suggests the end of human civilization as we know it....”

“...In a report that leads with the ‘good news’ of impending U.S. oil supremacy, to calmly suggest that the world is headed for that 3.6 degree C mark is like placing a thermonuclear bomb in a gaudily-wrapped Christmas present. In fact, the ‘good news’ is really the bad news: the energy industry’s ability to boost production of oil, coal, and natural gas in North America is feeding a global surge in demand for these commodities, ensuring ever higher levels of carbon emissions. As long as these trends persist--and the IEA report provides no evidence that they will be reversed in the coming years--we are all in a race to see who gets to the Apocalypse first.”

[From article “World Energy Report 2012: The Good, The Bad, and The Really, Truly, Ugly” by Michael T. Klare Published November 27, 2012 at Huffington Post (at http://www.huffingtonpost.com/michael-t-klare/world-energy-report-2012_b_2198033.html) (in Section “Continuing Reliance on Fossil Fuels”, paragraphs 2 and 5; in Section “No Hope for Averting Catastrophic Climate Change”, paragraphs 1, 2, and 5)]

84) Report “Zero Carbon Britain: Rethinking the Future” (Centre for Alternative Technology) (2013)

a) “Are We Keeping Within Our Budget?”

“Assuming an average global population of roughly 8 billion, and an average UK population of 70 million between now and 2050, the UK’s share of the global budget between 2010 and 2050 would be about:

8,400 MtCO₂e (80% chance of avoiding a 2°C global average temperature rise)

9,600 MtCO₂e (75% chance)

11,200 MtCO₂e (67% chance)

14,000 MtCO₂e (50% chance)”

“This covers all that we could ‘spend’ (or emit) between 2010 and 2050.”

“As the UK government has already published a series of legally binding carbon budgets up to 2028, and further emissions reductions to 2050, we can calculate roughly how much carbon we will ‘spend’, if we meet all our targets.”

“Using data for UK GHG emissions from 2000-12 (DECC, 2013b; and DECC, 2013a) and a projection of GHG emissions in line with current policy targets, we find that the UK will emit about 15,800 MtCO₂e including emissions from international aviation and shipping--currently not counted under the Kyoto Protocol) by 2050--well over the amount for even a 50% chance of avoiding the 2°C limit.”

“Such a budget would not be acceptable in international negotiations, especially in view of the fact that most of the present atmospheric GHGs were generated by wealthy countries like the UK during their development process. In some sense, such countries have already exhausted their ‘moral budget’—having emitted far more than their ‘fair share’ over the years since the industrial revolution—and should perhaps shoulder this ‘historical responsibility’.”

“In fact, a huge gulf between what is physically demanded by science and what is seen as politically possible is revealed. This is reflected in the difference between our projected emissions ‘spend’ above (15,800 MtCO₂e), and the UK’s portion of the global carbon budget in line with a good (80%) chance of avoiding a global temperature rise of 2oC (8,400 MtCO₂e). That’s a difference of 7,400 MtCO₂e.

“We call this the ‘physics-politics gap’, as illustrated in figure 2.10.”

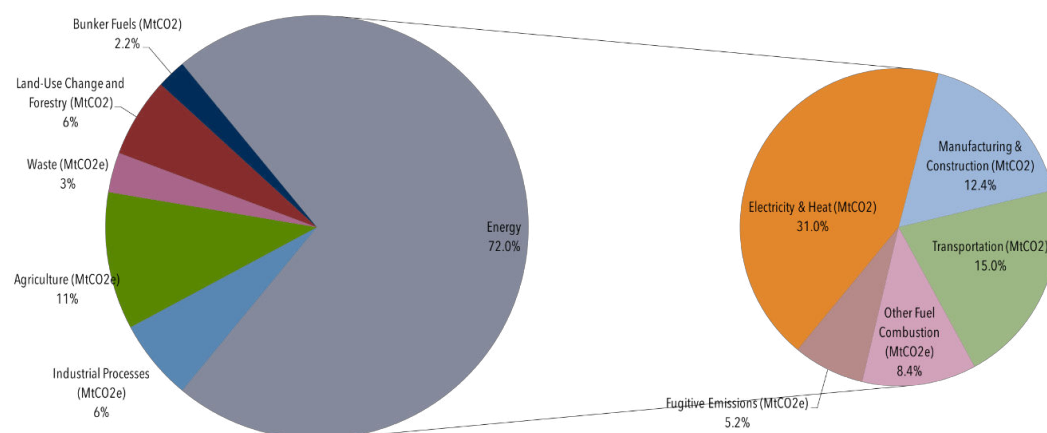
“Most current efforts attempt to build bridges from the now, working forwards within current political, economic and social boundaries to try and meet the challenge of rapid decarbonisation. There are plenty of ‘half bridges’ built on foundations in the politically realistic perspective, none of which quite reach where we need to go from the physically realistic perspective.”

“Another approach is to instead ask ‘what is the end point?’ A physically realistic perspective based on this line of question shows us where we need to get to in order to successfully meet the challenge of climate change. We can explore the possibilities for physically realistic worlds and consider what needs to change (from lifestyles, to infrastructure, to politics and economics) for us to get there, plus how fast we need to change, and the alternative routes that we can take.”

“Once we have worked out where we need to get to, we can work backwards to find out how we get there. Zero Carbon Britain focuses on the questions involved in this process and sets out such a physically realistic scenario—laying foundations on the ‘right’ side of the physics-politics gap.”

[From the report “Zero Carbon Britain: Rethinking the Future” by the Centre for Alternative Technology (2013)]

85) Pie Chart “Global Manmade Greenhouse Gas Emissions by Sector, 2013”



[above pie charts, titled “Global Manmade Greenhouse Gas Emissions by Sector, 2013” (via Climate Analytics Indicators Tool at World Resource Institute website) from the “Global Emissions” section of the Center for Climate and Energy Solutions webpage (C2ES) (at <https://www.c2es.org/content/international-emissions/> (Chart #5)]

86) Measurement “400 parts per million (ppm)” (May, 2013)

“On May 9, 2013, an instrument near the summit of Mauna Loa in Hawaii recorded a long-awaited climate milestone: the amount of carbon dioxide in the atmosphere there had exceeded 400 parts per million (ppm) for the first time in 55 years of measurement--and probably more than 3 million years of Earth history.”

“Two independent teams of scientists measure CO₂ on Mauna Loa: one from the U.S. National Oceanic and Atmospheric Administration (NOAA), the other from the Scripps Institution of Oceanography. The NOAA team was the first to post word on its web site: The daily average for May 9 was 400.03 ppm. The Scripps team later confirmed the milestone had been crossed.”

[From article “Climate Milestone: Earth's CO₂ Level Passes 400 ppm: Today, greenhouse gasses in the Earth's atmosphere are at their highest since the Pliocene Era, when sea levels were higher and the Earth was warmer” at the National Geographic website (at <https://www.nationalgeographic.org/article/climate-milestone-earths-co2-level-passes-400-ppm/#:~:text=On%20May%209%2C%202013%2C%20an,million%20years%20of%20Earth%20history.>) (paragraphs 1 and 4)]

87) Report “An Action Agenda for Sustainable Development: Report for the UN Secretary-General” (Leadership Council of the Sustainable Development Solutions Network) (June, 2013)

(From Chapter 4 “Ten Priority Challenges for Sustainable Development”; subsection 8 “Curb Human Induced Climate Change and Ensure Clean Energy for All”; p.20)

“The world has tentatively settled on the goal of avoiding a 2 degree Celsius (°C) rise in average global temperatures above the preindustrial baseline. Emission-reduction trajectories announced to date by UN member states are not adequate to achieve this goal. Even worse, the goal itself might well be insufficient to avoid very dangerous climate changes. Increasing scientific evidence suggests that a 2°C rise in average temperatures could mean severe climate changes in many parts of the world, including significant sea level rise and a sharp increase in extreme events, including storms, droughts, and floods. Moreover actions that produce a 2°C rise in temperatures in the coming decades might lead to much larger temperature and sea level rises in the longer term, as positive feedbacks in the Earth systems amplify the effects of greenhouse gases on the Earth’s average temperature and climate patterns. The results would also include catastrophic ocean acidification.”

“All of these grim realities underscore the crucial need to reduce greenhouse gas emissions globally beginning this decade and achieve low global emissions by mid-century, even as the world economy expands. Unless the climate challenge is addressed it may become impossible to end extreme poverty, particularly in vulnerable countries, and achieve the other sustainable development priorities.”

“While reductions will be needed in emissions of all greenhouse gases, the most important will be to reduce CO₂ emissions from fossil fuel use. In short, the main challenge will be to ‘de-carbonize’ the

world's energy system, meaning to achieve dramatic reduction of CO₂ emissions in both the aggregate and per unit of energy. The current rate of emissions of around 34 billion tons of CO₂ per year from fossil fuel use should decline by more than half, even as the world economy expands perhaps three-fold in the same period. Therefore, the CO₂ per dollar of world output must decline by more than 80% by 2050, with rich countries facing steeper reductions in per capita greenhouse gas emissions."

"Achieving such a deep transformation of the energy, industrial, and agricultural systems over the next few decades will represent one of the greatest technical, organizational, and financing challenges that humanity has faced."

[From "An Action Agenda for Sustainable Development: Report for the UN Secretary-General" prepared by the Leadership Council of the Sustainable Development Solutions Network (June 6, 2013) (at <https://unstats.un.org/unsd/broaderprogress/pdf/130613-SDSN-An-Action-Agenda-for-Sustainable-Development-FINAL.pdf>) (paragraphs 1, 2, 3, and 5)]

88) Article "James Hansen: Fossil fuel addiction could trigger runaway global warming: Without full decarbonisation by 2030, our global emissions pathway guarantees new era of catastrophic climate change" (Dr. Nafeez Ahmed) (July, 2013)

"Given that efforts to exploit available fossil fuels continue to accelerate, the paper's principal finding - that 'conceivable levels of human-made climate forcing could yield the low-end runaway greenhouse effect' based on inducing 'out-of-control amplifying feedbacks such as ice sheet disintegration and melting of methane hydrates'--is deeply worrying."

"They calculate that there is 'more than enough available fossil fuels' to generate emissions capable of unleashing 'amplifying feedbacks' that could trigger a 'runaway' greenhouse effect 'sustained for centuries.' Even if just a third of potentially available fossil fuel resources were exploited, calculations suggest, this scenario would still be guaranteed, meaning decisions we make this century will determine the fate of generations to come.

"... It seems implausible that humanity will not alter its energy course as consequences of burning all fossil fuels become clearer. Yet strong evidence about the dangers of human-made climate change have so far had little effect. Whether governments continue to be so foolhardy as to allow or encourage development of all fossil fuels may determine the fate of humanity."

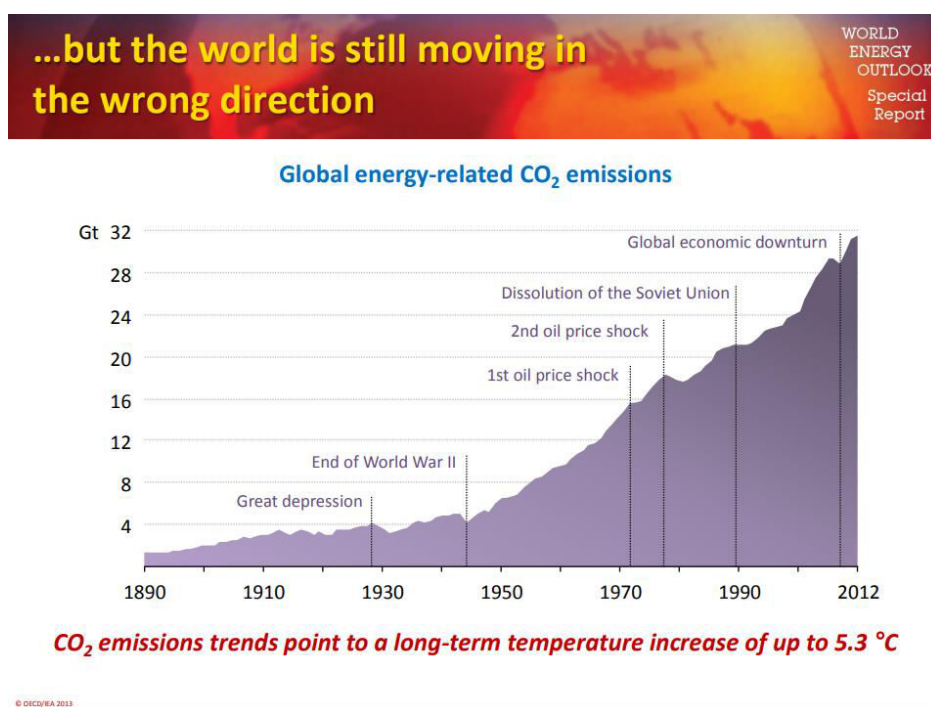
"Papers published by the Royal Society in 2011 showed that emissions pledges would still put the world on track for warming anywhere between 2.5C and 5C--and that a failure to deliver these pledges could see global temperatures rise by 7C by 2100. Amongst them, a Met Office study concluded that strong amplifying feedbacks--such as the oceans' reduced ability to absorb atmospheric carbon dioxide leading to further warming--could see us reach 4C as early as 2060."

"This was corroborated last month by the International Energy Agency (IEA)(Note: the next entry is about the IEA report, which was launched in different locations June through July, 2013), which found that even with current climate policies in place, we are locked into a rise of between 2C and 5.3C. *Two years ago, the IEA concluded that we had five years left to implement urgent energy reforms after which we would no longer be able to avoid dangerous climate change. We are now three years away from that point-of-no-return.*"

[From article “James Hansen: Fossil fuel addiction could trigger runaway global warming: Without full decarbonisation by 2030, our global emissions pathway guarantees new era of catastrophic climate change” By Dr. Nafeez Ahmed (10 July 2013)(at the website of the Guardian newspaper (UK) (see <http://www.theguardian.com/environment/earth-insight/2013/jul/10/james-hansen-fossil-fuels-runaway-global-warming>) (paragraphs 3, 6, 8, 13, and 16)]

89) Report Launch “Redrawing the Energy-Climate Map” (by Dr. Fatih Birol, Chief Economist and Director of Global Energy Economics at the International Energy Agency) (July, 2013)

a) Slide



b) Excerpt from Executive Summary of “Redrawing the Energy-Climate Map” Report

“The world is not on track to meet the target agreed by governments to limit the long term rise in the average global temperature to 2 degrees Celsius (°C). Global greenhouse gas emissions are increasing rapidly and, in May 2013, carbon-dioxide (CO₂) levels in the atmosphere exceeded 400 parts per million for the first time in several hundred millennia. The weight of science analysis tells us that our climate is already changing and that we should expect extreme weather events (such as storms, floods and heat waves) to become more frequent and intense, as well as increasing global temperatures and rising sea levels. Policies that have been implemented, or are now being pursued, suggest that the long-term average temperature increase is more likely to be between 3.6 °C and 5.3 °C (compared with pre-industrial levels), with most of the increase occurring this century. While global action is not yet sufficient to limit the global temperature rise to 2 °C, this target still remains technically feasible, though extremely challenging. To keep open a realistic chance of meeting the 2 °C target, intensive action is required before 2020, the date by which a new international climate agreement is due to come into force. Energy is at the heart of this challenge: the energy sector accounts for around two-thirds of greenhouse-gas emissions, as more than 80% of global energy consumption is based on fossil fuels.”

[a] Slide is from the “Redrawing the Energy-Climate Map” report launch--Slide Presentation (15 July, 2013) by Dr. Fatih Birol, Chief Economist and Director of Global Energy Economics at the International Energy Agency Note: “He (Dr. Birol) designs and develops the annual World Energy Outlook, which is recognised as the most authoritative source for strategic analysis of global energy markets” (from

Wikipedia 2013); (Slide Presentation at <https://www.biee.org/wpcms/wp-content/uploads/Redrawing-the-Energy-Climate-Map-IEA-July-151.pdf>) (BIEE--British Institute for Energy Economics) (Slide above is slide #4)]

[b) From the “Executive Summary” of the complete 134 page report “Redrawing the Energy-Climate Map” at the website for the United Nations Framework Convention for Climate Change (at https://unfccc.int/files/documentation/submissions_from_parties/adp/application/pdf/international_energy_agency_redrawing_the_energy_climate_map_world_energy_outlook_special_report_submitted_by_the_u.s..pdf) (paragraph 1)]

90) Article “Warsaw climate talks warned time is running out to close 'emissions gap'” (Jessica Shankleman) (November, 2013)

“The United Nations Environment Programme's annual ‘Gap report’, issued on Tuesday, aims to highlight the efforts needed by governments and businesses to avoid catastrophic climate change.”

“This year's report shows that even if nations meet their current climate pledges, greenhouse gas emissions in 2020 are likely to be eight to 12 gigatonnes of CO₂ equivalent (GtCO₂e) above the level needed to have a good chance of remain below 2C by 2020 on the lowest cost pathway.”

“The report shows that emissions should peak at 44 GtCO₂e by 2020 and fall to 22GtCO₂e by 2050 to stay within a 2C target, but under a business-as-usual scenario, which includes no emissions pledges, emissions would reach 59 GtCO₂e in 2020.”

[Note: According to Carbon Brief, in article “Analysis: Global fossil-fuel emissions up 0.6% in 2019 due to China” (December 4, 2019), “emissions from fossil fuel and industry (FF&I) are expected to reach 36.81bn tonnes of CO₂ (GtCO₂) in 2019” (see <https://www.carbonbrief.org/analysis-global-fossil-fuel-emissions-up-zero-point-six-per-cent-in-2019-due-to-china>) (paragraph 2)]

“...It also follows warnings from three of the chairs of the UN climate change secretariat that it is now extremely unlikely that the world will meet the 2C goal set by global leaders.”

[From article “Warsaw climate talks warned time is running out to close 'emissions gap'” by Jessica Shankleman (November 5, 2013) (at <http://www.theguardian.com/environment/2013/nov/05/warsaw-climate-talks-emissions-gap>) (paragraphs 2-4, and last paragraph)]

[Note: The complete United Nations Environment Programme's annual ‘Gap report’ for 2013 can be found at http://wedocs.unep.org/bitstream/handle/20.500.11822/8345/-The%20emissions%20gap%20report%202013_%20a%20UNEP%20synthesis%20report-2013EmissionsGapReport%202013.pdf?sequence=3&isAllowed=y]

91) Organization “Global Climate Action Portal” (UNFCCC) (launched in 2014)

“The Global Climate Action portal is an online platform where actors from around the globe--countries, regions, cities, companies, investors and other organizations--can display their commitments to act on climate change.”

“Launched by UN Climate Change, Peru and France in 2014, the portal was born of the realization that addressing climate change will take ambitious, broad-based action from all segments of society, public and private.”

“Crucially, it helped build momentum towards the adoption of the Paris Climate Agreement 2015. With the portals formal inclusion in the Decision Text of the Agreement, countries welcomed the efforts of all actors to scale-up their climate actions and encouraged them to register these actions via the Global Climate Action portal.”

“The aim is to present a clear, comprehensive view of Global Climate Action, recognizing actors and inspiring still greater ambition, for the good of current and future generations.”

[From the “About” webpage at the website of Global Climate Action (NAZCA) (at <https://climateaction.unfccc.int/views/about.html>) (paragraphs 1-4)]

92) Organization “Energy and Climate Intelligence Unit” (incorporated in 2014)

a) Who We Are

“The Energy and Climate Intelligence Unit is a non-profit organisation that supports informed debate on energy and climate change issues in the UK.”

“Climate change presents important challenges and opportunities to Britons in the decades ahead, while the choices we make on energy have implications for society, the economy and the climate system. We believe that debates on these issues should be underpinned by evidence, and involve the full range of stakeholders.”

“We support journalists, parliamentarians and other communicators with accurate and accessible briefings on key issues, and work with individuals and organisations that have interesting stories to tell, helping them connect to the national conversation.”

“Our Advisory Board reflects the breadth of society’s interest in energy and climate issues. It includes climate scientists, energy policy experts and economists, as well as a range of other stakeholders including MPs and Peers.”

[From the webpage “Who We Are” at the website of the Energy and Climate Intelligence Unit (ECIU) (at <https://eciu.net/about/who-we-are>) (paragraphs 1-4)]

b) What percentage of Global GDP is covered by regions with an actual or intended net-zero target?

i) “Almost a sixth of the entire global Gross Domestic Product (GDP) is now covered by net zero carbon emissions targets, according to a report.”

“The claim, made in analysis by the Energy and Climate Intelligence Unit (ECIU), reveals 16% of GDP is now covered by net-zero carbon emission ambitions, with fifteen nations, states and regional areas intending to reach the target by 2050.”

[From article “Report: Net-zero targets now cover one-sixth of global economy” by edie newsroom (June 25, 2019) at the website of edie (at <https://www.edie.net/news/9/net-zero-one-sixth-global-economy/>) (paragraphs 1-2)]

ii) The latest analysis from the Energy and Climate Intelligence Unit (ECIU), a London-based think-tank, has found that 49% of GDP, representing more than \$39trn, is now covered by regions with an actual or intended net-zero target.

[From “Report: 49% of world's GDP covered by net-zero targets” by the edie newsroom (February 18, 2020) at the website of edie (at <https://www.edie.net/news/9/Report--49--of-world-s-GDP-covered-by-net-zero-targets/>) (paragraph 2)]

iii) “The Race to Zero launch comes as the Energy and Climate Intelligence Unit estimates that 53% of global GDP is produced in countries, states and regions and cities that have committed to net-zero targets.

[From the article “UN launches push for net-zero emissions by 2050” by Kevin Keane (June 5, 2020) at the website of BBC News (at <https://www.bbc.com/news/uk-scotland-52939325>) (paragraph 19)]

93) Article “UN Climate Chief Figueres Urges 'Urgent Transformation' Of Oil And Gas Industry” (April, 2014)]

“The U.N.’s climate chief called on the oil and gas industry on Thursday to make a drastic shift to a clean, low-carbon future or risk having to leave three-quarters of fossil fuel reserves in the ground.”

“Limiting global warming to an agreed U.N. ceiling ‘means that three quarters of the fossil fuel reserves need to stay in the ground, and the fossil fuels we do use must be utilized sparingly and responsibly,’ she said.”

“She said oil and gas firms should start by reporting risks to their business after governments agreed in 2010 to limit warming to less than 2 degrees Celsius (3.6 Fahrenheit) above pre-industrial times.”

“Temperatures are heading to breach the ceiling.”

“Companies should also take measures such as cutting methane leaks, lobby for an effective price on carbon emissions and invest in carbon capture and storage (CCS), she said.”

[From article “UN Climate Chief Figueres Urges 'Urgent Transformation' Of Oil And Gas Industry” (by Alister Doyle (April 3, 2014) at the Reuters website (at <https://www.reuters.com/article/us-climate-oil/u-n-climate-chief-urges-radical-clean-up-of-oil-gas-industry-idUSBREA320T220140403>) (paragraphs 1, 4, 9, 10, and 12)]

94) Organization “Climate Mobilization” (founded March, 2014)

a) “When The Climate Mobilization was founded at the People’s Climate March in 2014, there was no climate group publicly organizing around the need for a whole-society, emergency-speed mobilization to zero emissions.”

[From the “About” webpage at the website of Climate Mobilization (at <https://www.theclimatemobilization.org/about/>) (click on Section “Origins” in orange navigation bar, or scroll down, paragraph 1)]

b) “We can build the pathway to a regenerative future.”

“A climate mobilization effort means not only preventing unimaginable suffering from climate and environmental catastrophe, but also working to reinvent our economy to address the social inequities on which the extractive economy has been based. We can phase out polluting industries that are harmful to human and non-human life, and create new pathways for equitable, sustainable livelihoods. We can reinvigorate local economies with new industries that protect the climate while providing dignified, productive work for all.”

[From the webpage “A Whole Society Mobilization” (at <https://www.theclimatemobilization.org/climate-mobilization/>), in the Section “Victory Plan” (subtitle, and paragraph 1)]

c) Governments That Have Declared A Climate Emergency (Date:

Governments Declared:	1,747
which represent:	830 million people
in	Countries

[From the webpage “The Climate Emergency Movement Has Arrived” at the website for Climate Mobilization (at <https://www.theclimatemobilization.org/climate-emergency/>)]

95) Report “Climate Change Impacts in the United States” (United States National Climate Assessment by U.S. Global Change Research Program) (the Third National Climate Assessment) (May, 2014)

a) From letter on p. iii

“May 2014”

“Members of Congress: On behalf of the National Science and Technology Council and the U.S. Global Change Research Program, we are pleased to transmit the report of the Third National Climate Assessment: Climate Change Impacts in the United States. As required by the Global Change Research Act of 1990, this report has collected, evaluated, and integrated observations and research on climate change in the United States. It focuses both on changes that are happening now and further changes that we can expect to see throughout this century.”

“This report is the result of a three-year analytical effort by a team of over 300 experts, overseen by a broadly constituted Federal Advisory Committee of 60 members. It was developed from information and analyses gathered in over 70 workshops and listening sessions held across the country. It was subjected to extensive review by the public and by scientific experts in and out of government, including a special panel of the National Research Council of the National Academy of Sciences. This process of unprecedented rigor and transparency was undertaken so that the findings of the National Climate Assessment would rest on the firmest possible base of expert judgment.”

[Letter signed by Dr. John P. Holdren Assistant to the President for Science and Technology Director, Office of Science and Technology Policy Executive Office of the President and Dr. Kathryn D. Sullivan Under Secretary for Oceans and Atmosphere NOAA Administrator U.S. Department of Commerce (Note: while the complete report is accessible at the complete report link below, a smaller section (“Front Matter”), which can be downloaded at <https://www.globalchange.gov/nca3-downloads-materials> , also contains the above letter, on p. iii)]

b) From section “Climate Change and the American People”, p. 2, paragraphs 1-5)

“This National Climate Assessment collects, integrates, and assesses observations and research from around the country, helping us to see what is actually happening and understand what it means for our lives, our livelihoods, and our future. The report includes analyses of impacts on seven sectors – human health, water, energy, transportation, agriculture, forests, and ecosystems – and the interactions among sectors at the national level. The report also assesses key impacts on all U.S. regions: Northeast, Southeast and Caribbean, Midwest, Great Plains, Southwest, Northwest, Alaska, Hawai`i and Pacific Islands, as well as the country’s coastal areas, oceans, and marine resources.”

“Over recent decades, climate science has advanced significantly. Increased scrutiny has led to increased certainty that we are now seeing impacts associated with human-induced climate change. With each passing year, the accumulating evidence further expands our understanding and extends the record of observed trends in temperature, precipitation, sea level, ice mass, and many other variables recorded by a variety of measuring systems and analyzed by independent research groups from around the world. It is notable that as these data records have grown longer and climate models have become more comprehensive, earlier predictions have largely been confirmed. The only real surprises have been that some changes, such as sea level rise and Arctic sea ice decline, have outpaced earlier projections.”

“What is new over the last decade is that we know with increasing certainty that climate change is happening now. While scientists continue to refine projections of the future, observations unequivocally show that climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of heat-trapping gases. These emissions come mainly from burning coal, oil, and gas, with additional contributions from forest clearing and some agricultural practices.”

“Global climate is projected to continue to change over this century and beyond, but there is still time to act to limit the amount of change and the extent of damaging impacts.”

“This report documents the changes already observed and those projected for the future. It is important that these findings and response options be shared broadly to inform citizens and communities across our nation. Climate change presents a major challenge for society. This report advances our understanding of that challenge and the need for the American people to prepare for and respond to its far-reaching implications.”

c) From “Overview” (p. 7, paragraph 2-3)

“Evidence for climate change abounds, from the top of the atmosphere to the depths of the oceans. Scientists and engineers from around the world have meticulously collected this evidence, using satellites and networks of weather balloons, thermometers, buoys, and other observing systems.”

“Evidence of climate change is also visible in the observed and measured changes in location and behavior of species and functioning of ecosystems. Taken together, this evidence tells an unambiguous story: the planet is warming, and over the last half century, this warming has been driven primarily by human activity.”

“Multiple lines of independent evidence confirm that human activities are the primary cause of the global warming of the past 50 years. The burning of coal, oil, and gas, and clearing of forests have increased the concentration of carbon dioxide in the atmosphere by more than 40% since the Industrial Revolution, and it has been known for almost two centuries that this carbon dioxide traps heat. Methane and nitrous oxide emissions from agriculture and other human activities add to the atmospheric burden of heat-trapping gases. Data show that natural factors like the sun and volcanoes cannot have caused the warming observed over the past 50 years. Sensors on satellites have measured the sun’s output with great accuracy and found no overall increase during the past half century. Large volcanic eruptions during this period, such as Mount Pinatubo in 1991, have exerted a short term cooling influence. In fact, if not for human activities, global climate would actually have cooled slightly over the past 50 years. The pattern of temperature change through the layers of the atmosphere, with warming near the surface and cooling higher up in the stratosphere, further confirms that it is the buildup of heat-trapping gases (also known as “greenhouse gases”) that has caused most of the Earth’s warming over the past half century.”

[From the Report “Climate Change Impacts in the United States” (United States National Climate Assessment by U.S. Global Change Research Program) (the Third National Climate Assessment) (May, 2014) at the webpage “Third National Climate Assessment Downloads & Materials” at the website of the U.S. Global Change Research Program (Complete 841 page report at http://s3.amazonaws.com/nca2014/high/NCA3_Climate_Change_Impacts_in_the_United%20States_HighRes.pdf (large file--may take a minute to download); there are options to download smaller sections of the report at <https://www.globalchange.gov/nca3-downloads-materials>)]

96) Article “The real budgetary emergency and the myth of ‘burnable carbon’” (David Spratt) (May, 2014)

“For all these reasons--that is, prudent catastrophic risk management, accounting for food production and deforestation emissions, and for Arctic sea ice and carbon store instability--the idea of ‘burnable carbon’--that is, how much more coal, gas and oil we can burn and still keep under 2°C--is a dangerous illusion, based on unrealistic, high-risk, assumptions.”

“A second consideration is that 2°C of warming is not a safe target. Instead, it's the boundary between dangerous and very dangerous, and 1°C higher than experienced during the whole period of human civilisation, illustrated in Figure 2. The last time greenhouse gas levels were as high as they are today, modern humans did not exist, so we are conducting an experiment for which we have no direct observable evidence from our own history, and for which we do not know the full result.”

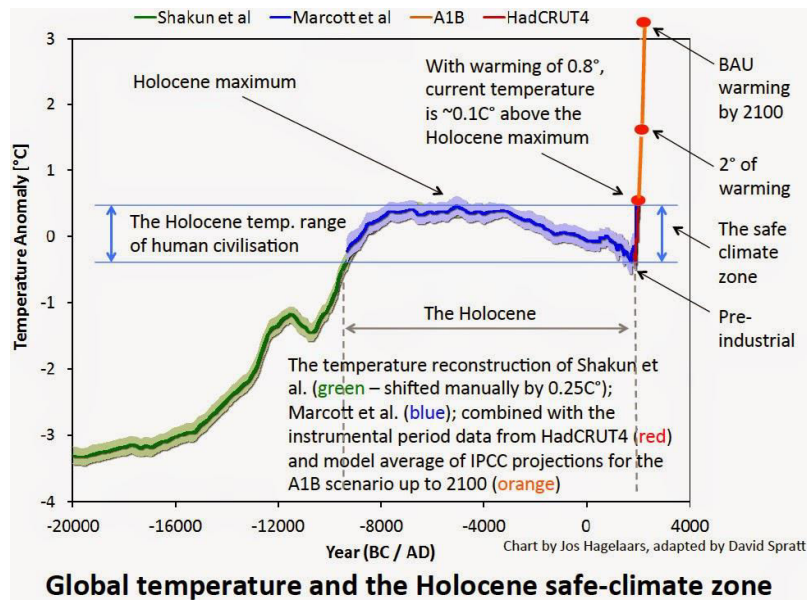


Figure 2: Past and future global temperature and the safe-climate zone

“It is now clear that the incremental-adjustment 2°C strategy has run out of time, if for no other reason than the "budget" for burning more fossil fuels is now zero, yet the global economy is still deeply committed to their continuing widespread use.”

“We all wish the incremental-adjustment 2°C strategy had worked, but it hasn't. It has now expired as a practical plan.”

“We now have a choice to make: we can accept much higher levels of warming of 3–5°C that will catastrophically affect the world's natural and human systems in a manner more forthright scientists say are incompatible with the maintenance of human civilisation; or we can conceive of a safe-climate emergency-action approach which would aim to reduce global warming back to the range of conditions experienced during the last 10,000 years, the period of human civilisation and fixed settlement.”

“This would involve fast and large emissions reduction through radical energy demand reductions, whilst a vast scaling-up of clean energy production was organised, together with the remaking of many of our essential systems such as transport and food production, with the target being zero net emissions. In addition, there would need to be a major commitment to atmospheric carbon dioxide drawdown measures. This would need to be done at a speed and scale more akin to the ‘war economy’, where social and economic priority is given to what is perceived to be an overwhelming existential threat.”

“After 30 years of climate policy and action failure, we are in deep trouble and now have to throw everything we can muster at the climate challenge. This will be demanding and disruptive, because there are no longer any non-radical, incremental paths available.”

“Emergency action has proven fair and necessary for great social and economic challenges we have faced before. Call it the great disruption, the war economy, emergency mode, or what you like; the story is still the same, and it is now the only remaining viable path.”

[From article “The real budgetary emergency and the myth of ‘burnable carbon’” by David Spratt (May 22, 2014) at the Climate Code Red website (at <http://www.climatecodedred.org/2014/05/the-real-budgetary-emergency-burnable.html>) (paragraphs 18-25, and 28--and Figure 2)]

97) Report “Pathways to Deep Decarbonization: 2014 Report” [Sustainable Development Solutions Network (SDSN) and Institute for Sustainable Development and International Relations (IDDRI)] (September, 2014)

a) “On September 19, 2014 the Deep Decarbonization Pathways Project published its 2014 report, which was presented at the United Nations Climate Summit on September 23, 2014.”

[From the webpage “Pathways to Deep Decarbonization: 2014 Report” (September 20, 2014) [Sustainable Development Solutions Network (SDSN) and Institute for Sustainable Development and International Relations (IDDRI)] at the website of Sustainable Development Solutions Network (SDSN) (at <https://resources.unsdsn.org/pathways-to-deep-decarbonization-2014-report>) (paragraph 1)]

b) “The Deep Decarbonization Pathways Project (DDPP) is a collaborative initiative to understand and show how individual countries can transition to a low-carbon economy and how the world can meet the internationally agreed target of limiting the increase in global mean surface temperature to less than 2 degrees Celsius (°C). Achieving the 2°C limit will require that global net emissions of greenhouse gases (GHG) approach zero by the second half of the century. In turn, this will require a profound transformation of energy systems by mid-century through steep declines in carbon intensity in all sectors of the economy, a transition we call ‘deep decarbonization’.”

[From the Report “Pathways to Deep Decarbonization: 2014 Report” at the website of the Sustainable Development Solutions Network (SDSN) (at https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/DDPP_Digit_updated2014.pdf) (in Section “Preface”, paragraph 1)]

c) “Robust economic growth and rising prosperity are consistent with the objective of deep decarbonization under the assumption of rapid technological evolution combined with their large-scale dissemination on terms that are economically and socially viable. The DDPs developed by the Country Research Partners assume that a strong global cooperative push on technology Research Development Demonstration and Diffusion (RDD&D) will support the timely deployment at scale and affordable costs of key low-carbon technologies. The DDPs also assume continued, sometimes rapid, economic growth.”

[From the Report “Pathways to Deep Decarbonization: 2014 Report” at the website of the Sustainable Development Solutions Network (SDSN) (at https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/DDPP_Digit_updated2014.pdf) (in Section “Executive Summary”, in subsection “Climate Change and Sustainable Development”, p. vii, in paragraph 3)]

d) *“In 2010, all governments operationalized the objective of the UNFCCC to ‘prevent dangerous anthropogenic interference with the climate system’ by adopting the target of keeping the global rise in mean surface temperature below 2°C compared with the pre-industrial average. They did this in recognition of the extreme risks to future human wellbeing resulting from a rise in temperature above 2°C. The latest scientific research analyzed by the IPCC Fifth Assessment Report (AR5) Working Group 2 (WG2) concludes that even an increase in global temperatures of 2°C constitutes a serious threat to human wellbeing. Keeping below 2°C of global warming is indispensable to maintain climate change within the boundaries of manageable risks and to our ability to adapt to climate change.*

[From the Report “Pathways to Deep Decarbonization: 2014 Report” at the website of the Sustainable Development Solutions Network (SDSN) (at https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/DDPP_Digit_updated2014.pdf) (in Section “Executive Summary”, in subsection “The carbon budget and emissions reduction trajectory to stay below 2°C”, p. viii, in paragraph 1)]

e) “The world is not on track to stay within the 2°C limit. While awareness of climate change is rising, and a large and growing number of countries, cities, and corporations have pledged to reduce their GHG emissions, these pledges taken together are not sufficient to stay within the 2°C limit. The scenarios reviewed by IPCC AR5 Working Group 3 (WG3) show that in the absence of additional commitments to reduce GHG emissions, the world is on a trajectory to an increase in global mean temperature of 3.7°C to 4.8°C compared to pre-industrial levels. When accounting for full climate uncertainty, this range extends from 2.5°C to 7.8°C by the end of the century.”

[From the Report “Pathways to Deep Decarbonization: 2014 Report” at the website of the Sustainable Development Solutions Network (SDSN) (at https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/DDPP_Digit_updated2014.pdf) (in Section “Executive Summary”, in subsection “Why the 2°C limit should be taken seriously”, p. viii, paragraph 5)]

f) *“The science is clear that global warming beyond 2°C carries the risk of grave and irreversible harm to human wellbeing and development prospects in all countries.”*

[From the Report “Pathways to Deep Decarbonization: 2014 Report” at the website of the Sustainable Development Solutions Network (SDSN) (at https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/DDPP_Digit_updated2014.pdf) (in Section “Executive Summary”, in subsection “Why the 2°C limit should be taken seriously”, p. ix, in paragraph 2)]

g) “The 15 illustrative initial DDPs developed by the Country Research Partners share three common pillars of deep decarbonization of national energy systems:

1. Energy efficiency and conservation: Greatly improved energy efficiency in all energy end-use sectors including passenger and goods transportation, through improved vehicle technologies, smart urban design, and optimized value chains; residential and commercial buildings, through improved end-use equipment, architectural design, building practices, and construction materials; and industry, through improved equipment, production processes, material efficiency, and re-use of waste heat.
2. Low-carbon electricity: Decarbonization of electricity generation through the replacement of existing fossil-fuel-based generation with renewable energy (e.g. hydro, wind, solar, and geothermal), nuclear power, and/or fossil fuels (coal, gas) with carbon capture and storage (CCS).
3. Fuel Switching: Switching end-use energy supplies from highly carbon-intensive fossil fuels in transportation, buildings, and industry to lower carbon fuels, including low-carbon electricity, other low-carbon energy carriers synthesized from electricity generation or sustainable biomass, or lower-carbon fossil fuels.”

[From the Report “Pathways to Deep Decarbonization: 2014 Report” at the website of the Sustainable Development Solutions Network (SDSN) (at https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/DDPP_Digit_updated2014.pdf) (in Section “Executive Summary”, in subsection “The three pillars of the deep decarbonization of energy systems”, p. xii, in paragraph 1-4)]

98) Conference “UN Climate Summit” (September, 2014)

[Note: Provided in this space is an overview of COP (Conference of the Parties to the United Nations Framework Convention for Climate Change) conferences from 2005-2014, which was included as background to reporting on the Climate Summit by IISD Reporting Services (full source reference below)]

a) A Brief History of Conference of the Parties--UN Framework Convention on Climate Change (UNFCCC)

“The international political response to climate change began with the adoption of the UN Framework Convention on Climate Change (UNFCCC) in 1992, which sets out a framework for action aimed at stabilizing atmospheric concentrations of greenhouse gases (GHGs) to avoid ‘dangerous anthropogenic interference with the climate system.’ The Convention, which entered into force on 21 March 1994, now has 195 parties.”

“In December 1997, delegates to the third Conference of the Parties (COP) in Kyoto, Japan, agreed to a protocol to the UNFCCC that committed industrialized countries and countries in transition to a market economy to achieve emission reduction targets. These countries, known as Annex I parties under the UNFCCC, agreed to reduce their overall emissions of six GHGs by an average of 5% below 1990 levels in 2008-2012 (first commitment period), with specific targets varying from country to country. The Kyoto Protocol entered into force on 16 February 2005, and now has 192 parties.”

“LONG-TERM NEGOTIATIONS IN 2005-2009: Convening in Montreal, Canada, in 2005, the first Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP 1) decided to establish the Ad Hoc Working Group on Annex I Parties’ Further Commitments under the Kyoto Protocol (AWG-KP) in accordance with Protocol Article 3.9, which mandated consideration of Annex I parties’ further commitments at least seven years before the end of the first commitment period.”

“COP 11 created a process to consider long-term cooperation under the Convention through a series of four workshops known as ‘the Convention Dialogue.’”

“In December 2007, COP 13 and CMP 3 in Bali, Indonesia, resulted in agreement on the Bali Roadmap on long-term issues. COP 13 adopted the Bali Action Plan (BAP) and established the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) with a mandate to focus on mitigation, adaptation, finance, technology and a shared vision for long-term cooperative action. Negotiations on Annex I parties’ further commitments continued under the AWG-KP. The deadline for concluding the two-track negotiations was Copenhagen in 2009.”

“COPENHAGEN: The UN Climate Change Conference in Copenhagen, Denmark, took place in December 2009. During the high-level segment, informal negotiations took place in a group consisting of major economies and representatives of regional and other negotiating groups. Late in the evening of 18 December, these talks resulted in a political agreement, the ‘Copenhagen Accord,’ which was then presented to the COP plenary for adoption. After 13 hours of debate, delegates ultimately agreed to ‘take note’ of the Copenhagen Accord. In 2010, over 140 countries indicated support for the Accord.”
“More than 80 countries also provided information on their national mitigation targets or actions. Parties also extended the mandates of the AWG-LCA and AWG-KP until COP 16 and CMP 6 in 2010.”

“CANCUN: The UN Climate Change Conference in Cancun, Mexico, took place in December 2010, when parties finalized the Cancun Agreements. Under the Convention track, Decision 1/CP.16, inter alia, recognized the need for deep cuts in global emissions in order to limit the global average temperature

rise to 2°C above pre-industrial levels. Parties agreed to consider strengthening the global long-term goal during a Review by 2015, including in relation to a proposed 1.5°C target.”

“The Cancun Agreements also established several new institutions and processes, such as the GCF, which was created and designated as an operating entity of the Convention’s financial mechanism.”

“Under the Protocol track, the CMP urged Annex I parties to raise the level of ambition towards achieving aggregate emission reductions, and adopted Decision 2/CMP.6 on land use, land-use change and forestry. The mandates of the two AWGs were extended for another year.”

“DURBAN: The UN Climate Change Conference in Durban, South Africa, took place from 28 November to 11 December 2011. The Durban outcomes covered a wide range of topics, notably the establishment of a second commitment period under the Kyoto Protocol, a decision on long-term cooperative action under the Convention and agreement on operationalization of the GCF.”

“Parties also agreed to launch the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) with a mandate “to develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties.” The ADP is scheduled to complete these negotiations by 2015, with the new instrument entering into effect in 2020. In addition, the ADP was mandated to explore actions to close the pre-2020 ambition gap in relation to the 2°C target.”

“DOHA: The UN Climate Change Conference in Doha, Qatar, took place in November and December 2012. The conference resulted in a package of decisions, referred to as the “Doha Climate Gateway.” These include amendments to the Kyoto Protocol to establish its second commitment period and agreement to terminate the AWG-KP’s work in Doha. The parties also agreed to terminate the AWG-LCA and negotiations under the BAP.”

“WARSAW: The Warsaw Climate Change Conference took place from 11-23 November 2013, in Warsaw, Poland. Negotiations focused on the implementation of agreements reached at previous meetings, including pursuing the work of the ADP. The meeting, among other things, adopted an ADP decision that invites parties to initiate or intensify domestic preparations for their intended nationally determined contributions (INDCs), and resolves to accelerate the full implementation of the BAP and pre-2020 ambition.”

“PREPARATIONS FOR CLIMATE SUMMIT 2014: On 24 September 2013, UN Secretary-General Ban Ki-moon invited global leaders and participants from business, finance, civil society and local communities to convene in September 2014 for the UN Climate Summit. The Summit, while not part of the official negotiating process under the UNFCCC, aims to mobilize political will to reach a global climate agreement at the Paris Climate Change Conference in December 2015 and galvanize action on the ground across all sectors.”

“Abu Dhabi Ascent: Held from 4-5 May 2014 in Abu Dhabi, United Arab Emirates (UAE), the Ascent was hosted by Secretary-General Ban and the Minister of State and Special Envoy for Energy and Climate Change, Sultan Al Jaber, UAE. The Ascent brought together 1,000 government ministers, and business, finance and civil society members to discuss new initiatives and partnerships to address climate change that would be further developed in the lead-up to the UN Climate Summit.”

“The Abu Dhabi Ascent identified action areas around which elements of the Climate Summit have been organized, including: short-lived climate pollutants; forests; agriculture; cities; transportation; resilience, adaptation and disaster risk reduction; climate finance; and economic drivers.”

[From the “Climate Summit Bulletin Volume 172 Number 18 - Friday, 26 September 2014” titled “Summary of Climate Summit 2014) (by IISD Reporting Services) (September 23, 2014) (at <https://enb.iisd.org/climate/cs/2014/html/crsvol172num18e.html> (the whole section of “A Brief History”)]

b) UN Climate Summit 2014

“The Summit brought together over 120 Heads of State and Government, as well as governments ministers and leaders from multilateral organizations, the finance and business sectors, civil society, and sub-national authorities and local communities, to catalyze action on climate change and mobilize political will towards a global agreement under the UN Framework Convention on Climate Change (UNFCCC) by 2015.”

“Following the opening ceremony, the Summit convened in three parallel plenary sessions during which Heads of State and Government made national action and ambition announcements. A private sector forum took place during lunch. Two parallel sessions on national action and ambition announcements took place in the afternoon for governments that sent ministers to the meeting. In the afternoon, three parallel sessions addressed multilateral and multi-stakeholder action announcements organized around the themes: finance; energy; forests; agriculture; resilience; petroleum and industry; transport; and cities. Two parallel sessions engaged in thematic discussions of: climate science; voices from climate frontlines; climate, health and jobs; and the economic case for action.

A number of major initiatives, coalitions and commitments were announced or launched during the Summit, such as: the adoption of a New York Declaration on Forests, which contains commitments to halve the loss of natural forests by 2020 and strive to end it by 2030; a total pledge of US\$2.3 billion made to the Green Climate Fund (GCF); the launch of the Global Alliance of Climate-Smart Agriculture; the announcement by the insurance industry of intention to create a climate risk investment framework by 2015 in Paris; and the launch of a new Compact of Mayors.

[From the “Climate Summit Bulletin Volume 172 Number 18 - Friday, 26 September 2014” titled “Summary of Climate Summit 2014) (by IISD Reporting Services) (September 23, 2014) (at <https://enb.iisd.org/climate/cs/2014/html/crsvol172num18e.html> (first 4 paragraphs)]

99) Statistics “Water, Sanitation, and Hygiene”--“Diseases and Risks”

“A significant amount of disease could be prevented through access to safe water supply, adequate sanitation services and better hygiene practices. Diarrheal disease alone amounts to an estimated 3.6 % of the total DALY global burden of disease and is responsible for the deaths of 1.5 million people every year (WHO 2012). It is estimated that 58% of that burden, or 842,000 deaths per year, is attributable to unsafe water supply, sanitation and hygiene and includes 361,000 deaths of children under age five, mostly in low-income countries (WHO 2014).”

[From the section “Water sanitation hygiene”, on the webpage “Diseases and Risks”, at the website of the World Health Organization (WHO) (at https://www.who.int/water_sanitation_health/diseases-risks/en/) (paragraph 1)]

100) Organization “RE100” (launched at Climate Week NYC 2014--September 22-28, 2014)

a) “RE100 is a global initiative bringing together the world’s most influential businesses committed to 100% renewable electricity.”

“Led by the Climate Group and in partnership with CDP, our mission is to accelerate change towards zero carbon grids at scale.”

“Companies in the commercial and industrial sector account for around half of the world’s end-of-use of electricity. We’re switching this demand to renewable electricity.”

[From the “About Us” webpage at the RE100 website (at <https://www.there100.org/about-us>) (paragraphs 1-3, and launch information from subsection “International Work and Partnerships”, paragraph 1)]

b) Joining Criteria

“5. All corporate members must have a renewable power strategy that includes credible deadlines for achieving 100% RE. The minimum requirements are:

--100% by 2050, with interim steps of at least

--60% by 2030

--90% by 2040”

“6. Companies are required to report annually on their renewable energy strategy and progress, either through the RE100 reporting spreadsheet (or the CDP questionnaire in the event of these being combined). Specifically, we need total electricity consumption and total renewable electricity use data as a minimum. Additional information may be requested to clarify a company’s progress towards their commitment.”

[From the “RE100 Joining Criteria” document (at https://www.there100.org/sites/re100/files/2020-09/RE100%20Joining%20Criteria_0.pdf) (#5 and #6)]

101) Organization “We Mean Business” (founded Climate Week NYC--September 22-28, 2014)

“The We Mean Business coalition has reached a key milestone on its mission to catalyze bold climate action – marking five years since it was launched by its seven core partners during Climate Week in 2014.”

“The coalition’s partners--BSR, CDP, Ceres, The B Team, The Climate Group, The Prince of Wales’s Corporate Leaders Group and WBCSD--have together helped drive unprecedented corporate climate action and policy ambition.”

“The coalition was launched thanks to the generosity of the IKEA Foundation, which recognised the need to bring together business-focused climate NGOs to build collaboration and provide a united voice for businesses to call for more ambitious climate policy.”

“To date over 1,000 forward-looking companies – representing more than \$20.1 trillion in market cap – equivalent to one quarter of global GDP, have committed to bold climate action through the partners’

initiatives. This includes more than 630 companies committed to science-based targets through the Science Based Targets initiative.”

“In response to the latest science, 87 companies are demonstrating further leadership by pledging to cut emissions in-line with what science says is necessary to limit global warming to 1.5°C – by setting 1.5°C aligned science-based targets and committing to net-zero emissions across their value chains by 2050.”

[From article “5 years of the We Mean Business coalition catalyzing bold climate action” by the We Mean Business Coalition (September 24, 2019) at the website of We Mean Business (at <https://www.wemeanbusinesscoalition.org/blog/5-years-of-the-we-mean-business-coalition-catalyzing-bold-climate-action/#:~:text=The%20We%20Mean%20Business%20coalition%20has%20reached%20a%20key%20milestone,during%20Climate%20Week%20in%202014>) (paragraphs 1-5)]

102) Organization “Under 2 Coalition” (founded May, 2015)

“The Under2 Coalition is a global community of state and regional governments committed to ambitious climate action in line with the Paris Agreement.”

“The coalition brings together more than 220 governments who represent over 1.3 billion people and 43% of the global economy. These governments include signatories to the Under2 Memorandum of Understanding as well as national endorsers and other supporters. There are 118 individual states and regions who have signed the Under2 MOU and are currently active members of the Under2 Coalition.”

“Signatories commit to keeping global temperature rises to well below 2°C with efforts to reach 1.5°C. Nineteen states and regions in the coalition have committed to reaching net-zero emissions by 2050 or earlier.”

[From the “About the Under 2 Coalition” webpage at the Under 2 Coalition website (at <https://www.under2coalition.org/about>) (paragraphs 1-3)]

103) Goals “Sustainable Development Goals (SDGs) (September, 2015)

a) “We, the Heads of State and Government and High Representatives, meeting at the United Nations Headquarters in New York from 25-27 September 2015 as the Organization celebrates its seventieth anniversary, have decided today on new global Sustainable Development Goals.”

[From the webpage “Transforming our world: the 2030 Agenda for Sustainable Development” at the Sustainable Development Goals website (at <https://sustainabledevelopment.un.org/post2015/transformingourworld>) (in the Section “Declaration”, in the subsection “Introduction”, paragraph 1)]

b) “We are determined to take the bold and transformative steps which are urgently needed to shift the world onto a sustainable and resilient path. As we embark on this collective journey, we pledge that no one will be left behind. The 17 Sustainable Development Goals and 169 targets which we are

announcing today demonstrate the scale and ambition of this new universal Agenda. They seek to build on the Millennium Development Goals and complete what these did not achieve.”

[From the webpage “Transforming our world: the 2030 Agenda for Sustainable Development” at the Sustainable Development Goals website (at <https://sustainabledevelopment.un.org/post2015/transformingourworld>) (in the Section “Preamble”)]

c) “We are meeting at a time of immense challenges to sustainable development. Billions of our citizens continue to live in poverty and are denied a life of dignity. There are rising inequalities within and among countries. There are enormous disparities of opportunity, wealth and power. Gender inequality remains a key challenge. Unemployment, particularly youth unemployment, is a major concern. Global health threats, more frequent and intense natural disasters, spiralling conflict, violent extremism, terrorism and related humanitarian crises and forced displacement of people threaten to reverse much of the development progress made in recent decades. Natural resource depletion and adverse impacts of environmental degradation, including desertification, drought, land degradation, freshwater scarcity and loss of biodiversity, add to and exacerbate the list of challenges which humanity faces. Climate change is one of the greatest challenges of our time and its adverse impacts undermine the ability of all countries to achieve sustainable development. Increases in global temperature, sea level rise, ocean acidification and other climate change impacts are seriously affecting coastal areas and low-lying coastal countries, including many least developed countries and small island developing States. The survival of many societies, and of the biological support systems of the planet, is at risk.”

[From the webpage “Transforming our world: the 2030 Agenda for Sustainable Development” at the Sustainable Development Goals website (at <https://sustainabledevelopment.un.org/post2015/transformingourworld>) (in the Section “Declaration”, in the subsection “Our World Today”, paragraph 14)]

d) “In these Goals and targets, we are setting out a supremely ambitious and transformational vision. We envisage a world free of poverty, hunger, disease and want, where all life can thrive. We envisage a world free of fear and violence. A world with universal literacy. A world with equitable and universal access to quality education at all levels, to health care and social protection, where physical, mental and social well-being are assured. A world where we reaffirm our commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene; and where food is sufficient, safe, affordable and nutritious. A world where human habitats are safe, resilient and sustainable and where there is universal access to affordable, reliable and sustainable energy.”

“We envisage a world of universal respect for human rights and human dignity, the rule of law, justice, equality and non-discrimination; of respect for race, ethnicity and cultural diversity; and of equal opportunity permitting the full realization of human potential and contributing to shared prosperity. A world which invests in its children and in which every child grows up free from violence and exploitation. A world in which every woman and girl enjoys full gender equality and all legal, social and economic barriers to their empowerment have been removed. A just, equitable, tolerant, open and socially inclusive world in which the needs of the most vulnerable are met.”

“We envisage a world in which every country enjoys sustained, inclusive and sustainable economic growth and decent work for all. A world in which consumption and production patterns and use of all natural resources – from air to land, from rivers, lakes and aquifers to oceans and seas - are sustainable. One in which democracy, good governance and the rule of law as well as an enabling environment at national and international levels, are essential for sustainable development, including sustained and

inclusive economic growth, social development, environmental protection and the eradication of poverty and hunger. One in which development and the application of technology are climate-sensitive, respect biodiversity and are resilient. One in which humanity lives in harmony with nature and in which wildlife and other living species are protected.”

[From the webpage “Transforming our world: the 2030 Agenda for Sustainable Development” at the Sustainable Development Goals website (at <https://sustainabledevelopment.un.org/post2015/transformingourworld>) (in the Section “Declaration”, in the subsection “Our Vision”, paragraphs 7, 8, and 9)]

e) Sustainable Development Goals

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts*

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

[From the webpage “Transforming our world: the 2030 Agenda for Sustainable Development” at the Sustainable Development Goals website (at <https://sustainabledevelopment.un.org/post2015/transformingourworld>) (in the Section “Sustainable Development Goals and Targets”, in the subsection “Sustainable Development Goals”, see list)]

f) Summary

“The Sustainable Development Goals (SDGs) are a collection of 17 global goals designed to be a ‘blueprint to achieve a better and more sustainable future for all’. The SDGs, set in 2015 by the United Nations General Assembly and intended to be achieved by the year 2030, are part of a UN Resolution called ‘The 2030 Agenda’. The targets and indicators for the SDGs are included in the UN Resolution adopted by the General Assembly two years later on 6 July 2017.”

“The 17 broad SDGs are made more specific by naming targets and indicators. Most of the SDGs have 8-12 targets, and each target has 1-4 indicators (used to measure progress toward targets). Across 17 SDGs, there are 169 targets and 231 unique indicators.”

[From the Wikipedia webpage for “Sustainable Development Goals” (at https://en.wikipedia.org/wiki/Sustainable_Development_Goals#Reception) (paragraphs 1 and 3)]

104) Conference “COP 21 Paris, France” (November-December, 2015)

“The 2015 United Nations Climate Change Conference, COP 21 or CMP 11 was held in Paris, France, from 30 November to 12 December 2015. It was the 21st yearly session of the Conference of the Parties (COP) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and the 11th session of the Meeting of the Parties (CMP) to the 1997 Kyoto Protocol.”

“The conference negotiated the Paris Agreement, a global agreement on the reduction of climate change, the text of which represented a consensus of the representatives of the 196 attending parties. The agreement enters into force when joined by at least 55 countries which together represent at least 55 percent of global greenhouse gas emissions. On 22 April 2016 (Earth Day), 174 countries signed the agreement in New York, and began adopting it within their own legal systems (through ratification, acceptance, approval, or accession).”

“According to the organizing committee at the outset of the talks, the expected key result was an agreement to set a goal of limiting global warming to ‘well below 2 °C’ Celsius compared to pre-industrial levels. The agreement calls for zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century. In the adopted version of the Paris Agreement, the parties will also ‘pursue efforts to’ limit the temperature increase to 1.5 °C. The 1.5 °C goal will require zero emissions sometime between 2030 and 2050, according to some scientists.”

“Prior to the conference, 146 national climate panels publicly presented a draft of national climate contributions (called ‘Intended Nationally Determined Contributions’, INDCs). These suggested commitments were estimated to limit global warming to 2.7 °C by 2100. For example, the EU suggested INDC is a commitment to a 40 percent reduction in emissions by 2030 compared to 1990. The agreement establishes a ‘global stocktake’ which revisits the national goals to ‘update and enhance’ them every five years beginning 2023. However, no detailed timetable or country-specific goals for emissions were incorporated into the Paris Agreement – as opposed to the previous Kyoto Protocol.”

[From the Wikipedia webpage for “2015 United Nations Climate Change Conference” (at https://en.wikipedia.org/wiki/2015_United_Nations_Climate_Change_Conference) (paragraphs 1-4)]

(Beginning a multi-year section--Motor Vehicles)

105) About Motor Vehicles (a multi-year section)

a) (for perspective) "... the first regularly scheduled stagecoach route between New York and Boston in 1772 took one week...."

[From the webpage "Roads" at the website Encyclopedia.com (at <https://www.encyclopedia.com/science-and-technology/technology/technology-terms-and-concepts/roads>) (in section "Rural Roads Before 1900", paragraph 3)]

b) "In 1900 only 4,192 passenger cars (and no trucks or buses) were built in the United States."

[From the webpage "Number of Cars" at the website of The Physics Factbook (at <https://hypertextbook.com/facts/2001/MarinaStasenko.shtml>) (first entry, which identifies source reference as "The Automobile." New Book of Popular Science 6th ed. Republic of China: Grolier, 1978)]

c) "In the first decade of the 20th century there were no stop signs, warning signs, traffic lights, traffic cops, driver's education, lane lines, street lighting, brake lights, driver's licenses or posted speed limits. Our current method of making a left turn was not known, and drinking-and-driving was not considered a serious crime."

"There was little understanding of speed. A driver training bulletin called "Sportsmanlike Driving" had to explain velocity and centrifugal force and why when drivers took corners at high speed their cars skidded or sometimes "turned turtle" (flipped over)."

[From article "1900-1930: The years of driving dangerously" by Bill Loomis (Special to the Detroit News) (April 26, 2015) (at <https://www.detroitnews.com/story/news/local/michigan-history/2015/04/26/auto-traffic-history-detroit/26312107/>) (in the section "Is the Car Inherently Evil?", paragraphs 1-2)]

d) "When the Office of Public Roads Inquiries undertook the first inventory of all U.S. roads in 1904, the country had 2,151,570 miles of rural public roads, but 1,997,908 miles, or 93 percent, were dirt. Of the 153,662 miles with any kind of surfacing, only 38,622 miles were stone or macadam, while the remainder included 108,232 miles of gravel and 6,810 of shell, sand, clay, brick, or other materials. Only a few hundred miles of roads in the entire country were suitable for motor vehicles."

"A majority of Americans still lived in rural areas in the early twentieth century, but operating a motor vehicle there was nearly impossible because of poor-quality--or nonexistent--roads. Consequently, most vehicles were purchased by people living in cities, where streets were paved. Roads in rural areas served primarily as feeders into train stations. A few miles from stations, roads would terminate at streams or county lines or simply disappear into the mud. The cost of hauling grain ten miles from farm to station by road was higher than the cost of hauling it five hundred or one thousand miles by train to big-city markets. It could take an entire day to travel twenty miles in a rural area."

[From the webpage "Roads" at the website Encyclopedia.com (at <https://www.encyclopedia.com/science-and-technology/technology/technology-terms-and-concepts/roads>) (in the sections "Roads in the Automotive Age", paragraphs 2-3)]

e) “In 1908, the Ford Model T, created by the Ford Motor Company, began production and would become the first automobile to be mass-produced on a moving assembly line. From 1913 to 1927, Ford produced over 15,000,000 Model T automobiles”

[From the Wikipedia webpage for “History of the Automobile” (at https://en.wikipedia.org/wiki/History_of_the_automobile) (paragraph 10)]

f) “The automotive industry caused a massive shift in the industrial revolution because it accelerated growth by a rate never before seen in the U.S. economy. The combined efforts of innovation and industrialization allowed the automotive industry to take off during this period and it proved to be the backbone of United States manufacturing during the 20th century.”

[From the Wikipedia webpage “Automotive industry in the United States” (at https://en.wikipedia.org/wiki/Automotive_industry_in_the_United_States) (in section “Development History”, in the subsection “Production”, paragraph 2)]

g) “The U.S. federal government first funded roadways through the Federal Aid Road Act of 1916, and began an effort to construct a national road grid with the passage of the Federal Aid Highway Act of 1921.”

“In June 1956, Eisenhower signed the Federal Aid Highway Act of 1956 into law. Under the act, the federal government would pay for 90 percent of the cost of construction of Interstate Highways.”

[From the Wikipedia webpage “Interstate Highway System” (at https://en.wikipedia.org/wiki/Interstate_Highway_System) (paragraph 2; and in section “Federal Aid Highway Act of 1956”, paragraph 2)]

h) “The world vehicle population passed the 500 million-unit mark in 1986, from 250 million motor vehicles in 1970. Between 1950 and 1970, the vehicle population doubled roughly every 10 years.”

“The US publisher Ward's estimates that as of 2010, there were 1.015 billion motor vehicles in use in the world.”

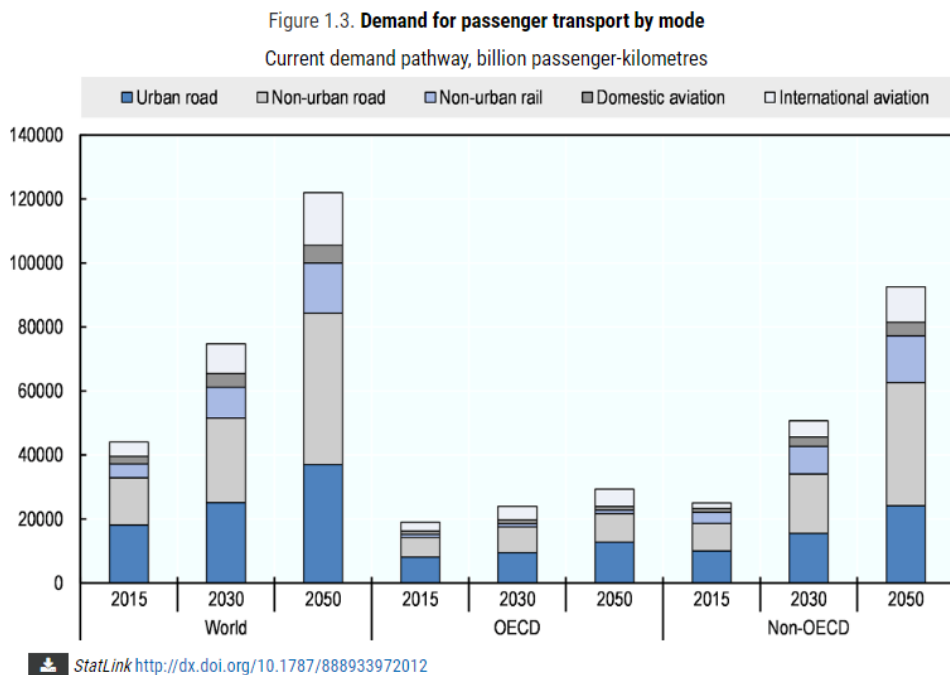
“Navigant Consulting forecasts that the global stock of light-duty motor vehicles will reach 2 billion units in 2035.”

[From the Wikipedia webpage “Motor Vehicles” (at https://en.wikipedia.org/wiki/Motor_vehicle) (in section “Ownership Trends”, paragraph 1)]

i) “In 2016, for the first time in history, over 70 million cars passenger cars were produced in a single year.”

[From the webpage “Car Production” at the website of Worldometers (at <https://www.worldometers.info/cars/>) (in the section “Definition of ‘car’ and ‘production’”, paragraph 5)]

j) “Demand for passenger transport is projected to grow in all world regions. It will increase three-fold between 2015 and 2050, from 44 trillion to 122 trillion passenger-kilometres (p-km), according to ITF projections (Figure 1.3). The distribution of demand will change significantly. OECD countries were responsible for 43% of global passenger movements in 2015, but their share will decline to 24% by 2050. The reason is the comparatively faster growth rates of passenger transport demand in other countries. China and India were responsible for a quarter of passenger-kilometres in 2015, but will generate one-third of passenger travel by 2050.”



[From the webpage “Chapter 1. How transport demand will change by 2050” (from the publication “ITF Transport Outlook 2019” by the International Transport Forum) at the website of OECD iLibrary (Note: “The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental economic organisation with 37 member countries, founded in 1961 to stimulate economic progress and world trade”--Wikipedia) (Chapter 1 at https://www.oecd-ilibrary.org/sites/transp_outlook-en-2019-en/1/2/1/index.html?itemId=/content/publication/transp_outlook-en-2019-en&_csp_=1b3375008054c148f41fef71cd42b552&itemIGO=oecd&itemContentType=book) (in section “Growing Demand for Passenger Transport”, paragraph 1 and Figure 1.3--about 3/8 way down the scroll bar)]

k) “Only about 17,000 electric cars were on the world’s roads in 2010. By 2019, that number had swelled to 7.2 million, 47% of which were in The People’s Republic of China (‘China’).” (in the section “Global sales of passenger cars were sluggish in 2019, but electric cars had another banner year”, paragraph 2)

“Electric vehicles play a critical role in meeting the environmental goals of the Sustainable Development Scenario to reduce local air pollution and to address climate change. In this scenario, the global electric vehicle stock (excluding two/three-wheelers) grows by 36% annually, reaching 245 million vehicles in 2030--more than 30 times above today’s level.” (in the section “Adoption of electric drivetrains accelerates”, paragraph 2)

“In 2030, in the Stated Policies Scenario, global electricity demand from electric vehicles (including two/three-wheelers) reaches 550 TWh, about a six-fold rise from 2019 levels. The share of demand due to electric vehicles in total electricity consumption at a national/regional level grows to as high as 4% in Europe.”

(in the section “Electric vehicles increase electricity demand but reduce oil demand and well-to-wheel greenhouse gas emissions”, paragraph 1)

[From the webpage “Global EV Outlook 2020: Entering the decade of electric drive?” at the website of the International Energy Agency (IEA) (at <https://www.iea.org/reports/global-ev-outlook-2020>)]

l) “People and goods are on the move faster and farther than ever.”

“All that movement comes at a cost--not just the sticker price of a new car, train ticket or shipping bill, but also an environmental cost. Transport, in fact, eats up a significant portion of our carbon budget.”

“Transport emissions--which primarily involve road, rail, air and marine transportation--accounted for over 24% of global CO2 emissions in 2016. They're also expected to grow at a faster rate than that from any other sector, posing a major challenge to efforts to reduce emissions in line with the Paris Agreement and other global goals.”

“In terms of transport modes, 72% of global transport emissions come from road vehicles, which accounted for 80% of the rise in emissions from 1970-2010.”

[From article “Everything You Need to Know About the Fastest-Growing Source of Global Emissions: Transport” by Shiyong Wang Shiyong Wang and Mengpin Ge (October 16, 2019) at the website of the World Resources Institute (at <https://www.wri.org/blog/2019/10/everything-you-need-know-about-fastest-growing-source-global-emissions-transport#:~:text=Transport%20emissions%20%E2%80%94%20which%20primarily%20involve,global%20CO2%20emissions%20in%202016.&text=Decarbonization%20of%20the%20transport%20sector,more%20affordable%20future%20for%20everyone>.) (paragraphs 1-3, and in the section “Where do transport emissions come from?”, paragraph 1)]

m) “Our personal vehicles are a major cause of global warming. Collectively, cars and trucks account for nearly one-fifth of all US emissions, emitting around 24 pounds of carbon dioxide and other global-warming gases for every gallon of gas. About five pounds comes from the extraction, production, and delivery of the fuel, while the great bulk of heat-trapping emissions--more than 19 pounds per gallon--comes right out of a car’s tailpipe.”

“In total, the US transportation sector--which includes cars, trucks, planes, trains, ships, and freight--produces nearly thirty percent of all US global warming emissions, more than almost any other sector.”

[From the “Explainer” titled “Car Emissions and Global Warming” (Published July 18, 2014) at the website of the Union of Concerned Scientists (<https://www.ucsusa.org/resources/car-emissions-global-warming#:~:text=Collectively%2C%20cars%20and%20trucks%20account,for%20every%20gallon%20of%20gas>.) (paragraphs 2-3)

n) (for perspective) Global Road Traffic Deaths, and other kinds of fatalities

i) Road Traffic Injuries and Deaths--A Global Problem

--“Each year, 1.35 million people are killed on roadways around the world.”

--“Every day, almost 3,700 people are killed globally in road traffic crashes involving cars, buses, motorcycles, bicycles, trucks, or pedestrians. More than half of those killed are pedestrians, motorcyclists, and cyclists.”

--“Road traffic injuries are estimated to be the eighth leading cause of death globally for all age groups and the leading cause of death for children and young people 5–29 years of age. More people now die in road traffic crashes than from HIV/AIDS.”

--“Low- and middle-income countries only account for 60 percent of the world’s registered vehicles but more than 90 percent of the world’s road traffic deaths.”

--“Road traffic injuries place a huge economic burden on low- and middle-income countries. Each year, according to the latest available cost estimate (1998), road traffic injuries cost \$518 billion USD worldwide and \$65 billion USD in low- and middle-income countries, which exceeds the total amount that these countries receive in development assistance.”

[From the webpage “Road Traffic Injuries and Deaths--A Global Problem” at the website of the Center for Disease Control and Prevention (at <https://www.cdc.gov/injury/features/global-road-safety/index.html>) (in section “The Facts About Global Road Traffic Injuries and Deaths”, bullets 1-3; in the section “Low- and Middle-Income Countries Are Most Affected”, bullets 1 and 4)]

ii) “Ischaemic heart disease and stroke are the world’s biggest killers, accounting for a combined 15.2 million deaths in 2016. These diseases have remained the leading causes of death globally in the last 15 years.”

[From the webpage “The top 10 causes of death” at the website of the World Health Organization (WHO) (at <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>) (paragraph 1)]

iii) “According to estimates from the International Agency for Research on Cancer (IARC), in 2018 there were 17.0 million new cancer cases and 9.5 million cancer deaths worldwide.”

[From the webpage “Global Cancer Facts & Figures” at the website of the American Cancer Society (at <https://www.cancer.org/research/cancer-facts-statistics/global.html#:~:text=According%20to%20estimates%20from%20the,9.5%20million%20cancer%20deaths%20worldwide>) (paragraph 1)]

iv) “At least 1,235,000 people have died from the coronavirus worldwide (data as of November 6 at 7:40 a.m.)”

[From the “Worldwide” section of Coronavirus coverage at the Washington Post (at https://www.washingtonpost.com/graphics/2020/world/mapping-spread-new-coronavirus/?itid=hp_pandemic-guide-box) (title of article)]

v) “In 2015 an estimated 470 000 people worldwide were victims of homicide (global rate of 6.4 per 100 000). Rates in high-income countries/areas are generally lower than rates in low- and middle-income countries/areas.”

[From the webpage “Homicide: WHO Global Health Estimates (2015 update)” at the website of the World Health Organization (WHO) (at <https://apps.who.int/violence-info/homicide/>) (in the section “Homicide Rate”, paragraph 1)]

j) Trends in Motor Vehicle Ownership

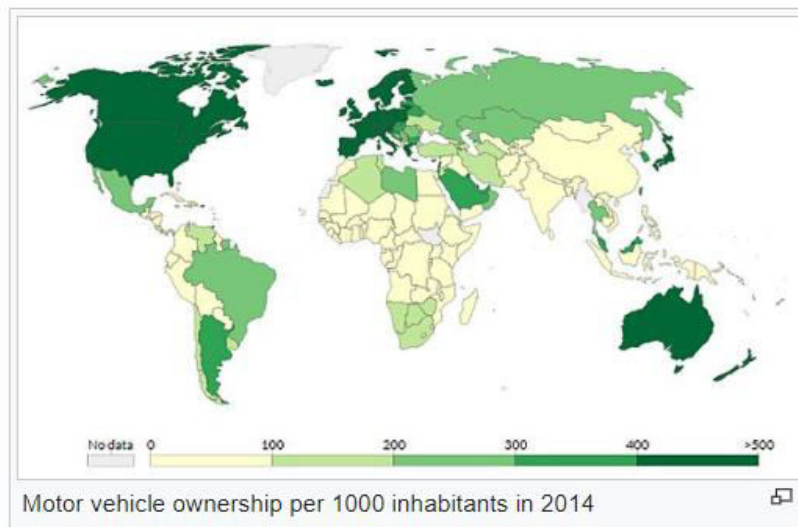
a)

Historical trend of worldwide vehicle registrations 1960-2017 (thousands) ^{[1][12][13][14][15][16]}										
Type of vehicle	1960	1970	1980	1990	2000	2005	2010	2015	2016	2017
Car registrations ⁽¹⁾	98,305	193,479	320,390	444,900	548,558	617,914	723,567	931,260	973,353	1,015,643
Truck and bus registrations	28,583	52,899	90,592	138,082	203,272	245,798	309,395	332,434	348,919	356,044
World total	126,888	246,378	410,982	582,982	751,830	863,712	1,032,962	1,263,694	1,322,272	1,371,687

Note (1) Car registrations do not include U.S. light trucks (SUVs, minivan and pickups) that are used for personal travel. These vehicles are accounted among trucks.

[From the Wikipedia webpage “Motor Vehicles” (at https://en.wikipedia.org/wiki/Motor_vehicle) (in the section “Ownership Trends”)]

b)



[From the Wikipedia webpage “Motor Vehicles” (at https://en.wikipedia.org/wiki/Motor_vehicle) (in the section “Ownership Trends”)]

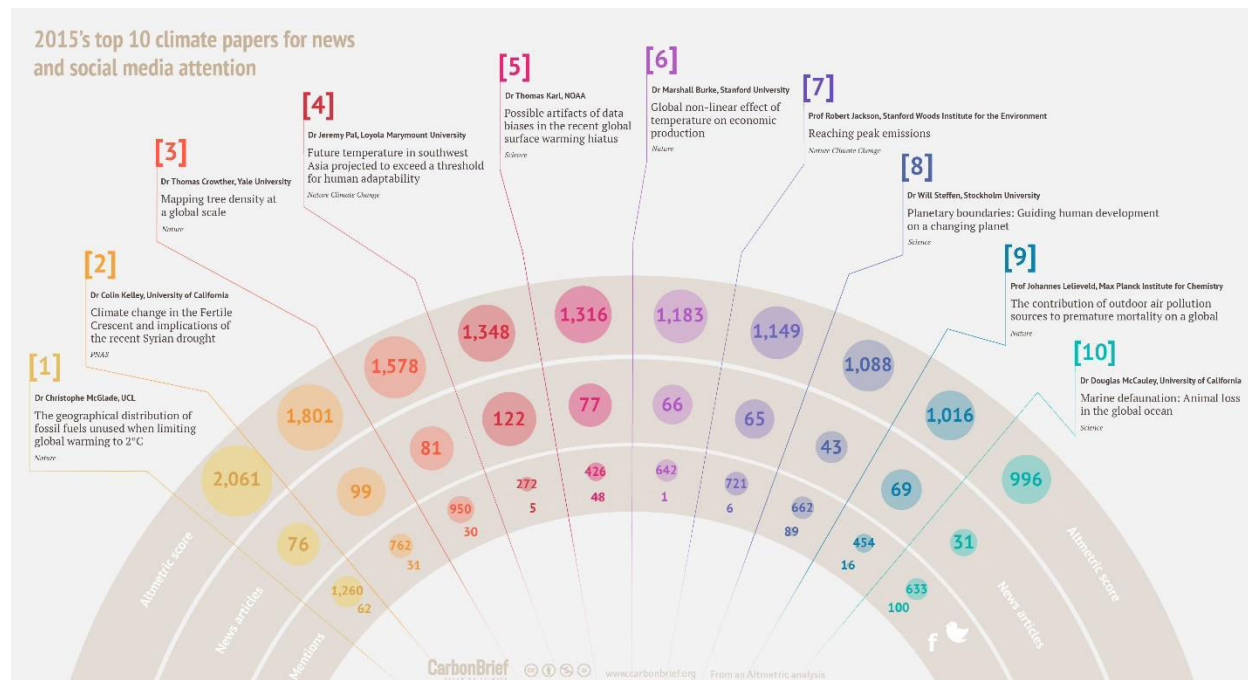
(End of multi-year section--Motor Vehicles)

106) Article “Analysis: The climate papers most featured in the media in 2015” (Carbon Brief) (January, 2016)

a) “The highest-scoring climate paper comes from the very beginning of the 2015. Published on 8 January--and with an Altmetric score of 2,061--is the Nature article, ‘The geographical distribution of fossil fuels unused when limiting global warming to two degrees’ by Dr Christophe McGlade and Prof Paul Ekins at University College London.”

“The paper describes how keeping global temperature rise to no more than 2°C above pre-industrial levels requires 80% of known coal reserves, 50% of gas reserves and 30% of oil reserves to remain unburned.”

b) Graphic



[From the article ““Analysis: The climate papers most featured in the media in 2015” (by Carbon Brief) (January 18, 2016) (at <https://www.carbonbrief.org/analysis-the-climate-papers-most-featured-in-the-media-in-2015>) (in the Section “On Top”, paragraphs 1 and 2; and graphic from top of page)]

107) Report “Climate Reality Check: Counting the Cost of the Paris Agreement” (David Spratt) (June, 2016)

“In light of the Paris commitments over the next 15 years, it is also very difficult to construct pathways that do not exceed 2°C thresholds and prevent more significant tipping points from being crossed, unless large-scale climate interventions are also adopted.”

“How Do We Resolve These Challenges?”

- The immediate goal of any climate strategy must be to avoid passing further significant tipping points, including those related to the carbon cycle, ice sheets and sea levels.
- No matter what we do, there will be severe and unavoidable consequences, especially for peoples and ecosystems most vulnerable to a hotter climate
- The best path is one that includes emergency scale action to get to zero emissions as fast as possible and by 2030.
- *Radical emissions reductions can be driven more quickly by demand reduction than by replacing the energy supply system, though of course both are essential*
- A great social mobilization is needed to transform society. Technological innovation in the energy sector by itself is insufficient to bring about the necessary change in energy use and production. When people are educated and motivated and act in concert, great social transformation can be achieved.”

[From Report “Climate Reality Check: Counting the Cost of the Paris Agreement” by David Spratt (June, 2016) at the Climate Code Red website (link to documents in right side list of “Publications” at <http://www.climatecodered.org/p/publications.html> ; actual document at http://media.wix.com/ugd/148cb0_9c80333f46ec4da8a2e8d7ba41886df6.pdf) (p. 16 and 17, first paragraph in section “Discussion”, and bullets 1-3, 5, 7 and 8 in section “How Do We Resolve These Challenges?”)]

108) Organization “Climate Action Project” (launched October, 2016)

a) “The Climate Action project is launched in October 2020 for the fourth consecutive time involving 1 to 10 million students across 107 countries. It is supported by governments in 15 countries. The project is free, student-centered and aims to lead to a change of behavior through education. It is in collaboration with WWF and NASA, and endorsed by Jane Goodall, President Higgins, Kumi Naidoo, scientists and public figures. It was covered by media across 45 countries including BBC, CNN and National Geographic.” (paragraph 2)

b) “The project allows teachers to connect and interact with other teachers from every continent. Teachers are being sent curriculum and will be personally guided by facilitators. Students will be offered great opportunities and a different way of learning. They will be the ones solving problems, sharing their findings and taking action. At the end of the project there will be live interactions and webinars by experts. Students and teachers will receive a certificate. We work very closely with large teacher organisations in 35 countries to make sure that the project is relevant to the specific needs in certain countries.” (paragraph 3)

c) STEP 1: Sign up, it's free

STEP 2: you receive guidelines, are part of a global platform which allows to connect to teachers from across the world, you get access to our free curriculum, there will be a webinar for teachers, you will be guided by one of our facilitators

STEP 3: the project starts

Week 1: What is Climate Change and what would be your definition? What causes Climate Change locally? Longest list of causes

Week 2: What are the effects of Climate Change locally? start #plantED

Week 3: Local to global: What are causes and effects globally? Connect to a school in other continent. Penpal

Week 4: What are potential solutions? Longest list of solutions. start #7point5

Week 5: live interactions and expert webinars. start #Mission2Mars

Week 6: Take action & Bring Change (Government & Media)

The project is modular, the weeks above are only suggestions.

STEP 4: evaluation via anonymous survey

(In “Process” section, paragraphs 2-5)

[From the “About the Climate Action Project” at the website for the Climate Action Project (at <https://www.climate-action.info/about/>)]

109) The 2050 Pathways Platform

a) “The 2050 Pathways Platform is a multi-stakeholder initiative launched at COP 22 (November 7, 2016--November 18, 2016) by High-Level Climate Champions Laurence Tubiana and Hakima El Haite to support countries seeking to develop long-term, net zero-GHG, climate-resilient and sustainable-development pathways. Designed as a space for collective problem-solving, the platform will also build a broader constellation of cities, states, and companies engaged in long-term low-emissions planning of their own, and in support of the national strategies.”

[From the About the 2050 Platform webpage at the 2050 Platform website (at <https://www.2050pathways.org/about/>) (paragraph 1)]

b) “The 2050 Pathways Platform has 30 member countries worldwide, along with hundreds of cities, states and regions and businesses through our partners.”

[Full list of members at <https://www.2050pathways.org/members/>]

“What We Offer

In-Country Support

- Identifying with member countries specific needs, whether technical or financial and facilitating fulfillment of those needs
- Connections to development banks and bilateral donors
- Assistance with nationally specific and relevant issues

International Expertise

- Connections to experts
- Facilitation of exchange between countries
- Deep dives into sectors and other specific topics through webinars and a broader partnership with UNFCCC
- Commissioning of analytical work around specific areas that need to be understood better

Community Support

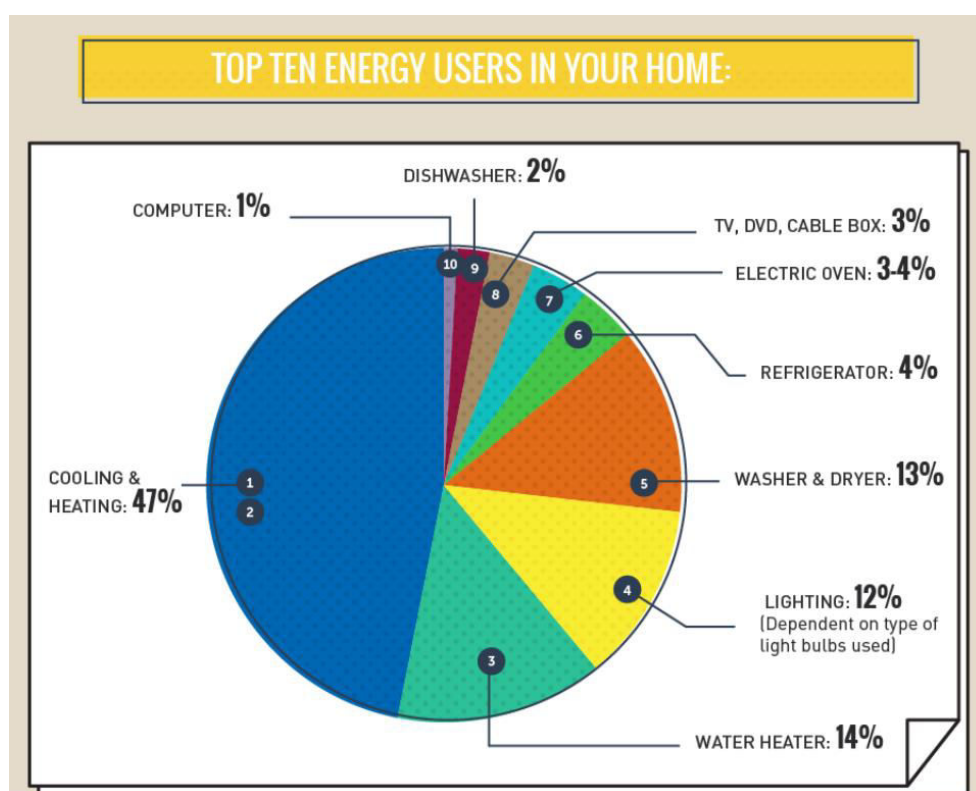
- Communications assistance
- Annual convening of members”

[From the “Why Join 2050PP?” webpage at the website of 2050 Pathways Platform (at <https://www.2050pathways.org/why-join-2050PP/>)]

110) Article “What Uses the Most Energy in Your Home?” (Jeff Desjardins) (November, 2016)

“Modern comfort comes at a price, and keeping all those air conditioners, refrigerators, chargers, and water heaters going makes household energy the third-largest use of energy in the United States.”

“Here’s what uses the most energy in your home”:



[From Article “What Uses the Most Energy in Your Home?” (Jeff Desjardins) (November 14, 2016) at the website Visual Capitalist (at <https://www.visualcapitalist.com/what-uses-the-most-energy-home/>) (paragraph 7 and pie chart)]

[Note: larger infographic (of which pie chart is only a part) is from webpage “What Uses the Most Energy in Your Home?” at the Connect4Climate website (at <https://www.connect4climate.org/infographics/what-uses-most-energy-your-home>) (whole infographic titled “The Biggest Sources of Residential Energy Consumption” by Uma Campbell)]

[Editor’s Note--SP]

Additional Commentary on the Modern Household

111) Book “Gift from the Sea” by Anne Morrow Lindbergh (1955)

“I mean to live a simple life... but I do not. I find that my frame of life does not foster simplicity. My husband and five children must make their way in the world. The life I have chosen as wife and mother entrains a whole caravan of complications. It involves a house in the suburbs and either household drudgery or household help which wavers between scarcity and non-existence for most of us. It involves food and shelter, meals, planning, marketing, bills, and making the ends meet in a thousand ways. It involves not only the butcher, the baker, the candlestick maker but countless other experts to keep my modern house with its modern “simplifications” (electricity, plumbing, refrigerator, gas-stove, oil-burner, dish-washer, radios, car, and numerous other labor saving devices) functioning properly. It involves health, doctors, dentists, appointments, medicine, cod-liver oil, vitamins, trips to the drugstore. It involves education, spiritual, intellectual, physical, schools, school conferences, car-pools, extra trips for basketball or orchestra practice, tutoring, camps, camp equipment and transportation. It involves clothes, shopping, laundry, cleaning, mending, letting skirts down and sewing buttons on, or finding

someone else to do it. It involves friends, my husband's, my children's, my own, and endless arrangements to get together, letters, invitations, telephone calls and transportation hither and yon."

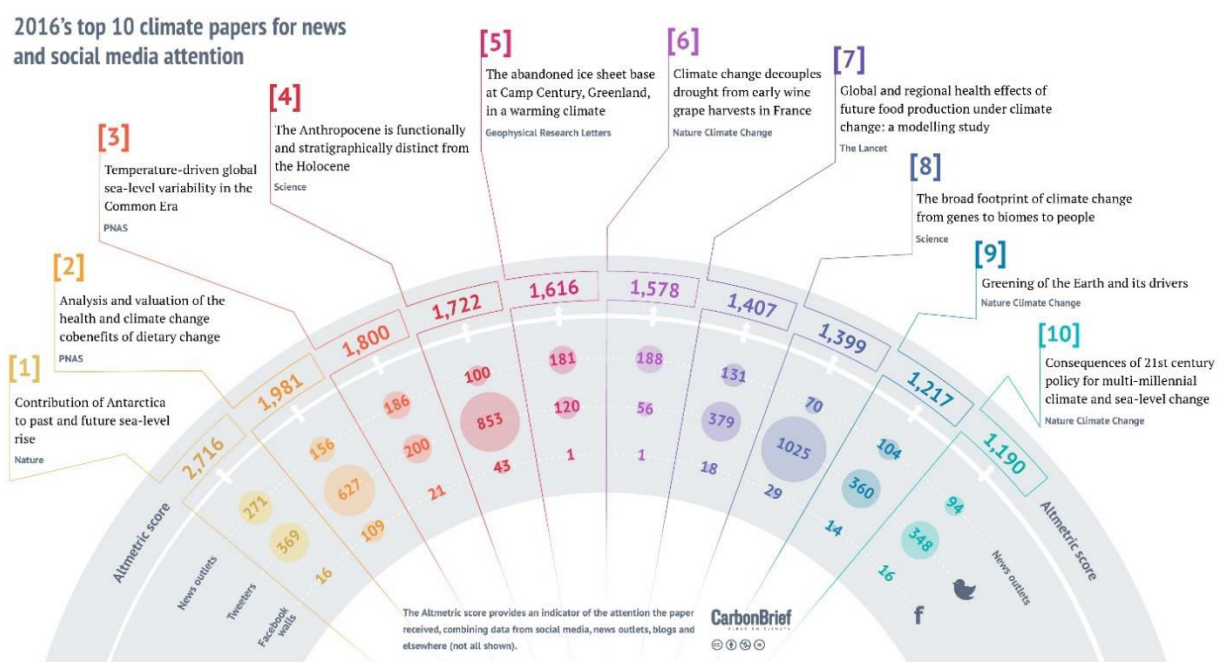
"For life today in America is based on the premise of ever-widening circles of contact and communication. It involves not only family demands, but community demands, national demands, international demands on the good citizen, through social and cultural pressures, through newspapers magazines, radio programs, political drives, charitable appeals, and so on. My mind reels with it. What a circus act we women perform every day of our lives. It puts the trapeze artist to shame. Look at us. We run a tight rope daily, balancing a pile of books on the head. Baby-carriage, parasol, kitchen chair, still under control. Steady now!"

"This is not the life of simplicity but the life of multiplicity that the wise men warn us of. It leads not to unification but to fragmentation. It does not bring grace; it destroys the soul." (p. 19-21)

[From "Gift from the Sea: 50th Anniversary Edition" by Anne Morrow Lindbergh (written in 1955) (with new introduction by her son Reeve Lindbergh) Pantheon Books New York 1991 (from pages 19-20) (Note: this passage is accessible through the "search inside this book" feature, which presents when you "look inside" the online 2005 edition at Amazon, using search terms in the passage (Ex: "foster simplicity"))(though must be signed in at Amazon to use the search inside feature) (see <https://www.amazon.com/Gift-50th-Anniversary-Anne-Morrow-Lindbergh/dp/0679732411>)

112) Article "Analysis: The climate papers most featured in the media in 2016" (Robert McSweeney) (January, 2017)

a)



b) #2, #4, and #5

i) "In second place is 'Analysis and valuation of the health and climate change co-benefits of dietary change', by lead author Dr. Marco Springmann from the Oxford Martin Programme on the Future of Food at the University of Oxford.

“This paper was published in March in the Proceedings of the National Academy of Sciences of the United States of America (PNAS), which also landed a paper in second place in last year’s list.”

“The research found that a worldwide switch to diets that rely less on meat and more on fruit and vegetables could reduce global mortality by up to 10% and food-related greenhouse gas emissions by up to 70% by 2050.”

ii) “In fourth place, published at the very beginning of 2016, is ‘The Anthropocene is functionally and stratigraphically distinct from the Holocene’ in Science.”

“This study presented evidence that the impact of humans on the Earth is so severe and so enduring that the geological time period since the mid-20th century should be declared the ‘Anthropocene’.”

iii) “In fifth is a paper that sounds like it could be the plot of a James Bond film. ‘The abandoned ice sheet base at Camp Century, Greenland, in a warming climate’, published in Geophysical Research Letters, assessed the possible fate of a US military base built in 1959 beneath the surface of the Greenland Ice Sheet.”

“This nuclear-powered ‘city under the ice’ doubled as a top secret site to study the feasibility of deploying missiles from the Arctic. The base was abandoned in 1967, under the assumption that all its chemical, biological, and radioactive wastes would forever be preserved in ice. However, the study shows that ice sheet melt as a result of climate change could uncover these wastes by the end of the century.”

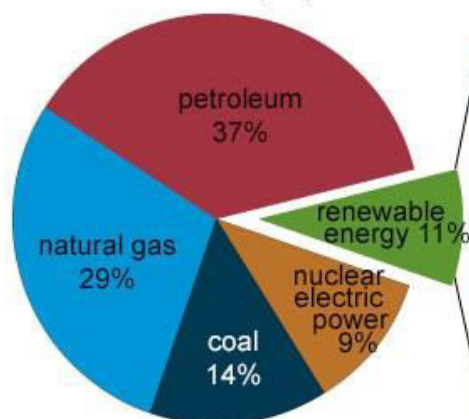
[From article “Analysis: The climate papers most featured in the media in 2016” (by Robert McSweeney) (December 1, 2017) at the website of Carbon Brief (at https://www.carbonbrief.org/analysis-climate-papers-featured-media-2016?utm_content=buffer273c2&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer) [a) graphic at top of page; b) i) paragraphs 8 and 10; ii) paragraphs 16 and 17; iii) paragraphs 20 and 21]]

113) Statistics “U.S. Energy Consumption by Energy Source, 2017” (Climate Warming Central)

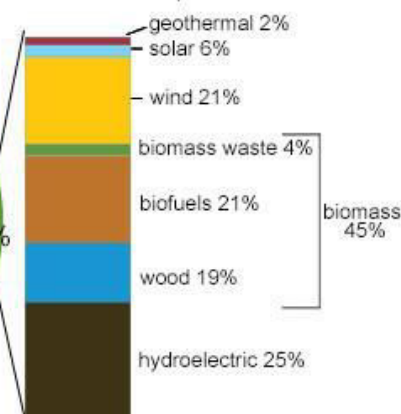
a)

U.S. energy consumption by energy source, 2017

Total = 97.7 quadrillion British thermal units (Btu)



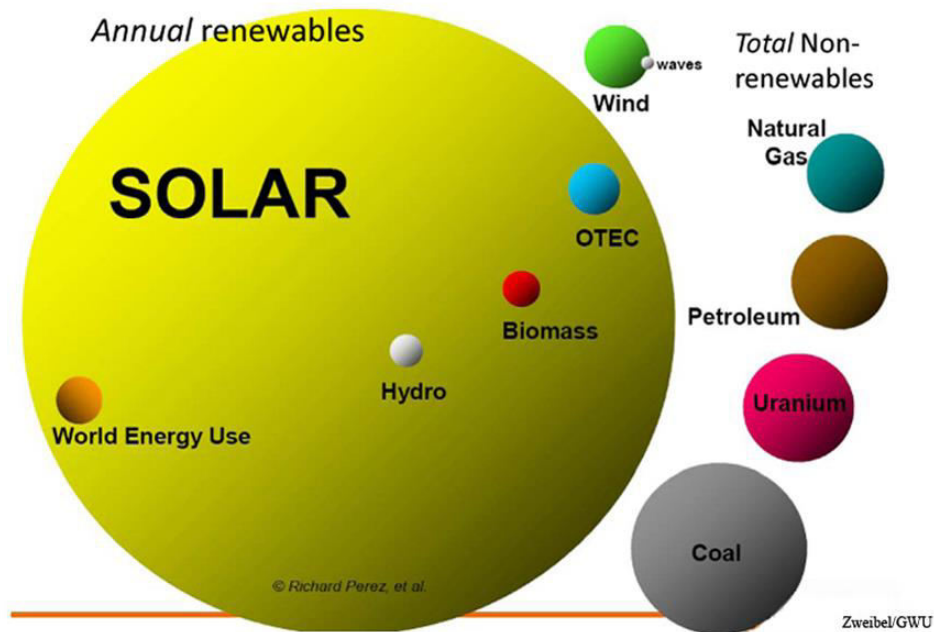
Total = 11.0 quadrillion Btu



Note: Sum of components may not equal 100% because of independent rounding.
Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3 and 10.1, April 2018, preliminary data



b) Solar Power is Our Most Abundant Resource



“The sun is our best source of energy by far. It dwarfs all other sources of power. The sun's total energy falling through the atmosphere to the earth in one year is approximately 4,000 times the current yearly energy usage by all of mankind. All the energy stored in the earth's reserves of coal, uranium, petroleum, and natural gas is equivalent to the energy from just 20 days of sunshine. Averaged over the entire surface of the earth, 24 hours per day for a year, each square meter collects the approximate energy equivalent of a barrel of oil each year. This converts to a 4.2 average kilowatt-hours of energy every day.”

[From the webpage “Energy Profiles” at the website of Climate Warming Central (at http://www.climatewarmingcentral.com/energy_page.html) (a) at top of webpage; b) at bottom of webpage)]

114) Book (paperback) “Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming” (Paul Hawken, Editor; lead author Katharine Wilkinson) (April, 2017)

a) “... ‘Drawdown’--the future point in time when levels of greenhouse gases in the atmosphere stop climbing and start to steadily decline.”

[From the “About Project Drawdown” webpage at the website for Project Drawdown (at <https://drawdown.org/about>) (paragraph 1)]

b) “The book provides a list of 100 potential solutions and ranks them by the potential amount of greenhouse gases each could cut, with cost estimates and short descriptions.”

[From the Wikipedia webpage for “Drawdown (book)” at [https://en.wikipedia.org/wiki/Drawdown_\(book\)](https://en.wikipedia.org/wiki/Drawdown_(book)) (paragraph 1)]

c) Summary of Solutions by Overall Ranking

1	Refrigerant Management	21	Clean Cookstoves
2	Wind Turbines (Onshore)	22	Wind Turbines (Offshore)
3	Reduced Food Waste	23	Farmland Restoration
4	Plant-Rich Diet	24	Improved Rice Cultivation
5	Tropical Forests	25	Concentrated Solar
6	Educating Girls	26	Electric Vehicles
7	Family Planning	27	District Heating Buildings and Cities
8	Solar Farms	28	Multistrata Agroforestry
9	Silvopasture	29	Wave and Tidal
10	Rooftop Solar	30	Methane Digesters (Large)
11	Regenerative Agriculture	31	Insulation
12	Temperate Forests	32	Ships
13	Peatlands	33	LED Lighting (Household)
14	Tropical Staple Trees	34	Biomass
15	Afforestation	35	Bamboo
16	Conservation Agriculture	36	Alternative Cement
17	Tree Intercropping	37	Mass Transit
18	Geothermal	38	Forest Protection
19	Managed Grazing	39	Indigenous Peoples' Land Management
20	Nuclear	40	Trucks
41	Solar Water	62	Women Smallholders
42	Heat Pumps	63	Telepresence
43	Airplanes	64	Methane Digesters (Small)
44	LED Lighting (Commercial)	65	Nutrient Management
45	Building Automation	66	High-speed Rail
46	Water Saving - Home	67	Farmland Irrigation
47	Bioplastic	68	Waste-to-Energy
48	In-Stream Hydro	69	Electric Bikes
49	Cars	70	Recycled Paper
50	Cogeneration	71	Water Distribution
51	Perennial Biomass	72	Biochar
52	Coastal Wetlands	73	Green Roofs
53	System of Rice Intensification	74	Trains
54	Walkable Cities	75	Ridesharing
55	Household Recycling	76	Micro Wind
56	Industrial Recycling	77	Energy Storage (Distributed)
57	Smart Thermostats	77	Energy Storage (Utilities)
58	Landfill Methane	77	Grid Flexibility
59	Bike Infrastructure	78	Microgrids
60	Composting	79	Net Zero Buildings
61	Smart Glass	80	Retrofitting

[From paper “Brainstorming 100% Zero Carbon ASAP” (by Stefan Pasti--this writer) (June, 2019) at the website for The Community Peacebuilding and Cultural Sustainability (CPCS) Initiative (see <https://nebula.wsimg.com/d9408ae2876dc55554bdd974c2e1667b?AccessKeyId=238D35F9602A8D5BA6F3&disposition=0&alloworigin=1>) (p. 5-6) (which was from the Project Drawdown website, in 2018)]
[Note: above ranking can be confirmed as the same in the book “Drawdown” (April, 2017) by using the “Look Inside” feature at the Amazon webpage for the book <https://www.amazon.com/Drawdown-Comprehensive-Proposed-Reverse-Warming/dp/0143130447> , and scrolling down to p. 222-223, which are part of the preview that is shown]

115) Hurricane “Hurricane Harvey” (August, 2017)

a) “Hurricane Harvey was a devastating Category 4 hurricane that made landfall on Texas and Louisiana in August 2017, causing catastrophic flooding and many deaths. It is tied with 2005’s Hurricane Katrina as the costliest tropical cyclone on record, inflicting \$125 billion (2017 USD) in damage, primarily from catastrophic rainfall-triggered flooding in the Houston metropolitan area and Southeast Texas.... In a four-day period, many areas received more than 40 inches (1,000 mm) of rain as the system slowly meandered over eastern Texas and adjacent waters, causing unprecedented flooding. With peak accumulations of 60.58 in (1,539 mm), in Nederland, Texas, Harvey was the wettest tropical cyclone on record in the United States. The resulting floods inundated hundreds of thousands of homes, which displaced more than 30,000 people and prompted more than 17,000 rescues.”

b) “Houston has seen rapid urban development (urban sprawl), with absorbent prairie and wetlands replaced by hard surfaces which rapidly shed storm water, overwhelming the drainage capacity of the rivers and channels. Between 1992 and 2010, almost 25,000 acres of wetlands were lost, decreasing the detention capacity of the region by four billion gallons. However, Harvey was estimated to have dropped more than fifteen trillion gallons of water in the area.”

c) *“The floodwaters contain a number of hazards to the environment and human health. The Houston Health Department stated that ‘millions of contaminants’ were present in floodwaters* [source: “A Sea of Health and Environmental Hazards in Houston’s Floodwaters” by Hiroko Tabuchi and Sheila Kaplan (August 31, 2017) at the website for the New York Times (at <https://www.nytimes.com/2017/08/31/us/houston-contaminated-floodwaters.html?auth=login-email&login=email&mcubz=3>)]. These include E. coli and coliform bacteria; measurements of colony-forming units showed the concentrations were so high that there were risks of contracting flesh-eating disease from the water.”

“Houston officials stated that the Houston drinking water and sewer systems were intact; however, ‘hundreds of thousands of people across the 38 Texas counties affected by Hurricane Harvey use private wells, according to an estimate by Louisiana State University researchers, and those people must fend for themselves.’ Additionally, Harris County, which includes Houston, contains a large number of Superfund-designed brownfield sites that contain a wide variety of toxins and carcinogens. Two Superfund sites in Corpus Christi were flooded.”

[From the Wikipedia webpage for “Hurricane Harvey” (at https://en.wikipedia.org/wiki/Hurricane_Harvey) [a] paragraph 1; b) in section “Environmental Factors”, in subsection “Urban Development”, paragraph 1; c) in section “Aftermath”, in subsection “Health and environmental hazards in flood waters”, paragraphs 1 and 2)]

d)



“As flood danger grows--the consequence of a warming climate--the risk is that there will be more toxic spills like the one that struck Baytown, Tex., where Hurricane Harvey swamped a chemicals plant, releasing lye. Or like the ones at a Florida fertilizer plant that leaked phosphoric acid and an Ohio refinery that released benzene.”

[From article “Floods Are Getting Worse, and 2,500 Chemical Sites Lie in the Water’s Path” by Hiroko Tabuchi, Nadja Popovich, Blacki Migliozzi and Andrew W. Lehren (February 6, 2018) in the New York Times (at <https://www.nytimes.com/interactive/2018/02/06/climate/flood-toxic-chemicals.html>) (paragraph 1)]

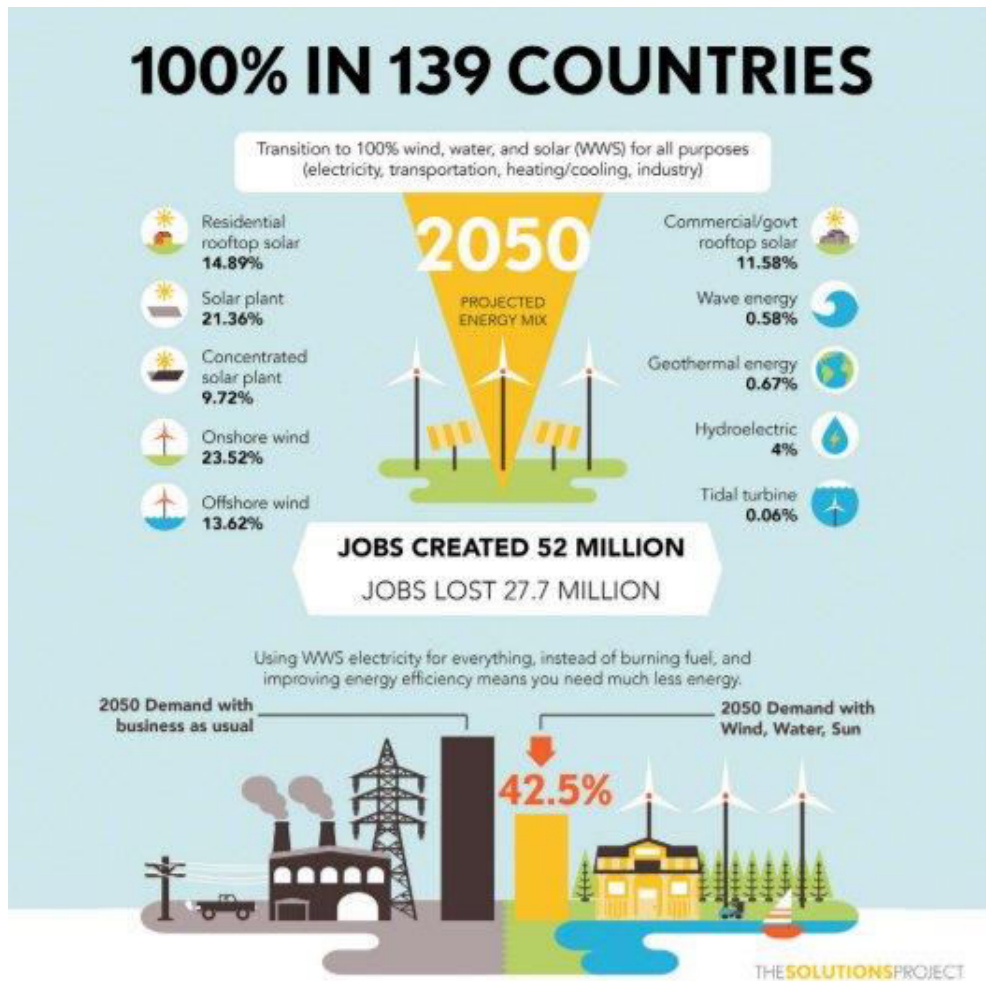
116) Paper “100% Clean and Renewable Wind, Water, and Sunlight All-Sector Energy Roadmaps for 139 Countries of the World” Mark Z. Jacobson (Stanford University, CA) et al. in Joule 1 (energy journal) (p. 108-121) (September, 2017)

[Note: All quotes below are from the “100% Clean and Renewable Wind, Water, and Sunlight All-Sector Energy Roadmaps for 139 Countries of the World” article in Joule.]

“The seriousness of air-pollution, climate, and energy-security problems worldwide requires a massive, virtually immediate transformation of the world’s energy infrastructure to 100% clean, renewable energy producing zero emissions.” (p. 108)

“The roadmaps [illustrated by charts via the Interactive Map at <http://thesolutionsproject.org/why-clean-energy/> (which also illustrates roadmaps for cities worldwide, and states in the U.S.)] describe a future where all energy sectors are electrified or use heat directly with existing technology, energy demand is lower due to several factors, and the electricity is generated with 100% wind, water, and sunlight (WWS).” (p. 108-109)

Summary: Getting to 100% Renewables for All Purposes--[the infographic below was on the cover page (p. 107) for article “100% Clean and Renewable Wind, Water, and Sunlight All-Sector Energy Roadmaps for 139 Countries of the World” in Joule 1 (September 6, 2017)]



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“... most of the electric technologies that we propose for replacing fossil-fuel technologies are already commercial on a large scale today (e.g., electric heat pumps for air and water heating, induction cooktops, electric passenger vehicles, electric induction furnaces, electric arc furnaces, dielectric heaters), but a few are still being designed for commercial use (e.g., electric aircraft and hybrid hydrogen fuel cell-electric aircraft).” (p. 109)

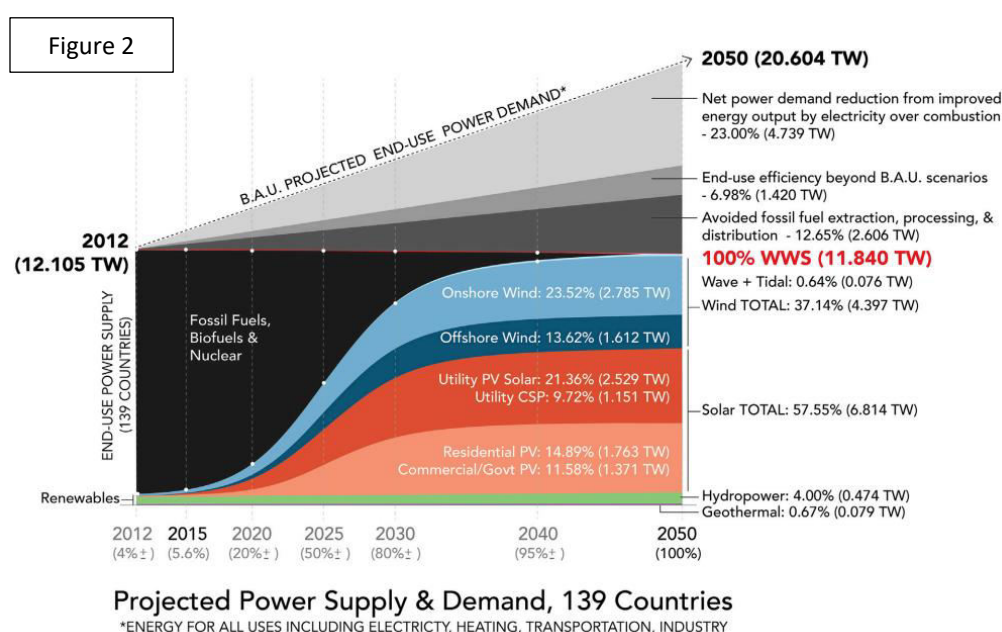
“Whether the roadmaps are implemented rapidly, however, depends on social and political factors.” (p. 110)

“Table 2 indicates that 4.26% of the 2050 nameplate capacity required for a 100% all-purpose WWS (Wind, Water, and Sunlight) system among the 139 countries was already installed as of the end of 2015.” (p. 113)

[(Editor’s Note--SP) In other words, in 2015, we had reached 4.26% of the capacity needed to reach 100% renewable (by WWS). There is still 95.74% of the capacity remaining for us to achieve, before we can reach the 100% goal.]

[Note: “Nameplate capacity, also known as the rated capacity, nominal capacity, installed capacity, or maximum effect, is the intended full-load sustained output of a facility such as a power plant, electric generator, a chemical plant, fuel plant, metal refinery, mine, and many others.” (Wikipedia)]

“Figure 2 (on p. 118) is a proposed WWS transformation timeline for the 139 countries. It assumes 80% conversion to WWS by 2030 and 100% by 2050. The rate of transformation is based on what is necessary to eliminate air-pollution mortality as soon as possible, what is needed to avoid 1.5C net global warming, and what we estimate is technically and economically feasible.” (p. 117)



“Air heating and cooling are powered by ground-, air-, or water-source electric heat pumps. Water heat is generated by heat pumps with an electric resistance element for low temperatures and/or solar hot water preheating. Cook stoves are electric induction. Electric arc furnaces, induction furnaces, and dielectric heaters are used to power high-temperature industrial processes directly.” (p. 120)

[From “100% Clean and Renewable Wind, Water, and Sunlight All-Sector Energy Roadmaps for 139 Countries of the World” Mark Z. Jacobson (Stanford University, CA) et al. in Joule 1 (energy journal) (p. 108-121) September 6, 2017 (at [https://www.cell.com/joule/pdf/S2542-4351\(17\)30012-0.pdf](https://www.cell.com/joule/pdf/S2542-4351(17)30012-0.pdf)); referred to Joule article by “Most of the world’s countries could run on 100% renewable energy by 2050, says study” by John McKenna at World Economic Forum September 18, 2017 (at <https://www.weforum.org/agenda/2017/09/countries-100-renewable-energy-by-2050/>) . Additional Source: The Solutions Project (for link to Interactive Map)(at <https://thesolutionsproject.org/why-clean-energy/>)]

117) Book “Yearbook of Global Climate Action” (launched November, 2017)

“UN Climate Change News, Bonn, Nov 15--At the High-Level closing of the Global Climate Action events, the first Yearbook of Climate Action was presented to UN Secretary-General António Guterres by Inia Seruiratu, Climate Champion and Fijian Minister for Agriculture, Rural and Maritime Development and National Disaster Management, and Salaheddine Mezouar, Minister for Foreign Affairs and Cooperation of the Kingdom of Morocco and President of COP22.”

“The Yearbook captures the climate actions of businesses, investors, cities, regions and civil society, demonstrating that non-Party stakeholders are steadily progressing to achieve the central goal of the Paris Agreement--to limit the rise of global average temperatures to well below 2 degrees Celsius and as close as possible to 1.5 degrees.”

“For instance, the report notes that coalitions, representing more than a billion people have committed to decrease emissions by 80 per cent by 2050. Mega-cities with more than 300 million inhabitants are working together to build capacity on adaptation in the water sector. It underlines how companies are committing to 100% renewable energy and energy productivity, and setting concrete targets in line with the climate science.”

“UN Climate Change Executive Secretary Patricia Espinosa said, “Governments must know the action in the real world to accelerate ambition over time, which is required to secure success for agreed global goals. It is a virtuous circle. This Yearbook shows how these actions drive global momentum towards our common challenge. And it can inspire and support governments to act on their Paris contributions.”

“The inaugural 2017 edition of the Yearbook informs governments about what has been achieved throughout the year--under the umbrella of the Marrakech Partnership--and puts a spotlight on how the transition toward a low-carbon economy can be accelerated.”

[From article “2017 Yearbook of Global Climate Action Launched at COP23” (November 17, 2017) at the UNFCCC website (<https://unfccc.int/news/2017-yearbook-of-global-climate-action-launched-at-cop23>) (paragraphs 1-5)]

b) From Yearbook of Global Climate Action 2017
(at https://unfccc.int/tools/GCA_Yearbook/GCA_Yearbook2017.pdf)

“Climate change is one of the greatest challenges humanity has ever faced. Left unchecked, it threatens to destabilize the natural world, our foundation for security, prosperity and peace.” (from Foreword from Patricia Espinosa, Executive Secretary of the UNFCCC; p. 5, paragraph 1)

“Agriculture, forestry and other land uses accounts for 20 to 25 per cent of global greenhouse gas emissions.” (P. 32)

“According to the fifth Annual Report on the International Panel on Climate Change, urban infrastructure accounts for over 70 per cent of global energy use and cities account for between 37 and 49 per cent of global greenhouse gas emissions.” (p. 39)

“Transport currently represents around 20 percent of global greenhouse gas emissions and is still almost totally dependent on fossil fuels.” (p. 42)

c) From Yearbook of Global Climate Action 2018
(at https://unfccc.int/sites/default/files/resource/GCA_Yearbook2018.pdf)

“Climate change remains a growing, existential threat. We were given stark warnings of this in 2018 from scientists in the Global Warming of 1.5 °C report of the International Panel on Climate Change and from nature in the form of record-breaking temperatures and extreme weather events.”

“Are we doing enough? The answer is clearly, no. We need to commit to urgent, increasingly ambitious global climate action.” [From “Foreword” by Patricia Espinosa Executive Secretary of the UNFCCC, p. iii, paragraphs 1-2)

d) From Yearbook of Global Climate Action 2019

(at https://unfccc.int/sites/default/files/resource/GCA_Yearbook2019.pdf)

“While the lessons contained within the Yearbook are numerous, the importance of coordination is paramount. On one level, coordination is about avoiding duplication of efforts--ensuring time and resources are not wasted by two or more groups doing the same work. On another level, coordination is about aligning policies, programs and services in a climate-positive direction. This could mean, in some cases, aligning business goals with the Paris Agreement, or ensuring government policies related to climate change are not restricted to one department or ministry alone; that they are truly cross-cutting and, ultimately, effective. Another lesson that stands out in this Yearbook is related to incentives. It underlines what should already be clear—we need to rapidly begin making the transition away from subsidies and incentives for fossil fuel-related areas and towards renewable and sustainable solutions. At the same time, while this transition is both necessary and urgent, we must also recognize that this must be a just transition, that takes into consideration those people—their jobs and their families—who will ultimately be affected.”

“Yet another critical ingredient is finance. While coordination, aspiration and personal action are vital to our collective success in addressing climate change, global large-scale efforts to address it often requires the proper financing to do so. While Parties must dedicate the proper resources both domestically and internationally to address climate change, Non-Party stakeholders need clear signals, access to finance, and a receptive home for their innovative approaches to finance.”

“Finally, the Yearbook highlights, as well, the role that each of us can and needs to play in reducing emissions. Our choices matter. Climate-thoughtful choices add up to meaningful levels of ambition, especially when markets and policymakers recognize these actions and reflect them in products, policy and programmes. The bottom line is that active participation by all of us--governments, businesses, investors, regions and more--is needed if we are to face and overcome the climate emergency we currently face. *We have an extremely short window remaining to make the changes that can ultimately change our current trajectory.* Together, we must reach a climate-neutral economy by 2050, stabilize global temperatures at 1.5C by the end of the century and provide for sustainable development.” [From Foreword by Patricia Espinosa Executive Secretary of the UNFCCC; p. ii, paragraphs 5-6 and p. iii, paragraphs 1-3)]

(Beginning a multi-year section--Emergency Relief; Displacements; Safe Water, Sanitation)

118) Report “Global Humanitarian Overview 2018” [ReliefWeb--“ReliefWeb is a humanitarian information service provided by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA)”]

a) From “Foreword” by Mark Lowcock (United Nations Under-Secretary-General for Humanitarian Affairs and Emergency Relief Coordinator)

“Conflict--in particular protracted crises--will continue to be the main driver of need in 2018. All but two of the 2018 humanitarian response plans are for situations that have a major element of conflict. In addition to the tragic human cost of violence, conflicts often lead to people fleeing from their homes. Children cannot go to school. People cannot work to support their families. War often disrupts food supplies and people’s access to food.”

“Natural disasters will also generate humanitarian needs in 2018. Although the world has become better at predicting and preparing for disasters, the most vulnerable people on the planet are still hit hard. Climate change will increase the number of extreme weather events and make drought in some regions chronic. The risk of droughts, floods, earthquakes, hurricanes and typhoons and other seismic and meteorological events will remain high in 2018.”

[From the “Global Humanitarian Overview 2018” [United Nations Office for the Coordination of Humanitarian Affairs (OCHA)] at the website ReliefWeb (at <https://reliefweb.int/sites/reliefweb.int/files/resources/GHO2018.PDF>) (p. 4, paragraphs 8-9)]

b) Funding overview and analysis

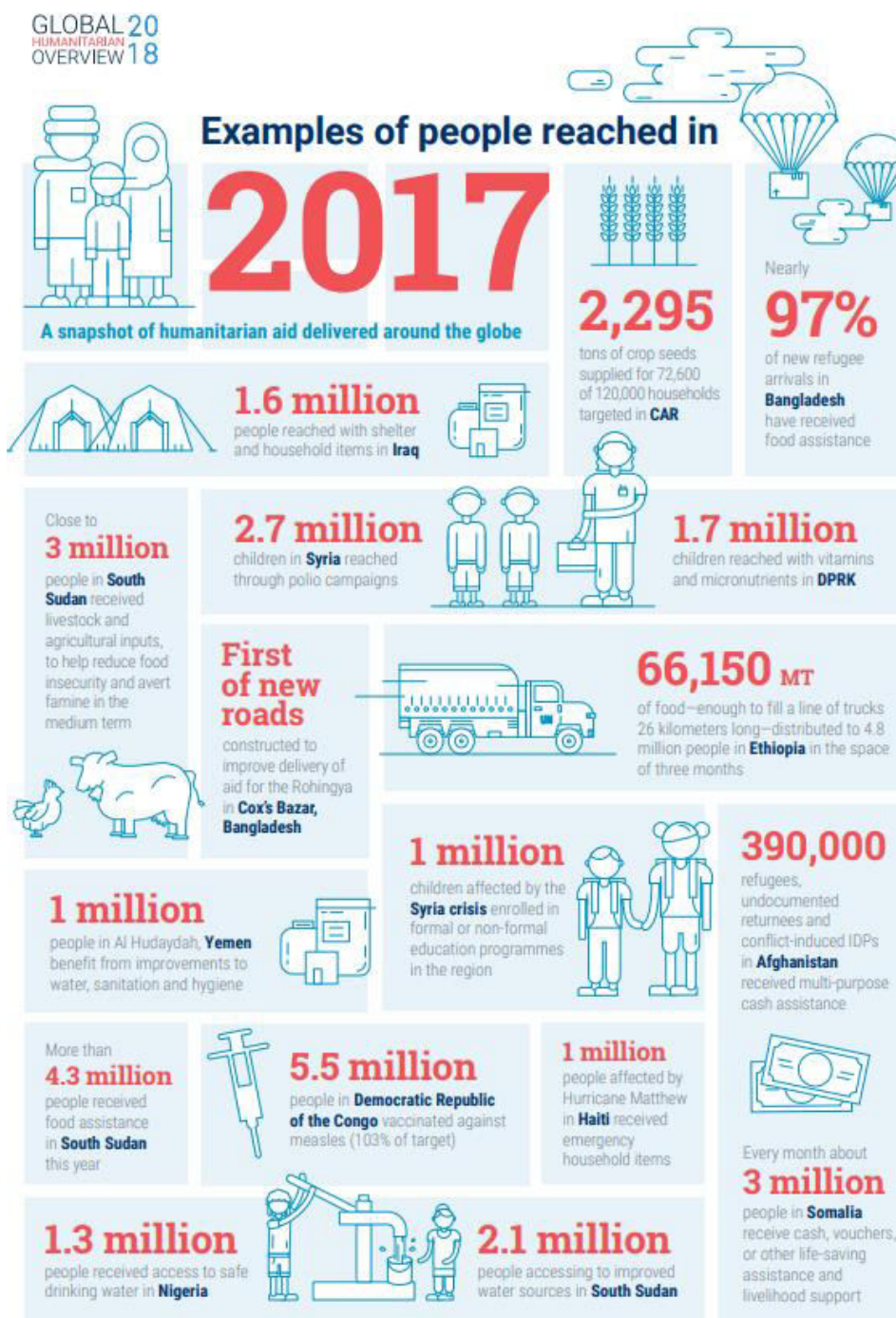
“The Global Humanitarian Overview for 2017 (Note: in their overview and request for funding last year) presented initial funding requirements of \$22.2 billion to help 92.8 million people in need. Over the course of the year, these figures rose to \$24.0 billion to help 105.1 million people. The increase stems from new or expanded crises, plus some humanitarian response plans that were revised after the GHO’s launch.”

“Funding for humanitarian response continued to increase in 2017. However, the growth in requirements (which are measured by the aggregation of the humanitarian response plans) has outpaced the increase in funding. This has resulted in a wider gap between humanitarian needs and available resources. Many humanitarian crises have become so protracted that they seem permanent. Nineteen of the 21 humanitarian response plans presented in this overview are for humanitarian crises that have been running for five years or more. Three have had humanitarian plans and appeals each year for at least 18 years (Democratic Republic of the Congo, Sudan and Somalia).”



[From the “Global Humanitarian Overview 2018” [United Nations Office for the Coordination of Humanitarian Affairs (OCHA)] at the website ReliefWeb (at <https://reliefweb.int/sites/reliefweb.int/files/resources/GHO2018.PDF>) (p. 9, paragraphs 1-3; p. 10, “2017 Funding Overview” graphic)]

c) “Examples of people reached in 2017”



[From the “Global Humanitarian Overview 2018” [United Nations Office for the Coordination of Humanitarian Affairs (OCHA)] at the website ReliefWeb (at <https://reliefweb.int/sites/reliefweb.int/files/resources/GHO2018.PDF>) (p. 8, infographic)]

d) In 2018....

“In 2018--

- Conflict will continue to be the main driver of humanitarian needs.
- Protracted violence will force people to flee from their homes, deny them access to enough food, and rob them of their means of making a living.
- Droughts, floods, hurricanes and other natural disasters will also create humanitarian needs. Although the risk of El Niño or La Niña is low next year, some scientists forecast an increased risk of earthquakes in 2018.

- In a number of countries, humanitarian needs are expected to fall, but still remain significant. In others, financial requirements have risen substantially since the beginning of last year, and needs will remain at exceptionally high levels in Nigeria, South Sudan, the Syria region, and Yemen, which is likely to remain the world's worst humanitarian crisis.
- Overall, 136 million people across the world will need humanitarian assistance and protection. • UN-coordinated response plans costed at \$22.5 billion can help 91 million.
- The overall number of people in need is more than 5% higher than in the 2017 GHO. The cost of the response plans sets a new record, about 1% higher than at the start of 2017.
- Humanitarian agencies will become more effective, efficient and cost-effective. They will respond faster to crises, in a way more attuned to the needs of those they are trying to help. They will undertake more comprehensive, cross-sectoral and impartial needs assessments. They will also contribute more to long-term solutions by working more closely with development agencies.
- Larger country-based pooled funds will improve the agility and prioritised use of funds in the places where they operate. An expanded Central Emergency Response Fund will better support the least-funded major crises."

[From the "Global Humanitarian Overview 2018" [United Nations Office for the Coordination of Humanitarian Affairs (OCHA)] at the website ReliefWeb (at <https://reliefweb.int/sites/reliefweb.int/files/resources/GHO2018.PDF>) (p. 3, all of the "In 2018" section)]

119) Report "World Migration Report 2020" (International Organization for Migration) (2019)

a) What has happened in migration?

"A lot has happened in migration in the last two years since the release of the World Migration Report 2018 in late 2017. The world has witnessed historic change at the global level with United Nations Member States coming together to finalize two global compacts on the international manifestations of migration and displacement: the Global Compact for Safe, Orderly and Regular Migration, and the Global Compact on Refugees. The finalization of the compacts is a result of decades-long efforts by States, international organizations, civil society organizations and other actors (such as private sector organizations) to improve Marie McAuliffe, Head, Migration Policy Research Division, IOM and Binod Khadria, Professor, Jawaharlal Nehru University. See, for example, Castles, 2010; Goldin, Cameron and Balarajan, 2011; Koser, 2016; Triandafyllidou, 2018. Ikenberry, 2018; Stone, 2016. Mishra, 2017. IOM, 2017. CHAPTER 1 – 2 Report overview: Providing perspective on migration and mobility in increasingly uncertain times how migration is governed at the international level. In the years leading up to States committing to develop the compacts, numerous dialogues, workshops, consultations and side events at international, regional, national as well as local levels have enabled different migration "realities" to be shared and the many areas of common interest to be expanded through deeper understandings of the benefits of migration as well as the challenges it may present. The compacts, therefore, build upon many years of engagement on the key issues underpinning the two compacts."

"The unfortunate reality is that there have been major migration and displacement events during the last two years; events that have caused great hardship and trauma as well as loss of life. Foremost have been the displacements of millions of people due to conflict (such as within and from the Syrian Arab Republic, Yemen, the Central African Republic, the Democratic Republic of the Congo and South Sudan), extreme violence (such as inflicted upon Rohingya forced to seek safety in Bangladesh) or severe economic and political instability (such as faced by millions of Venezuelans). There has also been growing recognition of the impacts of environmental and climate change on human mobility (such as planned migration/relocation and displacement), including as part of global efforts and international policy mechanisms to address the broader impacts of climate change. Large-scale displacement

triggered by climate and weather-related hazards occurred in many parts of the world in 2018 and 2019, including in Mozambique, the Philippines, China, India and the United States of America.”

“We have also seen the scale of international migration increase in line with recent trends. The number of international migrants is estimated to be almost 272 million globally, with nearly two-thirds being labour migrants. This figure remains a very small percentage of the world’s population (at 3.5%), meaning that the vast majority of people globally (96.5%) are estimated to be residing in the country in which they were born. However, the estimated number and proportion of international migrants already surpasses some projections made for the year 2050, which were in the order of 2.6 per cent or 230 million. That said, it is widely recognized that the scale and pace of international migration is notoriously difficult to predict with precision because it is closely connected to acute events (such as severe instability, economic crisis or conflict) as well as long-term trends (such as demographic change, economic development, communications technology advances and transportation access). We also know from long-term data that international migration is not uniform across the world but is shaped by economic, geographic, demographic and other factors resulting in distinct migration patterns, such as migration “corridors” developed over many years (see chapter 3 of this report for details). The largest corridors tend to be from developing countries to larger economies such as those of the United States, France, the Russian Federation, the United Arab Emirates and Saudi Arabia.”

[From the report “World Migration Report 2020” by the International Organization for Migration (2019) at the website of the United Nations (at https://www.un.org/sites/un2.un.org/files/wmr_2020.pdf) (from the section “What has happened in migration?” p. 1-2, paragraphs 1-3)]

b) Highlights from Part 1

Highlights from Part I: Data and information on migration and migrants

The number of international migrants globally in 2019: 272 million (3.5% of the world’s population)

- 52 per cent of international migrants were male; 48 per cent were female.
- 74 per cent of all international migrants were of working age (20–64 years).

India continued to be the largest country of origin of international migrants

- India had the largest number of migrants living abroad (17.5 million), followed by Mexico and China (11.8 million and 10.7 million respectively).
- The top destination country remained the United States (50.7 million international migrants).

The number of migrant workers declined slightly in high income countries while increasing elsewhere

- Between 2013 and 2017, high-income countries experienced a slight drop in migrant workers (from 112.3 million to 111.2 million). Upper middle-income countries observed the biggest increase (from 17.5 million to 30.5 million).
- Globally, male migrant workers outnumbered female migrant workers by 28 million in 2017. There were 96 million male migrant workers (58%) and 68 million female migrant workers (42%).

International remittances increased to USD 689 billion in 2018

- The top 3 remittance recipients were India (USD 78.6 billion), China (USD 67.4 billion) and Mexico (USD 35.7 billion).
- The United States remained the top remittance-sending country (USD 68.0 billion) followed by the United Arab Emirates (USD 44.4 billion) and Saudi Arabia (USD 36.1 billion).

The global refugee population was 25.9 million in 2018

- 20.4 million refugees were under the mandate of the United Nations High Commissioner for Refugees (UNHCR) and 5.5 million were refugees under the mandate of the United Nations Relief and Works Agency for Palestine Refugees (UNRWA) in the Near East.
- 52 per cent of the global refugee population was under 18 years of age.

The number of internally displaced persons due to violence and conflict reached 41.3 million

- This was the highest number on record since the Internal Displacement Monitoring Centre began monitoring in 1998.
- The Syrian Arab Republic had the highest number of people displaced (6.1 million) followed by Colombia (5.8 million) and the Democratic Republic of the Congo (3.1 million).

The number of stateless persons globally in 2018 was 3.9 million

- Bangladesh had the largest number of stateless persons (around 906,000). It was followed by Côte d’Ivoire (692,000) and Myanmar (620,000).

For further details, refer to chapter 2 of this report. Sources and dates of estimates above are outlined in the chapter.

[From the report “World Migration Report 2020” by the International Organization for Migration (2019) at the website of the United Nations (at https://www.un.org/sites/un2.un.org/files/wmr_2020.pdf) (from the summary box “Highlights from Part I: Data and information on migration and migrants” p. 3)]

c) “We are living through an era of intense turbulence....”

“The unprecedented pace of change in the (geo)political, social, environmental and technological spheres has led some analysts and commentators to coin or use phrases such as the “age of accelerations”, the “fourth industrial revolution”, and the “age of change”. There is wide recognition of how quickly the world is changing, and of how the pace of change seems to be accelerating beyond all expectations and predictions. There is also a sense that change is resulting in unexpected (and unwanted) impacts:

‘We are living through an era of intense turbulence, disillusionment and bewilderment. Deepening geopolitical tensions are transforming international relations, and political tribalism is revealing deep fissures within countries. The spread of exponential technologies is upending long-held assumptions about security, politics, economics and so much more.’”

“Of particular note have been major shifts in the political realm, particularly in terms of civic engagement through emerging social media and other online platforms as well as the standards of political leadership. The ‘Arab Spring’, for example, heralded a significant development in how voices were heard and activists organized in political arenas. More recently, we have seen a groundswell in analysis and commentary on the changes that are occurring in democratic systems around the world, and the implications for governance, geopolitics and international cooperation. We are living in a period in which the core values underpinning global governance are being challenged. The values of equity, accountability, impartiality, fairness, justice and probity are being actively undermined as some political leaders disregard common interest in preference for personal interest – even if it corrodes laws, processes and institutions that have, overall, sought to advance whole nations and peoples, without excluding or expelling some because of their inherent characteristics or beliefs. Ongoing and systematic corrosion, as we have witnessed throughout history, can extend to attacks on human rights and ultimately on groups of people within societies.”

[From the report “World Migration Report 2020” by the International Organization for Migration (2019) at the website of the United Nations (at https://www.un.org/sites/un2.un.org/files/wmr_2020.pdf) (p. 7, paragraphs 1-2)]

120) Report “Global Report on Internal Displacement 2020” [Internal Displacement Monitoring Center (iDMC)]

a) Internal displacement in 2019

“Conflict and disasters triggered 33.4 million new internal displacements across 145 countries and territories in 2019.”

[From the webpage “Global Report on Internal Displacement 2020” by the Internal Displacement Monitoring Center (iDMC) at the iDMC website (at <https://www.internal-displacement.org/global-report/grid2020/>) (scroll down just a little to “Part 1”)]

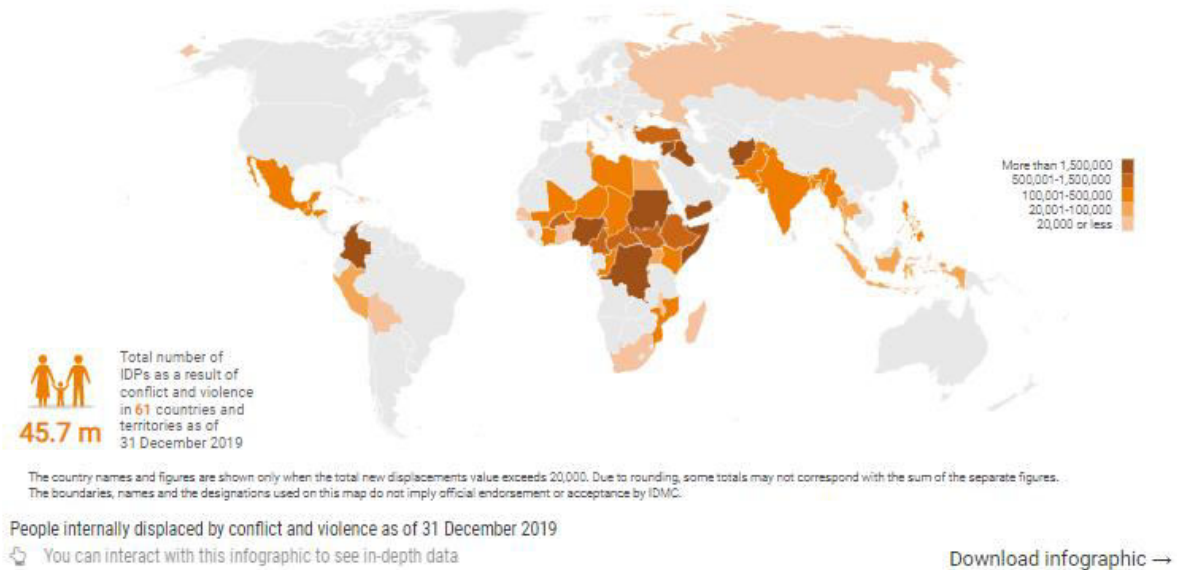
b)

PEOPLE LIVING IN DISPLACEMENT

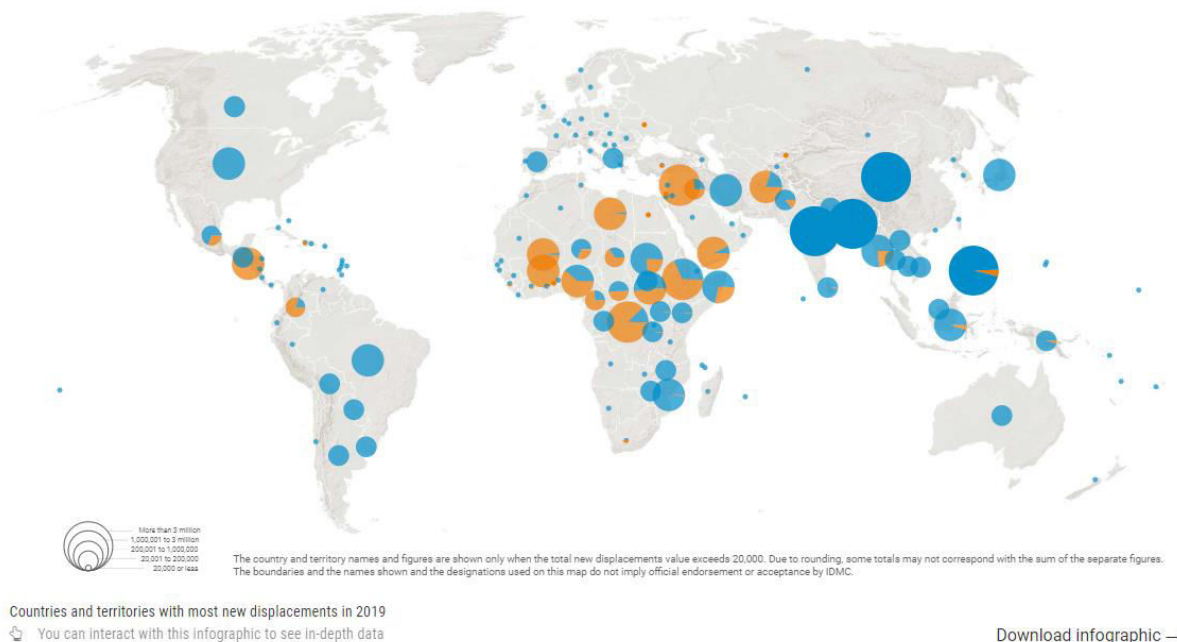
There were **50.8 million** internally displaced people across the world at the end of 2019, **45.7 million as a result of conflict and violence**, and **5.1 million as a result of disasters**. The latter is the first ever global estimate for disasters.



A record **45.7 million people** were living in internal displacement as a result of conflict and violence in **61 countries** and territories as of 31 December 2019. This figure is the highest ever recorded.



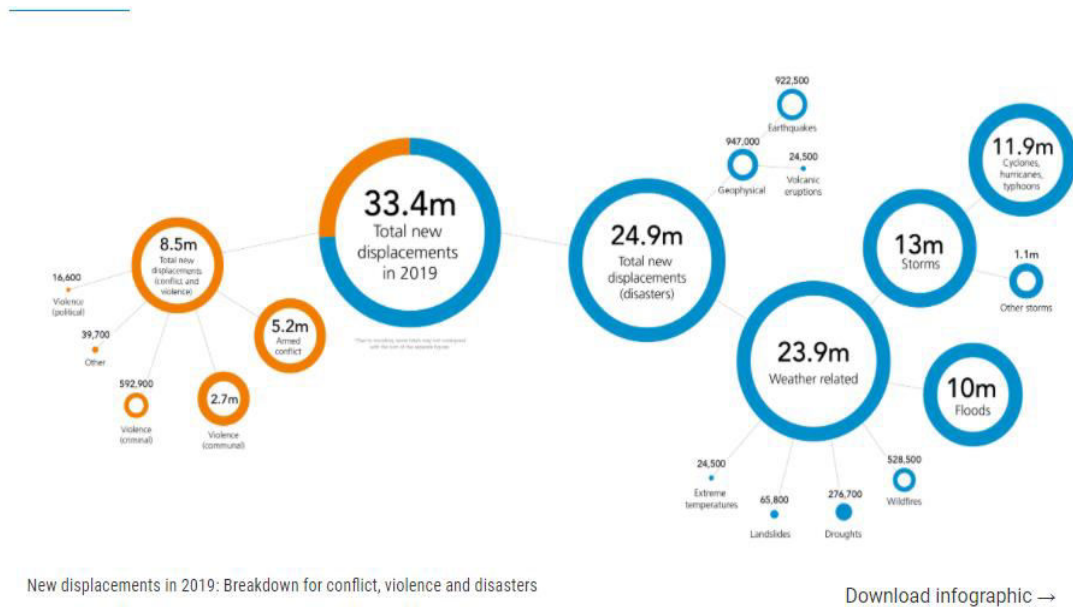
c) Countries and territories with most new displacements in 2019 (interactive, at source)



[From the webpage “Global Report on Internal Displacement 2020” by the Internal Displacement Monitoring Center (iDMC) at the iDMC website (at <https://www.internal-displacement.org/global-report/grid2020/>) (scroll down just a little to “Part 1”)]

d)

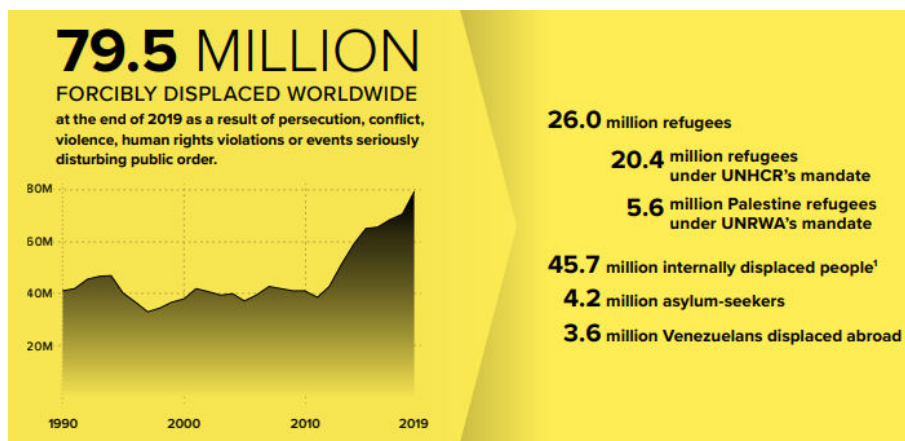
NEW DISPLACEMENTS IN 2019: BREAKDOWN BY CONFLICT AND DISASTER TYPE



[From the webpage “Global Report on Internal Displacement 2020” by the Internal Displacement Monitoring Center (IDMC) at the IDMC website (at <https://www.internal-displacement.org/global-report/grid2020/>) (scroll down just a little to “Part 1”)]

121) Report “Global Trends: Forced Displacement in 2019” [United Nations High Commissioner for Refugees (UNHCR)] (2019)

a)



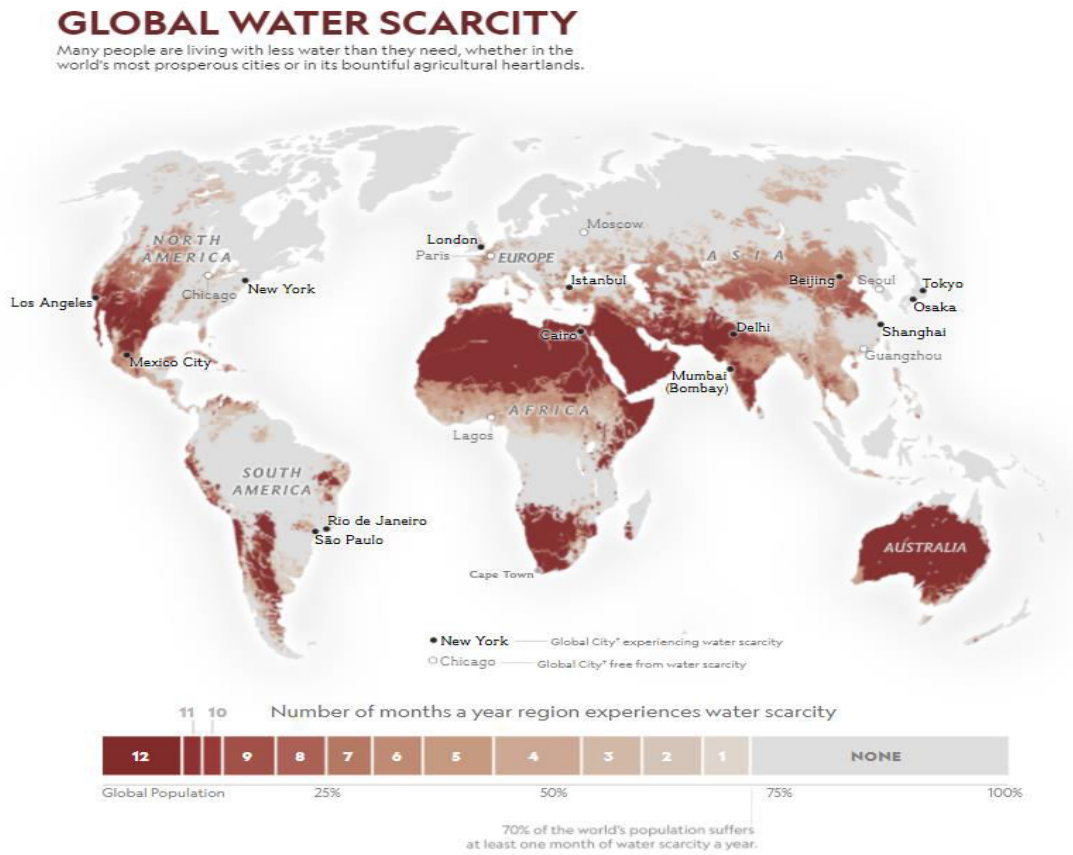
b) “The interplay between climate, conflict, hunger, poverty and persecution creates increasingly complex emergencies.”

“Climate change and natural disasters can exacerbate threats that force people to flee within their country or across international borders. The interplay between climate, conflict, hunger, poverty and persecution creates increasingly complex emergencies. For example, food insecurity may become a major driver of conflicts and displacement. An international alliance of the United Nations, governmental and nongovernmental agencies working to address the root causes of extreme hunger reported that conflict, weather extremes and economic turbulence contributed to several disturbing trends. The group reported that at the end of 2019, 135 million people across 55 countries and territories experienced acute food insecurity. In addition, 75 million children had stunted growth and 17 million suffered from wasting. These findings represented the highest level of acute food insecurity and malnutrition documented since the group’s first report in 2017. Eighty per cent of the world’s displaced populations were residing in these 55 countries or territories.”

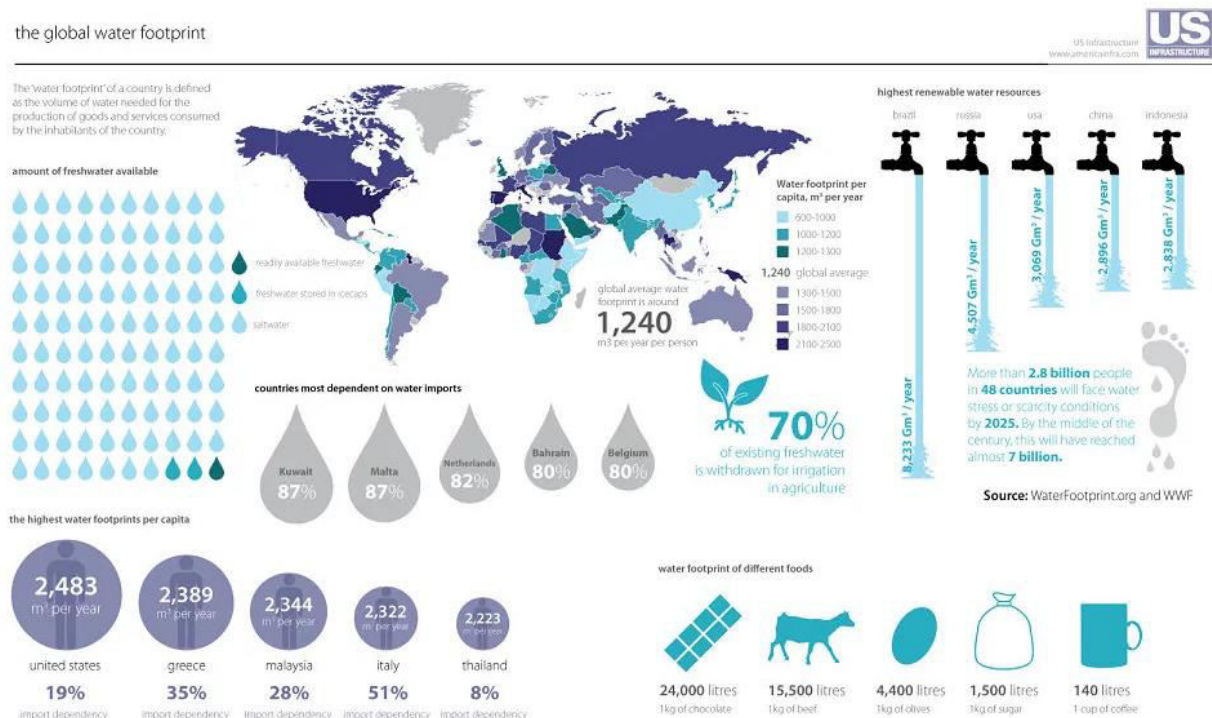
[From the report “Global Trends: Forced Displacement in 2019” by United Nations High Commissioner for Refugees (UNHCR) (2019) at the UNHCR website (at <https://www.unhcr.org/5ee200e37.pdf>) (p. 12, paragraph 1)]

122) [From “... The Water Crisis Explained” by Stephen Leahy (March 22, 2018) at the website for the National Geographic (at <https://www.nationalgeographic.com/news/2018/03/world-water-day-water-crisis-explained/> (in section “Global Risk”, paragraph 2; and “Global water Scarcity” graphic)]

“Fourteen of the world’s 20 megacities are now experiencing water scarcity or drought conditions. As many as four billion people already live in regions that experience severe water stress for at least one month of the year... With populations rising, these stresses will only mount.”



123) [From the webpage “Water Footprint” at the website HiSoRU.com (at <https://www.hisour.com/water-footprint-40416/>)]



124) From Report “SDG 6 Synthesis Report 2018 on Water and Sanitation” (UN Water) (2018)

“Billions of people still lack safe water, sanitation, and handwashing facilities: 844 million lack basic water services, 2.1 billion lack safely managed drinking water, 4.5 billion lack access to safely managed sanitation, and 892 million still practice open defecation. Only 27 percent of the population in least developed countries has access to soap and water for handwashing on premises.”

[From the webpage “SDG 6 Synthesis Report 2018 on Water and Sanitation” at the website for UN Water (United Nations Water) (at https://www.unwater.org/publication_categories/sdg-6-synthesis-report-2018-on-water-and-sanitation (from the “Highlights – SDG 6 Synthesis Report 2018 on Water and Sanitation” (2 page pdf file) (p. 1, first bullet))

125) Fact Sheet “Sanitation” [World Health Organization (WHO)] (June, 2019)

--“2.0 billion people still do not have basic sanitation facilities such as toilets or latrines.”

--“Of these, 673 million still defecate in the open, for example in street gutters, behind bushes or into open bodies of water.”

--“At least 10% of the world’s population is thought to consume food irrigated by wastewater.”

--“Poor sanitation is linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio and exacerbates stunting.”

--“Inadequate sanitation is estimated to cause 432 000 diarrhoeal deaths annually and is a major factor in several neglected tropical diseases, including intestinal worms, schistosomiasis, and trachoma. Poor sanitation also contributes to malnutrition.”

[From the webpage “Sanitation” at the website of the World Health Organization (WHO) (June 14, 2019) (at <https://www.who.int/news-room/fact-sheets/detail/sanitation>) (in the section “Key Facts”, bullets 5-7, 9, and 11)]

126) Information Websection “Water, sanitation, hygiene/Disease and risks” [World Health Organization (WHO)]

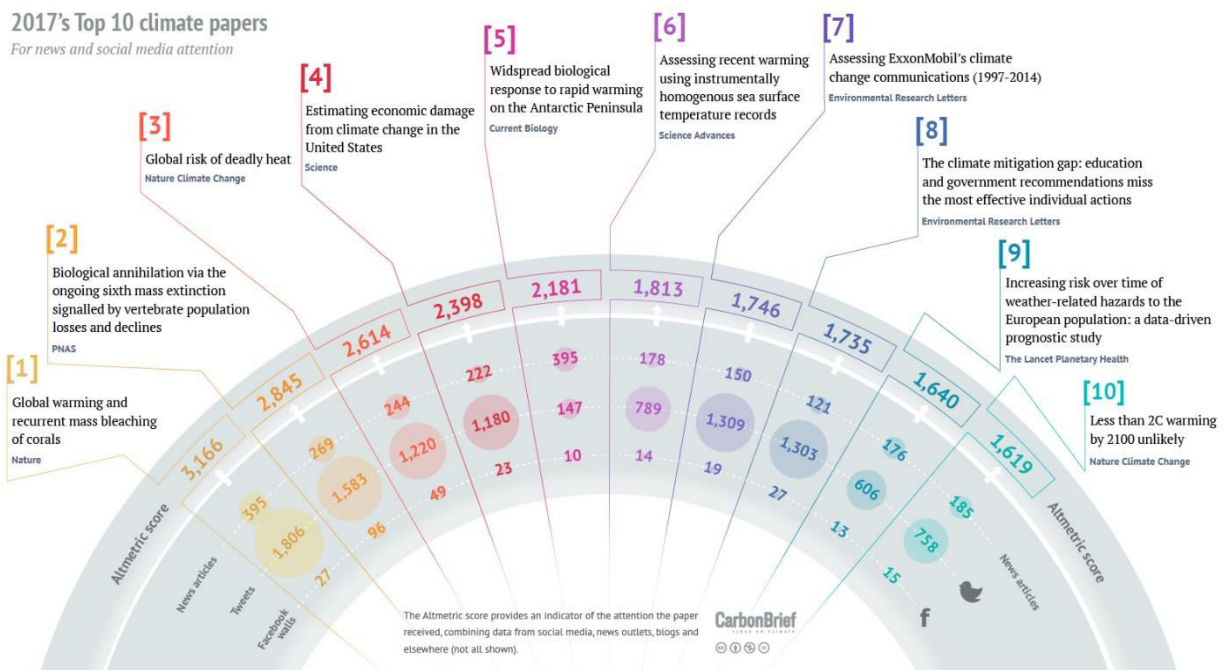
“A significant amount of disease could be prevented through access to safe water supply, adequate sanitation services and better hygiene practices. Diarrheal disease alone amounts to an estimated 3.6 % of the total DALY global burden of disease and is responsible for the deaths of 1.5 million people every year (WHO 2012). It is estimated that 58% of that burden, or 842 000 deaths per year, is attributable to unsafe water supply, sanitation and hygiene and includes 361 000 deaths of children under age five, mostly in low-income countries (WHO 2014).”

[From the information web section “Water, sanitation, hygiene”, in the subsection “Diseases and Risks” at the website of the World Health Organization (WHO) (at https://www.who.int/water_sanitation_health/diseases-risks/en/) (paragraph 1)]

(End of multi-year subject--Emergency Relief; Displacements; Safe Water, Sanitation)

127) Article “Analysis: The climate papers most featured in the media in 2017” (by Robert McSweeney) (January, 2018)

a)



b) “The most widely reported and shared article related to climate change last year was actually a “Policy Forum” commentary in the journal Science. Published in mid-January, [‘The irreversible momentum of clean energy’](#) was covered by 232 news articles and tweeted more than 9,000 times. Its overall Altmetric score of 7,872 means it is the highest ranked of any article published last year.

“This is no surprise, perhaps, considering the author was Barack Obama, who, at the time, was still the US president. But as the article is a commentary, it does not make it into Carbon Brief’s leaderboard of research papers.”

c) “Coming second is, [‘Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines’](#), published in the Proceedings of the National Academy of Sciences of the United States of America (or ‘PNAS’ for short) with an Altmetric score of 2,845.”

“The study, led by Dr Gerardo Ceballos of the National Autonomous University of Mexico, found that the Earth’s ‘sixth mass extinction’ is well underway and has ‘proceeded further than most assume’. Analysing nearly half of the Earth’s known vertebrate species, the researchers concluded that ‘habitat loss, overexploitation, invasive organisms, pollution, toxification, and more recently climate disruption’ have led to ‘catastrophic declines in both the numbers and sizes of populations of both common and rare vertebrate species’.”

[From article “Analysis: The climate papers most featured in the media in 2017” (by Robert McSweeney) (January 24, 2018) at the website for Carbon Brief (at <https://www.carbonbrief.org/analysis-the-climate-papers-most-featured-in-the-media-in-2017>) (a) graph at top of page; b) in the section “Birst Place”, paragraphs 1 and 2; c) in the section “The Top 5”, paragraphs 1 and 2)]

128) Report “Raising Ambition: Zero Carbon Scenarios from Across the Globe” (Zero Carbon Britain) (2018)

a) *“There is no shortage of evidence that humanity is entering a very serious place. Both data and real life stories from the ever-increasing global catalogue of extreme weather events clearly show we are heading into a climate emergency.”*

“Fortunately, we have the technology to rise to this challenge. CAT’s Zero Carbon Britain research and other low- and zero-carbon models from across the world show how we can reach net zero greenhouse gas emissions using technology available today.”

Modelling a climate safe future

“‘Raising Ambition: Zero Carbon Scenarios from Across the Globe’ collects and highlights the work of hundreds of people around the world to develop snapshots and deep visions of possible futures at the global, regional, national and sub-national scales.”

“From Tanzania to Los Angeles, South Asia to the Baltic, we take an in-depth look at 18 case studies of scenarios. These are drawn from 130 scenarios that model net zero, deep decarbonisation, and using up to 100% renewable energy.”

[From the webpage “Zero Carbon Britain: Raising Ambition” at the website of the Centre for Alternative Technology (at <https://www.cat.org.uk/info-resources/zero-carbon-britain/research-reports/zero-carbon-britain-raising-ambition/>) (paragraphs 1-4)]

b) “Key Findings”

i) “Why Zero Carbon?”

“Levels of ambition for action must reflect what climate science is telling us. To stabilise the climate system and stay below the internationally agreed limit of keeping global temperature rise well below 2°C above pre-industrial levels, and to pursue efforts to limit the increase to 1.5°C, humanity must move rapidly beyond fossil-fuel-based energy systems and sequester any remaining man-made greenhouse gas emissions.”

“Global society needs to be collectively on a path to achieving net zero greenhouse gas emissions as far in advance of the Paris Agreement’s target date of 2050 as possible. The earlier this is achieved, the greater the chance of limiting global temperature rise to near 1.5°C, minimising the risk of severe runaway climate impacts and protecting the most vulnerable countries. There is, therefore, an urgent need to integrate accelerated short term action with enhanced ambition in longer-term planning from all nations.”

ii) “What do we mean by zero?”

“All emissions that can go to zero must go to zero--as rapidly as possible. Not just in electricity, but also in heat, transport, industry and land-use... Even with a zero emissions end-goal, the science still requires a clearly defined trajectory so that the total cumulative greenhouse gas emissions released over a specific timeframe work within the agreed total carbon budget. Early action is vital.”

iii) “Net zero is possible”

“This report outlines scenarios at global, regional, national and sub-national scales that illustrate how the Paris Agreement targets could be met. Our conclusions are drawn from analysis of over 130

scenarios that demonstrate how deep decarbonisation or net-zero greenhouse gas emissions can be achieved before the second half of the century using existing technology, whilst also supporting social or economic development.

“Changing how billions of people live on Planet Earth is a very special kind of problem because the forces that shape our lives exist on many different levels. However, the depth and detail of these scenarios clearly demonstrate that we already have all the tools and technologies we need to achieve the Paris targets. *Rather than an unresolved technical challenge, what is actually holding us back is a mix of economic, cultural and psychological barriers.*”

[From the report “Raising Ambition: Zero Carbon Scenarios from Across the Globe” at the website of the Centre for Alternative Energy (at <https://www.cat.org.uk/info-resources/zero-carbon-britain/research-reports/zero-carbon-britain-raising-ambition/>) (in section “Executive Summary”: i) p. 7, in subsection “Why Zero Carbon?”; ii) p. 7, in subsection “What do we mean by zero?”; iii) p. 9, in subsection “Key Findings”--in “Net Zero is Achievable”)]

Note: also included here are some details about what the Centre for Alternative Technology does....

“The Centre for Alternative Technology (in Wales, UK) is a demonstration centre and educational resource, with many short courses and online workshops--and one of their many projects is a series of “Zero Carbon Britain” publications....

“We offer solutions to some of the most serious challenges facing our planet and the human race... Leading by example, we aim to show that living more sustainably is not only easy to attain but can provide a better quality of life.

“Our site is a unique and valuable practical demonstration centre, which includes:

- photovoltaics
- solar thermal
- a micro-grid
- off-grid and grid-connected systems
- biomass combined heat and power (CHP)
- hydro
- air source heat pumps
- a community heat main
- a range of small to medium wind turbines
- two reed bed systems
- off-mains water supply
- and extensive organic gardens....

“Our day-to-day activities include--

- a) running a visitor centre which is open 7 days a week, with 7 acres of interactive displays
- b) providing curriculum-based education to visiting schools, colleges and universities.”

[Source: From the webpage “What Do We Do?” at the website for the Centre for Alternative Technology (which **was** at <https://content.cat.org.uk/index.php/about-cat-what-do-we-do> before they did an upgrade to the website... and now I can’t find their excellent introductory information....)]

[So... the information above is still included, because at the CAT website, in the section “Short Courses”, (at <https://www.cat.org.uk/courses-and-training/short-courses/?date=upcoming&view=grid&type=Short-Course&category=All>) there is much evidence that the Centre for Alternative Technology has the skills to teach courses about these subjects.]

129) Press Release “Top Research Universities Announce Coalition to Accelerate Local Climate Action at 2018 Higher Education Climate Leadership Summit” (Second Nature) (February, 2018)

“February 6, 2018--Today at the 2018 Higher Education Climate Leadership Summit, a coalition of 13 leading North American research universities launched the University Climate Change Coalition, or UC3, a group committed to leveraging their research and resources to help communities accelerate climate action. UC3 members, a range of distinguished institutions spanning the United States, Canada, and Mexico, include eight signatories to the Presidents’ Climate Leadership Commitments, a signature Second Nature program in which university leaders commit to carbon neutrality and report publicly on their progress. For more than a decade, the diverse institutions in Second Nature’s Climate Leadership Network have been pursuing carbon neutrality in campus operations, creating new climate solutions through innovative research, and preparing students to solve the urgent climate challenges of the 21st century.”

“UC3 builds upon this effort through a specific focus on the place-based strengths of research institutions. In launching UC3, the initial cohort of member institutions has committed to mobilize their resources and expertise to help businesses, cities and states achieve their climate goals through the activities below:

- a) Cross-sector forums: Every UC3 institution will organize a climate change forum in 2018 to bring together community and business leaders, elected officials and advocates. Forums will be tailored to local and regional objectives, focusing on research-driven policies and solutions to assist various communities.
- b) Coalition climate mitigation and adaptation report: a coalition-wide report, to be released in late 2018, will synthesize the best practices, policies and recommendations from all UC3 forums into a framework for continued progress on climate change goals across the nation and the world.”

“With global climate change accelerating, higher education is stepping up its mobilization of teaching, research and operational change. UC3 represents a comprehensive approach, uniting leaders from many sectors of society to inspire solutions and make informed policy recommendations. As a recognized national leader and advocate for environmental stewardship, Virginia Wesleyan University is proud to support and promote this initiative,” notes President Scott Miller, incoming Chair of the Climate Leadership Steering Committee, the oversight body of the Presidents’ Climate Leadership Commitments.”

[From Press Release “Top Research Universities Announce Coalition to Accelerate Local Climate Action at 2018 Higher Education Climate Leadership Summit” (Second Nature) (February 6, 2018) at the website for Programa de Investigación en Cambio Climático (at http://www.pincc.unam.mx/UC3_UNAM/Documentos/UC3-SN-Press-Release_final.pdf) (paragraphs 1, 3, and 7)]

[Note: “2018 Higher Education Climate Leadership Summit” has been described as “the largest national gathering of higher education presidents, chancellors, trustees, and other senior leaders committed to accelerating climate solutions”. (from the webpage “2018 Higher Education Climate Leadership Summit” at the website for Intentional Endowments at https://www.intentionalendowments.org/2018_climate_summit, paragraph 1)]

130) Article “Emissions impossible: How big meat and dairy are heating up the planet” [GRAIN and the Institute for Agriculture and Trade Policy (IATP)] (July, 2018)

a) “New research from GRAIN and IATP shows that:

--Together, the world’s top five meat and dairy corporations are now responsible for more annual greenhouse gas emissions than Exxon, Shell or BP.

--By 2050, we must reduce global emissions by 38 billion tons to limit global warming to 1.5 degrees Celsius. If all other sectors follow that path while the meat and dairy industry’s growth continues as projected, the livestock sector could eat up 80% of the allowable GHG budget in just 32 years.

--Most of the top 35 global meat and dairy giants either do not report or underreport their emissions. -- Only four of them provide complete, credible emissions estimates.

--Fourteen of the 35 companies have announced some form of emission reduction targets. Of these, only six have targets that include supply chain emissions, yet these emissions can account for up to 90% of total emissions. The six companies that do pledge cuts in supply chain emissions are simultaneously pushing for growth in production and exports, driving their overall emissions up regardless of their intention to reduce emissions per kilo of milk or meat produced.”

“To avert climate catastrophe, we must reduce production and consumption of meat and dairy in overproducing and overconsuming countries and in affluent populations globally, while supporting a transition to agroecology.” (paragraphs 2-3)

b) “On 25 March 2014--World’s largest producer of meat had triumphant message for Wall Street: global meat consumption going up and JBS going to profit immensely from this growth. Brazil-based company told shareholders a pillar of its strategy is projected 30% increase in per capita global meat consumption to 48 kg by 2030, up from 37 kg per person in 1999.... JBS neglected to tell its investors about critical problem w/ growth strategy: climate change. If global meat production were to expand to 48 kg per capita, it would become impossible to keep global temperatures from rising to dangerous levels. JBS numbers in perspective: new Greenpeace report finds avg per capita meat consumption must fall to 22 kg by 2030, then to 16 kg by 2050, to avoid dangerous climate change.” (in section “Profits versus the planet”, paragraph 1-3)

“If we are to reach the 1.5 °C goal, total global emissions must rapidly decline from 51 gigatons to 13 gigatons by 2050.... Under a business-as-usual scenario, the livestock sector could eat up over 80% of the budget....” (in section “Profits versus the planet”, paragraph 4)

c) “Tyson expects annual growth of 3–4% from beef and poultry sales, while Marfrig targeted 7.5–9.5% annual growth for 2015–2018.... Danish dairy giant Arla plans to add 2 billion kg of milk to its European supply chain between 2015-2020 – a 14% increase... Fonterra projects a stunning 40% increase in its processed milk volume for 2015–2025.” (in section “Growth at all costs”, paragraph 1)

d) “The main culprits are major meat and dairy exporting regions: United States (US)-Canada; the European Union (EU); Brazil-Argentina; Australia-New Zealand. (These) "surplus protein" regions have surplus production and high per capita consumption of meat and dairy. These countries account for 43% of total global emissions from meat and dairy production, even though they are home to only 15% of the world's population. (in section “Do some countries and regions matter more than others?”, paragraph 1)

“These are the parts of the world where steep reductions in emissions from meat and dairy production are most necessary. This includes exports that fuel overconsumption amongst the more affluent middle and upper classes of developing countries.” (in Section “Profits versus the planet”, paragraph 6)

e) “There are several possible pathways to bringing emissions from meat and dairy production down to levels that are compatible with global efforts to prevent dangerous climate change. All of them, however, require significant reductions in meat and dairy production and consumption in the overproducing and overconsuming countries.” (in section “How do we get out of this?”, paragraph 1)

[From article “Emissions impossible: How big meat and dairy are heating up the planet” by GRAIN and the Institute for Agriculture and Trade Policy (IATP) (July 18, 2018) at the website for GRAIN (at <https://www.grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet>)]

131) School Strike for Climate Organization “Fridays for Future” (Greta Thunberg et. al.) (August, 2018)

a) “Fridays for Future” or FFF, is a global climate strike movement that started in August 2018, when 15-year-old Greta Thunberg began a school strike for climate. In the three weeks leading up to the Swedish election, she sat outside Swedish Parliament every school day, demanding urgent action on the climate crisis. She was tired of society’s unwillingness to see the climate crisis for what it is: a crisis.”

“To begin with, she was alone, but she was soon joined by others. On the 8th of September, Greta and her fellow school strikers decided to continue their strike until the Swedish policies provided a safe pathway well under 2° C, i.e. in line with the Paris agreement. They created the hashtag #FridaysForFuture, and encouraged other young people all over the world to join them. This marked the beginning of the global school strike for climate.”

“Their call for action sparked an international awakening, with students and activists uniting around the globe to protest outside their local parliaments and city halls. Along with other groups across the world, Fridays for Future is part of a hopeful new wave of change, inspiring millions of people to take action on the climate crisis, and we want you to become one of us.”

[From the webpage “Who We Are” at the website for Fridays for Futures (at <https://fridaysforfuture.org/what-we-do/who-we-are/>) (paragraphs 1-3)]

b) “... THE BIGGEST day of climate action ever!”



School Strike 4 Climate @StrikeClimate March 15, 2019

“BREAKING NEWS: While we were asleep, the world was striking! The numbers are in: yesterday was THE BIGGEST day of climate action ever! [@ScottMorrisonMP](#) [@billshortenmp](#) you catching this? The youth are rising! [#climatestrike](#) [#ss4c](#) “



[From a tweet (with photo) by School Strike 4 Climate @StrikeClimate on March 15, 2019 (at <https://twitter.com/StrikeClimate/status/1106696030911782912>)]

c) “A global strike on 15 March 2019 gathered more than one million strikers. Around 2200 strikes were organised in 125 countries. On 24 May 2019, the second global strike took place, in which 1600 events across 150 countries drew hundreds of thousands of protesters. The events were timed to coincide with the 2019 European Parliament election.”

“The 2019 Global Week for Future was a series of 4500 strikes across over 150 countries, focused around Friday 20 September and Friday 27 September. Likely the largest climate strikes in world history, 20 September strikes gathered roughly 4 million protesters, many of them schoolchildren, including 1.4 million people on strike in Germany. On 27 September, an estimated 2 million people participated in demonstrations worldwide, including over 1 million protesters in Italy and several hundred thousand protesters in Canada.”

[From the Wikipedia webpage “School Strike for Climate” at the Wikipedia website (at https://en.wikipedia.org/wiki/School_strike_for_climate) (paragraphs 3-4)]

132) Paper “Trajectories of the Earth System in the Anthropocene (frequently named as ‘hothouse Earth’ paper)” (August, 2018)

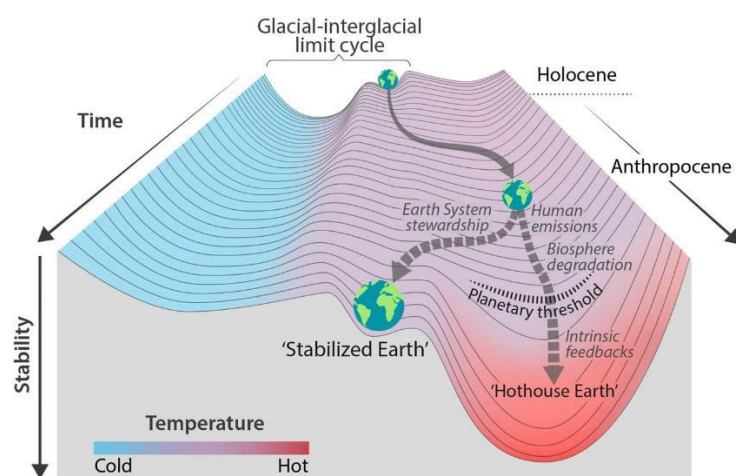
a) “The copan-co-contributed paper on Trajectories of the Earth System in the Anthropocene (frequently named as ‘hothouse Earth’ paper) has been ranked as the most impactful climate research article of the year 2018 by Altmetric and Carbon Brief.”

“The paper was the fifth most talked-about of all journal papers published last year. It was the subject of 460 news stories in 326 outlets, including the Guardian, BBC News, Sky News, New Scientist, Al Jazeera and the Sydney Morning Herald. Links to the paper were also included in 5,392 tweets and 34 Facebook

posts." (Source: Carbon Brief <https://www.carbonbrief.org/analysis-climate-papers-most-featured-in-media-2018>)

[From the webpage "Hothouse Earth paper most impactful climate research article and German word-of-the-year of 2018" at the website for the Potsdam Institute for Climate Impact Research (at <https://www.pik-potsdam.de/en/institute/departments/activities/copan/latest-publications-events/hothouse-earth-paper-most-impactful-climate-research-article-and-german-word-of-the-year-of-2018>) (paragraphs 1 and 2)]

b) Figure 2



[From the paper "Trajectories of the Earth System in the Anthropocene (frequently named as 'hothouse Earth' paper)" (Will Steffen, Johan Rockström, et al.) (August 14, 2018) at the website for the Proceedings of the National Academy of Sciences of the United States of America (at <https://www.pnas.org/content/115/33/8252>) (Figure 2)]

c) *"Our analysis suggests that the Earth System may be approaching a planetary threshold that could lock in a continuing rapid pathway toward much hotter conditions--Hothouse Earth. This pathway would be propelled by strong, intrinsic, biogeophysical feedbacks difficult to influence by human actions, a pathway that could not be reversed, steered, or substantially slowed."*

"Avoiding this threshold by creating a Stabilized Earth pathway can only be achieved and maintained by a coordinated, deliberate effort by human societies to manage our relationship with the rest of the Earth System, recognizing that humanity is an integral, interacting component of the system. Humanity is now facing the need for critical decisions and actions that could influence our future for centuries, if not millennia."

[From the paper "Trajectories of the Earth System in the Anthropocene (frequently named as 'hothouse Earth' paper)" (Will Steffen, Johan Rockström, et al.) (August 14, 2018) at the website for the Proceedings of the National Academy of Sciences of the United States of America (at <https://www.pnas.org/content/115/33/8252>) (in the section "Conclusions", paragraphs 2 and 5)]

d) "A domino-like cascade of melting ice, warming seas, shifting currents and dying forests could tilt the Earth into a 'hothouse' state beyond which human efforts to reduce emissions will be increasingly futile, a group of leading climate scientists has warned."

“This grim prospect is sketched out in a journal paper that considers the combined consequences of 10 climate change processes, including the release of methane trapped in Siberian permafrost and the impact of melting ice in Greenland on the Antarctic.”

“Previous studies have shown that weakening carbon sinks will add 0.25C, forest dieback will add 0.11C, permafrost thaw will add 0.9C and increased bacterial respiration will add 0.02C. The authors of the new paper also look at the loss of methane hydrates from the ocean floor and the reduction of snow and ice cover at the poles.”

“Rockström says there are huge gaps in data and knowledge about how one process might amplify another.”

[From the article “Domino-effect of climate events could move Earth into a ‘hothouse’ state” (Leading scientists warn that passing such a point would make efforts to reduce emissions increasingly futile) (by Jonathan Watts) (August 7, 2018) (paragraphs 1, 2, 6, and 11)]

133) The 2018 Wildfires

a) “The 2018 wildfire season involves wildfires on multiple continents. An extremely rare event occurred when wildfires broke out north of the Arctic Circle in Scandinavia, with one burning on the Russia–Finland border near the Barents Sea on July 20. By the end of the calendar year, the fires in British Columbia had burned more area than in any prior recorded year; and California experienced the single largest (by area) fire on record, and a fire destroyed more structures than in any other in modern history. Similarly, the UK saw the most wildfires ever recorded in a single year, at 76.”

[From the Wikipedia webpage for the “2018 Wildfire Season” (at https://en.wikipedia.org/wiki/2018_wildfire_season) (paragraph 1)]

b) “The 2018 wildfire season was the deadliest and most destructive wildfire season recorded in California history. With a total of 103 confirmed fatalities, 24,226 structures damaged or destroyed, and 8,527 fires burning 1,975,086 acres (799,289 ha), about 2% of the state's 100 million acres of land, it was the largest area of burned acreage recorded in a fire season at the time, according to the California Department of Forestry and Fire Protection (Cal Fire) and the National Interagency Fire Center (NIFC).”

[From the Wikipedia webpage for “California Wildfires” (see https://en.wikipedia.org/wiki/2018_California_wildfires) (paragraph 1)]

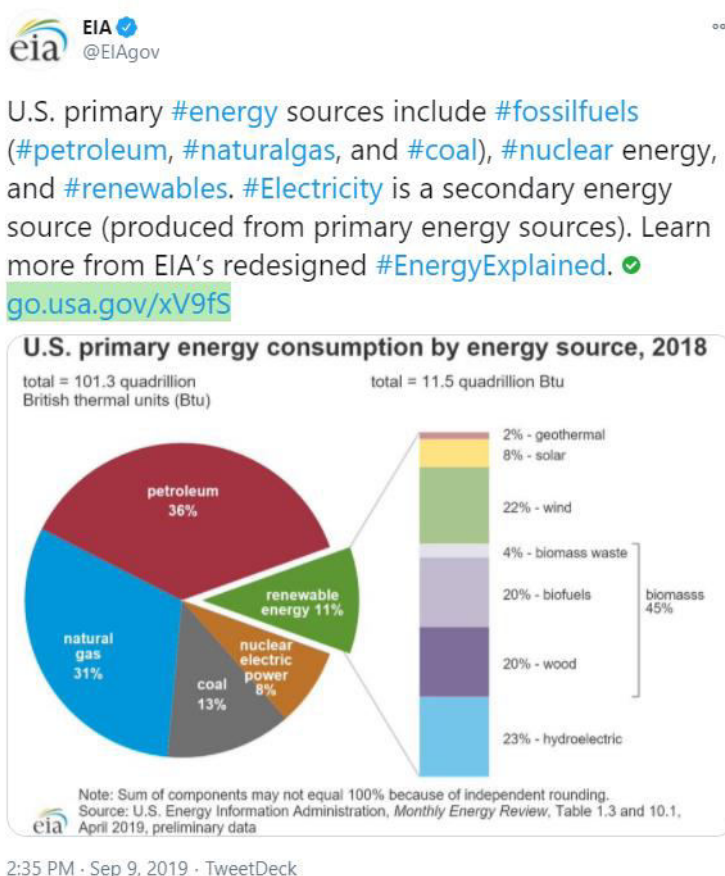
c) “Finally, California’s worsening wildfires are also complicating its efforts to cut emissions. Burning forests pump out massive amounts of greenhouse gases stored in plants and trees. And rising temperatures and shifting precipitation patterns have already extended the fire season by 75 days across the state’s sprawling Sierra Nevada range.”

“The raging wildfires in 2018 produced about 45 million metric tons of carbon dioxide. That’s nine times more than the amount by which the state cut emissions the previous year.”

[From article “California is on track to miss its climate targets--by a century: And it’s likely to get harder, not easier, for the state to achieve ever deeper cuts in emissions” by James Temple (November 1, 2019) at the website of MIT Technology Review (at

<https://www.technologyreview.com/2019/11/01/102477/california-is-on-track-to-miss-its-climate-targets-by-a-century/>) (in section “Wildfires”, paragraph 1-2)]

134) Statistics “U.S. Primary Energy Consumption by Energy Source, 2018” [U.S. Energy Information Administration (EIA)] (September, 2019)



[From tweet by the United States Energy Information Administration (EIA) on the Twitter Platform (at <https://twitter.com/eiagov/status/1171144994771492864>) September 9, 2018)]

135) Article “Q&A: Why cement emissions matter for climate change” (Jocelyn Timperly) (September, 2018)

“If the cement industry were a country, it would be the third largest emitter in the world.”

“In 2015, it generated around 2.8bn tonnes of CO₂, equivalent to 8% of the global total--a greater share than any country other than China or the US.”

“Cement use is set to rise as global urbanisation and economic development increases demand for new buildings and infrastructure. Along with other parts of the global economy, the cement industry will need to dramatically cut its emissions to meet the Paris Agreement’s temperature goals. However, only limited progress has been made so far.”

“The IEA and the industry-led Cement Sustainability Initiative (CSI) recently released a new low-carbon roadmap, showing how it considers emissions can be cut in line with a ‘2C’ scenario and a ‘below 2C’ scenario. The roadmap assumes cement demand will increase 12-23% by 2050.”

[From article “Q&A: Why cement emissions matter for climate change” by Jocelyn Timperly (September 13, 2018) at the website Carbon Brief (at <https://www.carbonbrief.org/qa-why-cement-emissions-matter-for-climate-change>) (paragraphs 1-3, and in the section “How far can cement emissions be reduced?”, paragraph 1)]

136) Conference “United Nations Climate Action Summit” (New York City) (September 26, 2018)

“President of France, Emmanuel Macron; Secretary-General of the United Nations, António Guterres; President of the World Bank Group, Jim Yong Kim; and UN Special Envoy for Climate Action, Michael R. Bloomberg to host the Second One Planet Summit in New York City”

“The Summit, to be held on September 26, 2018, will review the commitments made at the first One Planet Summit on December 12, 2017, and will further accelerate the implementation of the Paris Agreement by putting finance in service of climate action. It will contribute to strengthening multilateral collaboration, building trust between public and private actors, to ensure a collective response to the climate change.”

“Speakers include many heads of State and Government, business leaders, economists and representatives of civil society.”

“PARIS & NEW YORK – September 13, 2018 — In light of the emergency caused by the ecological, social and economic impacts of climate change, the climate challenge is a shared responsibility that requires the mobilization of and cooperation between everyone: governments, the public and private sectors, and civil society. Following the 2018 Global Climate Action Summit in San Francisco and ahead of the COP24 Conference in Katowice and the 2019 UNSG Climate Action Summit, the second One Planet Summit will be a crucial step for raising ambitions and accelerating the protection of our planet.”

“The second One Planet Summit will be co-hosted by French President Emmanuel Macron, Secretary-General of the United Nations António Guterres, President of the World Bank Group Jim Yong Kim, and United Nations Special Envoy for Climate Action Michael R. Bloomberg. The Summit will be held on the afternoon of September 26th from 2 pm to 4:30 pm at the Plaza Hotel in New York City, following the second annual Bloomberg Global Business Forum and alongside the 73rd session of the United Nations General Assembly.”

“‘Climate action requires a collective response. Discipline and ambition are essential. We are going through challenging times, but solutions are everywhere, all over the world. We must act together to foster innovation, boost transformative projects, gather public and private investments, and deliver on our promises for the next generations. The time has come. It is our priority, both economically and politically. We are ready now for this shared action’. Emmanuel Macron, President of France”

“‘New York City has long been a place where the world comes together to solve big problems--and climate change is one of the most urgent. Since last year’s summit, we’ve taken important steps forward to reduce carbon emissions and improve people’s lives, by cleaning the air, growing the economy, and creating jobs. This year’s summit is a chance to accelerate that progress and spread the health and economic benefits of climate action to more people around the world.’ Michael R. Bloomberg, founder of Bloomberg LP and Bloomberg Philanthropies, mayor of New York City from 2002-2013, UN Special Envoy for Climate Action and WHO Global Ambassador for Noncommunicable Diseases”

“Launched on December 12, 2017 in Paris, the inaugural One Planet Summit gathered more than 4,000 participants to accelerate the implementation of the Paris Agreement and to engage public and private actors in the fight against climate change. Twelve international commitments were made, bringing together some thirty coalitions and initiatives, based on three key fields of action: increasing finance for climate change adaptation and resilience; accelerating the transition towards a low-carbon economy; and firmly positioning climate challenges at the heart of finance. The 2018 Summit will provide an opportunity to review progress made in implementing these commitments and to strengthen trust and collaboration among actors in order to foster ambitious new initiatives.”

“Climate change is the most pressing challenge facing humankind. Strong leadership is needed urgently. We must use every opportunity—including the One Planet Summit and the high-level session of the United Nations General Assembly—to mobilize world leaders for ambitious and immediate climate action. The facts are clear and alarming: climate change continues to move faster than our efforts to address it. We must all do far more in order to win this race for our future.’ (António Guterres, Secretary-General of the United Nations)”

“The goals of the Paris Agreement are critical to sustaining the global fight against poverty. Commitment to climate action is strong, investment is growing, and the Paris goals are within our reach. But we need to accelerate progress. The public and private sectors must work together more effectively to coordinate policy reforms that boost investment. This will help us create new markets for climate action, especially in the developing countries that need it most.’ (World Bank Group President Jim Yong Kim)”

“The program of the 2018 Summit is structured to develop a One Planet Roadmap for climate action and green finance that can help align forces along the most strategic pathways to success, including: collaborating and sharing solutions to deliver local, national, and global action; investing in the transition to low-emissions and inclusive economies; and protecting vulnerable populations through innovative technologies and nature-based solutions and the restoration of ecosystems.”

“Heads of State and Government, business leaders, as well as other civil society actors who have already confirmed their participation at the One Planet Summit 2018 include: Prime Minister of New Zealand, Jacinda Ardern; Leontino Balbo Junior, Executive Vice-President of Native; Mark Carney, Governor of the Bank of England; Aliko Dangote, Founder and Chair of the Dangote Group; Valdis Dombrovskis, Vice-President of the European Commission; Bill Gates, Co-chair of the Bill & Melinda Gates Foundation; President of Togo, Faure Gnassingbé; President of the Republic of the Marshall Islands Dr. Hilda C. Heine; Christine Lagarde, Managing Director and Chair of the International Monetary Fund; Luis Alberto Moreno, President of the Inter-American Development Bank; H.E. Yasir Othman Al-Rumayyan, Chief Executive, Secretary-General, and Managing Director, Public Investment Fund; Paul Polman, CEO of Unilever; Prime Minister of Norway, Erna Solberg; Tri Rismaharini, Mayor of Surabaya, Indonesia; and Professor Johan Rockström, Director Designate of the Potsdam Institute for Climate Impact Research. The program will be presented and moderated by Arianna Huffington, Founder and CEO of Thrive Global.”

“Three years after the historic signing of the Paris Agreement, the second One Planet Summit will confirm the commitment of public and private actors to climate action, as well as their ability to translate their commitment to on-the-ground action through collaboration and specific initiatives that will ensure the well-being and security of worldwide populations.”

[From the Press Release for the “United Nations Climate Action Summit (2018)” at the website for the United Nations (at <https://www.un.org/sustainabledevelopment/blog/2018/09/one-planet-summit/>) (the complete text of the Press Release)]

137) Report “The IPCC Special Report of 1.5°C” [Intergovernmental Panel for Climate Change (IPCC)] (released October 8, 2018 in Incheon, Republic of Korea)

[Introductory Note: About the “Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments” (the Executive Summary part of the report)—

“Approval’ is the process used for IPCC Summaries for Policymakers (SPMs). *Approval signifies that the material has been subject to detailed, line-by-line discussion, leading to agreement among the participating IPCC member countries, in consultation with the scientists responsible for drafting the report.* This process strengthens the SPM by ensuring that SPM statements are as direct, clear and unambiguous as possible in summarizing the material contained in the corresponding Working Group Assessment Report or Special Report. Participation of assessment authors ensures that any changes to the SPM are consistent with the underlying report and are scientifically robust.”

[From the “IPCC Factsheet: How does the IPCC approve reports?” (at https://www.ipcc.ch/site/assets/uploads/2018/02/FS_ipcc_approve.pdf) (paragraph 2)]

a) From Press Release for the “IPCC Special Report on Global Warming of 1.5°C”

“Limiting global warming to 1.5°C would require rapid, far-reaching and unprecedented changes in all aspects of society, the IPCC said in a new assessment.” (paragraph 1)

“One of the key messages that comes out very strongly from this report is that we are already seeing the consequences of 1°C of global warming through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes,’ said Panmao Zhai, Co-Chair of IPCC Working Group I.” (paragraph 6)

“Every extra bit of warming matters, especially since warming of 1.5°C or higher increases the risk associated with long-lasting or irreversible changes, such as the loss of some ecosystems,’ said Hans-Otto Pörtner, Co-Chair of IPCC Working Group II.” (paragraph 8)

“The report finds that limiting global warming to 1.5°C would require “rapid and far-reaching” transitions in land, energy, industry, buildings, transport, and cities. Global net human-caused emissions of carbon dioxide (CO2) would need to fall by about 45 percent from 2010 levels by 2030, reaching ‘net zero’ around 2050. This means that any remaining emissions would need to be balanced by removing CO2 from the air.” (paragraph 10)

“The decisions we make today are critical in ensuring a safe and sustainable world for everyone, both now and in the future, said Debra Roberts, Co-Chair of IPCC Working Group II.” (paragraph 14)

“This report gives policymakers and practitioners the information they need to make decisions that tackle climate change while considering local context and people’s needs. The next few years are probably the most important in our history,’ she said.” (paragraph 15)

“Key statistics of the Special Report on Global Warming of 1.5°C

91 authors from 44 citizenships and 40 countries of residence

– 14 Coordinating Lead Authors (CLAs)

– 60 Lead authors (LAs)

– 17 Review Editors (REs)

133 Contributing authors (CAs)

Over 6,000 cited references

A total of 42,001 expert and government review comments”

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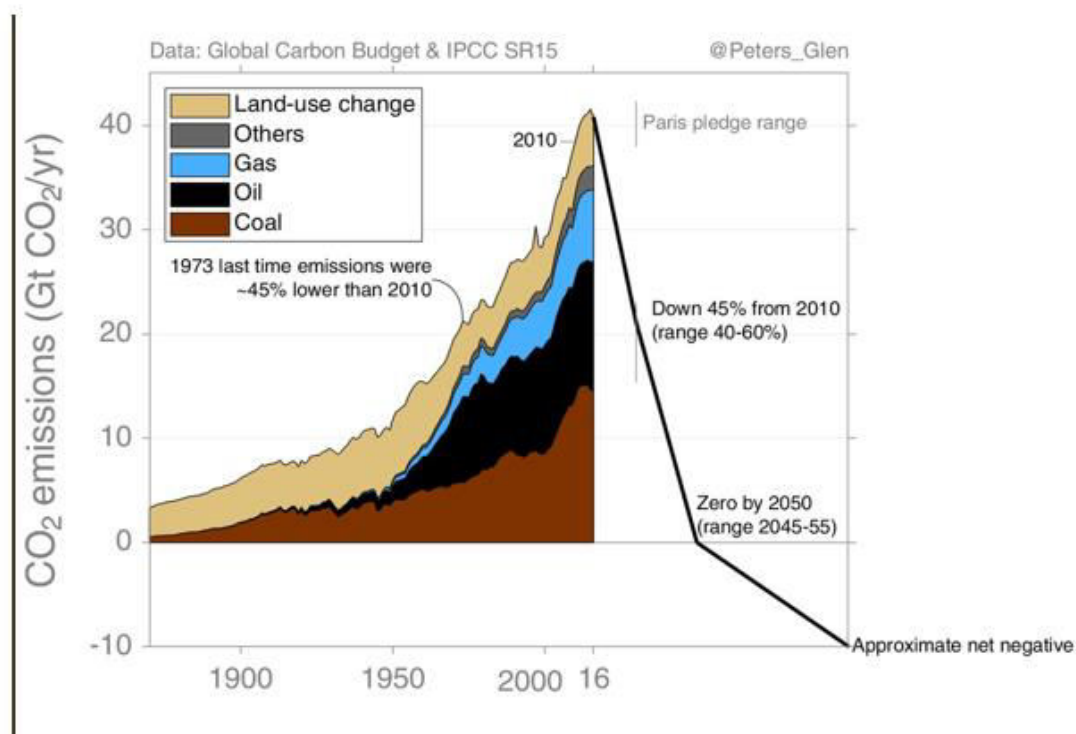
[From the Press Release for the “IPCC Special Report on Global Warming of 1.5°C” at the website of the Intergovernmental Panel for Climate Change (from webpage

<https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/> and--with same information--in Press Release pdf file (at https://www.ipcc.ch/site/assets/uploads/2018/11/pr_181008_P48_spm_en.pdf)]

b) From a tweet by Glen Peters @Peters_Glen (October 12, 2018) on the Twitter Platform (at https://twitter.com/Peters_Glen/status/1050651292178075648)

“According to #SR15, pathways with limited overshoot of 1.5°C require global net CO₂ emissions to decline by ~45% from 2010 levels by 2030 (40–60% interquartile), reaching net zero around 2050 (2045–2055 interquartile), & go negative thereafter (my estimate).”

“This is not easy...



[Note: from Glen Peters Twitter Profile: “Research Director at @CICERO_klima (Center for International Climate Research-- Oslo, Norway) on past, current, & future trends in energy use & GHG emissions.”]

c) From the Guardian article “We have 12 years to limit climate change catastrophe, warns UN”

“The world’s leading climate scientists have warned there is only a dozen years for global warming to be kept to a maximum of 1.5C, beyond which even half a degree will significantly worsen the risks of drought, floods, extreme heat and poverty for hundreds of millions of people.” (paragraph 1)

“Carbon pollution would have to be cut by 45% by 2030--compared with a 20% cut under the 2C pathway--and come down to zero by 2050, compared with 2075 for 2C.” (paragraph 16)

“Johan Rockström, a co-author of the recent ‘Hothouse Earth’ report, said scientists never previously discussed 1.5C, which was initially seen as a political concession to small island states. But he said opinion had shifted in the past few years along with growing evidence of climate instability and the approach of tipping points that might push the world off a course that could be controlled by emissions reductions.”

“‘Climate change is occurring earlier and more rapidly than expected. Even at the current level of 1C warming, it is painful,’ he told the Guardian. ‘This report is really important. It has a scientific robustness that shows 1.5C is not just a political concession. There is a growing recognition that 2C is dangerous.’” (last two paragraphs)

“Bob Ward, of the Grantham Research Institute on Climate Change, said the final document was ‘incredibly conservative’ because it did not mention the likely rise in climate-driven refugees or the danger of tipping points that could push the world on to an irreversible path of extreme warming.” (paragraph 21)

[Source: “We have 12 years to limit climate change catastrophe, warns UN” by Jonathan Watts, Global Environment Editor (October 8, 2018) at the website for the https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report?CMP=share_btn_tw]]

138) Article “90% of world's children are breathing toxic air, WHO study finds” [World Health Organization (WHO)] (October, 2018)

“Poisonous air is having a devastating impact on billions of children around the world, damaging their intelligence and leading to hundreds of thousands of deaths, according to a report from the World Health Organization.”

“The study found that more than 90% of the world’s young people--1.8 billion children--are breathing toxic air, storing up a public health time bomb for the next generation.”

“The WHO said medical experts in almost every field of children’s health are uncovering new evidence of the scale of the crisis in both rich and poor countries--from low birth weight to poor neurodevelopment, asthma to heart disease.”

“Dr Tedros Adhanom, WHO director general, said: ‘Polluted air is poisoning millions of children and ruining their lives. This is inexcusable – every child should be able to breathe clean air so they can grow and fulfil their potential.’”

“The findings coincide with the start of the first global conference on air pollution and health in Geneva, including a high-level action day at which nations and cities are expected to make new commitments to cut air pollution.”

“The WHO study found that children are particularly vulnerable to air pollution because pollutants are often more concentrated nearer to ground level. It added that their developing organs and nervous system are also more susceptible to long-term damage than those of adults.”

“‘Air pollution is stunting our children’s brains, affecting their health in more ways than we suspected,’ said Dr Maria Neira, WHO director of public health and the environment.”

“The study found that 600,000 children die from acute lower respiratory infections caused by dirty air and 93% are exposed to one of the most damaging pollutants--PM2.5. In poorer countries, 98% of all children under five are exposed to PM2.5 above WHO guidelines.”

[From article “90% of world's children are breathing toxic air, WHO study finds” by the World Health Organization (WHO) at the Guardian website (at <https://www.theguardian.com/environment/2018/oct/29/air-pollution-worlds-children-breathing-toxic-air-who-study-finds>) (paragraphs 1-8)]

139) Article “Emissions are still rising: ramp up the cuts” (Christina Figueres, et al.) (December, 2018)

“Global CO₂ emissions are projected to go up in 2018 by more than 2%. In 2017, they increased by 1.6%, having flattened out between 2014 and 2016. The reasons? The use of oil and gas keeps growing, and some countries are still using coal to fuel much of their economic growth.”

“Abating air pollution is another powerful driver of change. Globally, air pollution contributes to seven million premature deaths every year — from cardiovascular disease, ischaemic heart disease, stroke, chronic obstructive pulmonary disease and lung cancer. People are becoming less tolerant of particulate and noxious-gas emissions from coal plants, factories and cars. China has closed coal-fired power plants in and near cities and has limited diesel-engine emissions. Pollution levels in Beijing have fallen by 35% over 5 years, but still have a long way to go. India has nine of the world’s ten most polluted cities, according to the World Health Organization. The country’s target is to reduce air pollution in 100 cities by 20–30% by 2024.” (paragraph 16)

“... support for climate action remains strong in cities, regional governments and the private sector. Globally, more than 9,000 cities and municipalities from 128 countries, representing 16% of the world’s population, have reiterated their commitment to the Paris agreement through the Global Covenant of Mayors. So have 245 state and regional bodies from 42 countries, which are home to 17.5% of the global population⁶. Most US citizens live in a jurisdiction that still supports the Paris goals. If all of these US cities, states and companies stick to their emissions-reduction pledges, they could put the country within striking distance of the Paris commitment made by the Obama administration, irrespective of current federal action.” (paragraph 19)

“Boards of directors, presidents of central banks, investors and insurers are increasingly concerned about the economic risks of climate change and the threat to health, water, land and biodiversity resources worldwide. As many as 6,225 companies headquartered in 120 countries have pledged to contribute to the Paris goals⁶, representing \$36.5 trillion in revenue--more than the combined GDP of

the United States and China (see [go.nature.com/2aphgjs](https://www.nature.com/2aphgjs)). These firms understand that the agreement is likely to bring \$26 trillion in economic benefits by 2030, including 65 million jobs in the booming low-carbon economy.” (paragraph 20)

[From a “Comment” contribution titled “Emissions are still rising: ramp up the cuts” by Christina Figueres, Corinne Le Quéré, Anand Mahindra, Oliver Bäte, Gail Whiteman, Glen Peters. and Dabo Guan (December 5, 2018) at the website of Nature (at <https://www.nature.com/articles/d41586-018-07585-6>)]

140) Organization “Rapid Transition Alliance” (launched December, 2018)

a) from article “Welcoming the Rapid Transition Alliance--evidence-based hope in a warming world” (Andrew Simms) (December 3, 2018)

“As scientists call for rapid, far reaching action to prevent climate breakdown, and warn that time is running out, a new, unique international initiative--the Rapid Transition Alliance--is launching to reveal the possibilities and our hidden capacities for making good things happen quickly.”

“Our climate is changing faster than we are and the latest science says we are nearly out of time for taking meaningful action to prevent climate breakdown. We need to speed up and the Rapid Transition Alliance is launching to demonstrate why and how that is possible based on what is already known. The Alliance is a new, global initiative being coordinated by the New Weather Institute, the ESRC STEPS Centre at the Science Policy Research Unit (SPRU) and the Institute of Development Studies, and the School of Global Studies at the University of Sussex with the support of the Danish-based KR Foundation.”

“The Alliance is learning from where, when and how good things happen quickly. It has been set up to push for accelerated action at the scale and speed needed to meet the agreed 1.5 degree climate target. By gathering and sharing evidence-based hope, it aims to remove excuses for inaction, show what is possible, and find ways for people to take an active part in change. Its members range from household name environmental groups to professional bodies and international research centres.”

“Speaking at the launch in the House of Commons in London, on the first working day of the international climate talks in Poland, were:

Ed Davey MP, Member of Parliament for Kingston and Surbiton and former Secretary of State for Energy and Climate Change

Clive Lewis MP, Shadow Treasury Minister with responsibility for climate change

Amelia Womack, Deputy Leader of the Green Party

Farhana Yamin, Founder and CEO of Track 0”

“Organisations in the Alliance vary from international to highly local, from being specialised and with broad approaches, engaged in practical work, research and campaigning for change. What unites them is the belief that we must learn from each other and act urgently to maintain a habitable climate, and that our action must be at a speed and scale to match the challenge. The focus is on the importance of applying what we already know about achieving rapid transition, and the Alliance is calling on the public and any groups with relevant knowledge and experience to help add to the evidence base for hope.”

“While there’s no shortage of talk about the potential of greener technologies and long-term environmental targets, change is needed now and the Alliance will build a bigger conversation on the immediate possibilities of rapid transition and more sustainable behaviour. This will vary from stories of community action, to innovative policies and very personal, pivotal moments that allow us to see the world differently.”

[From article “Welcoming the Rapid Transition Alliance--evidence-based hope in a warming world” by Andrew Simms (December 3, 2018) at the website of the New Weather Institute (at <https://www.newweather.org/2018/12/03/welcoming-the-rapid-transition-alliance-evidence-based-hope-in-a-warming-world/>) (paragraphs 1-5, and 9)]

141) Speech “You say you love your children above all else, and yet you are stealing their future in front of their very eyes” [Greta Thunberg at COP 24 (Katowice, Poland)] (December, 2018)

[Note: COP24 is the informal name for the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).]

a) “Fifteen-year-old Swedish climate activist Greta Thunberg addressed the COP 24 U.N. plenary last night in Katowice, Poland, condemning global inaction in the face of catastrophic climate change.”

[introduction to video (above), and video (below) are from story “You Are Stealing Our Future: Greta Thunberg, 15, Condemns the World’s Inaction on Climate Change” at the website of “Democracy Now!” (at https://www.democracynow.org/2018/12/13/you_are_stealing_our_future_greta) There is also a transcript of the speech at this link.]

Greta Thunberg at COP 24 (Katowice, Poland)] (December, 2018)



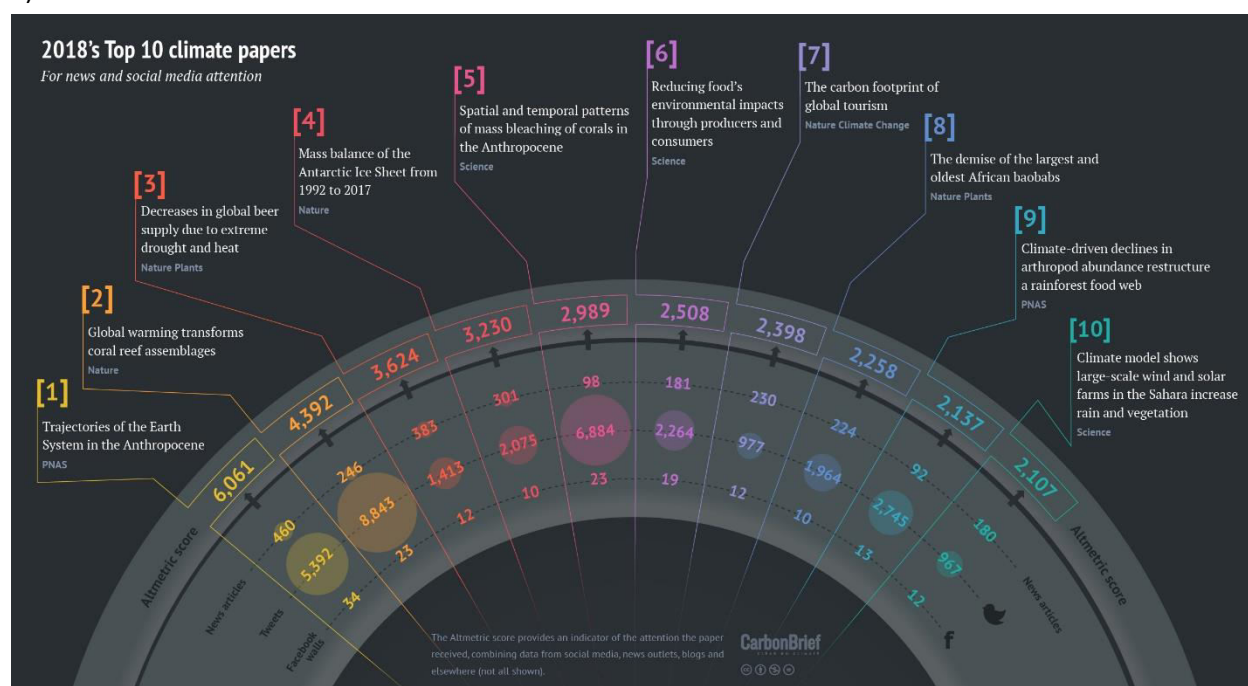
b) “In August 2018, at age 15, she (Greta Thunberg) started spending her school days outside the Swedish parliament to call for stronger action on climate change by holding up a sign reading Skolstrejk för klimatet (School strike for climate). Soon, other students engaged in similar protests in their own communities. Together, they organised a school climate strike movement under the name Fridays for Future.” (see also entry #129, “School Strike for Climate”)]

[From the Wikipedia webpage for “Greta Thunberg” at the Wikipedia website (at https://en.wikipedia.org/wiki/Greta_Thunberg) (in the section “Activism”, paragraph 1)]

c) “Greta Thunberg’s speeches--a timeline summary” is accessible at <https://www.environmentshow.com/greta-thunberg-speeches/>]

142) Article “Analysis: The climate papers most featured in the media in 2018” (Robert McSweeney) (January, 2019)

a)



b) “The highest-ranked climate research paper is ‘Trajectories of the Earth System in the Anthropocene’, published in Proceedings of the National Academy of Sciences (‘PNAS’) and led by Prof Will Steffen of the Stockholm Resilience Centre and Australian National University. It accrued an Altmetric score of 6,061.”

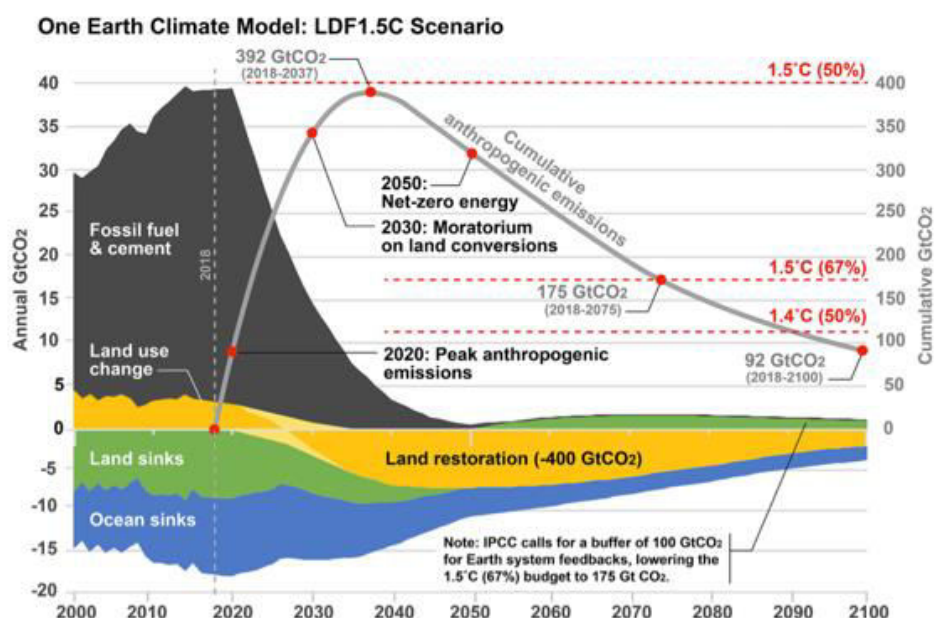
“Widely referred to as the ‘Hothouse Earth’ paper, the study explored the self-reinforcing ‘feedback loops’ that could magnify how the Earth warms in response to rising greenhouse gas concentrations. These feedbacks could push the Earth’s climate beyond a ‘planetary threshold’, the paper suggests, which – if crossed – could ‘lock in a continuing rapid pathway toward much hotter conditions’.”

“The paper was the fifth most talked-about of all journal papers published last year. It was the subject of 460 news stories in 326 outlets, including the Guardian, BBC News, Sky News, New Scientist, Al Jazeera and the Sydney Morning Herald. Links to the paper were also included in 5,392 tweets and 34 Facebook posts.”

[From article “Analysis: The climate papers most featured in the media in 2018” (by Robert McSweeney) (January 8, 2019) at the website Climate Brief (at <https://www.carbonbrief.org/analysis-climate-papers-most-featured-in-media-2018>) (paragraphs 7, 8, and 9)]

143) Article “State-of-the-Art Climate Model funded by the Leonardo DiCaprio Foundation shows how we can solve the Global Climate Crisis” (University of Technology, Sydney) (January, 2019)

a)



[From the “One Earth Climate Model” news story, in the “Climate News” section (a section no longer in the navigation menu) of the “Before the Flood” website (at <https://www.beforetheflood.com/news/one-earth-climate-model/>) (first graph)]

b) “Now, after two years of research and modeling by leading scientists at the University of Technology Sydney, the German Aerospace Center, and the University of Melbourne, a groundbreaking new framework offers a feasible roadmap for achieving--and surpassing--the targets set by the 2016 Paris Climate Agreement. This research effort was funded by the Leonardo DiCaprio Foundation as part of its new One Earth initiative.”

“The research produces the most detailed energy model to date, with 72 regional energy grids modeled in hourly increments through 2050, along with a comprehensive assessment of available renewable resources like wind and solar - and configurations for meeting projected energy demand and storage most efficiently for all sectors over the next 30 years.”

“Lead author Dr. Sven Teske, Research Director at the University of Technology Sydney's Institute for Sustainable Futures, said: ‘Scientists cannot fully predict the future, but advanced modeling allows us to map out the best scenarios for creating a global energy system fit for the 21st century - and with momentum around the Paris Agreement lagging, it's crucial that decision makers around the world can see that we can, in fact, meet global energy demand at a lower cost with clean renewables’.”

“While climate scientists have created hundreds of models to help policymakers understand the impacts of climate change and how to mitigate them, nearly all of these models have relied upon negative emissions technologies, which are expensive and not proven to work at scale. This model is the first to

achieve the required negative emissions through natural climate solutions, including the restoration of degraded forests and other lands, along with a transition to 100% renewable energy by mid-century.”

“Malte Meinshausen, Founding Director of the Climate and Energy College at the University of Melbourne and Potsdam Institute Fellow, said: ‘Citing a growing body of research, we show that using land restoration efforts to meet negative emissions requirements, along with a transition to 100% renewable energy by 2050, gives the world a good chance of staying below the 1.5°C target’.”

“A transition to 100% renewables and the implementation of natural climate solutions offer additional benefits beyond keeping the climate system in check. The energy transition will be able to recycle our natural gas infrastructure and create millions of permanent jobs. Natural climate solutions could also dramatically increase sustainable livelihoods in the developing world, offering better water security and reduced soil erosion.”

“Justin Winters, Executive Director of the Leonardo DiCaprio Foundation, said: ‘Nature is the key to solving the climate crisis. Currently our wildlands and oceans absorb one-half of all CO₂ emissions. While the renewable energy transition is imperative to solving the climate crisis, it isn't enough. As this climate model shows, in order to keep the global temperature rise to no more than 1.5°C, we have to keep our natural carbon sinks intact, scale up restoration efforts and shift to regenerative agriculture’.”

“The proposed energy transition outlined in the climate model is estimated to cost approximately \$1.7 trillion per year. This sounds like a lot, but it pales in comparison to the vast subsidies that governments currently provide to prop up the polluting fossil fuels largely responsible for climate change, estimated at more than \$5 trillion a year - \$10 million a minute, every day, [according to the IMF](#). The research tells us that we could be creating the clean energy future we so desperately need for one-third of the cost.”

[From article “State-of-the-Art Climate Model funded by the Leonardo DiCaprio Foundation shows how we can solve the Global Climate Crisis” (University of Technology, Sydney) (January 21, 2019) at the website for Cision PR Newswire (at <https://www.prnewswire.com/news-releases/state-of-the-art-climate-model-funded-by-the-leonardo-dicaprio-foundation-shows-how-we-can-solve-the-global-climate-crisis-300781304.html>) (paragraphs 2-9)]

144) Speech “Our House Is On Fire” [Greta Thunberg (at the World Economic Forum)] (January, 2019)

a) “On 25 January Thunberg gave a speech at the World Economic Forum in Davos. She warned the global leaders that “I don't want you to be hopeful. I want you to panic. I want you to feel the fear I feel every day. And then I want you to act. I want you to act as you would in a crisis. I want you to act as if the house was on fire--because it is.”

[From the Wikipedia webpage for “Speeches of Greta Thunberg” at the Wikipedia website (at https://en.wikipedia.org/wiki/Speeches_of_Greta_Thunberg) (in section “January 2019: World Economic Forum”, paragraph 1)]

b) [Transcript for the speech, and video clip (below) are accessible at the article 'Our house is on fire': Greta Thunberg” (January 25, 2019) at the Guardian website (at <https://www.theguardian.com/environment/2019/jan/25/our-house-is-on-fire-greta-thunberg16-urges-leaders-to-act-on-climate>)]



145) Book “The Uninhabitable Earth” (David Wallace-Wells) (February, 2019)

a) “It’s is worse, much worse, than you think. The slowness of climate change is a fairy tale, perhaps as pernicious as the one that says it isn’t happening at all, and comes to us bundled with several others in an anthology of comforting delusions: that global warming is an Arctic saga, unfolding remotely; that it is strictly a matter of sea level and coastlines, no an enveloping cries sparing no place and leaving no life undeformed; that it is a crisis of the ‘natural’ world not the human one; that those two are distinct, and that we live today somehow outside or beyond or at the very least defended against nature, no inescapably within and literally overwhelmed by it; that wealth can be a shield against the ravages of warming; that the burning of fossil fuels is the price of continued economic growth; that growth, and the technology it produces, will allow us to engineer our way out of environmental disaster; that there is any analogue to the scale or scope of this threat, in the long span of human history, that might give us confidence in staring it down.”

[From introduction/first section “Cascades” in the book “The Uninhabitable Earth” (by David Wallace-Wells) (February, 2019) at the website Amazon (at https://www.amazon.com/Uninhabitable-Earth-Life-After-Warming/dp/0525576711/ref=sr_1_1?crid=28FCBFUUXCJCV&dchild=1&keywords=the+uninhabitable+earth&qid=1604869550&s=books&prefix=The+Uninhabitable+Earth%2Caps%2C231&sr=1-1) (accessible using “Look Inside” feature) (p. 3, paragraph 1)]

b) “You already know it’s bad. You already know the weather has gone weird, the ice caps are melting, the insects are disappearing from the Earth. You already know that your children, and your children’s children, if they are reckless or brave enough to reproduce, face a vista of rising seas, vanishing coastal cities, storms, wildfires, biblical floods. As someone who reads the news and is sensitive to the general mood of the times, you have a general sense of what we’re looking at. But do you truly understand the scale of the tribulations we face? David Wallace-Wells, author of the distressingly titled The Uninhabitable Earth, is here to tell you that you do not. ‘It is,’ as he puts it in the book’s first line, ‘worse, much worse, than you think’.”

“The book is extremely effective in shaking the reader out of that complacency. Some things I did not want to learn, but learned anyway: every return flight from London to New York costs the Arctic three square metres of ice; for every half degree of warming, societies see between a 10 and 20% increase in the likelihood of armed conflict; global plastic production is expected to triple by 2050, by which point there will be more plastic than fish in the planet’s oceans....”

“For a relatively short book, *The Uninhabitable Earth* covers a great deal of cursed ground--drought, floods, wildfires, economic crises, political instability, the collapse of the myth of progress--and reading it can feel like taking a hop-on hop-off tour of the future’s sprawling hellscape. It’s not without its hopeful notes: in a sense, none of this would even be worth talking about if there were nothing we could do about it. As Wallace-Wells points out, we already have all the tools we need to avoid the worst of what is to come: ‘a carbon tax and the political apparatus to aggressively phase out dirty energy; a new approach to agricultural practices and a shift away from beef and dairy in the global diet; and public investment in green energy and carbon capture’.”

[From article “*The Uninhabitable Earth* by David Wallace-Wells review--our terrifying future” (by Mark O’Connell) (February 27, 2019) at the website for the Guardian (at <https://www.theguardian.com/books/2019/feb/27/the-uninhabitable-earth-review-david-wallace-wells>) (paragraphs 1, 4, and 9)]

146) Article “4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors” (Mengpin Ge and Johannes Friedrich) (February, 2019)

“Global annual greenhouse gas emissions have grown 41% since 1990, and they are still climbing.”

“Where are these emissions coming from, and who is responsible? WRI’s [ClimateWatch platform](#) offers comprehensive emissions data for all countries, sectors and gases. Here’s what we know about the sectors and countries driving greenhouse gas emissions globally:

The Energy Sector Produces the Most Greenhouse Gas Emissions

“Energy consumption is by far the biggest source of human-caused greenhouse gas emissions, responsible for a whopping 73% worldwide. The energy sector includes transportation, electricity and heat, buildings, manufacturing and construction, fugitive emissions and other fuel combustion.

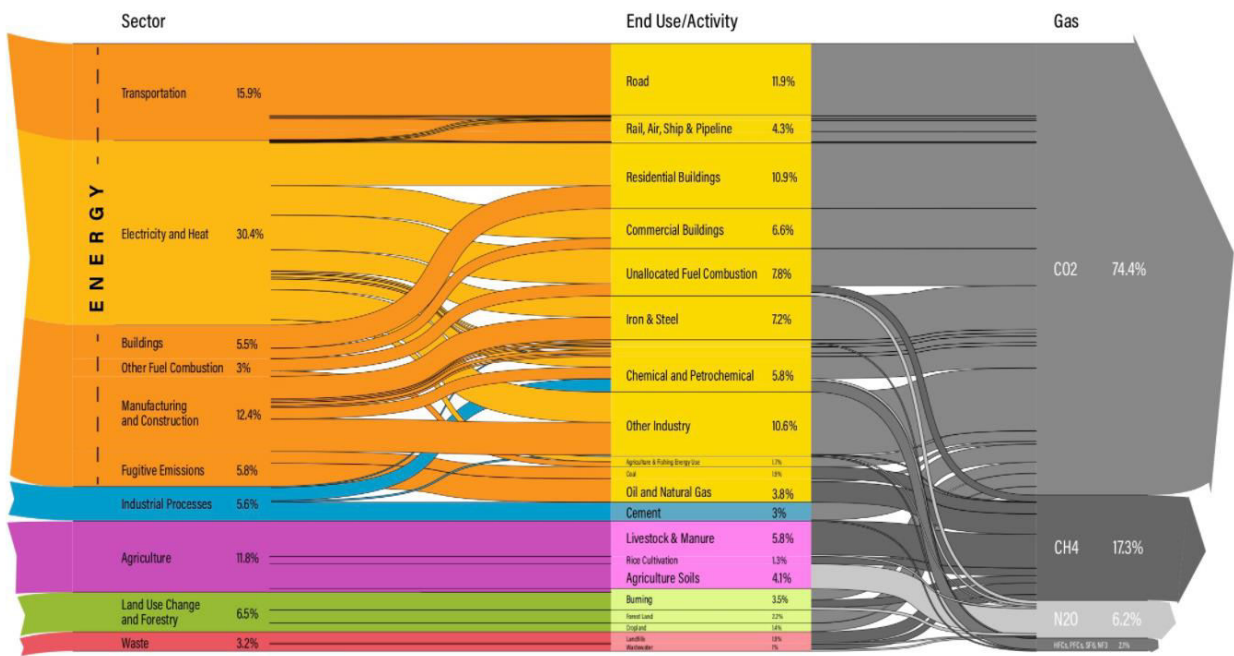
“The other top sectors that produce emissions are agriculture, such as livestock and crop cultivation (12%); land use, land-use change and forestry, such as deforestation (6.5%); industrial processes of chemicals, cement and more (5.6%); and waste, including landfills and waste water (3.2%).

“Within the energy sector, generation of heat and electricity is responsible for most emissions (15 GtCO₂e in 2016, or 30% of total greenhouse gas emissions), followed by transportation (7.9 GtCO₂e in 2016, or 15% of total emissions) and manufacturing and construction (6.1 GtCO₂e, or 12% of total emissions).

[Note: the chart below is static; however, the one offered on the source webpage for this article is interactive.]

World Greenhouse Gas Emissions in 2016

Total: 49.4 GtCO₂e



Source: Greenhouse gas emissions on Climate Watch. Available at: <https://www.climatewatchdata.org>

WORLD RESOURCES INSTITUTE

Industry and Transportation are the Fastest-growing Sources of Greenhouse Gas Emissions

“Since 1990, three sectors stand out as the fastest-growing sources of greenhouse gas emissions: Industrial processes grew by 174%, transportation (a subsector of energy) by 71%, and manufacturing and construction (also a subsector of energy) by 55%. The growth in industrial emissions stems primarily from increased use of refrigeration and air conditioning, which produce hydrofluorocarbons (HFCs), potent greenhouse gases. Increased travel by automobiles is the predominant reason transportation emissions are on the rise.



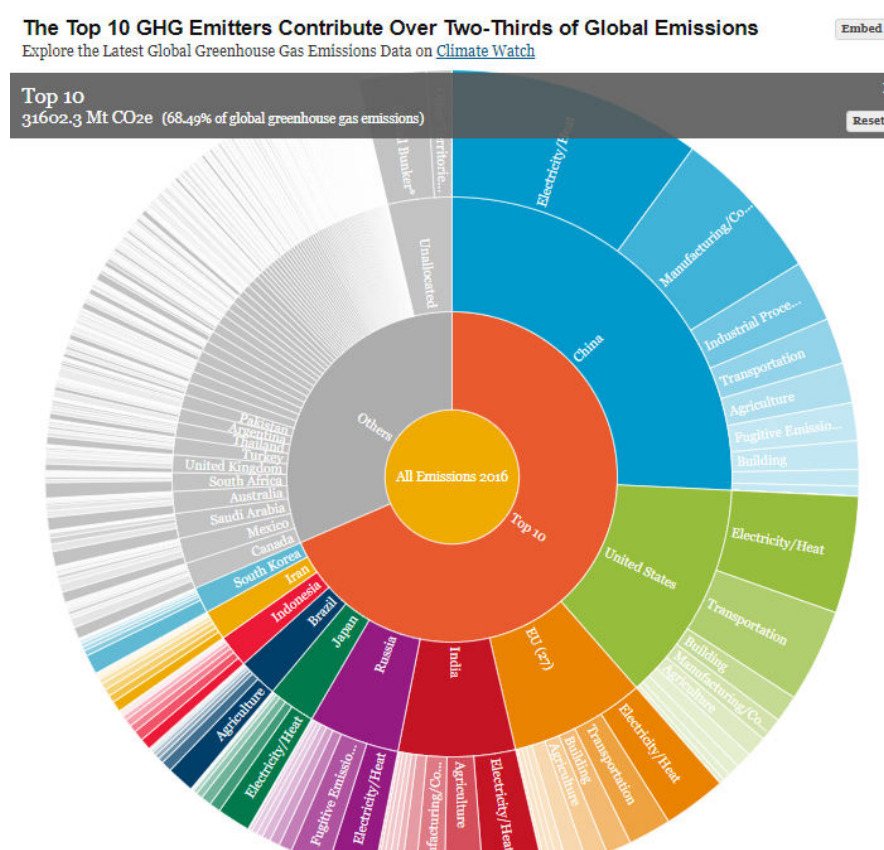
[Note: the chart above is static; however, the one offered on the source webpage for this article is interactive.]

10 Countries Produce More than 68% of Global Greenhouse Gas Emissions

“A small number of countries contribute the vast majority of greenhouse gas emissions, with the top 10 emitters accounting for over two-thirds of annual global greenhouse gas emissions. Most of them also have large populations and economies, together accounting for over 50% of the global population and almost 60% of the world’s GDP. China is the biggest emitter at 26% of global greenhouse gas emissions, followed by the United States at 13%, the European Union at 7.8% and India at 6.7%.¹

“Most of the top 10 emitters have higher emissions per person than the world average (around 6.8 tCO₂e per person). Among the top 10 total greenhouse gas emitters, Canada and the United States have the highest per capita greenhouse gas emissions at 22 tCO₂e per person and 18 tCO₂e per person, respectively, while India has the lowest at 2.4 tCO₂e per person. China’s per capita emissions (8.5 tCO₂e) now surpass those of the European Union (7.1 tCO₂e).

[Note: the chart below is static; however, the one offered on the source webpage for this article is interactive.]



Carbon Dioxide Makes Up Most, but Not All, Greenhouse Gas Emissions

Greenhouse Gas Emissions Must Be Reduced Rapidly to Avert the Climate Crisis

“The world is already facing the consequences from climate change. If we are to avoid much more dangerous and costly impacts, current levels of greenhouse gas emissions must be slashed in half by 2030 and reach net-zero by mid-century. The largest emissions sources, like the energy sector, are good places to start. But to fully tackle the climate crisis, we will need deep reductions across all sectors, big and small. Switching to renewable energy, electrifying the transportation sector, introducing more sustainable agriculture practices, curbing deforestation and forest degradation, and producing less waste are a few key ways to drive greenhouse gas emissions downward and set the world on course for a safer future.

[From article “4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors” by Mengpin Ge and Johannes Friedrich (February 6, 2019) at the World Resources Institute website (at https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector?utm_source=twitter&utm_medium=worldresources&utm_campaign=socialmedia&utm_term=e93c0580-6270-4921-afb6-07c2f0c40960) (paragraphs 1-5, Figure 1, paragraph 8, Figure 2, paragraphs 10-11, Figure 4, paragraph 15)]

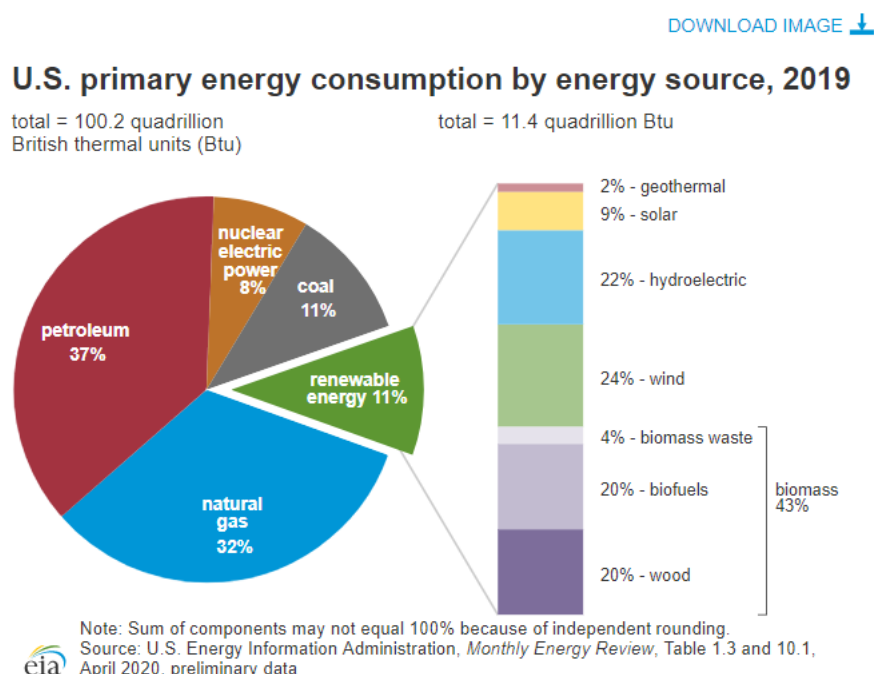
147) Report “Banking on Climate Change: Fossil Fuel Finance Report Card 2019” (Rainforest Action Network et. al.) (March, 2019)

“For the first time, this report adds up lending and underwriting from 33 global banks to the fossil fuel industry as a whole. *The findings are stark: these Canadian, Chinese, European, Japanese, and U.S. banks have financed fossil fuels with \$1.9 trillion since the Paris Agreement was adopted (2016–2018), with financing on the rise each year.* This report finds that fossil fuel financing is dominated by the big U.S. banks, with JPMorgan Chase as the world’s top funder of fossil fuels by a wide margin. In other regions, the top bankers of fossil fuels are Royal Bank of Canada in Canada, Barclays in Europe, MUFG in Japan, and Bank of China in China.

“This report also puts increased scrutiny on the banks’ support for 100 top companies that are expanding fossil fuels, given that there is no room for new fossil fuels in the world’s carbon budget. And yet banks supported these companies with \$600 billion in the last three years. JPMorgan Chase is again on top, by an even wider margin, and North American banks emerge as the biggest bankers of expansion as well.”

[From “Banking on Climate Change: Fossil Fuel Finance Report Card 2019” by Rainforest Action Network et al, (March 20, 2019) at the Rainforest Action Network website (at https://www.ran.org/wp-content/uploads/2019/03/Banking_on_Climate_Change_2019_vFINAL1.pdf) (in Executive Summary; p. 3, paragraphs 2 and 3)]

148) Statistics “U.S. Primary Energy Consumption by Energy Source, 2019” [U.S. Energy Information Administration (EIA)] (2019)



[From the webpage “U.S. energy facts explained” at the website for the U.S. Energy Information Administration (EIA) (at <https://www.eia.gov/energyexplained/us-energy-facts/>)]

149) Journalism Network “Covering Climate Now” (April, 2019)

a) “Covering Climate Now is a global journalism initiative committed to more and better coverage of the defining story of our time. Organized by journalists, for journalists, CCNow was co-founded in April 2019 by the Columbia Journalism Review, and The Nation, in association with The Guardian. Our partners include more than 400 news outlets with a combined audience approaching 2 billion people, and our innovative collaborations are driving stronger climate coverage across the media. CCNow works directly with newsrooms, sharing first-class content, providing story ideas and background resources, amplifying our partners’ coverage, convening climate journalism conferences, and publishing a weekly newsletter highlighting best practices.”

b) “Covering Climate Now helps partners provide that improved coverage by:

- i) Sharing high-quality content that partners can republish or rebroadcast, for free.
- ii) Organizing intensive coverage collaborations among CCNow partners around specific themes or newsmaking events. During these weeks, content sharing and social media campaigns help amplify the reach and impact of all partners’ coverage.
- iii) Providing concise, authoritative background resources, story ideas, and other tools to facilitate clear, fact-based journalism. Whether our fellow journalists are crashing a daily deadline, preparing a longer enterprise piece, or something in between, CCNow helps them sharpen their reporting.
- iv) Convening professional conferences that bring journalists together to hear from and question climate experts, discuss and share best practices, and talk shop about how to get this story right.
- v) Highlighting CCNow partners’ best climate coverage on our website and social media channels, both as an example and to increase its visibility and impact.”

c) “Below is a sampling of media coverage about Covering Climate Now.

--September 22, 2020 - [Media must put the existential threat of climate change front and center](#) - *The Washington Post*

--August 22, 2020 - [13 Must-Read Climate Change Reports for 2020](#) – EcoWatch

--July 23, 2020 - [The climate story won’t wait till the pandemic is done with us](#) - Columbia Journalism Review

--April 22, 2020 - [NBC News Joins Climate Coverage Initiative](#) - Multichannel News

--April 19, 2020 - [The Guardian joins forces with hundreds of newsrooms to promote climate solutions](#) - *The Guardian*

--April 10, 2020 - [Reuters to provide free climate change coverage to Covering Climate Now organization ahead of Earth Day](#) – Reuters

--February 27, 2020 - [How broadcast TV networks covered climate change in 2019](#) - Media Matters”

[From the website of “Covering Climate Now” a) from the “About” webpage (at <https://www.coveringclimatenow.org/about>) (paragraph 1) b) in the “About” section (at <https://www.coveringclimatenow.org/about>) (paragraph 7) c) from the “In The News” webpage (at <https://www.coveringclimatenow.org/media>) (first seven entries)]

150) Paper “A Global Deal For Nature: Guiding principles, milestones, and targets” (Eric Dinerstein et. al.) (April, 2019)

a) From article “Half of all land must be kept in a natural state to protect Earth....” (by Stephen Leahy) in National Geographic (April, 2019)

“Countries should double their protected zones to 30 percent of the Earth’s land area, and add 20 percent more as climate stabilization areas, for a total of 50 percent of all land kept in a natural state, scientists conclude.”

(“Notably, these are not meant to be ‘no go’ areas, but rather areas protected from resource extraction and land conversion. Sustainable uses would be permitted in all but the most sensitive areas.”)

“The benefits of protecting 50 percent of nature by 2030 are tremendous,” says Eric Dinerstein, director of biodiversity and wildlife solutions at [RESOLVE](#), a non-profit group, and lead author of a new paper published Friday in *Science Advances* titled “[A Global Deal For Nature: Guiding principles, milestones, and targets.](#)”

“All of this needs to be done by 2030 to have a real hope of keeping climate change under the “danger zone” target of 2.7 degrees Fahrenheit (1.5 degrees Celsius) and to prevent the world’s ecosystems from unravelling—according to an ambitious plan called the Global Deal for Nature.”

[From article “Half of all land must be kept in a natural state to protect Earth: New science says land conservation must double by 2030 to prevent dangerous warming and unravelling of ecosystems” by Stephen Leahy (April 19, 2019) at the website of National Geographic (at <https://www.nationalgeographic.com/environment/2019/04/science-study-outlines-30-percent-conservation-2030/>)]

b) From paper “A Global Deal For Nature: Guiding principles, milestones, and targets” (Eric Dinerstein et. al.) in *Science Advances* (April 19, 2019)

i) “The Global Deal for Nature (GDN) is a time-bound, science-driven plan to save the diversity and abundance of life on Earth.... The GDN targets 30% of Earth to be formally protected and an additional 20% designated as climate stabilization areas, by 2030, to stay below 1.5°C. We highlight the 67% of terrestrial ecoregions that can meet 30% protection, thereby reducing extinction threats and carbon emissions from natural reservoirs. Freshwater and marine targets included here extend the GDN to all realms and provide a pathway to ensuring a more livable biosphere.” (in Abstract)

ii) “Because about two-thirds of all species on Earth are found in natural forests, maintaining intact forest is vital to prevent mass extinction.” (in section “Introduction”, paragraph 2)

iii) Here, we offer a policy framework based on scientific guidelines that could pair nature and climate deals, be mutually reinforcing, and recommend time-bound milestones and targets. We identify specific threats and drivers of biodiversity loss, and discuss costs of implementation of a GDN. Finally, we introduce breakthrough technologies for monitoring progress.” (in section “Introduction”, paragraph 4)

iv) “The science of conservation biology underpins the GDN and is based on five fundamental goals:

(1) represent all native ecosystem types and successional stages across their natural range of variation-- or “representation”;

- (2) maintain viable populations of all native species in natural patterns of abundance and distribution— or ‘saving species’;
- (3) maintain ecological function and ecosystem services;
- (4) maximize carbon sequestration by natural ecosystems; and
- (5) address environmental change to maintain evolutionary processes and adapt to the impacts of climate change.” (in section “Scientific Guidance for a GDN”, paragraph 1)

v) “One hundred and thirteen ecoregions (13%) have already exceeded 50% protection. Yet, these rarely include the largest ecoregions containing the vast carbon reservoirs. Thus, a critical caveat in the representation approach is that some ecoregions may need much more area under protection to sustain species and processes and avoid biospheric feedback from release of greenhouse gases after conversion (see below discussion on CSAs for Amazon, Congo Basin, Southeast Asia, boreal, and tundra). At the other end of the spectrum, species extinctions will likely be most swift and severe in the 192 Nature Imperiled ecoregions, category 4 (Fig. 1B and table S1). Thus, efforts to bring the Nature Imperiled ecoregions to a protection level of 10% emerges as a clear 2030 restoration and recovery milestone. These ecoregions constitute known centers of endemism but have only a median of 4% protected habitat and 1% remaining outside protected areas. An approach to create a “species safety net”--to ensure the representation of vanishing biota ranging from single-site endemics to intact large mammal assemblages requiring large landscapes--is presented below.” (in section “Priorities of a GDN”, in subsection “Theme 1: Protecting Biodiversity”, paragraph 6)

(Insert from another source--also in paper excerpts here are from, But that version does not have explainer underneath)

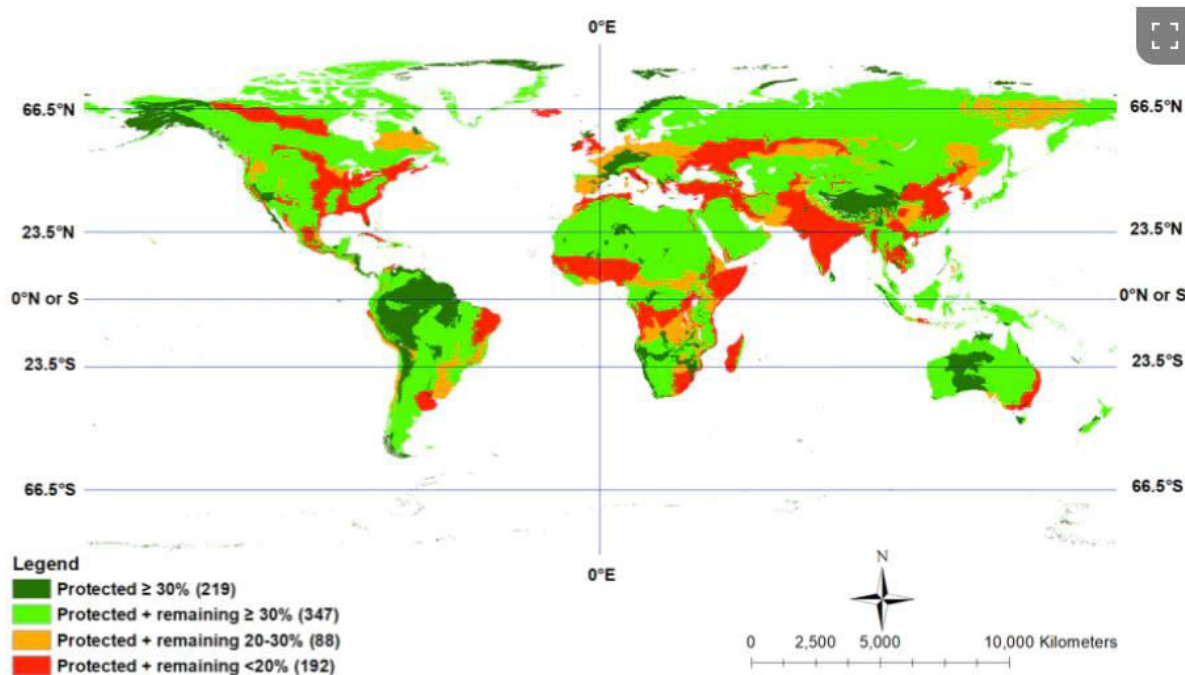


Fig 2. Level of protection of the world’s terrestrial ecoregions. The assessment shows ecoregions that have more than 30% protected already (dark green); those that have enough habitat remaining to achieve 30% or more with designation only (light green); and those regions that would require some (orange) or significant amounts of restoration (red). Note that the areas in red have an average amount of only 6% remaining habitat. Meeting a target of 10% would be a significant achievement for many of these regions.

[From the webpage/article “The Global Deal For Nature” by Carly Vynne, PhD Conservation Biologist and Strategic Partner, RESOLVE and Karl Burkart, Managing Director, One Earth at the One Earth website (at <https://www.oneearth.org/the-global-deal-for-nature/>) (Figure 2)]

vi) “The proliferation of invasive species, pollutants, and toxins is a major driver of species loss, population declines, and habitat degradation around the world. The amount of plastic making its way

into the oceans is predicted to nearly double in the next decade; allowing this to occur would unleash extremely detrimental impacts on marine species and ecosystems. Beyond plastics, widespread use of ecologically damaging toxins is causing massive declines in global pollinators, invertebrate biomass, and degradation of aquatic ecosystems. To achieve the Sustainable Development Goals (SDG) target to prevent and significantly reduce pollution, the world needs to move from our current “linear economy” (make, use, dispose) to a circular economy in which resources do not become waste but instead are recovered and regenerated at the end of each service life.” (in section “Priorities of a GDN”, in subsection “Theme 3: Reducing Major Threats”, paragraph 3)

vii) “Complex life has existed on Earth for about 550 million years, and it is now threatened with the sixth mass extinction. If we fail to change course, it will take millions of years for Earth to recover an equivalent spectrum of biodiversity. Future generations of people will live in a biologically impoverished world. Adopting a GDN and the milestones and targets presented here would better allow humanity to develop a vibrant, low-impact economy and conserve intact ecosystems, all while leaving space for nature. Linking the GDN and the Paris Agreement could solve the two major challenges facing the biosphere and all the species within it and result in a return to safe operating space for humanity.” (in “Discussion” section, paragraph 5)

[From paper “A Global Deal For Nature: Guiding principles, milestones, and targets” (Eric Dinerstein et. al.) (April 19, 2019) at the website of Science Advances [an affiliate of the American Association for the Advancement of Science (AAAS)] (at <https://advances.sciencemag.org/content/5/4/eaaw2869>)]

151) Article “A warming Arctic could cost the world trillions of dollars: New science warns that melting ice and permafrost could set off feedback loops that make climate change worse” (Stephen Leahy) (April, 2019)

“Permafrost feedback involves the frozen soils of the permafrost zone that cover nearly a quarter of the land area of the northern hemisphere. These soils, which contain enormous stores of carbon and methane, have been thawing since the 1980s. As Arctic temperatures climb, thawing permafrost releases those warming gases.”

“The Arctic is warming at least twice as fast as the global average.”

“Just last week, a new study revealed that thawing permafrost in Alaska appeared to be releasing 12 times more nitrous oxide than previously estimated. Nitrous oxide is another global warming gas but is nearly 300 times more potent at trapping heat than carbon dioxide. It also dissolves ozone in the upper atmosphere.”

[From article “A warming Arctic could cost the world trillions of dollars: New science warns that melting ice and permafrost could set off feedback loops that make climate change worse” (April 23, 2019) by Stephen Leahy, in the National Geographic online version (at <https://www.nationalgeographic.com/environment/2019/04/arctic-climate-change-feedback-loops-cost-trillions/>) (paragraphs 8, 7, and 13)]

152) Article “‘This report will change your life’: what zero emissions means for UK” (Damian Carrington, Guardian) (May, 2019)

“... cars will need a lot of electricity, meaning clean power generation must quadruple by 2050, the CCC (Committee on Climate Change) said. That certainly means more offshore windfarms, but the cheapest option--onshore windfarms--are effectively banned in England. Big storage will also be needed, but battery costs are plummeting.”

“Homes heated by natural gas will also be long gone, with the CCC saying no new home should be connected to the gas grid after 2025. Electrified heating will be more common, but hydrogen could be an alternative to natural gas, if it can be produced cleanly at scale.”

“Meat has a heavy environmental impact, but the CCC envisages only a 20% cut in beef, lamb and dairy consumption in 2050, far lower than in other studies and the 86% cut needed to meet UK health guidelines. ‘We absolutely don’t think there would be support for that [huge cut], or that it is necessary,’ said Stark. ‘A 20% cut seems cautious and prudent to us, but it is true that if you were to shift more to plant-based diets, the [net-zero] target would be easier overall.’”

“The UK landscape will also significantly change by 2050, if emissions are stopped. A fifth of all farmland--15% of land--will have been converted to tree planting and growing biofuel crops.”

“This is essential because some activities, like cattle rearing and aviation, will still emit greenhouses gases in 2050. The CCC target is for ‘net zero’, with these residual emissions cancelled out by taking carbon out of the air.”

[From the article “‘This report will change your life’: what zero emissions means for UK” (May 1, 2019) by Damian Carrington, Guardian Environment Editor (at https://www.theguardian.com/environment/2019/may/02/this-report-will-change-your-life-what-zero-emissions-means-for-uk?CMP=share_btn_tw) (paragraphs 5-9)]

153) Working Paper “Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates” (David Coady et. al. at IMF) (May, 2019)

a) “This paper updates estimates of fossil fuel subsidies, defined as fuel consumption times the gap between existing and efficient prices (i.e., prices warranted by supply costs, environmental costs, and revenue considerations), for 191 countries.”

“Globally, subsidies remained large at \$4.7 trillion (6.3 percent of global GDP) in 2015 and are projected at \$5.2 trillion (6.5 percent of GDP) in 2017.”

“The largest subsidizers in 2015 were China (\$1.4 trillion), United States (\$649 billion), Russia (\$551 billion), European Union (\$289 billion), and India (\$209 billion).”

“About three quarters of global subsidies are due to domestic factors—energy pricing reform thus remains largely in countries’ own national interest—while coal and petroleum together account for 85 percent of global subsidies.”

b) “The main findings of the paper can be summarized as follows:
--Underpricing of fossil fuels remains pervasive and substantial.

--At the global level, energy subsidies are estimated at \$4.7 trillion⁶ (6.3 percent of world GDP) in 2015 and \$5.2 trillion (6.5 percent of GDP) in 2017

--In absolute terms, China was still, by far, the largest subsidizer in 2015 (at \$1.4 trillion), followed by the United States (\$649 billion), Russia (\$551 billion), European Union (\$289 billion), and India (\$209 billion).

--By component, underpricing for local air pollution is still the largest source (48 percent in 2015), while that for global warming is similar to earlier estimates (24 percent), followed by broader environmental costs of road fuels (15 percent), undercharging for general consumption taxes (7 percent) and for supply costs (7 percent). Energy pricing reform therefore remains largely in countries own interest, given that about three quarters of the benefits are local.

--By fuel, coal remains the largest source of subsidies (44 percent), followed by petroleum (41 percent), natural gas (10 percent), and electricity output (4 percent).

--If fuel prices had been set at fully efficient levels in 2015, estimated global CO₂ emissions would have been 28 percent lower, fossil fuel air pollution deaths 46 percent lower, tax revenues higher by 3.8 percent of global GDP, and net economic benefits (environmental benefits less economic costs) would have amounted to 1.7 percent of global GDP.”

c) “It is helpful to distinguish two different notions of fossil fuel subsidies. One is a narrow measure, termed pre-tax subsidies, reflecting differences between the amount consumers actually pay for fuel use and the corresponding opportunity cost of supplying the fuel. In contrast, a broader measure, termed post-tax subsidies, reflects differences between actual consumer fuel prices and how much consumers would pay if prices fully reflected supply costs plus the taxes needed to reflect environmental costs and revenue requirements.¹² The post-tax measure therefore corresponds to the definition of subsidies used in this paper, although the international debate (e.g., at the 2009 G20 meeting in Pittsburg) typically focuses on the narrower notion of pre-tax subsidies. Where prices exceed supply costs or efficient prices, then pre-tax and post-tax subsidies respectively are counted here as zero (rather than negative), given our focus on underpricing.”

“The discussion (in this paper) is primarily about consumer price distortions, but producer subsidies also arise when firms receive direct or indirect support (e.g., prices above supply costs, preferential tax treatment, direct government budget transfers, or paying input prices below supply costs) that is not passed forward to lower consumer prices (OECD, 2018). Producer subsidies are included in pre-tax subsidies below, but they are relatively small.”

[From the working paper “Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates” by David Coady et. al. (May 2, 2019) at the website of the International Monetary Fund [at <https://www.imf.org/en/Publications/WP/Issues/2019/05/02/Global-Fossil-Fuel-Subsidies-Remain-Large-An-Update-Based-on-Country-Level-Estimates-46509> (Working Paper No. 19/89), where the article can be downloaded (downloaded article is where the excerpts were derived) (a) from the “Abstract” on p. 2; b) from the main findings summary on p. 5-6; c) from the subsection “Definitions of Fossil Fuel Subsidies” on p. 7-8, paragraphs 1-2)]

154) Appendix 7 (excerpt) in Paper “Brainstorming 100% Reduction in GHG Emissions ASAP Campaign” (Stefan Pasti) (June, 2019)

“Human Morality is not a Constant...

“It should be clear to most readers that the virtuous conduct (the discipline, restraint, wisdom, understanding, compassion, forgiveness, etc.) necessary--to transform examples of cultures of violence, greed, corruption, and overindulgence into examples of the treasured wisdom of our human heritage

being more fully appreciated, and applied in the everyday circumstances of community life--would inspire “waves” of additional goodwill.

“And yet... if readers carefully explore the following 14 critical challenge assessments and solution guides (which are offered here as representative and well-known examples from the past 50 years)--

“The Limits to Growth” report (1972; updated 2004) (and “2052 - A Global Forecast for the Next Forty Years”, published in 2012 by one of the original authors)
“Gaia: An Atlas of Planetary Management” (1984; updated 2005)
Worldwatch Institute—annual “State of the World” Reports, and “Worldwatch Reports” (formerly “Worldwatch Papers”)
UN-Habitat (United Nations Human Settlement Programme)—“State of the World’s Cities” Reports, and (formerly annual) “Global Reports on Human Settlements”
UNEP (United Nations Environment Programme)—annual “Human Development” Reports
United Nations—Millennium Development Goals (MDGs) Progress Reports, and Sustainable Development Goals (SDGs) Updates
IPCC (Intergovernmental Panel on Climate Change)—ongoing reports
International Monetary Fund—bi-annual “World Economic Outlook” Reports
World Bank—“World Development Reports”
World Economic Forum—annual “Outlook on the Global Agenda” Reports
International Energy Agency—annual “World Energy Outlook” Reports
Earth Policy Institute—including “Plan B 4.0: Mobilizing to Save Civilization”, “World on the Edge: How to Prevent Environmental and Economic Collapse”, “Full Planet, Empty Plates: The New Geopolitics of Food Scarcity”
“Pathways to Deep Decarbonization” [Published by Sustainable Development Solutions Network (SDSN) and Institute for Sustainable Development and International Relations (IDDRI), September 2014 (and presented at the United Nations Climate Summit on September 23, 2014)]

“--they will find that these critical challenge assessments and solution guides do not give serious attention to variations in human morality as a significant factor affecting the nature of the challenges of our times... *even now (in the above annual reports), when we are in uncharted territory, in need of the most unprecedented cultural transformation in the history of life Planet Earth, and living the most complex cultural landscapes ever created.*”

[From Appendix 7 “Human Morality is not a Constant....” in the paper “Brainstorming 100% Reduction in GHG Emissions ASAP Campaign” (June, 2019) by this writer (Stefan Pasti) at the website of The Community Peacebuilding and Cultural Sustainability (CPCS) Initiative (at <https://nebula.wsimg.com/d9408ae2876dc55554bdd974c2e1667b?AccessKeyId=238D35F9602A8D5BA6F3&disposition=0&alloworigin=1>)]

155) Flooding in Mid-West United States (late May, 2019 continuing to November, 2019)

a) Article “The Fields are Washing Away: Midwest Flooding is Wreaking Havoc on Farmers” (Emily Moon) (June, 2019)

“It’s a common story across the Midwest and Great Plains, where the Missouri and Mississippi River basins are still recovering from a catastrophic deluge: Since March, record flooding in the central United States has caused historic crop delays.”

“On Monday, the U.S. Department of Agriculture's National Agricultural Statistics service estimated that farmers had planted just 67 percent of the acreage planned for corn. This time last year, they were at 96 percent. ‘That translates to almost 40 million acres of corn not planted,’ says Michael Nepveux, an

economist for the American Farm Bureau Federation, the country's largest agriculture lobbying group. 'When you think about where we are in terms of the planting season, that's astronomical.'

[From the article "The Fields are Washing Away: Midwest Flooding is Wreaking Havoc on Farmers Subtitled: "Historic flooding this year is setting back planting season. Climate change will force farmers to adjust to similarly brutal weather events in the future" by Emily Moon (June 6, 2019) at the Pacific Standard website (see <https://psmag.com/environment/the-fields-are-washing-away-midwest-flooding-is-wreaking-havoc-on-farmers>.)]

b) Wikipedia webpage "2019 Midwestern U.S. Floods"

"On March 18, Nebraska governor Pete Ricketts declared a state of emergency and stated that the floods caused '[t]he most extensive damage our state has ever experienced.'"

"Flood damage in Nebraska has been estimated at over \$1.3 billion, including '\$449 million in damage to roads, levees and other infrastructure.' Twenty seven bridges were damaged."

"Agricultural damages included '\$440 million in crop losses; and \$400 million in cattle losses.'"

[From the Wikipedia webpage "2019 Midwestern U.S. Floods" (at https://en.wikipedia.org/wiki/2019_Midwestern_U.S._floods) (in section "Nebraska", paragraphs 5-7)]

156) Report "Renewables 2019 Global Status Report" (REN21) (June, 2019)

"Between the adoption of the Paris Agreement in 2016 and the end of 2018, cumulative bank finance for fossil fuels amounted to USD 1.9 trillion. (And) Global *subsidies* for fossil fuel consumption reached an estimated USD 300 billion in 2017, an 11% increase from the USD 270 billion the year before, and about double the estimated support for renewable power generation. In addition, one estimate places the true cost of fossil fuels at upwards of USD 5.2 trillion⁷⁵

[from "End Notes" #75: These estimates are of fossil fuel subsidies using the so-called price-gap (IEA), approach to estimate consumption subsidies, defined as the difference between the average end-use prices actually paid by consumers for the fuel and the reference prices that correspond to the full cost of supply. A similar estimate comes from the so-called pre-tax approach (IMF), defined as the difference between the end-use prices paid by consumers and the corresponding opportunity cost of supplying the fuel. The estimates do not include subsidies for fossil fuel production.]

.... While at least 40 countries have undertaken some level of fossil fuel subsidy reform since 2015, fossil fuel subsidies remained in place in at least 115 countries in 2017, with at least 73 countries providing subsidies of more than USD 100 million each (See Figure 5)."

[From report "Renewables 2019 Global Status Report" by REN21 (June, 2019) from the REN21 website (at <https://www.ren21.net/gsr-2019/>) or directly from the pdf file https://www.ren21.net/wp-content/uploads/2019/05/gsr_2019_full_report_en.pdf) (p. 34, paragraph 2)]

(Beginning a multi-year section: Plastic Pollution--A Cautionary Tale)

157) Plastic Pollution--A Cautionary Tale

a) "More than 8 million tons of it ends up in the ocean every year. If we continue to pollute at this rate, there will be more plastic than fish in the ocean by 2050."

"By analyzing the waste found in the rivers and surrounding landscape, researchers were able to estimate that just 10 river systems carry 90% of the plastic that ends up in the ocean. Eight of them are in Asia: the Yangtze; Indus; Yellow; Hai He; Ganges; Pearl; Amur; Mekong; and two in Africa--the Nile and the Niger."

From article "90% of plastic polluting our oceans comes from just 10 rivers" by Alex Gray (June 8, 2018) at the website of the World Economic Forum (at <https://www.weforum.org/agenda/2018/06/90-of-plastic-polluting-our-oceans-comes-from-just-10-rivers/>) (paragraphs 2, 5, and 6)]

b) "When exposed to sunlight, oxygen or the action of waves, it doesn't biodegrade but simply fragments into smaller and smaller bits, until microscopic or nano-sized particles enter the food chain, the air, the soil and the water we drink.... In the past few years, minute microplastics and fibres, measuring the width of a human hair or far less, have been found in an extraordinary range of products, such as honey and sugar, shellfish, bottled and tap water, beer, processed foods, table salt and soft drinks."

"In one study, 95% of all adults tested in the US had known carcinogenic chemical bisphenol A in their urine. In another, 83% of samples of tap water tested in seven countries were found to contain plastic microfibrils. A study published last week revealed plastics contamination in more than 90% of bottled-water samples, which were from 11 different brands. And earlier this year the River Tame in Manchester was found to have 517,000 particles of plastic per cubic metre of sediment--that's nearly double the highest concentration ever measured across the world."

[From article "The plastics crisis is more urgent than you know. Recycling bottles won't fix it" by John Vidal (March 28, 2018) at the Guardian website (at https://www.theguardian.com/commentisfree/2018/mar/28/plastic-crisis-urgent-recycling-bottles-no-fix?CMP=share_btn_tw) (paragraphs 5-7)]

c) "... the park's conservation academy found about 5.9kg (13lbs) of plastic waste in the animal's stomach (115 plastic cups, four plastic bottles, 25 plastic bags, two flip-flops, a nylon sack and more than 1,000 other assorted pieces of plastic)."

[From article "Indonesia: dead whale had 1,000 pieces of plastic in stomach" by the Associated Press in Jakarta (November 20, 2018) at the Guardian website (at <https://www.theguardian.com/environment/2018/nov/20/indonesia-dead-whale-had-1000-pieces-of-plastic-in-stomach>) (paragraph 3)]

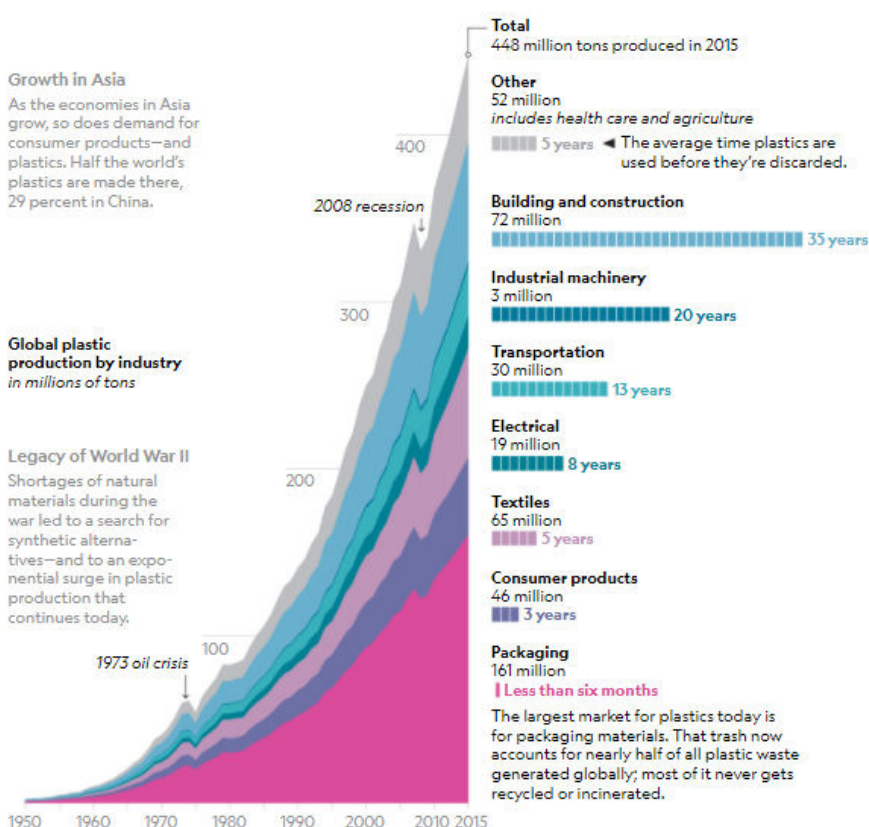
d) "... 9.2 billion tons of the stuff to deal with (and) more than 6.9 billion tons have become waste, And of that waste, a staggering 6.3 billion tons never made it to a recycling bin--a figure that stunned the scientists who crunched the numbers in 2017."

Meanwhile, ocean plastic is estimated to kill millions of marine animals every year. Nearly 700 species, including endangered ones, are known to have been affected by it. Some are harmed visibly—strangled by abandoned fishing nets or discarded six-pack rings. Many more are probably harmed invisibly. Marine species of all sizes, from zooplankton to whales, now eat microplastics, the bits smaller than one-fifth of an inch across."

"Six decades later, roughly 40 percent of the now more than 448 million tons of plastic produced every year is disposable, much of it used as packaging intended to be discarded within minutes after purchase. Production has grown at such a breakneck pace that virtually half the plastic ever manufactured has been made in the past 15 years. Last year the Coca-Cola Company, perhaps the world's largest producer of plastic bottles, acknowledged for the first time just how many it makes: 128 billion a year. Nestlé, PepsiCo, and others also churn out torrents of bottles."

A LIFETIME OF PLASTIC

The first plastics made from fossil fuels are just over a century old. They came into widespread use after World War II and are found today in everything from cars to medical devices to food packaging. Their useful lifetime varies. Once disposed of, they break down into smaller fragments that linger for centuries.



JASON TREAT AND RYAN WILLIAMS, NGM STAFF
SOURCE: ROLAND GEYER, UNIVERSITY OF CALIFORNIA, SANTA BARBARA

From article "We made plastic. We depend on it. Now we're drowning in it" by Laura Parker (June, 2018) at the website of National Geographic (at <https://www.nationalgeographic.com/magazine/2018/06/plastic-planet-waste-pollution-trash-crisis/>) (paragraphs 4, 6, 24, and graphic "A Lifetime of Plastic")]

158) Article “Himalayan glaciers melting at alarming rate, spy satellites show” (Stephen Leahy) (June, 2019)

“Our study reveals a robust signal of glacier ice loss linked to rising temperatures from climate change,’ Maurer says. As much as quarter of the region’s ice has been lost over the last 40 years, he estimated.”

“That’s double the amount of melting that took place from 1975 to 2000, revealing that the ice loss is accelerating with rising temperatures. It’s also threatening water supplies for hundreds of millions of people downstream across much of Asia.”

“Temperatures in the region have risen one degree Celsius (1.8 degrees Fahrenheit) higher than those from 1975 to 2000, according to temperature data collected from ground stations. Researchers calculated the amount of melting likely to result from warmer temperatures to confirm that one degree was indeed enough to produce such a massive loss of glacier ice.”

“‘A one degree C increase is a huge change,’ says co-author Joerg Schaefer, a professor at Columbia University’s Lamont-Doherty Earth Observatory. *‘In the middle of the last ice age the mean annual temperature was only 3 degrees C cooler,’ he says.*”

[From article “Himalayan glaciers melting at alarming rate, spy satellites show: Hotter temperatures have melted as much as a quarter of Himalayan glacial ice in the past 40 years, reveals a study of declassified spy satellite photos from the 1970s” by Stephen Leahy (June 19, 2019) in National Geographic (at <https://www.nationalgeographic.com/environment/2019/06/himalayan-glaciers-melting-alarming-rate-spy-satellites-show/>) (paragraphs 4, 2, 5, and 6)]

159) Article “Vatican Calls for Catholics to Divest from Fossil Fuels: Church urges its 1.2 billion members to invest in renewable energy and to monitor mining activities” (June, 2019)

“The Vatican is calling on the world’s 1.2 billion Catholics to divest from fossil fuels, and it’s urging the reform of fossil fuel subsidies and the taxation of CO2 emissions.”

“The decree came in a 225-page encyclical from the Vatican called ‘Journeying for the Care of the Common Home,’ which was sent to all bishops within the church and sets guidelines for Catholic dioceses, parishes, missions, and movements around the world. It also encouraged monitoring sectors such as mining to make sure they are not damaging the environment.”

“The document calls for Catholics to reduce pollution, de-carbonize the energy and economic sectors, and invest in ‘clean and renewable’ energy, which it said should be accessible to everyone. The document also emphasizes the need to promote a ‘circular economy’ that does not over-exploit productive resources so they can be reused.”

“The Vatican suggests steps to take in order to reach the goals of the encyclical, which supports agreements to contain global warming and warned against the dangers of climate change.”

“The release of the document marked the fifth anniversary of Pope Francis’ encyclical ‘Laudato Si’ (Praised Be), which was intended to stimulate reflection and dialogue on social and environmental justice and to motivate Catholics to take concrete actions.”

“In Laudato Si, Pope Francis wrote that climate change represents one of the principal challenges facing humanity, and that its worst impact will probably be felt by developing countries in the coming decades.”

“‘There is an urgent need to develop policies so that, in the next few years, the emission of carbon dioxide and other highly polluting gases can be drastically reduced, for example, substituting for fossil fuels and developing sources of renewable energy,’ Pope Francis wrote in the 2015 encyclical.”

“He also wrote that ‘greater investment needs to be made in research aimed at understanding more fully the functioning of ecosystems and adequately analyzing the different variables associated with any significant modification of the environment.’”

“Last month, 42 faith institutions from 14 countries announced that they would divest from fossil fuels. The initiative was led by Operation Noah, which was established in 2004 to provide a Christian response to the climate crisis.”

“According to Operation Noah, religious communities have contributed the single greatest number of commitments. At the time of the announcement, Operation Noah said that, during the previous month, 21 Catholic organizations with \$40 billion in assets under management committed to invest in companies that align with their values by signing the Catholic Impact Investing Pledge.”

[From article “Vatican Calls for Catholics to Divest from Fossil Fuels: Church urges its 1.2 billion members to invest in renewable energy and to monitor mining activities” (June 23, 2019) at the website of Chief Investment Officer (at <https://www.ai-cio.com/news/vatican-calls-catholics-divest-fossil-fuels/>) (paragraphs 1-10)]

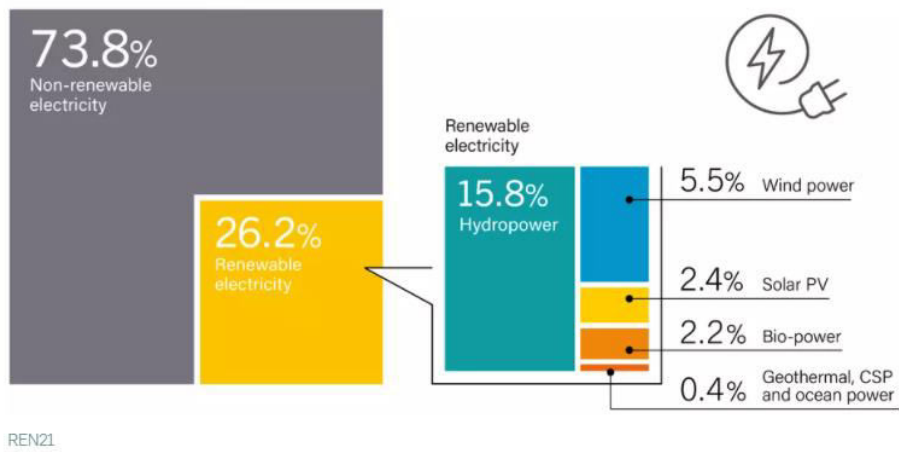
160) Article “The global transition to clean energy, explained in 12 charts” (David Roberts) (June, 2019)

a) “As you might have heard, the planet is warming up, and in response, people are trying to switch to cleaner energy, to heat it up less, or at least more slowly. So how’s that going?”

“A report released this month goes into that question in considerable detail. The “Renewables 2020 Global Status Report”, released annually by the Renewable Energy Policy Network for the 21st Century (REN21, a think tank), digs into the growth rates of various energy sources, the flows of clean energy investment, and the world’s progress on its sustainability goals.

In an effort to save you, the modern information consumer, precious time, I have gone through the report and extracted the 12 charts and graphs that best tell the story of clean energy as of 2018.

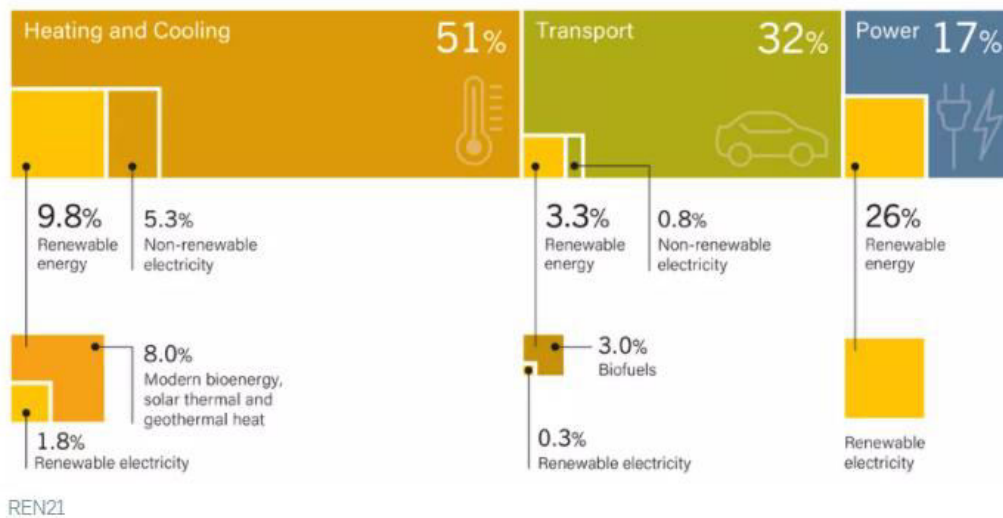
Estimated Renewable Energy Share of Global Electricity Production, End-2018



REN21

“Where renewables are 26 percent of global electricity, they represent less than 10 percent (renewable electricity less than 2 percent) of heating and cooling and just 3.3 percent (renewable electricity only 0.3 percent) of transportation energy.

Renewable Energy in Total Final Energy Consumption, by Sector, 2016



REN21

“Heating and cooling, at 51 percent of global energy use, mostly run on natural gas and oil. Transportation, at 32 percent of global energy use, mostly runs on gasoline and diesel.

“What’s worse, policy is still overbalanced toward power.

There are 169 countries, at the national or state/provincial level, that have passed renewable energy targets. Meanwhile, the report says, ‘only 47 countries had targets for renewable heating and cooling, while the number of countries with regulatory policies in the sector fell from 21 to 20.’ Fewer than a third of all countries worldwide have mandatory building codes, ‘while 60% of the total energy used in buildings in 2018 occurred in jurisdictions that lacked energy efficiency policies.’ Only about a quarter of industrial energy use is covered by industrial energy-efficiency policies.

“It’s not much better in transportation, where ‘fuel economy policies for light-duty vehicles existed in only 40 countries by year’s end and have been largely offset by trends towards larger vehicles.’

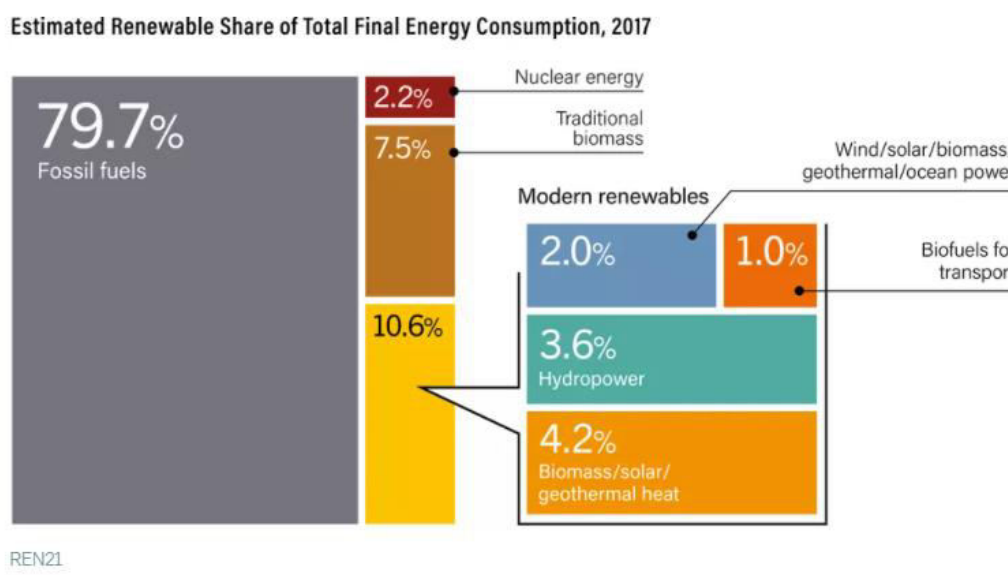
“Carbon pricing isn’t helping much either. ‘Carbon pricing remains acutely under-utilised,’ the report says. ‘By the end of 2018, only 44 national governments, 21 states/provinces and 7 cities had implemented carbon pricing policies, covering just 13% of global CO2 emissions.’

Key Insight: “This is the story in the US and in the world at large: Renewables are starting to make a dent in electricity, but they are lagging badly everywhere else.”

b) However...

“One (admittedly imperfect) way to mark the progress of renewables is to measure them against total final energy consumption (TFEC), which adds up all energy consumed worldwide.”

“As of 2017, fossil fuels were still providing about 80 percent of humanity’s energy, which is roughly what they’ve been providing for decades.”



“Why is TFEC a flawed measure? Because a huge, huge chunk of that energy consumption is waste. If you look at a [“Sankey diagram” of US energy use](#), which shows the origin and destination of all energy sources, you’ll see that fully two-thirds of the energy that enters the economy ends up “rejected,” i.e., wasted.”

“That’s because fossil fuel combustion is wasteful. Mining or drilling fossil fuels, transporting them, refining them, burning them, converting them to useful energy, using the energy, disposing of the waste and pollution--at every single stage of that process, there is loss. Burning fossil fuels, for electricity, heat, or transportation, inherently involves enormous levels of waste.”

“Renewable electricity, which will be the world’s primary energy source if it is to tackle climate change, is simpler. It involves no combustion and fewer conversions generally. Electric motors are simpler than combustion engines, with fewer moving parts, substantially lower maintenance costs, and much higher efficiency. Electrified heating and transportation sectors can be integrated into electricity grid operations, creating system efficiencies.”

“In short, economies running on renewable electricity will consume less energy because they will waste less energy.”

[From article “The global transition to clean energy, explained in 12 charts: Despite all the progress, we’re still struggling to hit the climate emergency brake” by David Roberts (June 26, 2019) at the Vox website (at <https://www.vox.com/energy-and-environment/2019/6/18/18681591/renewable-energy-china-solar-pv-jobs>) (in section 7 “But electricity is only part of energy consumption, and not the largest part”, paragraphs 1-7; in section 12 “Renewables have a long way to go and a short time to get there”, paragraphs 1-2, and 4-7--and three charts)]

161) "European Heatwave" (June-July, 2019)

a) "The June 2019 European heat wave was a period of unusually hot weather affecting southwestern to central Europe, starting in late June and resulting in the hottest June ever recorded in Europe. It resulted in record-breaking temperatures for the month of June at many locations. France experienced temperatures in excess of 45 °C (113 °F) for the first time in recorded history."

"Owing to building codes with old structures common across the country, numerous buildings in France lack air conditioning. The French Government acted more proactively for the heat wave in light of its failings during the 2003 European heat wave; 15,000 people died during that event in the country. Approximately 4,000 schools closed nationwide. Authorities in Paris opened public cooling rooms. Parks and pools extended operation hours in multiple cities. Museums with air conditioning allowed free entry for all people."

[From the Wikipedia webpage for "June 2019 European heat wave" (at https://en.wikipedia.org/wiki/June_2019_European_heat_wave) (paragraph 1; and in section "France", paragraph 1)]

b) "The July 2019 European heat wave was a period of exceptionally hot weather, setting all-time high temperature records in Belgium, Germany, Luxembourg, the Netherlands, and the United Kingdom."

"Due to high river water temperatures and sluggish flows, particularly in France and to some extent Germany, a number of thermal power stations that use once-through cooling and do not have cooling towers had to reduce output or shut down to avoid breaching environmental limits on river water temperature designed to protect aquatic life."

[From the Wikipedia webpage for "July 2019 European heat wave" (at https://en.wikipedia.org/wiki/July_2019_European_heat_wave) (paragraph 1 and 2)]

162) Article "Networks of 7,000 universities declare climate emergency" (Brendan O'Malley) (July, 2019)

"Networks representing more than 7,000 higher and further education institutions from six continents have announced that they are declaring a 'climate emergency', and agreed to undertake a three-point plan to address the crisis through their work with students."

"The three-point plan, published in an open letter on 10 July, includes:

- Committing to going carbon neutral by 2030 or 2050 at the very latest.
- Mobilising more resources for action-oriented climate change research and skills creation.
- Increasing teaching and learning about environmental and sustainability education across curricula, campus and community outreach programmes."

"The letter says: 'The young minds that are shaped by our institutions must be equipped with the knowledge, skills and capability to respond to the ever-growing challenges of climate change. We all need to work together to nurture a habitable planet for future generations and to play our part in building a greener and cleaner future for all.'"

“Organisers of the open letter, the Alliance for Sustainability Leadership in Education, known as EAUC, the United States-based higher education climate action organisation Second Nature and UN Environment’s Youth and Education Alliance, say it marks the first time further and higher education establishments have come together to make a collective commitment to address the climate emergency.”

“It is being shared with key ministers meeting in New York on 10 July at the Higher Education Sustainability Initiative Global Event.”

“In addition to the three networks organising the declaration, networks that have signed up include the Higher Education Sustainability Initiative, Global Alliance, Caribbean Youth Environment Network, Globally Responsible Leadership Initiative, US Partnership for Education for Sustainable Development, Association for the Advancement of Sustainability in Higher Education, Nordic Sustainable Campus Network, World Environmental Education Congress Network, Red Ambiental de Universidades Sostenibles, China Green University Network, Asian Sustainable Campus Network and CAS-Net Japan.”

“The Higher Education Sustainability Initiative (HESI), a partnership between United Nations departments and agencies – including UNESCO, UN Environment and the UN Global Compact’s Principles for Responsible Management Education initiative – provides a way for higher education to interface between higher education, science and policy-making across the UN.”

“HESI was created in 2012 in the run-up to the United Nations Conference on Sustainable Development (Rio+20). With commitments from over 300 universities from around the world, HESI accounted for more than one-third of all the voluntary commitments that were launched at Rio+20.”

“The HESI Global Event for higher education institutions and stakeholders is being held on 10 July to coincide with the 2019 session of the High-Level Political Forum on Sustainable Development to explore how the 2030 Agenda for Sustainable Development is changing the way higher education institutions are working and how they engage critically with the UN Sustainable Development Goals (SDGs).”

“It will explore issues such as what more universities could be offering to build the skillset and work with the public and private sectors to create more green collar jobs; whether the private sector is hiring the right kind of young talent and the right skills for sustainability and energy transformation; whether universities are doing enough to influence students to adopt sustainable lifestyles throughout their life; and what incentives matter most to universities when it comes to engaging with the 2030 Agenda and the SDGs and investing in sustainability.”

[From article “Networks of 7,000 universities declare climate emergency” by Brendan O’Malley (July 10, 2019) at the website of University World News (at <https://www.universityworldnews.com/post.php?story=20190710141435609>) (paragraphs 1-5, and in the section “Ten thousand institutions to ‘sign up’”, paragraphs 2-6)]

163) Report “The Sustainable Development Goals Report 2019” (United Nations) (July, 2019)

“As described in Goal 1, climate change is already exacerbating disaster risk. From 1998 to 2017, climate-related disasters around the world accounted for 77 per cent of the nearly \$3 trillion in direct economic losses from disasters. Over that period, climate-related and geophysical disasters claimed an estimated 1.3 million lives. The Sendai Framework for Disaster Risk Reduction 2015–2030 outlines clear

targets and priorities for action to prevent new disaster risks and reduce existing ones. Since its adoption, countries have been making efforts to develop and implement, by 2020, national and local disaster risk reduction strategies in line with the Sendai Framework. In the latest reports (2017–2018) from 70 countries, 67 had strategies that were aligned to some extent with the Sendai Framework.”

[From the report “The Sustainable Development Goals Report 2019” (United Nations) (July 19, 2019) at the “The Sustainable Development Goals Report 2019” webpage of UNiLibrary (at https://www.un-ilibrary.org/economic-and-social-development/the-sustainable-development-goals-report-2019_55eb9109-en for access through Table of Contents, in Climate Action section, p. 48; or for whole report, see <https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf> and p. 48)]

164) Article “Greenland Is Melting Away Before Our Eyes” (Eric Holthaus) (July, 2019)

“Amid an ongoing heat wave, new data show the Greenland ice sheet is in the middle of its biggest melt season in recorded history.”

“In the 1980s, wintertime snows in Greenland roughly balanced summertime melt from the ice sheet, and the conventional wisdom among scientists was that it might take thousands of years for the ice to completely melt under pressure from global warming.”

“With a decade or two of hindsight, scientists now believe Greenland passed an important tipping point around 2003, and since then its melt rate has more than quadrupled.”

“This week alone, Greenland will lose about 50 billion tons of ice, enough for a permanent rise in global sea levels by about 0.1mm. So far in July, the Greenland ice sheet has lost 160 billion tons of ice — enough to cover Florida in about six feet of water.”

“Altogether, the Greenland ice sheet contains enough ice to raise global sea levels by about 24 feet.”

(In addition), “Unusual wildfires across Siberia, Scandinavia, Alaska, and Greenland have been raging all summer, and by one estimate released about 50 million tons of carbon dioxide in the month of June alone--equivalent to the annual emissions of Sweden.”

[From article “Greenland Is Melting Away Before Our Eyes” by Eric Holthaus (July 31, 2019) at the Rolling Stone magazine online website (at <https://www.rollingstone.com/politics/politics-news/greenland-ice-sheet-melt-865803/>) (paragraphs 1, 8, 10, 11, 13, and 15)]

165) Article “Discrepancy in scientific authority and media visibility of climate change scientists and contrarians” (by Alexander Michael Petersen, Emmanuel M. Vincent and Anthony LeRoy Westerling) (August, 2019)

“Since the early 2000s there has been little disagreement among scientific experts over the fundamental evidence supporting the existence, origin, and societal significance of anthropogenic climate change

(CC). Yet, while an anthropogenic cause is supported by an overwhelming majority of climate change scientists (CCS), climate change contrarians (CCC) have successfully organized a strong voice within politics and science communication in the United States.”

“Here we show via direct comparison that contrarians are featured in 49% more media articles than scientists. Yet when comparing visibility in mainstream media sources only, we observe just a 1% excess visibility, which objectively demonstrates the crowding out of professional mainstream sources by the proliferation of new media sources, many of which contribute to the production and consumption of climate change disinformation at scale.”

“Susceptibility to information manipulation may continue to be a serious problem until society fully adapts to managing the sheer range and volume of new media sources.”

[From article “Discrepancy in scientific authority and media visibility of climate change scientists and contrarians” by Alexander Michael Petersen, Emmanuel M. Vincent and Anthony LeRoy Westerling (August 13, 2019) at the Nature Communications website (at <https://www.nature.com/articles/s41467-019-09959-4>) (paragraphs 2, 1, and 4)]

166) Report “Zero Carbon Britain: Rising to the Climate Emergency” [Zero Carbon Britain [a project of the Centre for Alternative Technology (Wales, UK)] (September, 2019)

“The big shift--

“Over recent months there has been a massive social and political recognition of the urgency of our collective situation. This has arisen not only from the science, but from the powerful voices of youth school strikes, from the actions of brave citizens taking to the streets across the globe, and from bold elected officials, councils, and parliaments declaring a climate emergency.

“At the time of writing (September, 2019), 330 local and national government bodies have declared across Britain since November, 2018: in Wales, the Welsh Parliament and 21 local councils; 261 in England; 10 in Scotland; 2 in Northern Ireland; 2 in Jersey; all the Parliaments of the Isle of Man, Jersey and Gibraltar. The current global count is 1009 jurisdictions in 19 countries (from <https://www.cedamia.org/global/>).

“There is now a massive social demand for the detailed sectoral policies which can drive the rapid actions needed to reach net zero. If policy frameworks are to be truly compliant with this evidence base, existing policies must rapidly be reviewed and new policies developed.”

[From report “Zero Carbon Britain: Rising to the Climate Emergency” by Zero Carbon Britain [a project of the Centre for Alternative Technology (Wales, UK)] (September, 2019) at the Centre for Alternative Technology website (at <https://www.cat.org.uk/info-resources/zero-carbon-britain/research-reports/zero-carbon-britain-rising-to-the-climate-emergency/>) (p. 148, paragraphs 1-3)]

167) Press Release “Landmark 'United in Science' Report Informs Climate Action Summit” (about report “United in Science” by the Science Advisory Group to the UN Secretary-General’s Climate Action Summit) (September, 2019)

“The Report provides a unified assessment of the state of our Earth system under the increasing influence of anthropogenic climate change, of humanity’s response thus far and of the far-reaching changes that science projects for our global climate in the future. The scientific data and findings presented in the report represent the very latest authoritative information on these topics,” said the Science Advisory Group to the UN Secretary-General’s Climate Action Summit.”

“Highlights from the report include:

a) Continued decrease of sea ice and ice mass

“Arctic summer sea-ice extent has declined at a rate of approximately 12% per decade during 1979-2018. The four lowest values for winter sea-ice extent occurred between 2015 and 2019.”

“Overall, the amount of ice lost annually from the Antarctic ice sheet increased at least six-fold between 1979 and 2017. Glacier mass loss for 2015-2019 is the highest for any five-year period on record.”

b) Sea-level rise is accelerating, sea water is becoming more acidic

“The observed rate of global mean sea-level rise accelerated from 3.04 millimeters per year (mm/yr) during the period 1997–2006 to approximately 4mm/yr during the period 2007–2016. This is due to the increased rate of ocean warming and melting of the Greenland and West Antarctica ice sheets. There has been an overall increase of 26% in ocean acidity since the beginning of the industrial era.”

c) “Despite extraordinary growth in renewable fuels over the past decade, the global energy system is still dominated by fossil fuel sources. The annual increase in global energy use is greater than the increase in renewable energy, meaning the fossil fuel use continues to grow. This growth needs to halt immediately.”

[From the Press Release “Landmark 'United in Science' Report Informs Climate Action Summit” (about report “United in Science” by the Science Advisory Group to the UN Secretary-General’s Climate Action Summit) (September, 2019) at the website for the United Nations Framework Convention on Climate Change (at <https://unfccc.int/news/landmark-united-in-science-report-informs-climate-action-summit>) (paragraph 3; and from section “Highlights from the report include:” paragraphs 2-4, and 12)]

168) Press Release “‘Brainstorming Zero Carbon ASAP Campaign’ seeks to accelerate Climate Emergency Action at Universities, Colleges, and catalyze local Community Visioning” (Stefan Pasti) (September, 2019)

A. Overview

In 2008, more than 1500 educational institutions (mostly colleges, universities) held “teach-ins” titled “Focus the Nation: Global Warming Solutions for America” <http://bit.ly/2E5cwdh> .

In 2009, more than 50 papers worldwide ran the same front-page leader article calling for action at the climate summit in Copenhagen <http://bit.ly/2AJadsY> .

Now, in 2019, when there is clearest urgency (#ArcticFires, #GreenlandIceSheet melting, #AmazonFires) to have highly visible accelerated climate emergency action, this Brainstorming Campaign is calling for 5-10p overviews on how to reduce Greenhouse Gas (GHG) Emissions 100% ASAP from 1000s of tipping point related organizations (616 in 30 categories in Appendix 10 of the [157 page “Brainstorming” paper](#)) which—

- 1) make available all known key emission reduction pathways in a form most people can read
- 2) provide a clear visualization of transformations needed in every aspect of our lives--since different organizations will focus on priorities in their fields of activity
- 3) provide the equivalent of a needs assessment for local communities, of the kind which precedes Community Visioning
- 4) can be a great asset to “over 1000 local governments in 19 countries (that) have declared a Climate Emergency” (as of 9/18/19)(see <https://www.theclimatemobilization.org/climate-emergency-campaign>).

Education during comprehensive Community Visioning (a series of community meetings for maximizing citizen participation in identifying challenges and solutions), and especially in Neighborhood Learning Centers, lead to residents becoming aware of—

- a) where to buy only what goods and services they absolutely need--so they can lower Total Energy Demand, and contribute the most possible to carbon-neutral supply chains
---and provides local newspapers, and other news sources, with
- b) numerous positive ways of reporting on this Accelerating Climate Emergency Action process.

B. The Potential of Thousands of Local Community Visioning Initiatives

- 1) Clearinghouse website of 5-10 page overviews on how to achieve Zero Carbon ASAP from 1000s of tipping point related organizations can inform local surveys (prior to Community Visioning) of 100-150 key local leaders--with surveys asking: given this clearinghouse of solutions, please brainstorm on challenges and solutions for your local community)
- 2) Responses to the preliminary survey of key local leaders can demonstrate need for Community Visioning, and many Neighborhood Learning Centers, and inform initial selection of topics for workshops in Neighborhood Learning Centers
- 3) The 1984 Chattanooga Community Visioning Project (“Vision 2000”) attracted more than 1,700 participants, and produced 40 community goals--which resulted in the implementation of 223 projects and programs, and a total financial investment of 793 million dollars. (see 13 minute documentary [“Chattanooga: A Community with a Vision”](#)) (*highly recommended*)
- 4) Universities and colleges--which are already advanced in recognizing and implementing Climate Breakdown mitigation solutions--will be natural lead organizations for building the partnerships necessary to carry out Community Visioning Initiatives in their local community
 - a) Universities, colleges, education organizations, and other organizations, can increase their existing efforts, or take up the call, to develop related curriculum and offer classes, workshops, and teacher training to support the development of Neighborhood Learning Centers
- 5) Through the Community Visioning process, Neighborhood Learning Center workshops, numerous positive ways of news reporting on this Accelerating Climate Emergency Action, much other education, etc., people everywhere can learn--
 - a) if they are in an area of surplus (in which case their surplus may help others with emergency needs)
 - b) where to buy only what goods and services they absolutely need--so they can lower Total Energy Demand, and contribute the most possible to carbon-neutral supply chains

c) what kind of businesses to boycott so that the most carbon neutral and circular local economies can be established in the shortest amount of time; etc.

—and thus how all the investments of time, energy, and money (the “votes”) can result in countless ways of earning a living which contribute to the peacebuilding, community resilience, and ecological regeneration efforts necessary to resolve the Climate Emergency--and other unprecedented challenges--at the same time. As the ancient Chinese proverb says: “Many hands make much work light.”

If this kind of selective buying is done in cooperation with Brainstorming 100% ASAP Campaigns, and thousands of Community Visioning Initiatives with supporting Neighborhood Learning Centers, it may be a way to make the “closing window” cultural transformation manageable... as it may be enough of a downsizing of the Total World Energy Demand to match up with the efforts to power electric grids and mini-grids from 100% renewable energy sources. Further, once it becomes clear that people around the world are “getting together” on purchasing, and that many local communities are going to “drive” economies from global to local-and- regional, changes may come more quickly in the upper echelons of governments, international corporations, international banks, etc.--which have been slow to respond to this Climate Emergency.

6) Local Newspapers could report on--

a) the clearinghouse of 5-10 page overviews on how to achieve Zero Carbon ASAP

b) the preliminary surveys of 150 key local leaders

c) the different stages of the local Community Visioning process: preliminary surveys; assembling a steering committee; planning and coordination with a variety of local leaders; brainstorming meetings identifying challenges; workshops prioritizing the challenges; brainstorming meetings identifying solutions; workshops prioritizing the solutions; providing access to priority solutions and action plans in a large meeting center (so that citizens can mark preferences and decide where they will participate)etc.

d) the countless workshops, and other informal learning, at Neighborhood Learning Centers

e) the job fairs at the end of the Community Visioning process

f) and, in addition, add a new section in their paper, which might be called “Neighbor to Neighbor Community Education”. This new section would be used to highlight and accumulate stories, personal experiences, and other forms of reader contributions which identify helpful people and valuable resources, and reinforce important community goals. (Step 13 in the CPCS Initiative document [“Growing Wisdom and Compassion in Small Communities \(13 Steps\)”](#) is a longer overview of this idea)

7) Residents (especially those who are unemployed) who volunteer time and energy to assist with Community Visioning and Neighborhood Learning Centers--and to advance resulting action plans—could receive, as compensation, local currency (which, because it can only be spent in local community business, helps support the local economy).

8) Local leaders of religious/spiritual traditions could step up on every frontline possible to help people understand the urgent need to—

a) sacrifice personal desires for the greater good

b) choose forgiveness, and reconciliation--*and abstaining from violent conflict resolution*--as a way of bringing cycles of violence to an end

c) create community life and cultural traditions which “... bring to the fore how many good people there are, how many ways there are to do good, and how much happiness comes to those who extend help, as well as to those who receive it”.

Thus--

Many Colleges and Universities assisting with carrying out local Community Visioning Initiatives

+ many supporting Neighborhood Learning Centers

= an exponential acceleration in solution-oriented activity.

1000 time-intensive Community Visioning Initiatives, in communities around the world, would create—
--an exponential acceleration in solution-oriented investment
--an exponential acceleration in solution-oriented employment
--an exponential acceleration in our collective capacity to overcome the challenges of our times.

Complete Brainstorming Paper: ["Brainstorming 100% Reduction in Greenhouse Gas \(GHG\)Emissions ASAP Campaign"](#) (157 pages; June, 2019) (Note: 11 Appendices account for 113 pages)

We are at one of the most critical crossroads humanity has faced since the dawn of civilization.

It is very, very important that most people know how close we are to irreversible Global Heating, how close we are to catastrophic Climate Crises and Extinction Crises... and what to do to very, very quickly move towards positive tipping points.

"... there are truths which none can be free to ignore, if one is to have that wisdom through which life can become useful. These are the truths concerning the structures of the good life and concerning the factual conditions by which it may be achieved...."

(*"General Education in a Free Society; The Harvard Committee, 1945*)

[From Press Release "'Brainstorming Zero Carbon ASAP Campaign' seeks to accelerate Climate Emergency Action at Universities, Colleges, and catalyze local Community Visioning" by Stefan Pasti (September 18, 2019) at the website of The Community Peacebuilding and Cultural Sustainability (CPCS) Initiative (at <https://nebula.wsimg.com/21a24faba2453512e9c7dea52ecc8d03?AccessKeyId=238D35F9602A8D5BA6F3&disposition=0&alloworigin=1>) (Sections A. "Overview" and B. "The Potential of Thousands of Local Community Visioning Initiatives")]

[(Editor's Note--SP): Appendix 10 of the 157 page paper ["Brainstorming Zero Carbon ASAP Campaign"](#) contains a list of 631 positive tipping point organizations and institutions (organizations and institutions working on Climate Emergency Action, and organizations and institutions doing significant work in the many critical fields of activity which are necessary for the unprecedented cultural transformation we need to actually happen. It seemed to this writer that a list of this kind (even if it represents the preferences of a single compiler, this writer) might help other people visualize the kind of inspiration and encouragement we would have for local Community Visioning Initiatives--if these 616 organizations and institutions created 5-10 page overviews of what we need to do.]

169) Report "Lessons from a Decade of Emissions Gap Assessments" [United Nations Environment Programme (UNEP)] (September, 2019)

Section 2 "A decade lost – essentially no change in global emissions trend"

"Despite progress on climate policy in many countries, global GHG emissions continue to grow and show no signs of peaking (Figure 3)." (p. 3, paragraph 1)

"The current level of global GHG emissions is by now almost exactly at the level of emissions projected for 2020 under the business-as-usual, or no-policy, scenarios used in the Emissions Gap Reports (see

Figures 1 and 2), which are based on the assumption that no new climate policies are put into place from 2005 onwards. *In other words, essentially there has been no real change in the global emissions pathway in the last decade. The effects of climate policies have been too small to offset the impact of key drivers of emissions such as economic growth and population growth.*" (p. 3, paragraph 2)

Section 3 "The emissions gap is larger than ever"

"Updated analysis for the forthcoming 2019 Emissions Gap Report reiterates that progress on national commitments under the Paris Agreement is limited and that the current pace of national action is hugely insufficient for achieving the Paris Agreement long-term temperature goal, and even for achieving the emissions reductions implied by the current NDCs. Increased emissions and lagging action means that the gap numbers in the 2019 report will be larger than ever." (p. 4, paragraph 3)

Section 5 "The gap can still be bridged, but unprecedented and immediate action is required"

"The 2017 assessment showed that by considering only proven technologies and adopting relatively precautionary assumptions, emissions could be reduced by 33 GtCO₂e per year by 2030 (uncertainty range of 30–36 GtCO₂e), which is sufficient to get on track to well below 2°C and 1.5°C. This 'basic' potential is illustrated in Figure 5. Remarkably, a large part of this potential is available in just six areas: solar energy, wind energy, efficient appliances, efficient passenger cars, afforestation and stopping deforestation. These six areas present a combined potential of up to 21 GtCO₂e per year by 2030, which is more than sufficient to get on a pathway to well below 2°C." (p. 6, paragraph 2)

"The underlying assumption is that all countries will act quickly and implement the most cost-effective measures in their national contexts. This is evidently a very idealistic assumption, but it underlines the fact that the policies and technologies needed to bridge the gap are readily available and at limited costs. While new innovation will be needed for full decarbonization, there is no excuse for inaction now." (p. 6, paragraph 4)

"Despite the huge potential of carbon pricing to reduce GHG emissions, it is still only just emerging in many countries and is generally not applied at a sufficient level to facilitate a real shift towards low-carbon societies. Even when considering energy-specific taxes together with explicit carbon pricing policies, half of the emissions from fossil fuels are not priced at all, and only 10 per cent of global emissions from fossil fuels are estimated to be priced at a level consistent with limiting global warming to 2°C." (p. 7, paragraph 3)

Section 6 "Decarbonizing energy supply and transport is key for 6 transformational change"

"CO₂ emissions from fossil-fuel use in the energy and industry sectors dominate total GHG emissions. *Following a period of stabilization from 2014 to 2016, emissions started to rise again in 2017 and 2018. At the same time, energy needs are projected to grow by approximately 30 per cent by 2040. This increasing demand is stimulated by economic growth and the accompanying trends of urbanization, industrialization, infrastructure growth, and a growing global middle class.* As the challenge for the energy sector is therefore immense, transforming the way in which energy is produced and consumed will be key to reaching the Paris Agreement goals." (p. 8, paragraph 1)

“The transition requires rapid expansion of renewable electricity supply, establishment of smarter and more flexible electricity grids, and huge increases in the numbers of products and processes that run on electricity in buildings, transport and industry.” (p. 9, paragraph 2)

Section 7 “Phasing out coal is indispensable, but requires a balanced transition”

“At the global scale, the stock of coal-fired power plants is still increasing, as are emissions from coal. The existing stocks, in combination with what is currently planned and being built (assuming standard lifetimes and usage rates) alone account for a significant share of the available carbon budget for a 2°C target, and would plausibly make a 1.5°C target infeasible, as illustrated in Figure 9. Facilitating a transition away from coal for power production will therefore be essential to successful global mitigation efforts. Avoiding further lock-in through new coal-fired power plants is therefore a major and urgent requirement, followed by a gradual phasing out of existing coal plants.” (p. 10, paragraph 1)

“While coal is widely used, only around 10 or 11 large countries have very significant coal emissions. For all these countries, a transition away from coal presents a major political and economic challenge that will take time. Removing domestic subsidies and including pricing of externalities will be important, with the latter helping generate revenue to address the societal challenges a transition will encounter. This will include addressing impacts on affected workers and communities, as well as the coal owners and industry, balancing energy prices for different social groups and energy-intensive industries, to mention a few (see also Figure 6).” (p. 10, paragraph 2)

Section 8 “Nature-based solutions can make a large contribution and are currently the main option for CO₂ removal”

“Most mitigation options are quite well known, but often difficult to implement in practice due to challenges related to limited access to financing, poverty issues, institutions, ecological issues, and barriers concerning technological development, diffusion and transfer.” (p. 11, paragraph 3)

(Concluding Comments)

“Looking ahead--the next decade will be defining”

“While the past decade has been a lost opportunity in terms of bending the global emissions curve, a large number of positive policy and technology developments have taken place, creating a solid foundation for enhancing mitigation ambition and accelerating action. The scientific understanding of both the consequences of inadequate action and the available options for rapid and cost-effective emission reductions has also improved significantly.”

“Bending the emissions curve and bridging the emissions gap, while presenting an unprecedented challenge, is still possible. It will require the full utilization of all emission reduction options and policies to support these, replication and scale-up of current best practices, a shift in investments to bring about the transformations and innovations needed in the longer term, and careful management of the interests of the economic and societal sectors that might be affected during the transition to a zero-carbon and climate-resilient future. It will require concerted climate action of all stakeholders, at all levels and in all sectors.” (p. 14, paragraphs 1 and 2)

[From report “Lessons from a Decade of Emissions Gap Assessments” by the United Nations Environment Programme (UNEP) (September, 2019) at <https://wedocs.unep.org/bitstream/handle/20.500.11822/30022/EGR10.pdf?sequence=1&isAllowed=y>)]

170) Press Materials “UN Climate Action Summit 2019” (September, 2019)

“Leaders from government, business, and civil society today are to announce potentially far-reaching steps to confront climate change at the United Nations Secretary-General’s Climate Action Summit in New York.” (paragraph 2)

“He (United Nations Secretary-General António Guterres) said, ‘Governments are here to show you are serious about enhancing Nationally Determined Contributions under the Paris Agreement. Cities and businesses are here showing what leadership looks like, investing in a green future. Financial actors are here to scale-up action and deploy resources in fundamentally new and meaningful ways. Coalitions are here with partnerships and initiatives to move us closer to a resilient, carbon-neutral world by 2050.’” (paragraph 9)

“‘And young people are here providing solutions, insisting on accountability, demanding urgent action.’” (paragraph 10)

“The Summit is designed to showcase government, business, and civil society efforts to increase their commitments under the Paris Agreement and work toward reducing emissions to essentially zero by mid-century. Many of the more than 70 key announcements showcase the concrete ways in which countries can better adapt to climate change and cut emissions while getting the necessary technical and financial support many of them need.” (in section “Increased Ambition, Accelerated Action”, bullet 1)

“President of Chile, Sebastián Piñera, announced the ‘Climate Ambition Alliance,’ which Chile hopes to build in the lead-up to COP25 in Santiago. The Alliance brings together nations upscaling action by 2020, as well as those working towards achieving net zero CO₂ emissions by 2050. 59 nations have signaled their intention to submit an enhanced climate action plan (or NDC), and an additional 11 nations have started an internal process to boost ambition and have this reflected in their national plans. In terms of the 2050 group, 65 countries and the European Union are joined by 10 regions, 102 cities, 93 businesses and 12 investors – all committed to net zero CO₂ emissions by 2050.” (in section “Increased Ambition, Accelerated Action”, bullet 2)

“Getting out of coal is a priority. The Powering Past Coal Alliance expanded to include 30 countries, 22 states or regions, and 31 corporations committed to stopping the building of new coal power plants in 2020 and rapidly transitioning to renewable energy.” (in section “Increased Ambition, Accelerated Action”, bullet 4)

“The Asset Owner Alliance, a group of the world’s largest pension funds and insurers, responsible for directing more than US\$2 trillion in investments, is committed to transitioning to carbon-neutral investment portfolios by 2050.” (in section “Climate Finance”, bullet 1)

“The Climate Investment Platform will seek to directly mobilize US\$1 trillion in clean energy investment by 2025 in 20 least developed countries.” [in section “Assistance for the Least Developed Countries (LDCs)”, bullet 1]

“The Cool Coalition will address cooling as a ‘major blind spot’ by delivering up to 1 degree on the pathway to a 2050 net zero carbon world. With emissions from air conditioning and refrigeration expected to rise 90 percent from 2017 levels by 2050, the collective platform will set ambitious cooling targets and support cross-sectional national strategies and policies such as National Cooling Action Plans.” (in section “Cutting GHG Emissions Now with Cooling and Energy Efficiency”, bullet 2)

“Recognizing that traditional ways of life have already shifted dramatically in a changing climate, the Governments of Norway, Germany, the Netherlands, and the United Kingdom, as well as the World Bank and the Gates Foundation, announce a plan to support 300 million small-scale farmers in enhancing their resilience to climate shocks and extreme events, increase household incomes and food security, and reverse ecological decline.” (in section “Toward a Resilient Future, Making People Safer”, bullet 5)

“The International Labor Organization (ILO) and other members of the Summit’s Social and Political Drivers Action Area, co-led by Spain and Peru, launch the “Climate Action for Jobs” initiative, with the goal of developing a framework for countries that considers job creation, social protection, skills development, and technology and knowledge transfer when taking climate action.” (in section “People Centered Action Now”, bullet 1)

“The shipping industry is to launch the Getting to Zero Coalition, bringing together decision makers from across the shipping value chain to reduce GHG emissions by at least 50 percent by 2050 and make the transition to full decarbonization possible.” (in section “The Economy Moving from Grey to Green”, bullet 2)

[From Press Materials article “In the face of worsening climate crisis, UN Summit delivers new pathways and practical actions to shift global response into higher gear” by UN Department of Global Communication and the Climate Action Summit Team (September 23, 2019) at the United Nations website (at <https://www.un.org/sustainabledevelopment/blog/2019/09/in-the-face-of-worsening-climate-crisis-un-summit-delivers-new-pathways-and-practical-actions-to-shift-global-response-into-higher-gear/>)]

171) Event “2019 C40 World Mayors Summit in Copenhagen” (October, 2019)

a) “The C40 World Mayors Summit is C40’s milestone event, serving as a unique forum for member cities to present the innovative actions they have taken to reduce greenhouse gas emissions and improve climate resilience; influence decision makers - from fellow mayors to CEOs and national leaders - to take the bold and urgent action needed to keep global temperature rise to below 1.5 °C; and inspire participants and citizens to take climate action in their own lives.

“Over the past decade, C40 has convened six Mayors Summits, hosted by London (2005), New York (2007), Seoul (2009), Sao Paulo (2011), Johannesburg (2014) and Mexico City (2016). Each C40 Mayors Summit has provided unique opportunities for the mayors of the world’s great cities to showcase their climate leadership on the global stage.

“With its agenda setting programme, and inspiring set of speakers, the C40 Mayors Summit is a unique global event. Previous C40 Summits have made headlines around the world by publishing groundbreaking research, showcasing cutting edge innovation from cities and launching new partnerships to promote creative urban solutions to climate change.”

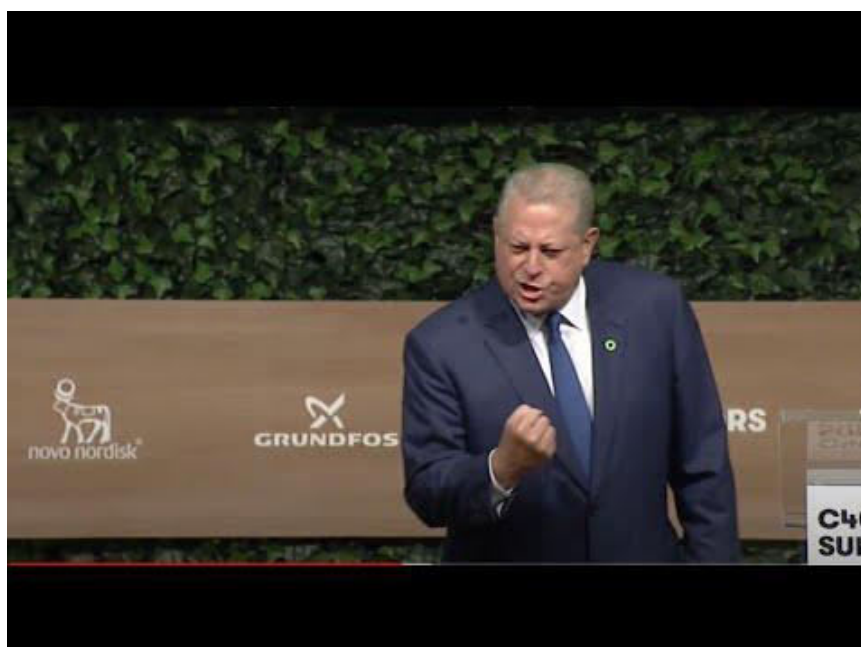
[From article “The 2019 C40 World Mayors Summit in Copenhagen” in the “C40 Events” section of the C40 Cities website (at <https://www.c40.org/events/the-2019-c40-world-mayors-summit-in-copenhagen>) (paragraphs 1-3)]

b) 2019 C40 Cities Bloomberg Philanthropies Awards Winners and Projects:

<u>2019 C40 Cities Bloomberg Philanthropies Awards Winners and Projects:</u>		
CITY	CATEGORY	PROJECT
Medellin, Colombia	RESILIENCE	Avenida Oriental Green Corridors: Medellín installed a connected network of plants across the city to improve urban biodiversity, reduce the city's heat island effect, soak up air pollutants, and capture CO2.
Kolkata, India	GREEN MOBILITY	Low Carbon Commute Transition: Kolkata is transitioning their city fleet to 5,000 electric buses, and plans to fully electrify the ferries that run across the Ganges River by 2030.
Seoul, South Korea	RENEWABLE ENERGY	Solar City Expansion: Seoul is installing domestic solar panels in 1 million households, solar systems on all municipal sites, and fostering growth in the solar industry with the goal of achieving 1 GW installed solar PV capacity by 2022.
Accra, Ghana	ENGAGED CITIZENS	Informal Waste Collection Expansion: To increase collection of waste, close illegal open waste sites, and ensure fair and inclusive employment, Accra integrated its informal waste collectors into the city's official waste management system.
London, UK	CLEAN AIR	Ultra-Low Emission Zone: London implemented a first-in-the-world requirement for vehicles to meet Euro emission standards in order to drive in the central London area.
San Francisco, USA	TRANSFORMATIVE CHANGE	CleanPowerSE: The City and County of San Francisco provides residents with the option to purchase electricity from renewable and low-carbon sources of energy at competitive rates.
Guangzhou, China	GREEN TECHNOLOGIES	Expansive Bus Electrification: Guangzhou converted its fleet of 11,220 buses to run solely by means of electricity and installed 4,000 charging stations across the city.

[From article “World’s Seven Best Climate Projects Announced as 2019 C40 Cities Bloomberg Philanthropies Awards Winners” (October 10, 2019) on the “Media” webpage, at the C40 Cities website (at https://www.c40.org/press_releases/c40-awards-2019) (paragraph 11)]

c) Excerpt from former U.S. Vice President Al Gore’s Keynote Speech at the 2019 C40 World Mayors Summit (Copenhagen, Denmark; October 9-12, 2019)



[complete Keynote Speech of Al Gore at the 2019 C40 World Mayors Summit (Copenhagen, Denmark; October 9-12, 2019) (at [https://www.youtube.com/watch?v= S1INmKK9Lg](https://www.youtube.com/watch?v=S1INmKK9Lg))]

172) Descriptions with Media “Greenland Ice Loss 2002-2016” (NASA), and “Climate Change and Arctic Tipping Points” (Stefan Ramsdorf) (October, 2019)

“The mass of the Greenland ice sheet has rapidly declined in the last several years due to surface melting and iceberg calving.”

“Research based on observations from the NASA/German Aerospace Center’s twin Gravity Recovery and Climate Experiment (GRACE) satellites indicates that between 2002 and 2016, Greenland shed approximately 280 gigatons of ice per year, causing global sea level to rise by 0.03 inches (0.8 millimeters) per year.”

[From the webpage “Greenland Ice Loss 2002-2016”, at the at the NASA (National Aeronautics and Space Administration-U.S.) website (at [https://grace.jpl.nasa.gov/resources/30/greenland-ice-loss-2002-2016/#:~:text=Research%20based%20on%20observations%20from,\(0.8%20millimeters\)%20per%20year](https://grace.jpl.nasa.gov/resources/30/greenland-ice-loss-2002-2016/#:~:text=Research%20based%20on%20observations%20from,(0.8%20millimeters)%20per%20year)) (paragraph 1)

b) “Stefan Rahmstorf, Professor and Head of Earth System Analysis at the Potsdam Institute for Climate Impact Research spoke about Climate Change and Arctic Tipping Points in a Plenary Session during the #ArcticCircle2019 Assembly.”

[From the description section of the YouTube segment below (at <https://www.youtube.com/watch?v=mb-1MPIjoAY>) (paragraph 1), with this additional note: the Arctic Circle 2019 Assembly took place October 10-12, 2019 in Reykjavik, Iceland (see <http://www.arcticcircle.org/assemblies/2019>)]



[From the presentation: “... with a hundred years we have undone more than 5,000 years of cooling...”
“... global temperatures are higher than at any time in the history of civilization.”]

173) Article “California is on track to miss its climate targets--by a century” (James Temple) (November, 2019)

“California has established itself as a global model on climate issues, with Teslas filling its roads and solar farms stretching across its sun-baked Central Valley.”

“The state set up the nation’s first economy-wide cap-and-trade program, put in place aggressive vehicle fuel efficiency standards, and passed a series of ever stricter climate pollution rules. That includes the landmark 2018 law requiring all of the state’s electricity to come from carbon-free sources by the end of 2045.”

“But for all its regulatory achievements, California also offers a case study in just how hard it is to make progress on the only thing that really matters: reducing emissions.”

“The state’s climate pollution declined by just 1.15% in 2017, according to the latest **California Green Innovation Index**. At that rate, California won’t reach its 2030 decarbonization goals (cutting emissions to 40% below 1990 levels) until 2061--and wouldn’t hit its 2050 targets (80% below 1990 levels) until 2157.”

“What went wrong?”

“Transportation emissions, the state’s largest source, have steadily risen since 2013, as the improving economy put more cars on the road and planes in the sky. Emissions from waste dumped into landfills have also been ticking up since the recovery took hold. Meanwhile, highly potent greenhouse gases from the aerosols, foams, and solvents used in refrigeration and air conditioning are rising sharply.”

“These increases have offset the highly touted declines in emissions from the electricity sector as a growing share of the state’s power comes from renewable sources like wind and solar. Emissions from in-state generation are down 35% since 2000.”

“The glimmer of good news for transportation is that electric vehicles do represent a growing share of new vehicle sales, at just under 8% in the state last year. But they still make up only 1.5% of registered vehicles in the state, with hybrids accounting for 3.4%, the report notes.”

“At the same time, overall car ownership rates are rising, public-transit use is falling, and consumers are still shifting toward gas-guzzling trucks and SUVs. And the 92% of vehicles sold last year that weren’t EVs will, on average, still be on the roads more than a decade from now.”

Wildfires

“Finally, California’s worsening wildfires are also complicating its efforts to cut emissions. Burning forests pump out massive amounts of greenhouse gases stored in plants and trees. And rising temperatures and shifting precipitation patterns have already extended the fire season by 75 days across the state’s sprawling Sierra Nevada range.”

“The raging wildfires in 2018 produced about 45 million metric tons of carbon dioxide. That’s nine times more than the amount by which the state cut emissions the previous year.” (editor’s italics)

[From article “California is on track to miss its climate targets--by a century: And it’s likely to get harder, not easier, for the state to achieve ever deeper cuts in emissions” by James Temple (November 1, 2019)

at the website of MIT Technology Review (at <https://www.technologyreview.com/2019/11/01/102477/california-is-on-track-to-miss-its-climate-targets-by-a-century/>) (paragraphs 1-4, 6-7, 16-17, 20-21)]

174) Article “World Scientists’ Warning of a Climate Emergency” (William J. Ripple et al.) (November, 2019)

“... we declare, with more than 11,000 scientist signatories from around the world, clearly and unequivocally that planet Earth is facing a climate emergency.”

“Exactly 40 years ago, scientists from 50 nations met at the First World Climate Conference (in Geneva 1979) and agreed that alarming trends for climate change made it urgently necessary to act. Since then, similar alarms have been made through the 1992 Rio Summit, the 1997 Kyoto Protocol, and the 2015 Paris Agreement, as well as scores of other global assemblies and scientists’ explicit warnings of insufficient progress (Ripple et al. 2017). Yet greenhouse gas (GHG) emissions are still rapidly rising, with increasingly damaging effects on the Earth’s climate. An immense increase of scale in endeavors to conserve our biosphere is needed to avoid untold suffering due to the climate crisis (IPCC 2018).”

“The climate crisis is closely linked to excessive consumption of the wealthy lifestyle. The most affluent countries are mainly responsible for the historical GHG emissions and generally have the greatest per capita emissions (table S1).”

“Profoundly troubling signs from human activities include sustained increases in both human and ruminant livestock populations, per capita meat production, world gross domestic product, global tree cover loss, fossil fuel consumption, the number of air passengers carried, carbon dioxide (CO₂) emissions, and per capita CO₂ emissions since 2000 (figure 1, supplemental file S2).”

“Especially disturbing are concurrent trends in the vital signs of climatic impacts (figure 2, supplemental file S2). Three abundant atmospheric GHGs (CO₂, methane, and nitrous oxide) continue to increase (see figure S1 for ominous 2019 spike in CO₂), as does global surface temperature (figure 2a–2d). Globally, ice has been rapidly disappearing, evidenced by declining trends in minimum summer Arctic sea ice, Greenland and Antarctic ice sheets, and glacier thickness worldwide (figure 2e–2h). Ocean heat content, ocean acidity, sea level, area burned in the United States, and extreme weather and associated damage costs have all been trending upward (figure 2i–2n). Climate change is predicted to greatly affect marine, freshwater, and terrestrial life, from plankton and corals to fishes and forests (IPCC 2018, 2019). These issues highlight the urgent need for action.”

“The climate crisis has arrived and is accelerating faster than most scientists expected (figure 2, IPCC 2018). It is more severe than anticipated, threatening natural ecosystems and the fate of humanity (IPCC 2019). Especially worrisome are potential irreversible climate tipping points and nature’s reinforcing feedbacks (atmospheric, marine, and terrestrial) that could lead to a catastrophic ‘hothouse Earth,’ well beyond the control of humans (Steffen et al. 2018). These climate chain reactions could cause significant disruptions to ecosystems, society, and economies, potentially making large areas of Earth uninhabitable.”

“Economic and population growth are among the most important drivers of increases in CO₂ emissions from fossil fuel combustion (Pachauri et al. 2014, Bongaarts and O’Neill 2018); therefore, we need bold and drastic transformations regarding economic and population policies. We suggest six critical and

interrelated steps (in no particular order) that governments, businesses, and the rest of humanity can take to lessen the worst effects of climate change.”

“The good news is that such transformative change, with social and economic justice for all, promises far greater human well-being than does business as usual. We believe that the prospects will be greatest if decision-makers and all of humanity promptly respond to this warning and declaration of a climate emergency and act to sustain life on planet Earth, our only home.”

[From article “World Scientists’ Warning of a Climate Emergency” (with more than 11,000 scientist signatories from around the world) by William J. Ripple et al. (affiliated with the Alliance of World Scientists) (November 5, 2019) at the BioScience Journal website (affiliated with the American Institute of Biological Sciences and Oxford Academic Journals) (at

<https://academic.oup.com/bioscience/article/70/1/8/5610806#165912528>)

(paragraphs 1, 2, 4-7, 8, and 16)]

[Additional Note: Specifically, according to a “corrigendum” published at the BioScience Journal website, there were 11,258 scientist signatories from 153 countries to the “World Scientists’ Warning of a Climate Emergency” article (see <https://academic.oup.com/bioscience/article/70/1/100/5670749>)]

175) Report “Production Gap 2019 Report” [United Nations Environment Programme (UNEP) et. al.] (November, 2019)

“The report was produced by leading research organisations, including the Stockholm Environment Institute (SEI), International Institute for Sustainable Development, Overseas Development Institute, CICERO Centre for International Climate and Environmental Research, Climate Analytics, and UNEP. Over fifty researchers contributed to the analysis and review, spanning numerous universities and additional research organisations.”

“This report addresses the necessary winding down of the world’s production of fossil fuels in order to meet climate goals. Though coal, oil, and gas are the central drivers of climate change, they are rarely the subject of international climate policy and negotiations. This report aims to expand that discourse and provide a metric for assessing how far the world is from production levels that are consistent with global climate goals.”

“Specifically, this first Production Gap Report assesses the discrepancy between government plans for fossil fuel production and global production levels consistent with 1.5°C and 2°C pathways. This production gap tells us the magnitude of the challenge.”

“Key messages (include):

Governments are planning to produce about 50% more fossil fuels by 2030 than would be consistent with a 2°C pathway and 120% more than would be consistent with a 1.5°C pathway.”

[From introductory information to “Production Gap 2019 Report” by UNEP et. al. (November 20, 2019) at the website for Climate Analytics (<https://climateanalytics.org/publications/2019/production-gap-2019-report/>) (paragraphs 2-4 and first bullet in section “Key Messages”)]

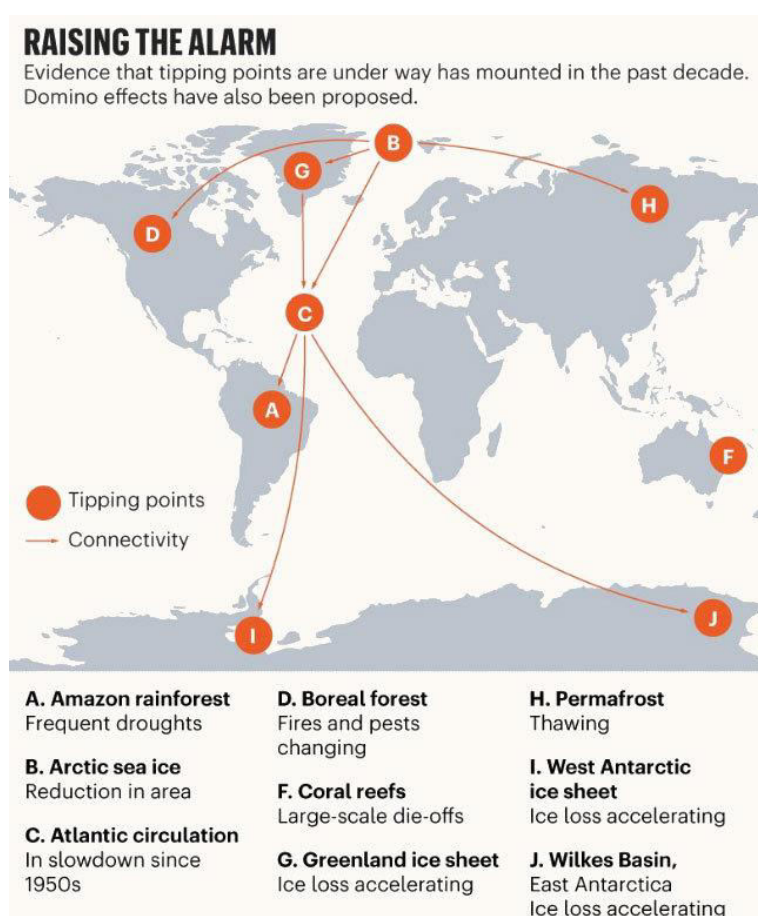
176) Article “Climate tipping points--too risky to bet against: The growing threat of abrupt and irreversible climate changes must compel political and economic action on emissions.”

(Timothy M. Lenton, Johan Rockström, Owen Gaffney, Stefan Rahmstorf, Katherine Richardson, Will Steffen and Hans Joachim Schellnhuber) (November, 2019)

“Here we summarize evidence on the threat of exceeding tipping points, identify knowledge gaps and suggest how these should be plugged. We explore the effects of such large-scale changes, how quickly they might unfold and whether we still have any control over them.”

“Information summarized in the two most recent IPCC Special Reports (published in 2018 and in September this year) suggests that tipping points could be exceeded even between 1 and 2 °C of warming (see ‘Too close for comfort’ graph--in article).”

“Climate change and other human activities risk triggering biosphere tipping points across a range of ecosystems and scales (see ‘Raising The Alarm’).”



“Deforestation and climate change are destabilizing the Amazon--the world’s largest rainforest, which is home to one in ten known species. Estimates of where an Amazon tipping point could lie range from 40% deforestation to just 20% forest-cover loss. About 17% has been lost since 1970.”

“Permafrost across the Arctic is beginning to irreversibly thaw and release carbon dioxide and methane--a greenhouse gas that is around 30 times more potent than CO₂ over a 100-year period.”

“The world’s remaining emissions budget for a 50:50 chance of staying within 1.5 °C of warming is only about 500 gigatonnes (Gt) of CO₂. Permafrost emissions could take an estimated 20% (100 Gt CO₂) off this budget, and that’s without including methane from deep permafrost or undersea hydrates. If

forests are close to tipping points, Amazon dieback could release another 90 Gt CO₂ and boreal forests a further 110 Gt CO₂. With global total CO₂ emissions still at more than 40 Gt per year, the remaining budget could be all but erased already.”

“Atmospheric CO₂ is already at levels last seen around four million years ago, in the Pliocene epoch. It is rapidly heading towards levels last seen some 50 million years ago--in the Eocene--when temperatures were up to 14 °C higher than they were in pre-industrial times.”

“It is our position that, given its huge impact and irreversible nature, any serious risk assessment must consider the evidence, however limited our understanding might still be. To err on the side of danger is not a responsible option.”

“If damaging tipping cascades can occur and a global tipping point cannot be ruled out, then this is an existential threat to civilization. No amount of economic cost-benefit analysis is going to help us.”

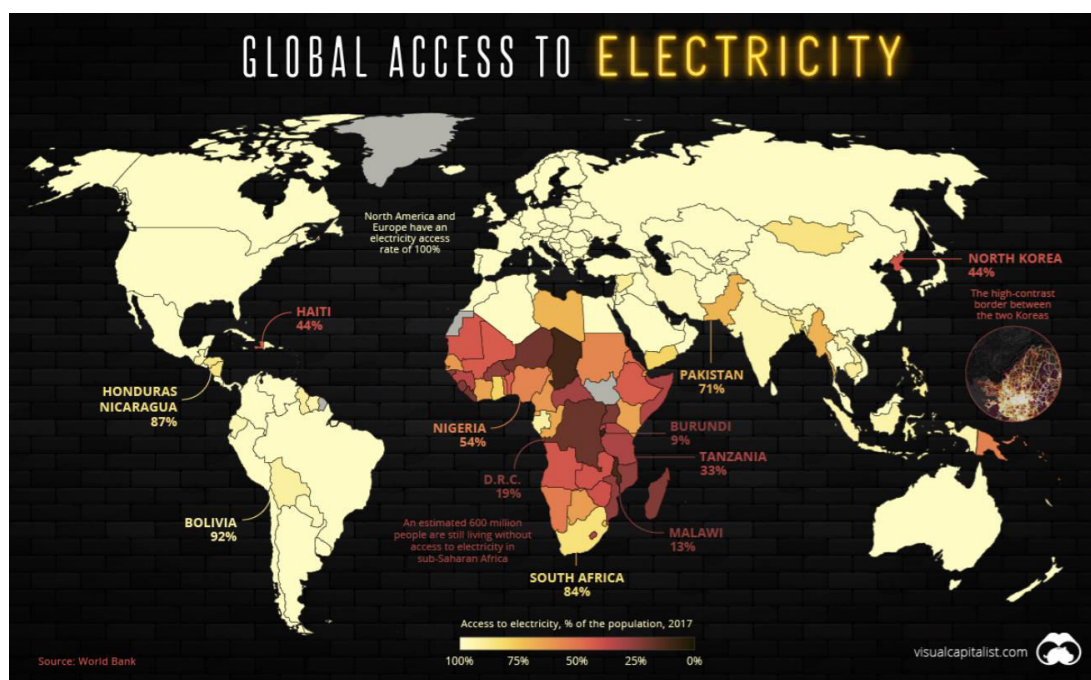
“We argue that the intervention time left to prevent tipping could already have shrunk towards zero, whereas the reaction time to achieve net zero emissions is 30 years at best. Hence we might already have lost control of whether tipping happens. A saving grace is that the rate at which damage accumulates from tipping--and hence the risk posed — could still be under our control to some extent.”

“The stability and resilience of our planet is in peril. International action--not just words--must reflect this.”

[From article “Climate tipping points--too risky to bet against: The growing threat of abrupt and irreversible climate changes must compel political and economic action on emissions.” (Timothy M. Lenton, Johan Rockström, Owen Gaffney, Stefan Rahmstorf, Katherine Richardson, Will Steffen and Hans Joachim Schellnhuber) (November 27, 2019) at the website of Nature (online journal) (at <https://www.nature.com/articles/d41586-019-03595-0>) (paragraphs 2, 4, 13, 16, 18, 21, 24, 25, 27, and 28)]

177) Article “Mapped: The 1.2 Billion People Without Access to Electricity” (Nick Routley) (November, 2019)

“Lack of access to electricity, or ‘energy poverty’, is the ultimate economic hindrance as it prevents people from participating in the modern economy.”



[From article “Mapped: The 1.2 Billion People Without Access to Electricity” by Nick Routley (November 27, 2019) at the website of Visual Capitalist (at <https://www.visualcapitalist.com/mapped-billion-people-without-access-to-electricity/>)

[(Editor’s Commentary--SP)

“Throughout the world, civil society, indigenous peoples and new social movements--rather than academics or professional policy think tanks--are the prime movers behind a newly emerging food sovereignty policy framework. At its heart, this alternative policy framework for food and agriculture aims to guarantee and protect people’s space, ability and right to define their own models of production, food distribution and consumption patterns. This notion of “food sovereignty” is perhaps best understood as a transformative process that seeks to recreate the democratic realm and regenerate a diversity of autonomous food systems based on equity, social justice and ecological sustainability.”

“Food Sovereignty is the right of peoples to define their own food and agriculture; to protect and regulate domestic agricultural production and trade in order to achieve sustainable development objectives; to determine the extent to which they want to be self reliant; to restrict the dumping of products in their markets; and to provide local fisheries-based communities the priority in managing the use of and the rights to aquatic resources. Food Sovereignty does not negate trade, but rather it promotes the formulation of trade policies and practices that serve the rights of peoples to food and to safe, healthy and ecologically sustainable production.”

[From “Towards Food Sovereignty: Reclaiming autonomous food systems” by Michel Pimbert (project archived 2008-2009) at the website of International Institute for Environment and Development (IIED) (at <https://www.iied.org/towards-food-sovereignty-reclaiming-autonomous-food-systems>) (from pdf file of Chapters 1-3--links in “Publications” section near bottom of webpage--which can be downloaded from <https://pubs.iied.org/G02268/> ; actual pdf file of Chapters 1-3 <https://pubs.iied.org/pdfs/G02268.pdf> , excerpts above in “Introduction”, p. 3, paragraphs 1-2)]

178) Article “Record 631 institutional investors managing more than \$37 trillion in assets urge governments to step up ambition to tackle global climate crisis” (Ceres) (December, 2019)

“631 institutional investors managing more than \$37 trillion in assets urged governments to step up efforts to tackle the global climate crisis and achieve the goals of the Paris Agreement, in a joint statement issued today at the United Nations Climate Conference (COP25). The Global Investor Statement to Governments on Climate Change, developed by the seven Founding Partners of The Investor Agenda, urges governments to phase out thermal coal power, put a meaningful price on carbon pollution, end subsidies for fossil fuels, and update and strengthen nationally-determined contributions to meet the goals of the Paris Agreement.”

“Global investors with US\$37 trillion in assets under management are demanding that governments implement robust and credible climate change policy to reduce the costs of climate change for the global economy and for the communities we live in,” said Emma Herd, Chief Executive Officer, Investor Group on Climate Change (IGCC). ‘Global investors could not be clearer, governments must step up and deliver the policy ambition needed to manage the costs of climate change. Without ambitious climate goals, supported by investable policy, climate change as a risk to financial stability will continue to ratchet.’”

[From article “Record 631 institutional investors managing more than \$37 trillion in assets urge governments to step up ambition to tackle global climate crisis” (Ceres) (December 9, 2019) at the website for Ceres (at <https://www.ceres.org/news-center/press-releases/record-631-institutional-investors-managing-more-37-trillion-assets-urge>) (paragraphs 2 and 9)]

179) Press Release “Climate Ambition Alliance: Nations Renew their Push to Upscale Action by 2020 and Achieve Net Zero CO₂ Emissions by 2050” (December, 2019)

a) Climate Ambition Alliance announced

“President of Chile, Sebastián Piñera, announced the ‘Climate Ambition Alliance,’ which Chile hopes to build in the lead-up to COP25 in Santiago. The Alliance brings together nations upscaling action by 2020, as well as those working towards achieving net zero CO₂ emissions by 2050. 59 nations have signaled their intention to submit an enhanced climate action plan (or NDC), and an additional 11 nations have started an internal process to boost ambition and have this reflected in their national plans. In terms of the 2050 group, 65 countries and the European Union are joined by 10 regions, 102 cities, 93 businesses and 12 investors – all committed to net zero CO₂ emissions by 2050.” (in section “Increased Ambition, Accelerated Action”, bullet 2)

[From Press Materials article “In the face of worsening climate crisis, UN Summit delivers new pathways and practical actions to shift global response into higher gear” by UN Department of Global Communication and the Climate Action Summit Team (September 23, 2019) at the United Nations website (at <https://www.un.org/sustainabledevelopment/blog/2019/09/in-the-face-of-worsening-climate-crisis-un-summit-delivers-new-pathways-and-practical-actions-to-shift-global-response-into-higher-gear/>)]

b) from Press Release “Climate Ambition Alliance: Nations Renew their Push to Upscale Action by 2020 and Achieve Net Zero CO₂ Emissions by 2050” (December 11, 2019)

In Madrid today, the President COP25, Minister Carolina Schmidt, presented a renewed alliance of countries and Non-State Actors who determined to follow the recommendations of science as regards climate change. Chile has led this alliance after a request of the Secretary General of the United Nations, António Guterres, in the context of the 2019 Climate Summit.

“Minister Schmidt announced that 103 nations have signaled their intention to submit an enhanced climate action plan (or Nationally Determined Contribution), and she acknowledged those 11 nations who have started an internal process to boost ambition and have this reflected in their national plans by 2020, as established in the Paris Agreement. This group represents 114 nations in total (full list in Annex 1).”

“She also stated that 120 countries plus the EU (121 total), alongside 15 regions, 398 cities, 786 businesses and 16 investors are working towards achieving netzero CO₂ emissions by 2050. This demonstrates clearly that both State and nonState actors recognize the urgent need to take ambitious action to address the climate change emergency (full list in Annex 2).”

“As we urgently increase our efforts to reduce emissions, we must also give equal and increased urgency to adapt to climate impacts and build resilience for the future. Communities that are vulnerable to the impacts of climate change face an existential threat. The IPCC Special Report on the Impacts of Global

Warming of 1.5°C states that both urgent and transformational adaptation action is needed to reduce climate-related risk. *The scale of expected impacts is such that business as usual is no longer an option for any country, community, business or financial institution.* The Call for Action on Adaptation and Resilience was launched at the UN Climate Action Summit and has been signed by 118 countries. The call marks the beginning of a paradigm shift in the way we all build adaptation and resilience.”

“... the deep transformation towards net zero CO2 emissions requires the mobilization of all actors across all segments of society.”

“Cities consume over two-thirds of the world’s energy, accounting for more than 70% of global energy-related CO2 emissions and are therefore critical to delivering a climate safe future. Megacities under ‘Deadline 2020’, as well as local cities under ‘The Argentinian Network of Municipalities’--representing over 660 million people--are following a pathway that would deliver emissions reductions consistent with 1.5°C. Moreover, ICLEI – a global network of local and regional governments--will work on a process to strengthen the criteria and alignment of climate neutrality targets, by developing additional guidance to maximize emissions reduction impacts of its local and regional governments worldwide.”

“Businesses are similarly pledging net zero emissions, publicly committing to adopt science-based emissions reduction targets under the Business Ambition for 1.5°C - Our Only Future campaign. 177 businesses have signed this pledge, accounting for emissions roughly equivalent to 83 coal-fired power plants, or the annual total emissions of France. Entire sectors are also demonstrating signs of progress, as exemplified by the Fashion Industry Charter for Climate Action, whose 85 signatories share a fundamental commitment to drive the fashion industry to net-zero emissions in line with the goals of the Paris Agreement no later than 2050. Meanwhile, 532 B Corporations--organizations that meet the highest standard of social and environmental performance--have announced their commitment to reach net zero by 2030, 20 years ahead of Paris Agreement targets. Finally, networks are adding to this momentum, with the Chambers Climate Coalition of more than 2,000 chambers of commerce, representing millions of local businesses, supporting action aligned with limiting global temperature rise to 1.5°C and reaching net-zero emissions by no later than 2050.”

“Investors too are delivering on a bold commitment to transition investment portfolios to net-zero GHG emissions by 2050. Representing nearly US\$ 4 trillion in assets under management, the United Nations-convened Net-Zero Asset Owner Alliance shows united investor action to align portfolios with a 1.5°C scenario, addressing Article 2.1c of the Paris Agreement. The Alliance will accompany asset owners throughout the process of aligning their portfolios to the needs of an economy that is compatible with a stable climate.”

[From Press Release “Climate Ambition Alliance: Nations Renew their Push to Upscale Action by 2020 and Achieve Net Zero CO2 Emissions by 2050” (December 11, 2019) at the website of the Chile delegation to COP 25 (on the webpage “Climate Ambition Alliance” (at <https://cop25.mma.gob.cl/en/climate-ambition-alliance/>), Press Release can be downloaded in Spanish and English--this is the English version <https://cop25.mma.gob.cl/wp-content/uploads/2020/04/Alianza-11122019-INGL%C3%89S.pdf>) (paragraphs 1-3, and in section “Annex II: Net zero CO2 emissions by 2050”, paragraphs 3 and 6-8)]

180) Article “Bank of England chief Mark Carney issues climate change warning” (Roger Harrabin) (December, 2019)

“The world will face irreversible heating unless firms shift their priorities soon, the outgoing head of the Bank of England has told the BBC.”

“He said leading pension fund analysis ‘is that if you add up the policies of all of companies out there, they are consistent with warming of 3.7-3.8C’.”

“Mr. Carney, who will next year start [his new role as United Nations special envoy for climate action and finance](#), continued: ‘The concern is whether we will spend another decade doing worthy things but not enough... and we will blow through the 1.5C mark very quickly. As a consequence, the climate will stabilise at the much higher level.’”

“Speaking to the Today programme, he re-iterated his warning that unless firms woke up to what he called the climate crisis, many of their assets would become worthless.”

“‘If we were to burn all those oil and gas [reserves], there’s no way we would meet carbon budget,’ he said. ‘Up to 80% of coal assets will be stranded, [and] up to half of developed oil reserves.’”

“‘A question for every company, every financial institution, every asset manager, pension fund or insurer: what’s your plan?’”

“‘Four to five years ago, only leading institutions had begun to think about these issues and could report on them.’”

“‘Now \$120tn worth of balance sheets of banks and asset managers are wanting this disclosure [of investments in fossil fuels]. But it’s not moving fast enough.’”

[From article “Bank of England chief Mark Carney issues climate change warning” by Roger Harrabin (December 30, 2019) at the website of BBC News (at <https://www.bbc.com/news/business-50868717#:~:text=Bank%20of%20England%20chief%20Mark%20Carney%20issues%20climate%20change%20warning,-By%20Roger%20Harrabin&text=The%20world%20will%20face%20irreversible,fuels%20%E2%80%93%20but%20far%20too%20slowly>) (paragraphs 1-3, 8, and 10-13)]

181) Australian Bushfires (peaking December, 2019--January, 2020)

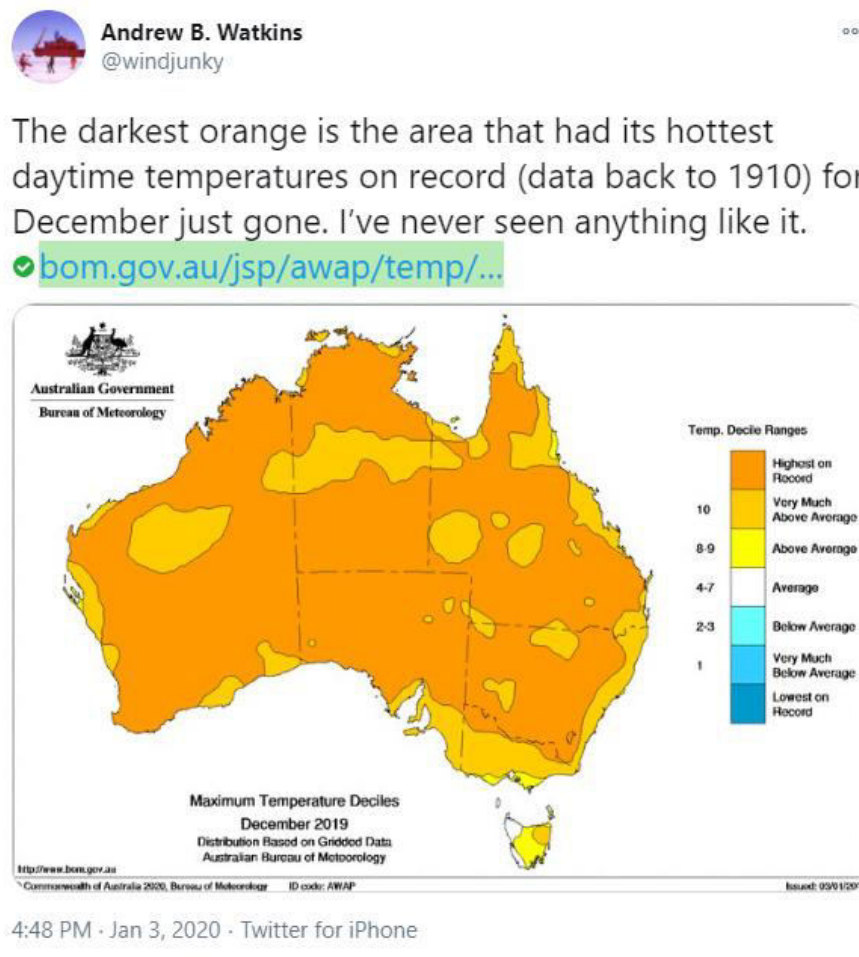
“The 2019–20 Australian bushfire season, colloquially known as the Black Summer, was a period of unusually intense bushfires in many parts of Australia.”

“As of 9 March 2020, the fires burnt an estimated 18.6 million hectares (46 million acres; 186,000 square kilometres; 72,000 square miles), destroyed over 5,900 buildings (including 2,779 homes) and killed at least 34 people. Nearly three billion terrestrial vertebrates alone--the vast majority being reptiles--were affected and some endangered species were believed to be driven to extinction. At its peak, air quality dropped to hazardous levels in all southern and eastern states. The cost of dealing with the bushfires is expected to exceed the A\$4.4 billion of the 2009 Black Saturday fires, and tourism sector revenues fell by more than A\$1 billion. However, economists estimated that the Australian bushfires may cost over A\$103 billion in property damage and economic losses, making the bushfires Australia's

costliest natural disaster to date. Nearly 80 per cent of Australians were affected either directly or indirectly by the bushfires. By 7 January 2020, the smoke had moved approximately 11,000 kilometres (6,800 mi) across the South Pacific Ocean to Chile and Argentina. *As of 2 January 2020, NASA estimated that 306 million tonnes (337 million short tons) of CO₂ had been emitted.*"

[From the Wikipedia webpage for "2019–20 Australian bushfire season" at the Wikipedia website (at https://en.wikipedia.org/wiki/2019%E2%80%9320_Australian_bushfire_season) (paragraphs 1 and 3)]

182) Tweet "Maximum Temperature Deciles, December 2019" (Australian Government Bureau of Meteorology) (January, 2020)



[From tweet by Andrew B. Watkins (January 3, 2020) at the Twitter Platform (at <https://twitter.com/windjunky/status/1213230606181531648>)

(Note: Andrew B. Watkins Twitter Profile: "Australian Climate Scientist: sea ice, oceans, Australian climate drivers & trends. Previously played goalie for Antarctica. All personal opinions only")]

183) Article "Half of UK universities have committed to divest from fossil fuel" (Matthew Taylor) (January, 2020)

"Half of UK universities have signed up to divest from fossil fuels in what campaigners say is a significant blow to the 'social licence' of big oil."

"Seventy-eight of the UK's 154 public universities have joined the divestment campaign, either divesting or pledging to divest hundreds of millions from the fossil fuel industry."

“Although some of the universities have only withdrawn from certain fossil fuels – such as tar sands or coal – others have already divested from all fossil fuels as part of what campaigners say it is an accelerating process of delegitimisation of the industry.”

“Chris Saltmarsh from the campaign group People & Planet said excluding the industry from universities was now ‘a mainstream and majority position.’”

“That universities across the sector are now divesting so fully and quickly demonstrates how far the fossil fuel industry’s social license has been eroded over the last seven years.”

[From article Article “Half of UK universities have committed to divest from fossil fuel” by Matthew Taylor (January 13, 2020) at the Guardian website (at <https://www.theguardian.com/environment/2020/jan/13/half-of-uk-universities-have-committed-to-divest-from-fossil-fuel#:~:text=Half%20of%20UK%20universities%20have%20signed%20up%20to%20divest%20from,social%20licence%E2%80%9D%20of%20big%20oil.&text=Chris%20Saltmarsh%20from%20the%20campaign,a%20mainstream%20and%20majority%20position%E2%80%9D>) (paragraphs 1-4)]

184) Article “BlackRock C.E.O. Larry Fink: Climate Crisis Will Reshape Finance--In his influential annual letter to chief executives, Mr. Fink said his firm would avoid investments in companies that “present a high sustainability-related risk.” (Andrew Ross Sorkin) (January, 2020)

a) “Laurence D. Fink, the founder and chief executive of BlackRock, announced Tuesday that his firm would make investment decisions with environmental sustainability as a core goal.”

“BlackRock is the world’s largest asset manager with nearly \$7 trillion in investments, and this move will fundamentally shift its investing policy--and could reshape how corporate America does business and put pressure on other large money managers to follow suit.”

“Mr. Fink’s annual letter to the chief executives of the world’s largest companies is closely watched, and in the 2020 edition he said BlackRock would begin to exit certain investments that ‘present a high sustainability-related risk,’ such as those in coal producers. His intent is to encourage every company, not just energy firms, to rethink their carbon footprints.”

“‘Awareness is rapidly changing, and I believe we are on the edge of a fundamental reshaping of finance,’ Mr. Fink wrote in the letter, which was obtained by The New York Times. ‘The evidence on climate risk is compelling investors to reassess core assumptions about modern finance.’”

[From article “BlackRock C.E.O. Larry Fink: Climate Crisis Will Reshape Finance--In his influential annual letter to chief executives, Mr. Fink said his firm would avoid investments in companies that “present a high sustainability-related risk” by Andrew Ross Sorkin (January 14, 2020) at the website of the New York Times (at <https://www.nytimes.com/2020/01/14/business/dealbook/larry-fink-blackrock-climate-change.html?action=click&auth=login-email&login=email&module=Top%20Stories&pgtype=Homepage>) (paragraphs 1-4)]

b) from Larry Fink's 2020 letter to CEOs titled "A Fundamental Reshaping of Finance"

"The evidence on climate risk is compelling investors to reassess core assumptions about modern finance. Research from a wide range of organizations--including the UN's Intergovernmental Panel on Climate Change, the BlackRock Investment Institute, and many others, including new studies from McKinsey on the socioeconomic implications of physical climate risk--is deepening our understanding of how climate risk will impact both our physical world and the global system that finances economic growth."

"Will cities, for example, be able to afford their infrastructure needs as climate risk reshapes the market for municipal bonds? What will happen to the 30-year mortgage--a key building block of finance--if lenders can't estimate the impact of climate risk over such a long timeline, and if there is no viable market for flood or fire insurance in impacted areas? What happens to inflation, and in turn interest rates, if the cost of food climbs from drought and flooding? How can we model economic growth if emerging markets see their productivity decline due to extreme heat and other climate impacts?"

"Investors are increasingly reckoning with these questions and recognizing that climate risk is investment risk."

"These questions are driving a profound reassessment of risk and asset values. And because capital markets pull future risk forward, we will see changes in capital allocation more quickly than we see changes to the climate itself. In the near future – and sooner than most anticipate – there will be a significant reallocation of capital."

[From letter "A Fundamental Reshaping of Finance" at the website of BlackRock (at <https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter>) (paragraphs 3-6)]

c) From letter "Sustainability as BlackRock's New Standard for Investing" (BlackRock)

Exiting Thermal Coal Producers

"Thermal coal production is one such sector. *Thermal coal is significantly carbon intensive, becoming less and less economically viable, and highly exposed to regulation because of its environmental impacts. With the acceleration of the global energy transition, we do not believe that the long-term economic or investment rationale justifies continued investment in this sector.* As a result, we are in the process of removing from our discretionary active investment portfolios the public securities (both debt and equity) of companies that generate more than 25% of their revenues from thermal coal production, which we aim to accomplish by the middle of 2020. As part of our process of evaluating sectors with high ESG risk, we will also closely scrutinize other businesses that are heavily reliant on thermal coal as an input, in order to understand whether they are effectively transitioning away from this reliance. In addition, BlackRock's alternatives business will make no future direct investments in companies that generate more than 25% of their revenues from thermal coal production."

[From letter "Sustainability as BlackRock's New Standard for Investing" (BlackRock) at the website for BlackRock (at <https://www.blackrock.com/corporate/investor-relations/blackrock-client-letter>) (in section "Sustainable, Resilient, and Transparent Portfolios", in subsection "Reducing ESG Risk in Active Strategies", in additional subsection "Exiting Thermal Coal Producers", paragraph 1)]

185) Article “America’s Radioactive Secret: Oil-and-gas wells produce nearly a trillion gallons of toxic waste a year. An investigation shows how it could be making workers sick and contaminating communities across America” (Justin Nobel) (January, 2020)

a) “In an investigation involving hundreds of interviews with scientists, environmentalists, regulators, and workers, Rolling Stone found a sweeping arc of contamination — oil-and-gas waste spilled, spread, and dumped across America, posing under-studied risks to the environment, the public, and especially the industry’s own employees. There is little public awareness of this enormous waste stream, the disposal of which could present dangers at every step—from being transported along America’s highways in unmarked trucks; handled by workers who are often misinformed and underprotected; leaked into waterways; and stored in dumps that are not equipped to contain the toxicity. Brine has even been used in commercial products sold at hardware stores and is spread on local roads as a de-icer.” (paragraph 16)

b) “The Earth’s crust is in fact peppered with radioactive elements that concentrate deep underground in oil-and-gas-bearing layers. This radioactivity is often pulled to the surface when oil and gas is extracted—carried largely in the brine.” (paragraph 4)

Brine: “... a naturally occurring waste product that gushes out of America’s oil-and-gas wells to the tune of nearly 1 trillion gallons a year....”

“There are about 1 million active oil-and-gas wells, across 33 states, with some of the biggest growth happening in the most radioactive formation—the Marcellus.” (paragraph 15)

“... thanks to a single exemption the industry received from the EPA in 1980, the streams of waste generated at oil-and-gas wells—all of which could be radioactive and hazardous to humans—are not required to be handled as hazardous waste.” (paragraph 27)

“... Silverio Caggiano, a near 40-year veteran of the Youngstown fire department and a hazardous-materials specialist with the Ohio Hazmat Weapons of Mass Destruction Advisory Committee: ‘If we caught some ISIS terrorist cells dumping this into our waterways, they would be tried for terrorism and the use of a WMD on U.S. citizens. However, the frac industry is given a pass on all of this.’” (paragraph 43)

c) “Tanks, filters, pumps, pipes, hoses, and trucks that brine touches can all become contaminated, with the radium building up into hardened “scale,” concentrating to as high as 400,000 picocuries per gram. With fracking—which involves sending pressurized fluid deep underground to break up layers of shale—there is dirt and shattered rock, called drill cuttings, that can also be radioactive. But brine can be radioactive whether it comes from a fracked or conventional well; the levels vary depending on the geological formation, not drilling method. Colorado and Wyoming seem to have lower radioactive signatures, while the Marcellus shale, underlying Ohio, Pennsylvania, West Virginia, and New York, has tested the highest. Radium in its brine can average around 9,300 picocuries per liter, but has been recorded as high as 28,500. ‘If I had a beaker of that on my desk and accidentally dropped it on the floor, they would shut the place down,’ says Yuri Gorby, a microbiologist who spent 15 years studying radioactivity with the Department of Energy. ‘And if I dumped it down the sink, I could go to jail.’” (paragraph 14)

d) “Brine-spreading is legal in 13 states, including the Dakotas, Colorado, much of the Upper Midwest, northern Appalachia, and New York....” (paragraph 47)

“CPI Road Solutions, an Indianapolis-based snow- and ice-management company, sells hundreds of thousands of gallons of AquaSalina each winter to the Pennsylvania Turnpike Commission and Ohio Department of Transportation, says Jay Wallerstein, a company VP.” (paragraph 58)

“Used for home patios, sidewalks, and driveways--‘Safe for Environment & Pets,’ the label touts-- AquaSalina was found by a state lab to contain radium at levels as high as 2,491 picocuries per liter.” (paragraph 53)

e) “Sitting in her dining room, surrounded by pictures she has taken to document the contamination... she tells me the brine is spread regularly on roads that abut cornfields, cow pastures, and trees tapped for maple syrup sold at a local farmer’s market.” (paragraph 49)

f) “The first state to enact any protections at all was Louisiana, in the late 1980s....” (paragraph 30)

“Expert testimony in lawsuits by dozens of Louisiana oil-and-gas industry workers going back decades and settled in 2016 show that pipe cleaners, welders, roughnecks, roustabouts, derrickmen, and truck drivers hauling dirty pipes and sludge all were exposed to radioactivity without their knowledge and suffered a litany of lethal cancers.” (paragraph 19)

“The levels of radium in Louisiana oil pipes had registered as much as 20,000 times the limits set by the EPA for topsoil at uranium-mill waste sites.” (paragraph 31)

“...former secretary of the Louisiana Department of Environmental Quality and the first state official to tackle oil’s radioactivity issue, is now 79 years old and lives... in New Mexico. But he has to return to Louisiana once every couple of months to serve as an expert in lawsuits over oil-field contamination.... There are now more than 350 of these legacy lawsuits moving forward in the state.” (last paragraph)

g) “There is a massive liability that has been lying silently below the surface for all these years,” says Allan Kanner, one of the nation’s foremost environmental class-action lawyers, whose recent cases have included PFAS contamination and the Deepwater Horizon oil spill. “The pieces haven’t all really been put together, because the industry has not really been telling the story and regulators haven’t been telling the story and local doctors aren’t informed, but at some point I expect you will see appropriate and reasonable litigation emerge on this.” (paragraph 94)

[From the article “America’s Radioactive Secret: Oil-and-gas wells produce nearly a trillion gallons of toxic waste a year. An investigation shows how it could be making workers sick and contaminating communities across America” (Justin Nobel) (January, 2020) (at <https://www.rollingstone.com/politics/politics-features/oil-gas-fracking-radioactive-investigation-937389/>)]

[Related Article: “America’s nuclear headache: old plutonium with nowhere to go” by Scot J. Paltrow (Reuters) (April 20, 2018) (at <https://www.reuters.com/article/us-usa-nukes-plutonium-specialreport/americas-nuclear-headache-old-plutonium-with-nowhere-to-go-idUSKBN1HR1KC>)]

186) Activism “Move your money, or we’ll move ours” (Jane Fonda message Jamie Dimon, CEO of Chase Bank) (The Years Project) (January, 2020)

[Same video as tweet from The Years Project at the Twitter Platform (January 22, 2020) (at <https://twitter.com/YEARsofLIVING/status/1220009438842642432>)]

Jane Fonda’s message to Chase Bank
“Move your money or we’ll move ours”



187) Editorial “Investing in humanity: The BMJ’s divestment campaign” (Kamran Abbasi, executive editor and Fiona Godlee, editor in chief) (January, 2020)

“On our current trajectory we will miss carbon emission targets and sustainable development goals, both agreed by international consensus. Populist politicians rubbish science confirming the harmful effects of climate change. Big business obfuscates, distorts, and denies evidence for the adverse effects of its products. When future historians, if such a future exists, look back on our stewardship of Planet Earth, what will be their judgment? That we allowed politics and profits to harm our home planet and ourselves?”

“Health professionals and medical organisations should not accept the world as it is. This is not a matter of playing party politics or anticorporate posturing. Taking action is a duty to the people we serve and to future generations. And we can act: by divesting from health harming industries. Divestment offers health professionals and medical organisations, for the duty is both individual and collective, an opportunity to influence politicians and industry towards behaviours that are better for the planet and people’s health (box 1).”

“Extraction of fossil fuels damages our planet. Products of the fossil fuel industry harm health, causing global conflict, driving climate change through carbon emissions, and shortening lives through air pollution. Yet politicians refuse to relinquish their political and commercial links to fossil fuels, and fossil

fuel companies manipulate science to downplay the ill effects of their business. This allows us all to continue the convenient fantasy that all is well with the way we live.”

“Consuming our planet’s fossil fuel reserves will ensure we miss carbon emission targets. Although the industry shows little sign of changing its strategy, the financial world is waking up to the threat to investments as well as to the planet. The governor of the Bank of England considers fossil fuels a risky investment because the demands of meeting the 2°C climate target will render the majority of oil, gas, and coal reserves ‘stranded’ and ‘unburnable.’ In 2017, at the One Planet Summit in Paris, the World Bank announced its intention to end financial support for oil and gas extraction in response to the threat posed by climate change. Recently, the European Investment Bank, the European Union’s lending arm and the world’s largest multilateral financial institution, stated its ambition to become the world’s first ‘climate bank’ by ending its multibillion euro financing of oil, gas, and coal projects after 2021.9

“With this editorial, we launch a campaign for divestment from fossil fuels. Our campaign is aimed at health professionals and medical organisations, since divestment is one way of exerting influence on politicians and industry on behalf of our patients and the public....”

“The BMJ applauds organisations such as the Royal College of Physicians, the Royal College of General Practitioners, the Royal Australasian College of Physicians, the medical associations of America and Canada, and the BMA, our owner, for committing to divest from fossil fuels. For our part, we will not accept advertising or research funded by companies that produce fossil fuels. We will also explore how else our business might be dependent on fossil fuel companies and take steps to end any such reliance....”

Next steps

“We will consider what else to add to the divestment list.... Workable criteria will help decide which other industries should join tobacco and fossil fuels as targets for divestment. We propose possible criteria in [box 3](#). We welcome your views on these criteria and on our fossil fuel divestment campaign overall.”

“Box 3

Possible criteria for divestment from an industry

- Harm caused by the industry, either in the creation or use of its product(s), clearly outweighs the benefits
- Industry manipulates the science to hide harmful effects
- The industry is not essential for our existence or an alternative industry is available or can be developed”

[From the Editorial “Investing in humanity: The BMJ’s divestment campaign” by Kamran Abbasi, executive editor and Fiona Godlee, editor in chief (January 23, 2020) at the website of BMJ (at https://www.bmj.com/content/368/bmj.m167?utm_source=twitter&utm_medium=social&utm_term=hootsuite&utm_content=sme&utm_campaign=usage) (paragraphs 2-3, 5-8, 11, and Box 3)]

b) “The BMJ is a weekly peer-reviewed medical trade journal, published by the trade union the British Medical Association (BMA). The BMJ has editorial freedom from the BMA. It is one of the world's oldest general medical journals. Originally called the British Medical Journal, the title was officially shortened to BMJ in 1988, and then changed to The BMJ in 2014. The journal is published by BMJ Publishing Group Ltd, a subsidiary of the British Medical Association (BMA).”

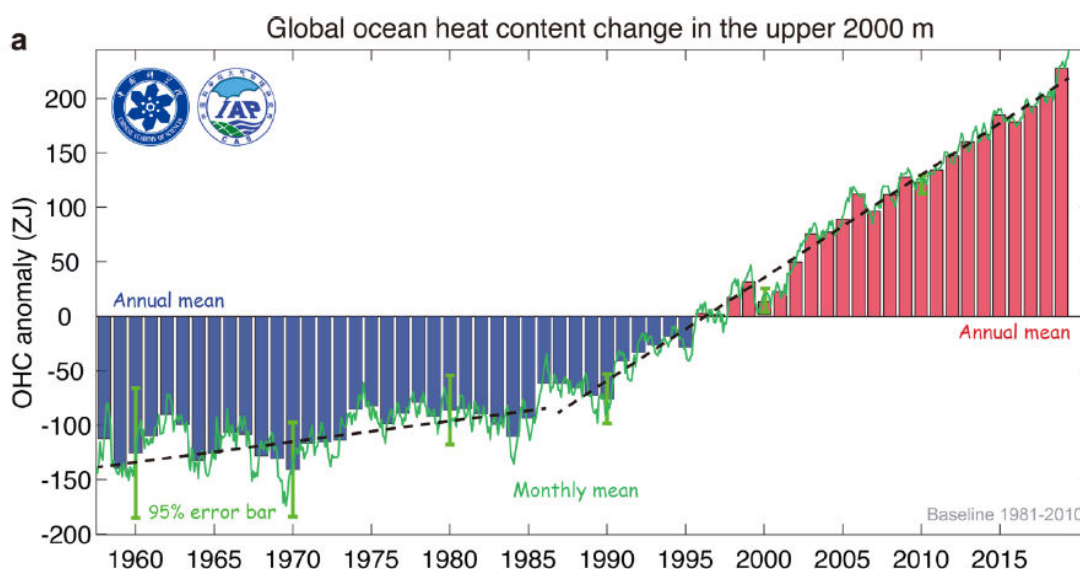
[From the Wikipedia webpage for “The BMJ” (at https://en.wikipedia.org/wiki/The_BMJ) (paragraph 1)]

188) Article “Record-Setting Ocean Warmth Continued in 2019” (Lijing Cheng et. al.)
(January, 2020)

“The ocean heating is irrefutable, and a key measure of the Earth’s energy imbalance: the excess GHGs in the air trap more heat inside the climate system and drives global warming. More than 90% of the heat accumulates in the ocean because of its large heat capacity, and the remaining heating manifests as atmospheric warming, a drying and warming landmass, and melting of land and sea ice. There are no reasonable alternatives aside from anthropogenic emissions of heat-trapping gases (IPCC, 2001, 2007, 2013, 2019; USGCRP, 2017). Increased ocean temperatures lead to rising sea levels (thermal expansion of the ocean and added mass from melting land ice) (Oppenheimer et al., 2019). According to the altimetry satellite record, the past 10 years are also the highest in global mean sea level since 1900 (IPCC, 2019).”

“Increases in ocean temperature reduce dissolved oxygen in the ocean and significantly affect sea life, particularly corals and other temperature- and chemistry-sensitive organisms (Abram et al., 2019; Bindoff et al., 2019). The increasing heat increases evaporation, and the extra moisture in the warmer atmosphere nourishes heavy rains and promotes flooding (Trenberth et al., 2003; Held and Soden, 2006; Trenberth, 2011; Collins et al., 2019), leading to a more extreme hydrological cycle and more extreme weather (in particular hurricanes and typhoons) (Trenberth et al., 2018). It is one of the key reasons why the Earth has experienced increasing catastrophic fires in the Amazon, California, and Australia in 2019 (extending into 2020 for Australia).”

“It is important to note that ocean warming will continue even if the global mean surface air temperature can be stabilized at or below 2°C (the key policy target of the Paris Agreement) in the 21st century (Cheng et al., 2019a; IPCC, 2019), due to the long-term commitment of ocean changes driven by GHGs. Here, the term “commitment” means that the ocean (and some other components in the Earth system, such as the large ice sheets) are slow to respond and equilibrate, and will continue to change even after radiative forcing stabilizes (Abram et al., 2019). However, the rates and magnitudes of ocean warming and the associated risks will be smaller with lower GHG emissions (Cheng et al., 2019a; IPCC, 2019). Hence, the rate of increase can be reduced by appropriate human actions that lead to rapid reductions in GHG emissions (Cheng et al., 2019a; IPCC, 2019), thereby reducing the risks to humans and other life on Earth.”

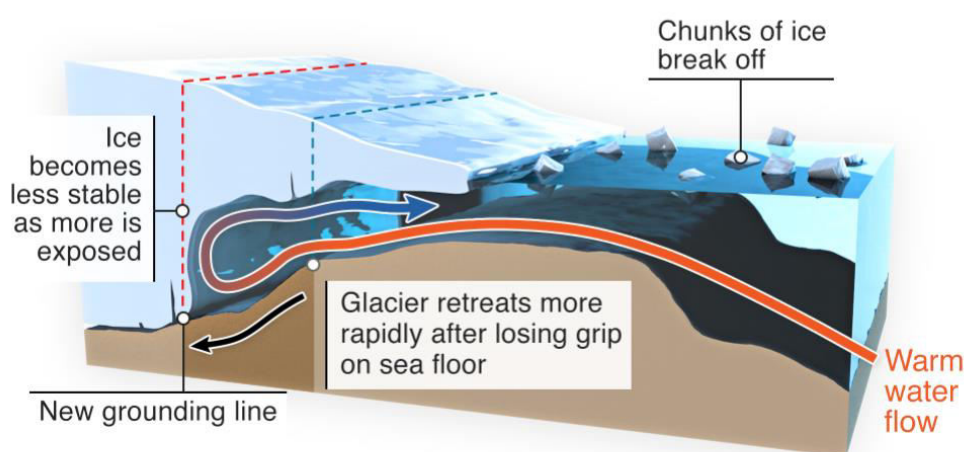


[From article "Record-Setting Ocean Warmth Continued in 2019" by Lijing Cheng et. al.) (January 26, 2020) at the website Springer Link (at <https://link.springer.com/article/10.1007/s00376-020-9283-7>) (where article can be downloaded as a pdf file) (paragraphs 7-9, and Graph a)]

189) Article "Antarctica melting: Climate change and the journey to the 'doomsday glacier'" (Justin Rowlett) (January, 2020)

"Glaciologists have described Thwaites as the 'most important' glacier in the world, the 'riskiest' glacier, even the 'doomsday' glacier. It is massive--roughly the size of Britain. It already accounts for 4% of world sea level rise each year--a huge figure for a single glacier--and satellite data show that it is melting increasingly rapidly. There is enough water locked up in it to raise world sea level by more than half a metre. And Thwaites sits like a keystone right in the centre of the West Antarctic Ice Sheet--a vast basin of ice that contains more than 3m of additional potential sea level rise."
(in section "The 'Doomsday' Glacier")

Changing winds and currents mean warmer water is getting under the ice



Drawing not to scale

Source: International Thwaites Glacier Collaboration

BBC

"They say what is happening here is down to the complex interplay of climate, weather and ocean currents. The key is the warm seawater, which originates on the other side of the world. As the Gulf Stream cools between Greenland and Iceland, the water sinks. This water is salty, which makes it relatively heavy, but is still a degree or two above freezing. This heavy salty water is carried by a deep ocean current called the Atlantic conveyor all the way down to the south Atlantic."
(in section "Drilling Through the Ice")

"Here it becomes part of the Antarctic Circumpolar Current, flowing deep - a third of a mile (530m) - below a layer of much colder water. The surface water in Antarctica is very cold, just above -2C degrees, the freezing point of salt water. The deep warm circumpolar water travels all the way around the continent but has been increasingly encroaching on the icy edge of West Antarctica. This is where our changing climate comes in. The scientists say the Pacific Ocean is warming up and that is shifting wind patterns off the coast of West Antarctica, allowing the warm deep water to well up over the continental shelf. 'The deep Antarctic circumpolar water is only a handful of degrees warmer than the water above

it - a degree or two above 0C - but that's warm enough to light this glacier up,' says David Holland, an oceanographer with New York University and one of the lead scientists at the grounding zone camp" (in section "Shifting Winds").

"A metre of sea level rise may not sound much, particularly when you consider that in some places the tide can rise and fall by three or four metres every day. But sea level has a huge effect on the severity of storm surges, says Prof David Vaughan, the director of science at the British Antarctic Survey. An increase in sea level of 50cm would mean the storm that used to come every thousand years will now come every 100 years. If you increase that to a metre then that millennial storm is likely to come once a decade." (in section "Rising Seas Levels")

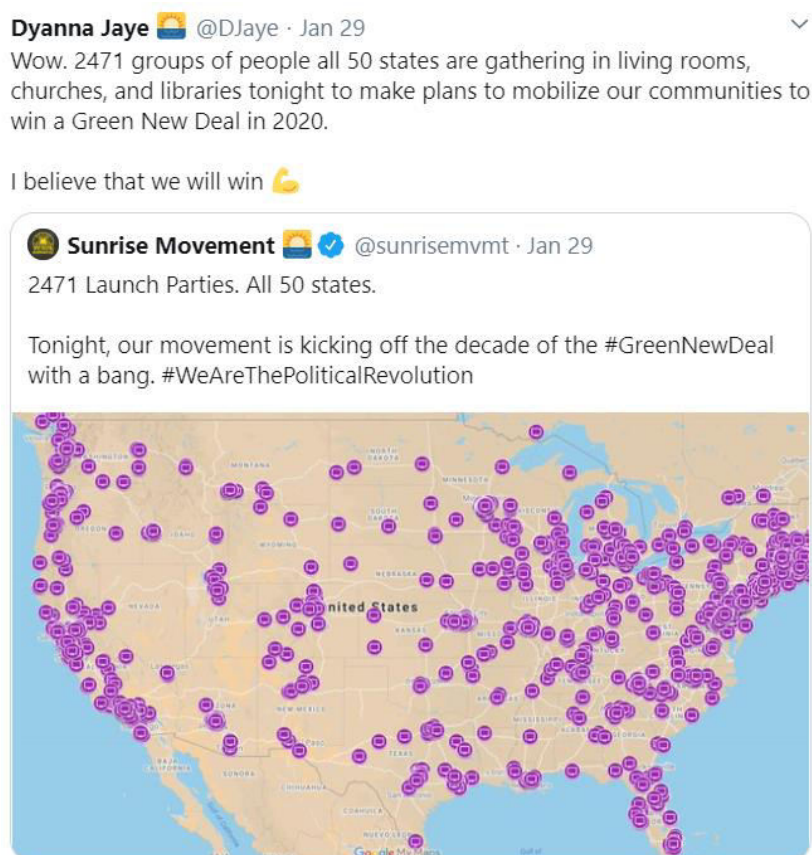
(repeated for emphasis)

"And Thwaites sits like a keystone right in the centre of the West Antarctic Ice Sheet--a vast basin of ice that contains more than 3m of additional potential sea level rise."

(in section "The 'Doomsday' Glacier")

[From the article "Antarctica melting: Climate change and the journey to the 'doomsday glacier'" by Justin Rowlett (January 28, 2020) at the website of BBC News (at <https://www.bbc.com/news/science-environment-51097309>)

190) Tweet "2471 Launch Parties" (Dyanna Jaye) (January 29, 2020)



[From Tweet by Dyanna Jaye (January 29, 2020) on Twitter (at <https://twitter.com/DJaye/status/1222679380176134152>)]

[Note: Dyanna Jaye's profile at Twitter: "Co-founder & Organizing Director @sunrisemvmt. Building an army of young people to stop climate change & create millions of jobs in the process. Tweets my own."]

191) Article “4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors” (Mengpin Ge and Johannes Friedrich) - (February, 2020)

“Global annual greenhouse gas emissions have grown 41% since 1990, and they are still climbing. While emissions dipped notably in 2016, recent data suggests that carbon dioxide emissions rose each year since then.”

“Where are these emissions coming from, and who is responsible? WRI’s ClimateWatch platform offers comprehensive emissions data for all countries, sectors and gases. Here’s what we know about the sectors and countries driving greenhouse gas emissions globally:”

The Energy Sector Produces the Most Greenhouse Gas Emissions

“Energy consumption is by far the biggest source of human-caused greenhouse gas emissions, responsible for a whopping 73% worldwide. The energy sector includes transportation, electricity and heat, buildings, manufacturing and construction, fugitive emissions and other fuel combustion.”

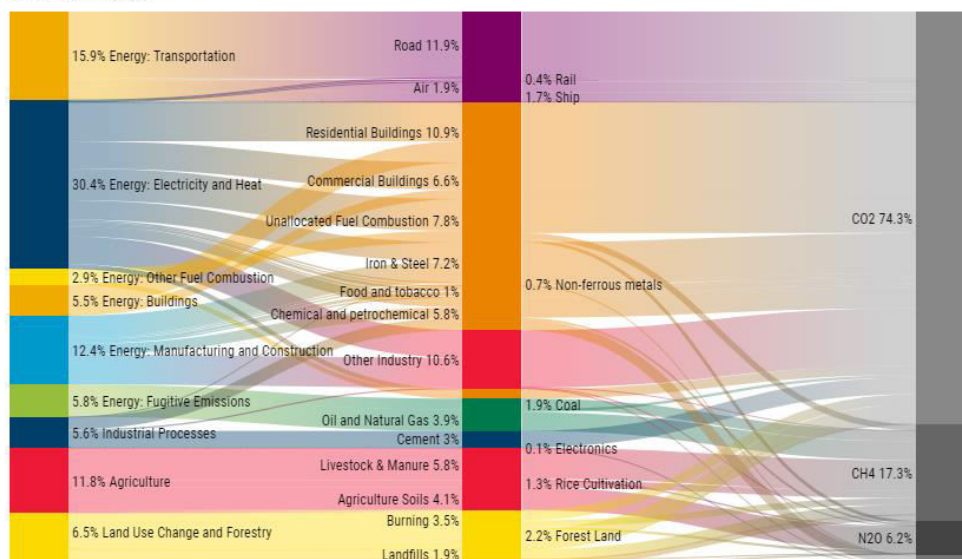
“The other top sectors that produce emissions are agriculture, such as livestock and crop cultivation(12%); land use, land-use change and forestry, such as deforestation (6.5%); industrial processes of chemicals, cement and more (5.6%); and waste, including landfills and waste water (3.2%).”

“Within the energy sector, generation of heat and electricity is responsible for most emissions (15 GtCO₂e in 2016, or 30% of total greenhouse gas emissions), followed by transportation (7.9 GtCO₂e in 2016, or 15% of total emissions) and manufacturing and construction (6.1 GtCO₂e, or 12% of total emissions).”

World Greenhouse Gas Emissions: 2016

World Greenhouse Gas Emissions in 2016 (Sector | End Use | Gas)

Total: 49.4 GtCO₂e



Source: Climate Watch, based on raw data from IEA (2018), CO₂ Emissions from Fuel Combustion, www.iea.org/statistics; modified by WRI.

WORLD RESOURCES INSTITUTE

Buildings and Cars are the Main Activities Driving Energy-related Emissions

“The middle column of the chart above shows emissions by end-use activities, helping us understand the specific activities from which emissions stem. Activities driving most energy emissions include road transportation (11.9% of total emissions), residential buildings (10.9% of total emissions) and

commercial buildings (6.6% of total emissions). Emissions from those activities include both direct emissions from combustion of fossil fuels, as well as indirect emissions such as use of electricity.”

Industry and Transportation are the Fastest-growing Sources of Greenhouse Gas Emissions

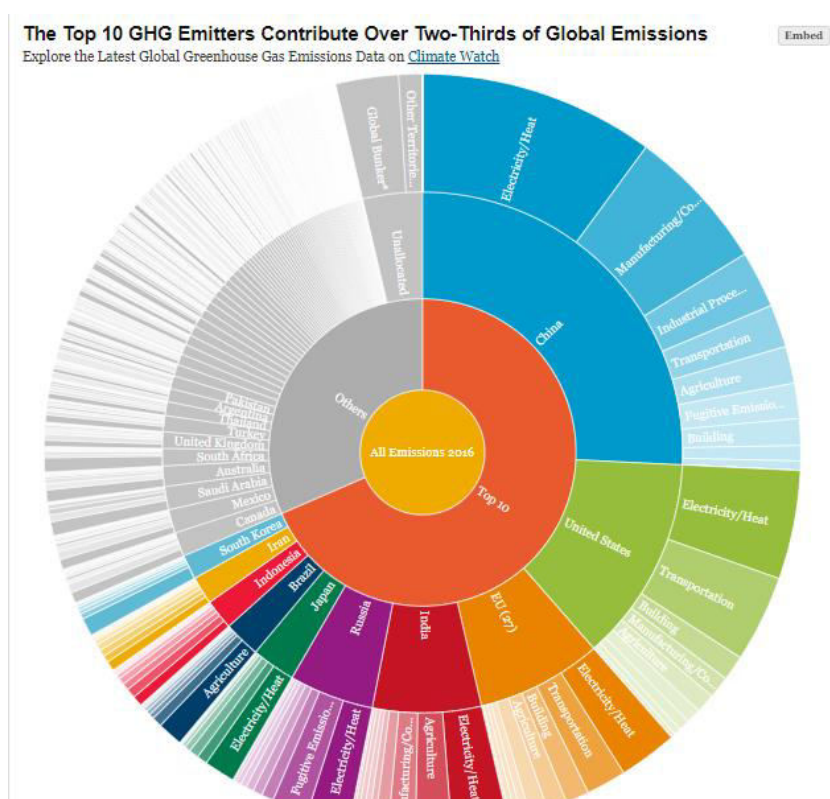
“Since 1990, three sectors stand out as the fastest-growing sources of greenhouse gas emissions: Industrial processes grew by 174%, transportation (a subsector of energy) by 71%, and manufacturing and construction (also a subsector of energy) by 55%. The growth in industrial emissions stems primarily from increased use of refrigeration and air conditioning, which produce hydrofluorocarbons (HFCs), potent greenhouse gases. Increased travel by automobiles is the predominant reason transportation emissions are on the rise.”

“In comparison, emissions from the largest-emitting subsector within the energy sector, electricity and heat generation, increased 78% from 1990-2013, but then dropped by 2% between 2013-2016. The decrease was driven by various factors, including a shift to natural gas from coal and increased use of renewables. However, the latest carbon emissions data suggests that CO2 emissions from energy rose again in 2017 and 2018.”

“A small number of countries contribute the vast majority of greenhouse gas emissions, with the top 10 emitters accounting for over two-thirds of annual global greenhouse gas emissions. Most of them also have large populations and economies, together accounting for over 50% of the global population and almost 60% of the world’s GDP. China is the biggest emitter at 26% of global greenhouse gas emissions, followed by the United States at 13%, the European Union at 7.8% and India at 6.7%.”

“Most of the top 10 emitters have higher emissions per person than the world average (around 6.8 tCO2e per person). Among the top 10 total greenhouse gas emitters, Canada and the United States have the highest per capita greenhouse gas emissions at 22 tCO2e per person and 18 tCO2e per person, respectively, while India has the lowest at 2.4 tCO2e per person. China’s per capita emissions (8.5 tCO2e) now surpass those of the European Union (7.1 tCO2e).”

“Countries such as Qatar and Australia, while not among the top 10 emitters, have higher per capita emissions than most top emitters at 34.8 tCO2e per person and 21.5 tCOe2 per person, respectively.”



Carbon Dioxide Makes Up Most, but Not All, Greenhouse Gas Emissions

“Carbon dioxide (CO₂) comprises 74% of greenhouse gas emissions. Most CO₂ emissions (89%) are from the use of fossil fuels, especially for generation of electricity and heat, transportation, and manufacturing and consumption. Land use, land-use change and forestry is another major contributor (7%) to human-made CO₂ emissions, mostly due to deforestation.”

“Methane (CH₄) and nitrous oxide (N₂O) make up 17% and 6.2% of total greenhouse gas emissions, respectively, mostly from agriculture, waste treatment and gas flaring. Fluorinated gases (comprised of HFCs, PFCs, SF₆ and NF₃) from industrial processes make up 2% of global emissions. These gases are much more potent than CO₂ in terms their global warming potential, and often provide overlooked opportunities for mitigation.”

Greenhouse Gas Emissions Must Be Reduced Rapidly to Avert the Climate Crisis

“The world is already facing the consequences from climate change. If we are to avoid much more dangerous and costly impacts, current levels of greenhouse gas emissions must be slashed in half by 2030 and reach net-zero by mid-century. The largest emissions sources, like the energy sector, are good places to start. But to fully tackle the climate crisis, we will need deep reductions across all sectors, big and small. Switching to renewable energy, electrifying the transportation sector, introducing more sustainable agriculture practices, curbing deforestation and forest degradation, and producing less waste are a few key ways to drive greenhouse gas emissions downward and set the world on course for a safer future.”

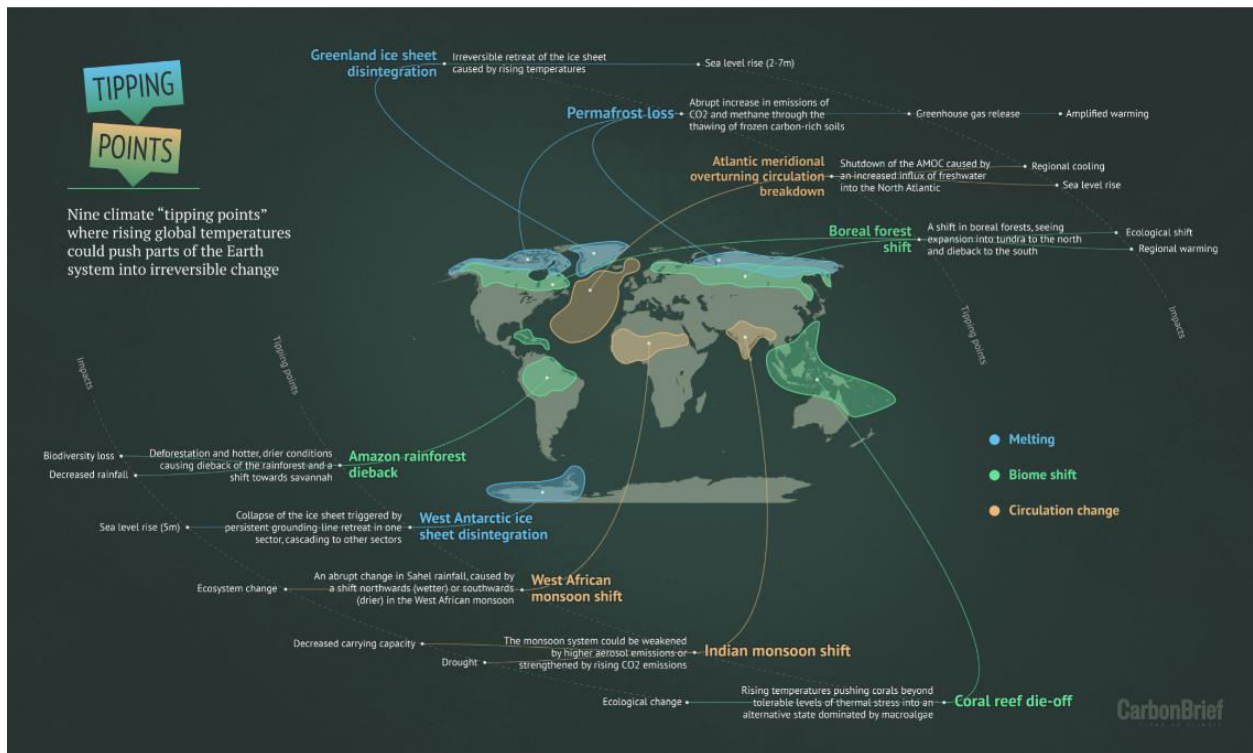
[From article “4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors” by Mengpin Ge and Johannes Friedrich (February 6, 2020) at the website of the World Resources Institute (at https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector?utm_source=twitter&utm_medium=worldresources&utm_campaign=socialmedia&utm_term=e93c0580-6270-4921-afb6-07c2f0c40960) (paragraphs 1-2; and then in section “The Energy Sector Produces the Most Greenhouse Gas Emissions”, paragraphs 1-3; in section “Buildings and Cars are the Main Activities Driving Energy-related Emissions”, paragraph 1; in section “Industry and Transportation are the Fastest-growing Sources of Greenhouse Gas Emissions”, paragraphs 1-5; in section “Carbon Dioxide Makes Up Most, but Not All, Greenhouse Gas Emissions”, paragraphs 1-2; in section “Greenhouse Gas Emissions Must Be Reduced Rapidly to Avert the Climate Crisis”, paragraph 1-- and two graphs)]

192) Explainer “Nine ‘tipping points’ that could be triggered by climate change” (Carbon Brief) (February, 2020)

“The persistent march of a warming climate is seen across a multitude of continuous, incremental changes. CO₂ levels in the atmosphere. Ocean heat content. Global sea level rise. Each creeps up year after year, fuelled by human-caused greenhouse gas emissions.”

“And while climate records are being routinely broken, the cumulative impact of these changes could also cause fundamental parts of the Earth system to change dramatically and irreversibly.”

“These ‘tipping points’ are thresholds where a tiny change could push a system into a completely new state.”



“In the game of Jenga, the tower collapses in a split second. For a component of the Earth system, the shift to one physical state to another may take many decades or centuries. But the feature they have in common is that once the collapse has started, it is virtually impossible to stop.”

“Finally, in addition to the physical tipping points in the Earth system, the term is often also applied to transforming human society in a positive way. Lenton explains:

‘I think we also need to be looking at tipping points in human, social and technological systems-- this time, tipping points for the good. Cases where a little bit of policy intervention or incentive could tip us onto a path towards a more sustainable future that essentially avoids the worst of the climate tipping points.’”

“For example, analysts and columnists frequently predict an impending tipping point in the increasing uptake and/or falling cost of electric cars--as sales of traditional cars peak and demand for electric vehicles, and the infrastructure to support them, takes hold.”

“A groundswell of demand can push a behaviour, product or technology from the fringe and into the mainstream, often as a result of falling prices. An article published in January this year by the thinktank Carbon Tracker, for example, described how a ‘political tipping point is coming’ on renewable power generation:

‘The falling costs of renewables are driving a political tipping point where politicians move from expensive support for renewables to embrace the sector and to tax fossil fuel externalities.’”

“There are tipping points across society that could lead to a rapid global transformation, recent research in Proceedings of the National Academy of Sciences (PNAS) argues. For example, the study identifies six ‘social tipping interventions’ that could help lead to a carbon-neutral society by 2050:

‘These social tipping interventions comprise removing fossil-fuel subsidies and incentivising decentralised energy generation, building carbon-neutral cities, divesting from assets linked to

fossil fuels, revealing the moral implications of fossil fuels, strengthening climate education and engagement, and disclosing greenhouse gas emissions information.”

“While the term ‘tipping point’ is often applied quite loosely regarding political and societal change, it is clear that a number of them will need to be crossed – and quickly – to avoid toppling those in the Earth system.”

[From article “Explainer: Nine ‘tipping points’ that could be triggered by climate change” (Robert McSweeney) (February, 2020) at the website Carbon Brief (at <https://www.carbonbrief.org/explainer-nine-tipping-points-that-could-be-triggered-by-climate-change>) (paragraphs 1-3; in section “Tipping Towers”, paragraph 7; in section “Other Tipping Points”, paragraphs 15-19, and graphic)]

(Beginning a Special Section: Gender Equality)

193) Article “6 shocking facts about gender inequality: Discover six unbelievable gender inequality statistics revealed in Melinda Gates's inspiring “The Moment of Lift”, and find out why they matter for women's global empowerment” [Pan MacMillan (the publishers)] (March, 2020)

“With women’s marches in headlines the world over, the awe-inspiring stories of women such as Malala Yousafzai, not to mention the Me Too and TIME’S UP movements: unquestionably, we are witnessing a mass call for change in gender inequality. International Women's Day on 8 March 2020 celebrates the social, economic, cultural and political achievements of women, but also highlights how far we still have to go to achieve gender parity.”

Gender Inequality Statistics

1. “The US is one of only eight countries in the world that does not provide any form of paid maternity leave.”

“Maternity leave has been linked to fewer newborn and infant deaths, higher rates of breastfeeding, less postpartum depression and a more hands-on role for new fathers and And while women who have the opportunity of proper paid maternity leave are more likely to stay in the workforce and earn higher wages, the United States and a seven smaller nations still offer no such compensation.”

3. “In low-income countries, for every hundred boys who continue their education after high school, only fifty-five girls do the same.”

“Access to education is life-changing Sending girls to school leads to improved literacy, higher wages, and faster income growth. It reduces the chance of premarital sex, lowers the chance of early marriage, delays first births, and helps mothers learn about how to plan and space their births apart. Whilst the benefits are endless, girls around the world continue to face barriers to secondary and post-secondary education.”

4. “On average, women around the world spend more than twice as many hours as men doing unpaid work.”

“Unpaid work refers to work performed in the home, from childcare, cooking and cleaning, to collecting water and gathering firewood in communities without electricity and running water. In India, women spend an average of six hours a day performing unpaid work, while men spend only one. In the US, women spend an average of four hours a day; men just 2.5. There is no country where the gap is zero. Across their lifetimes, on average a woman will spend seven years more performing unpaid work than a man. Cutting women’s unpaid work from five hours a day to three boosts women’s participation in the workforce by approximately 20 percent. Participating in paid work is hugely significant as it gives women the power, independence and financial resources to achieve equality with their male counterparts.”

5. “Women across the world currently bear the majority of childcare...”

“But, when fathers take on at least 40 percent of the childcare responsibilities, they themselves are at lower risk of depression and drug abuse, and their children will average higher test scores, have stronger self-esteem, and fewer behavioural problems.”

6. “Gender discrimination is encoded into law in countries across the globe. These are just a few examples:

113 countries do not have laws to ensure equal pay for equal work among men and women

104 countries make certain jobs off-limits for women.

39 countries have laws that mean a daughter cannot inherit the same proportion of assets as a son.

36 countries limit what wives can inherit from their husbands;

29 countries restrict the hours women can work;

18 countries allow men to prohibit their wives from working;

17 countries limit when and how women can travel outside the home.”

[From article “6 shocking facts about gender inequality: Discover six unbelievable gender inequality statistics revealed in Melinda Gates's inspiring “The Moment of Lift”, and find out why they matter for women's global empowerment” by Pan MacMillan (the publishers) (March 3, 2020) at the website of Pan MacMillan (at <https://www.panmacmillan.com/blogs/lifestyle-wellbeing/shocking-gender-inequality-facts-melinda-gates>) (from paragraph 1, and Gender Equality Statistics 1, and 3-6)]

194) Article “A discussion with Dena Merriam, Global Peace Initiative of Women” (Katherine Marshall, Berkley Center for Religion, Peace & World Affairs) (May 2010)

“Background: This May 2010 exchange between Dena Merriam and Katherine Marshall highlights Ms. Merriam’s pioneering work in creating a Global Initiative for women that centers on women. She recounts how she has come to see women's spiritual voices as critical to global peace, and why their voices and the agendas and energy they reflect result in differences in approach and outcome. Her initiative has taken shape over the past decade, born of the glaring gap in women's roles at the pivotal Millennium Summit of Religious leaders at the United Nations in August, 2000 (she was co-organizer). She highlights GPIW's evolution from a focus on women's roles in peace making in conflict situations (Israel, Palestine, Iraq) to a wider focus that extends to environment and is inclusive of men and a broad range of traditions.”

Dena Merriam: “...Women have not created the structures we now have that are not functioning, so we can more easily lead the changes towards the new structures we need. Women, we find, can more easily envisage and articulate the kinds of change that we need across all parts of society.”

Katherine Marshall: “Can you give any examples of what you mean? We are trying to articulate this hard to define sense of what is different.”

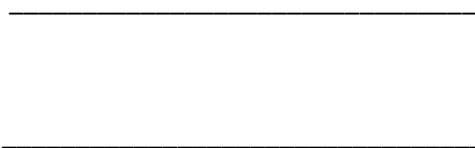
Dena Merriam: “...I have found that when I sat with women, no matter where they come from and how harsh the conditions and conflicts are that they are living, the women, from Israel, Palestine, and Iraq, for example, come as divided as the men, but are far more able to come together on common issues.”

“And the issue where women always come together is the damage that conflict causes to children. No matter how divided they are, they find themselves on the same side of the fence. When a group of women leaders get together, within the first hour or two children always come up. Men can sit together for days of talk and the issue will not come up. Women are simply more finely tuned to how family structures are suffering, and how the different layers of society are damaged.”

“They are also, I have found, more prepared to plunge in to try to solve the problem, more prepared to sacrifice for the solution. They have less need to hold onto positions. That applies even to the hardest core women, who are deeply set in conflict modes, and have suffered terribly. Even they can focus on the issue of children and look for common ground. I have seen this again and again.”

[From article “A discussion with Dena Merriam, Global Peace Initiative of Women” (Katherine Marshall, Berkley Center for Religion, Peace & World Affairs) (May, 2010) at the Berkley Center website ((Note: “The Berkley Center for Religion, Peace, and World Affairs seeks a more just and peaceful world by deepening knowledge and solving problems at the intersection of religion and global affairs through research, teaching, and engaging multiple publics.” (from <https://berkeleycenter.georgetown.edu/about> , paragraph 1)) (at <https://berkeleycenter.georgetown.edu/interviews/a-discussion-with-dena-merriam-global-peace-initiative-of-women>) (paragraph 1; and paragraphs from Ms. Merriam’s response to the fifth question from the bottom “Can you give any examples of what you mean? We are trying to articulate this hard-to-define sense of what is different.”

(End of Special Section: Gender Equality)



(Beginning a Special Section: Why Rich People Use So Much More Energy)

195) Article “Why rich people use so much more energy” (David Roberts) (March, 2020)

“Here’s a simple and important fact for the fight against climate change: Wealthy people consume more energy and, consequently, are responsible for more greenhouse gas emissions than less wealthy people. And as income and wealth inequality have risen across the world for the past 40 years, the wealthy have

consumed more and more relative to their numbers. Energy inequality has increased alongside income inequality.”

“The study began by calculating the total energy footprint—including indirect energy use, i.e., the energy ‘embodied’ in materials—of a wide range goods and services. It examined who buys those services, and how that changes as income rises.”

“Basic goods are the things we can’t or won’t buy much less of, even if our income falls. Luxury goods are the things we buy more of as we get wealthier.”

“The study seeks to understand which goods and services are most energy intensive, which are basic and which are luxury goods, and how the distribution of those goods and services changes as incomes rise.”

“So, what did it find? In a nutshell, as people get wealthier, they spend more on transport (cars, boats, planes, vacations), which is one of the most energy intensive consumer categories. Because wealthier people turn to more energy intensive goods, the energy gap rises even faster than the income gap.”

“... there are at least three policy implications in this work.”

“Final energy demand simply cannot be allowed to rise as much as it is now projected; it will overwhelm efforts to substitute cleaner technologies for their fossil fuel counterparts.”

“... electrify everything: shift all electricity generation to carbon-free sources and then shift as much heat and transportation as possible over to electricity.”

“However, this still leaves the problem that many of the energy uses in the upper right-hand quadrant--the energy intensive luxury goods, mostly having to do with transport--are difficult to decarbonize.”

“The only way to decarbonize many of the most energy intensive goods and services fast enough is for wealthy people to change their behavior and consume less of them.”

“Broadly speaking, there are two ways to accomplish this. The first is by reducing overall income inequality with, say, progressive income taxes or wealth taxes. Since income inequality produces a whole host of other problems, beyond disproportionate consumption of energy intensive good and services, this seems like a promising approach.”

“The second is to reduce energy inequality within particular categories. This can be done with targeted taxation—for example, a tax on first-class flying, cruises and yachts, vacation packages, or other energy intensive luxury goods.”

“The problem is, in a political system dominated by the wealthy, there is little appetite for taxes on the habits of the wealthy. ‘The climate issue is framed by us high emitters--the politicians, business people, journalists, academics,’ climate scientist Kevin Anderson told the BBC. ‘When we say there’s no appetite for higher taxes on flying, we mean we don’t want to fly less.’”

[From article “Why rich people use so much more energy” by David Roberts (March 20, 2020) at the Vox website (at <https://www.vox.com/energy-and-environment/2020/3/20/21184814/climate-change-energy-income-inequality>) (parzgraphs 1, 4, 6-9, 24-25, 26-31)]

196) Article “Shining a light on international energy inequality” [Environment News (University of Leeds)] (March, 2020)

“The findings expose how varied goods and services are in terms of distribution and energy requirements. The researchers also identify key areas where consumption should be cut.”

“Lead author Yannick Oswald, PhD researcher in the School of Earth and Environment at Leeds, said: ‘We found that none of the energy categories are free from energy inequality or benefit populations to an equal degree.’”

“Transport-related consumption categories are among the least equal. Without reducing the energy demand of these services, either through frequent-flyer levies, promoting public transport and limiting private vehicle use, or alternative technology such as electric vehicles, the study suggests that as incomes and wealth improve, our fossil fuel consumption in transport will skyrocket.” (“Indeed, the researchers found that 187 times more vehicle fuel energy is used by the top 10% consumers relative to the bottom 10%.”)

“Study co-author Dr Anne Owen, also from the School of Earth and Environment at Leeds, said: ‘*Our results demonstrate that we can measure the energy footprints of all kinds of goods and services, across the world, in a comparable way. This kind of research is very promising for modelling future distributional implications of climate and energy policies.*’”

“Growth and increased consumption continue to be core goals of today’s politics and economics. The transition to zero carbon energy will be made easier by reduction in demand, which means that top consumers will play an important role in lowering their excess energy consumption.”

“Study co-author Julia Steinberger, leader of the [Living Well Within Limits](#) project and Professor of Social Ecology and Ecological Economics at Leeds, said: ‘There needs to be serious consideration to how to change the vastly unequal distribution of global energy consumption to cope with the dilemma of providing a decent life for everyone while protecting climate and ecosystems.’”

[From article “Shining a light on international energy inequality” by Environment News (University of Leeds) (March 16, 2020) at the University of Leeds website (at https://www.leeds.ac.uk/news/article/4562/shining_a_light_on_international_energy_inequality) (paragraphs 8-10, 14-15, and paragraph 19, which is also highlighted in larger type earlier in the article)]

(End of Special Section: Why Rich People Use So Much More Energy)

197) Article “Methane Levels Reach an All-Time High: New NOAA analysis highlights an alarming trend; experts call for curbing pollution from oil and gas wells” (Jeremy Deaton) (April, 2020)

“A preliminary estimate from NOAA finds that levels of atmospheric methane, a potent heat-trapping gas, have hit an all-time high.”

“Methane is roughly 80 times more powerful than carbon dioxide, and while it stays in the atmosphere for only around a decade, as opposed to centuries, like CO₂, its continued rise poses a major challenge to international climate goals.”

“‘Here we are. It’s 2020, and it’s not only not dropping. It’s not level. In fact, it’s one of the fastest growth rates we’ve seen in the last 20 years,’ said Drew Shindell, a climate scientist at Duke University.

“To gauge methane levels, scientists regularly gathered samples of air from dozens of sites around the world and analyzed them at NOAA’s Global Monitoring Laboratory in Boulder, Colorado. By comparing measurements, they were able to determine the global average. In 2019, the concentration of atmospheric methane reached nearly 1875 parts per billion, the highest level since record-keeping began in 1983.”

“Even more troubling, 2019 saw the second-largest single-year leap in two decades. However, this figure may change, as preliminary estimates have trended high, said Ed Dlugokencky, a research chemist at NOAA. The final numbers will likely be unveiled in November after a more detailed analysis.”

“Methane emissions primarily come from natural sources, like wetlands, and manmade sources, like farms and oil and gas wells. In wetlands, microbes excrete methane, an issue that humans can do little about. On farms, cows and sheep belch methane--a problem that people can address by raising fewer livestock.”

“‘Eat less beef and less dairy. That’s the most straightforward thing,’ Shindell said. ‘For the sake of our own health, we should be doing that anyway.’”

“The easiest way to stem methane pollution, however, is to limit its release from oil and gas drilling sites, he said. Natural gas is mostly methane, and it is prone to leaking from wells. There are essentially two ways to deal with this problem. The first is to burn the natural gas that seeps out, which turns the methane into carbon dioxide. The second is to plug the leaks.”

“Companies can install recovery equipment that allows them to collect the natural gas that would otherwise seep out. They can then sell this gas, helping to offset the cost of the equipment. By one estimate, oil and gas firms could cut methane pollution by 45 percent at no net cost.”

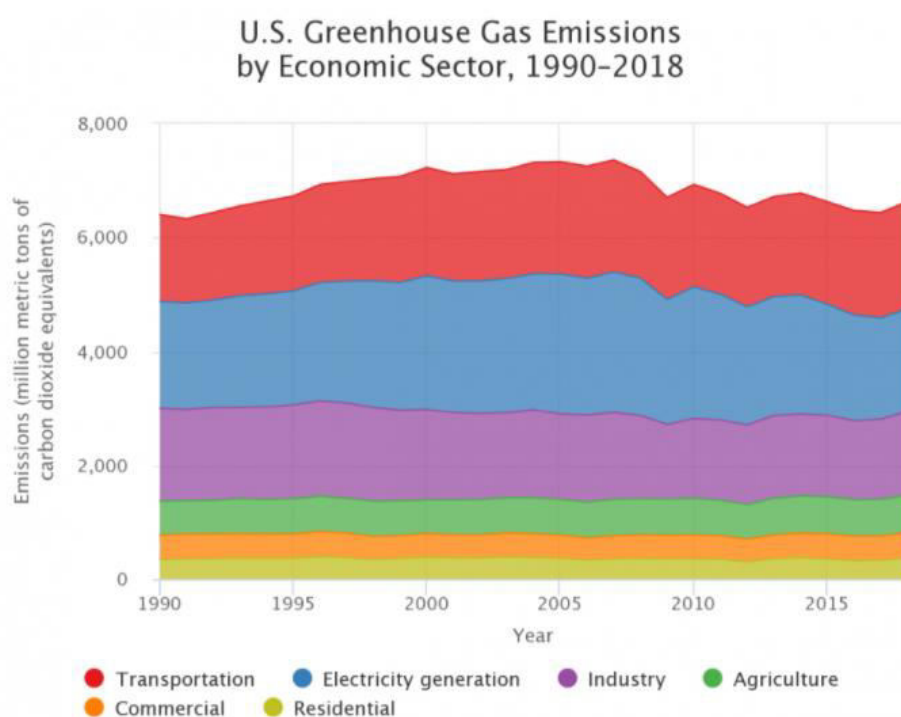
“Despite this, many companies are reluctant to pay for recovery equipment.”

[From article “Methane Levels Reach an All-Time High: New NOAA analysis highlights an alarming trend; experts call for curbing pollution from oil and gas wells” by Jeremy Deaton (Nexus Media News) (April 12, 2020) at the website of Scientific American (at <https://www.scientificamerican.com/article/methane-levels-reach-an-all-time-high/>) (paragraphs 1-5, 7-11)]

198) Report “Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018” (United States Environmental Protection Agency) (published April, 2020)

a) “EPA has prepared the Inventory of U.S. Greenhouse Gas Emissions and Sinks since the early 1990s. This annual report provides a comprehensive accounting of total greenhouse gas emissions for all man-made sources in the United States. The gases covered by the Inventory include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. The Inventory also calculates carbon dioxide removal from the atmosphere by ‘sinks,’ e.g., through the uptake of carbon and storage in forests, vegetation, and soils.”

“The national greenhouse gas inventory is submitted to the United Nations in accordance with the Framework Convention on Climate Change. In preparing the annual emissions inventory report, EPA collaborates with hundreds of experts representing more than a dozen U.S. government agencies, academic institutions, industry associations, consultants and environmental organizations. EPA also collects greenhouse gas emissions data from individual facilities and suppliers of certain fossil fuels and industrial gases through the Greenhouse Gas Reporting Program.”



Source: U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018.
<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

[From the webpage “Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018” at the website of the United States Environmental Protection Agency (EPA) at <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>) (paragraphs 1-2, and graph)

b) “An emissions inventory that identifies and quantifies a country's anthropogenic¹ sources and sinks of greenhouse gases is essential for addressing climate change. This inventory adheres to both (1) a comprehensive and detailed set of methodologies for estimating sources and sinks of anthropogenic greenhouse gases, and (2) a common and consistent format that enables Parties to the United Nations Framework Convention on Climate Change (UNFCCC) to compare the relative contribution of different emission sources and greenhouse gases to climate change.”

“In 1992, the United States signed and ratified the UNFCCC. As stated in Article 2 of the UNFCCC,

'The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.'"

"Parties to the Convention, by ratifying, 'shall develop, periodically update, publish and make available...national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies...'
The United States views this report as an opportunity to fulfill these commitments."

"This chapter summarizes the latest information on U.S. anthropogenic greenhouse gas emission trends from 1990 through 2018. To ensure that the U.S. emissions inventory is comparable to those of other UNFCCC Parties, the estimates presented here were calculated using methodologies consistent with those recommended in the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC 2006). The structure of this report is consistent with the UNFCCC guidelines for inventory reporting, as discussed in Box ES- 1. 4."

[From report "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018" at the webpage "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018" (published 2020) at the website of the United States Environmental Protection Agency (EPA) (at <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018>) (where the pdf file of the complete report, or parts of it, can be downloaded) (the actual pdf file of the complete report is at <https://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf>) (p. ES-1, paragraphs 1-2)]

199) Article "Coronavirus is reducing CO₂. Why that's worrisome" (Benjamin Storrow) (April, 2020)

"A growing number of prognosticators expect that global carbon dioxide emissions could fall 5% this year as a result of the coronavirus pandemic, amounting to the largest annual reduction on record. But climate researchers say there is little reason for celebration, for people or the planet."

"CO₂ is a long-lived gas. An annual drop in emissions, even one of historic proportions, is unlikely to dramatically change the concentrations of carbon dioxide swirling around Earth's atmosphere. Then there is the nature of the reductions. Few think draconian economic lockdowns, like those implemented to halt the virus's spread, represent a viable decarbonization strategy."

"Mostly, the emissions projections show just how much work the world needs to do to green the economy. Holding global temperature rise below 1.5 degrees Celsius, for instance, would require annual emission reductions of 7.6% over the next decade, according to the United Nations' projections."

"If this is all we get from shutting the entire world down, it illustrates the scope and scale of the climate challenge, which is fundamentally changing the way we make and use energy and products,' said Costa Samaras, a professor who studies climate and energy systems at Carnegie Mellon University."

“Most emissions estimates are tied to economic growth. A few weeks ago, most prognosticators predicted the world economy would rebound in the second half of 2020, resulting in little to no growth for the entire year. The International Monetary Fund now expects the world economy to contract by 3%, with the U.S. economy shrinking by almost 6%.”

[From article “Coronavirus is reducing CO2. Why that's worrisome” by Benjamin Storrow (April 17, 2020) at the website of E and E News (Energy and Environment) (at <https://www.eenews.net/stories/1062893583>) (paragraphs 1-4, and 7)]

200) Article “Satellites and state regulators: New data spotlights extreme emissions and need for action in nation’s largest oilfield” (Jon Goldstein and Colin Leyden) (April, 2020)

“This week a study drawing on nearly a year’s worth of satellite data revealed that Permian methane emissions are the highest ever measured from a U.S. oil and gas basin.”

“As the federal government continues its rollback of methane safeguards, public attention is now trained on policymakers and companies in Texas and New Mexico--two leading oil producing states that straddle the Permian Basin.”

“While New Mexico Gov. Michelle Lujan Grisham forges ahead on nation-leading rules to curb oil and gas methane waste and pollution, state leaders in Texas have yet to get serious about a problem that could undermine the industry’s viability in an economy that increasingly prioritizes cleaner sources of energy.”

“The findings published this week are based on over 200,000 individual readings from the European Space Agency’s TROPOMI satellite instrument, and show Permian oil and gas operators are leaking 3.7% of the gas they produce.”

“These figures sharply undermine the value proposition of companies billing natural gas as a ‘clean’ fuel in response to growing concern from both investors and consumers who increasingly prioritize low-carbon alternatives.”

“There is also a clear public health imperative behind strong methane standards. More than 75% of children under five years old in New Mexico’s largest oil producing counties live within a mile of an active wellsite, where co-pollutants such as toxic benzene and toluene, as well as smog-forming volatile organic compounds are emitted alongside methane. Just this week, the American Lung Association reported that all of these areas received poor grades for ozone pollution. Protecting the state’s most vulnerable requires tackling these emissions.”

[From article “Satellites and state regulators: New data spotlights extreme emissions and need for action in nation’s largest oilfield” by Jon Goldstein and Colin Leyden) (April 22, 2020) at the website of the Environmental Defense Fund (EDF) (at http://blogs.edf.org/energyexchange/2020/04/22/satellites-and-state-regulators-new-data-spotlights-extreme-emissions-and-need-for-action-in-nations-largest-oilfield/?utm_source=twitter&utm_campaign=fkrupp_none_upd_marcomm&utm_medium=social-media&utm_id=1587752428) (paragraphs 1-4, 7, and 12)]

201) Article “‘We Need to Hear These Poor Trees Scream’--Unchecked Global Warming Means Big Trouble for Forests: New studies show drought and heat waves will cause massive die-offs, killing most trees alive today” (Bob Berwyn) (April, 2020)

The study, published April 17 in the journal *Science*, reviewed the last 10 years of research on tree mortality, concluding that forests are in big trouble if global warming continues at the present pace. Most trees alive today won't be able to survive in the climate expected in 40 years, Brodribb said. The negative impacts of warming and drying are already outpacing the fertilization benefits of increased carbon dioxide.

The new paper shows that the hope that rising carbon dioxide would green the planet is probably misplaced. Studies have shown that increased carbon dioxide in the atmosphere boosts photosynthesis, spurring plant growth by chemically combining the carbon with water and ground nutrients.

But there will "probably be more browning than greening," said University of Arizona forest scientist Dave Breshears, who was not involved in the new research.

The stakes are high, since trees are the foundation for terrestrial biodiversity and because they capture and store about one-third of human-caused CO₂ emissions within their dense wood frames. A global loss of forests could lead to a surge in heat-trapping carbon dioxide, causing more warming, and would also eliminate habitat for countless other animals, plants and fungi, with a rippling effect that reaches humans.

In some areas, researchers have documented how forests are struggling to grow back. For example, in parts of the Four Corners region, hardly any new piñon pines have sprouted to replace trees killed by beetles in the early 2000s because it's too warm for seeds to take hold and grow.

"I was always amazed by the early predictions for enhanced growth of forests, especially in the West," she said. Many of the models only included warmer temperatures or higher CO₂ effects. The projections were made mainly by economists who assumed that only temperatures and CO₂ affect tree growth, she added.

"No one seemed to consider water. With warmer temperatures and a longer growing season comes greater demand for water and we are getting less, not more, in most cases. That should have been a big red flag," she said.

Six's research focuses on tree-killing bugs, and she said it's clear how global warming and insect devastation fit together. Heat causes drought-weakened trees to release different chemicals from healthy trees, and the bugs "are incredibly good at finding them," she said.

And global warming has weakened a lot of trees in the West.

"Some of the things we are seeing are dreadful and devastating, but there are studies showing trees can adapt quite rapidly on an evolutionary level. But if we keep cranking up the temperature, there is never going to be enough adaptation possible," she said.

[From article “‘We Need to Hear These Poor Trees Scream’--Unchecked Global Warming Means Big Trouble for Forests: New studies show drought and heat waves will cause massive die-offs, killing most trees alive today” by Bob Berwyn) (April 25, 2020) at the website for Inside Climate News (at <https://insideclimatenews.org/news/24042020/forest-trees-climate-change-deforestation>) (paragraphs 3, 7-8, 15, 21, 26-29, and 38)]

202) Open Letter "Let's put the environment at the heart of the economic recovery" (TRIBUNE Collective) (May, 2020)

"At the initiative of Jean-Laurent Bonnafé, CEO of BNP Paribas and President of EPE, more than ninety managers of French and international companies are calling, in a forum in the 'World', for a collective mobilization to make economic recovery an accelerator of ecological transition."

"Tribune. Over the past few weeks, unprecedented means have been mobilized to deal with the unprecedented crisis triggered by Covid-19."

"In addition to the health impacts, the social and economic consequences are now tangible for all French people. Today, it is a question of limiting its effects, in particular by mobilizing financial resources to ensure the capacity of our country's businesses to bounce back in an inclusive and resilient manner."

"We salute the rapid and massive decisions taken by the French government, and the solidarity of the business world. This test comes at a time when the transformation of our economy was underway in response to the challenges of climate change and the loss of biodiversity, to prevent other major crises announced by the scientific community."

"We are keeping our collective ambitions in terms of ecological transition, and reaffirm the commitments made for several years, the continuity of this effort is a condition for its success. To do this, a large part of the financial resources that will soon be mobilized for economic recovery would have every interest in being mobilized in the directions that had previously been identified to support the ecological transition, with an even greater concern for social justice."

A recovery plan

"We believe that today it is possible to make these financial resources an accelerator of a green and inclusive recovery. The upcoming stimulus plans provide opportunities for the necessary investments to support transformation trajectories."

"The first opportunity is based on strengthened support in the short and medium term for sectors that make it possible to mobilize numerous jobs and contribute to the preservation of the environment, with, first and foremost:

- energy renovation of housing and buildings, public and private services,
- the development of low-carbon mobility, electric vehicles, soft mobility infrastructure and public transport,
- the expansion and storage of renewable and carbon-free energies, electric or heat."

Towards decarbonization

"In these sectors, any public financial effort is a powerful lever for private investment, which makes them the best candidates for an early recovery. All sectors are progressing on their decarbonisation trajectory."

"The second opportunity is to make our industrial tools in Europe more resilient, to decarbonize them and reduce our carbon footprint, the crisis having also revealed the vulnerability of globalized value chains."

“The development of a more circular economy and that of more sustainable and local food, which are the subject of strong demand from our fellow citizens, are part of this second opportunity.”

“The third opportunity, which will produce massive effects in the medium and long term, consists in stepping up efforts in research, innovation, industrial demonstrators and the industrialization of future solutions: among many others, the bioeconomy and the hydrogen and their uses for land and air transport, the reuse of carbon dioxide are already well identified to be encouraged.”

The next European Green Deal

“The benefits of these green investments will improve air quality, the health of residents and the quality of life in cities. Succeeding in this emergency plan will also give us strong legitimacy to take full advantage of the next European Green Deal.”

“Beyond the short term, dealing with the crisis must be extended by mobilizing collective intelligence on the world after this pandemic, with deeper transformations to consider in our ways of producing and our business models, changes in consumer behavior and lifestyles, a relationship with nature to review.”

“We are already initiating this reflection so that the economic recovery takes place on sustainable and resilient trajectories. By mobilizing collectively, we will be able to preserve the health of our fellow citizens and relaunch our work tools; we will be able to accomplish the transformations necessary to ensure for our children a livable planet and human, economic and social prosperity. Let's make the current challenges that we face together an opportunity for all, put the environment at the heart of the collective rebound.”

Signatories: Patrick André, Vesuvius; Bernard Arnault, LVMH; Jacques Aschenbroich, Valeo; Patrick Berard, Rexel; Laurent Beuselinck, ERM-France; Thierry Blandinières, InVivo; Thierry Boisnon, Nokia-France; Sophie Boissard, Korian; Yannick Bolloré, Vivendi; Jean-Laurent Bonnafé, BNP Paribas; Christel Bories, Eramet; François Brottes, RTE; Thomas Buberl, AXA; Laurent Burelle, president of Afep; Patrice Caine, Thales; Bertrand Camus, Suez; Heiko Carrie, Bosch-France; Guillaume Charlin, BCG-France; Jean-Marc Chéry, STMicroelectronics; Jean-Pierre Clamadieu, Engie; Benoît Coquart, Legrand; Anne-Marie Couderc, Air France-KLM Group; Christophe Cuvillier, Unibail-Rodamco-Westfield; Philippe Darmayan, ArcelorMittal-France; Pierre-André de Chalendar, company of Saint-Gobain; Thierry de La Tour d'Artaise, SEB group; Augustin de Romanet, ADP group; Michel de Rosen, Faurecia; Fabrice Domange, Marsh SA; Pierre Donnersberg, Siaci Saint-Honoré; Emmanuel Faber, Danone; Jean-Pierre Farandou, SNCF; Guillaume Fauray, Airbus; Laurent Favre, Plastic Omnium company; Antoine Flamarion, Tikehau Capital; Antoine Frérot, Veolia; Didier Gauthier, Chimirec; Jean-Marc Germain, Constellium; Jacques Gounon, Getlink; Jean-Laurent Granier, Generali France; Christopher Guérin, Nexans; Catherine Guillouard, RATP; Edouard Guinotte, Vallourec; Paul Hermelin, Capgemini; Thierry Herning, BASF-France; Paul Hudson, Sanofi; Xavier Huillard, Vinci; Sylvie Jéhanno, Dalkia; Denis Kessler, SCOR; Ilham Kadri, Solvay; Christophe Kullmann, Covivio; Marianne Laigneau, Enedis; Matthieu Lassalle, Primagaz; Olivier Laureau, Servier; Jean-Yves Le Gall, CNES; Thierry Le Hénaff, Arkema; Dominique Lefebvre, Crédit Agricole; Jean-Bernard Lévy, EDF; Eric Lombard, Caisse des Dépôts ; Thierry Martel, Groupama; Xavier Martiré, Elis; Florent Menegaux, Michelin; Didier Michaud-Daniel, Bureau Veritas; Laurent Mignon, BPCE; Virginie Morgon, Eurazeo; Frédéric Oudéa, Société Générale; Bruno Pavlovsky, Chanel; Jérôme Péresse, GE France; Yves Perrier, Amundi; Jean-Luc Petithuguenin, Paprec; Nicolas Petrovic, Siemens-France; François Petry, LafargeHolcim France; Olivier Peyret, Schlumberger SA; Bruno Pillon, HeidelbergCement France; François-Henri Pinault, Kering; Benoît Potier, Air Liquide; Henri Poupart-Lafarge, Alstom; Patrick Pouyanné, Total; Jean-Philippe Puig, Avril Group ; Benoît Rabilloud, Bayer-France; Sami Rahal, Deloitte France; François Riahi, Natixis; Alexandre Ricard, Pernod-Ricard; Stéphane Richard, Orange; Bris Rocher, Rocher group; Geoffroy Roux de Bézieux, president of Medef; Frédéric Sanchez, Fives; Joël Séché, Séché-

Environment; Jean-Dominique Senard, Renault; Guy Sidos, Vicat; Jean-Pascal Tricoire, Schneider Electric; Philippe Varin, Orano, president of France-Industrie.

Collective

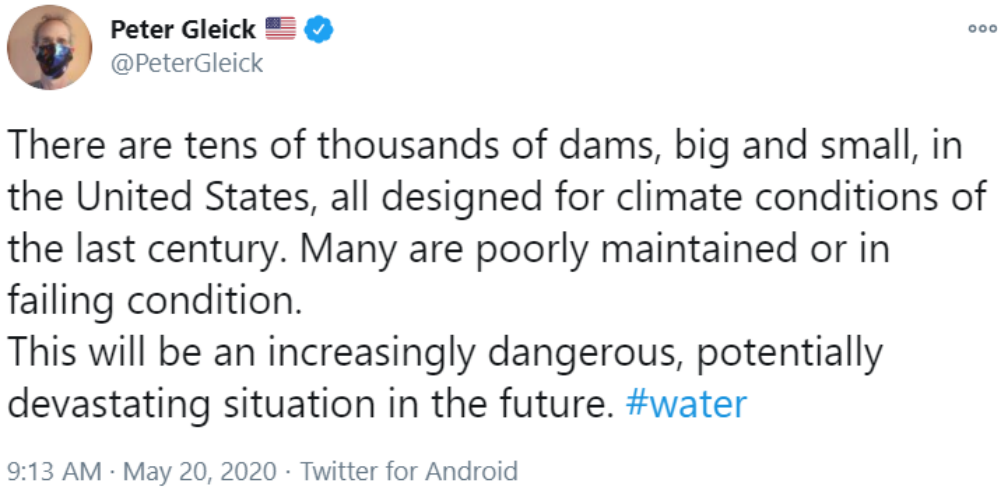
[From Open Letter "Let's put the environment at the heart of the economic recovery" by TRIBUNE Collective (May 3, 2020) at the website of Le Monde (at https://www.lemonde.fr/idees/article/2020/05/03/mettons-l-environnement-au-c-ur-de-la-reprise-economique_6038523_3232.html) (translated into English at Le Monde) (Complete article with signatories included here)]


203) Facebook Post (Teresa Burns Parkhurst) (May 9, 2020)



[From Facebook post by Teresa Barns Parkhurst (May 9, 2020) at the website of Facebook (photo of cartoon at <https://www.facebook.com/photo?fbid=10221161428218804&set=a.3924422722512>)]

204) Tweet by Peter Gleick (May, 2020)



[Note: Peter Gleick’s profile at Twitter: Climate/water scientist; US National Academy of Science; MacArthur Fellow; birds, 2018 Carl Sagan Prize for Science Popularization. My opinions only.  BLM.]

205) Launch “Race to Zero launch: Climate Leadership After COVID-19 Framing the New Growth Agenda for Economies, Cities Businesses and Civil Society” (June, 2020)

a) Description: Race to Zero

“Race To Zero is a global campaign to rally; leadership and support from businesses, cities, regions, investors for a healthy, resilient, zero carbon recovery that prevents future threats, creates decent jobs, and unlocks inclusive, sustainable growth.”

“It mobilizes a coalition of leading net zero initiatives, representing 452 cities, 22 regions, 1,101 businesses, 45 of the biggest investors, and 549 universities. These ‘real economy’ actors join 120 countries in the largest ever alliance committed to achieving net zero carbon emissions by 2050 at the latest. Collectively these actors now cover nearly 25% global CO2 emissions and over 50% GDP.”

“Led by the High-Level Climate Champions for Climate Action--Nigel Topping and Gonzalo Muñoz--Race To Zero mobilizes actors outside of national governments to join the Climate Ambition Alliance, which was launched at the UNSG’s Climate Action Summit 2019 by the President of Chile, Sebastián Piñera.”

“The objective is to build momentum around the shift to a decarbonized economy ahead of COP26, where governments must strengthen their contributions to the Paris Agreement. This will send governments a resounding signal that business, cities, regions and investors are united in meeting the Paris goals and creating a more inclusive and resilient economy.”

[From the webpage “Race to Zero Campaign” at the website of the United Nations Framework Convention on Climate Change (UNFCCC) (at <https://unfccc.int/climate-action/race-to-zero-campaign#eq-1>) (paragraphs 1-4)]

b) Race To Zero Partners

“Race to Zero brings together net zero commitments from a range of leading networks and initiatives across the climate action community. Race to Zero collaborates with the following initiatives and networks, which have independently been mobilizing non-Party net zero commitments, and who all meet Race to Zero’s ‘minimum criteria’:

The Argentinian Network of Municipalities
Certified B Corporation
The B Team
Business Ambition for 1.5 C - Our Only Future
Business Declares
C40’s Deadline 2020
Carbon Neutrality Coalition
Chambers Climate Coalition
The Climate Pledge
Exponential Roadmap Initiative
Fashion Charter for Climate Action
Global Universities and Colleges for the Climate
Health Care Without Harm
ICLEI- Local Governments for Sustainability
PRI/UNEPFI –Net-Zero Asset Owners Alliance
Science Based Targets for Cities
SME Climate Hub
Under2Coalition
We Mean Business Coalition”

[From the webpage “Race to Zero Campaign” at the website of the United Nations Framework Convention on Climate Change (UNFCCC) (at <https://unfccc.int/climate-action/race-to-zero-campaign#eq-1>) (in section “Race to Zero Partners”, paragraph 1 and list)]

c) From the Launch

“The campaign--under the stewardship of the UN High Level Climate Champions for the UK and Chile--will rally ‘real economy’ leaders to join the largest ever coalition of leaders--from countries, businesses, cities, regions, investors, and civil society--all committed to the same overarching goal: achieving net zero emissions by 2050 at the very latest.”

“Already covering about a third of GDP and sounding the drumbeat to COP26, the campaign aims to reframe the innovation and growth agenda in support of a healthier, more inclusive and resilient economy--and what that will take.”

“Alongside the UK COP26 Presidency, the Chile COP25 Presidency, and UN Climate Change, the UN High-Level Climate Champions for UK & Chile--Nigel Topping and Gonzalo Munoz will give a platform to private sector leaders to make a range of announcements.”

“At this launch event we will discuss:

Ambitions and latest plans for COP26
COVID-19 & climate – the public health case for a resilient, inclusive, zero carbon economy

The Race to Zero campaign: major new announcements, data, and plans to drive sector-level transformation

Zero carbon as the new growth & leadership agenda--cities, finance & real economy pioneers”

“Nigel Topping (HL Climate Champion for UK) and Gonzalo Munoz (HL Climate Champion for Chile) will convene the event with the following participants:

Minister Alok Sharma, COP26 President

Minister Carolina Schmidt, COP25 President

Minister Sergio Costa (Italian Minister for the Environment, Land and Sea Protection)

Patricia Espinosa, UN Climate Change Executive Secretary

Mark Carney, Finance Adviser for COP26

Dr. Maria Neira, Director of Public Health, WHO

Warren East, Chief Executive Officer, Rolls-Royce

Mark Schneider, Chief Executive Officer, Nestlé”

[From “Race to Zero launch: Climate Leadership After COVID-19 Framing the New Growth Agenda for Economies, Cities Businesses and Civil Society” at the webpage “June Momentum for Climate Change” at the website of the United Nations Framework Convention on Climate Change (UNFCCC) (at <https://unfccc.int/event/climate-leadership-after-covid-framing-the-new-growth-agenda-for-economies-cities-businesses-and>) (paragraphs 2-6)]

d) % of GDP committed to net-zero targets

i) “Almost a sixth of the entire global Gross Domestic Product (GDP) is now covered by net zero carbon emissions targets, according to a report.”

“The claim, made in analysis by the Energy and Climate Intelligence Unit (ECIU), reveals 16% of GDP is now covered by net-zero carbon emission ambitions, with fifteen nations, states and regional areas intending to reach the target by 2050.”

[From article “Report: Net-zero targets now cover one-sixth of global economy” by edie newsroom (June 25, 2019) at the website of edie (at <https://www.edie.net/news/9/net-zero-one-sixth-global-economy/>) (paragraphs 1-2)]

ii) The latest analysis from the Energy and Climate Intelligence Unit (ECIU), a London-based think-tank, has found that 49% of GDP, representing more than \$39trn, is now covered by regions with an actual or intended net-zero target.

[From “Report: 49% of world's GDP covered by net-zero targets” by the edie newsroom (February 18, 2020) at the website of edie (at <https://www.edie.net/news/9/Report--49--of-world-s-GDP-covered-by-net-zero-targets/>) (paragraph 2)]

iii) “The Race to Zero launch comes as the Energy and Climate Intelligence Unit estimates that 53% of global GDP is produced in countries, states and regions and cities that have committed to net-zero targets.

[From the article “UN launches push for net-zero emissions by 2050” by Kevin Keane (June 5, 2020) at the website of BBC News (at <https://www.bbc.com/news/uk-scotland-52939325>) (paragraph 19)]

d) Starting Line criteria

“All commitments in the Race to Zero Campaign are channeled through networks and initiatives that require their participants to meet the following procedural criteria, and so have begun their “race to zero”:

1. Pledge: Pledge at the head-of-organization level to reach (net)-zero in the 2040s or sooner, or by midcentury at the latest, in line with global efforts to limit warming to 1.5C.
2. Plan: In advance of COP26, explain what steps will be taken toward achieving net zero, especially in the short- to medium-term. Set an interim target to achieve in the next decade, which reflects a fair share of the 50% global reduction in CO2 by 2030 identified in the IPCC Special Report on Global Warming of 1.5C
3. Proceed: Take immediate action toward achieving net zero, consistent with delivering interim targets specified.
4. Publish: Commit to report progress at least annually, including via, to the extent possible, platforms that feed into the UNFCCC Global Climate Action Portal”

[From the pdf file “Defining the ‘Starting Line’ Minimum criteria required for participation in the Race to Zero campaign” which is accessible at the webpage “Race to Zero Campaign” (at <https://unfccc.int/climate-action/race-to-zero-campaign#eq-1>) (actual pdf file is at <https://unfccc.int/sites/default/files/resource/Minimum-criteria-for-participation-in-RTZ.pdf>) (in section “Starting Line Criteria”, paragraph 1)]

e) Appendix: Questionnaire on criteria for net zero targets for networks or initiatives joining the Race to Zero campaign

Question	Answer
<p>Scope</p> <ol style="list-style-type: none"> 1. How do you define net zero? 2. What do you require targets to cover? 3. What is not covered? 4. For companies, do you include scope 1, 2, or 3? 5. For jurisdictions, do you cover territorial emissions or imported ones as well? 6. What greenhouse gasses and sectors do you cover? <p>Explain your rationale for any exclusions.</p>	
<p>Timing</p> <ol style="list-style-type: none"> 7. When will net zero be achieved? 8. What interim targets do you set? 9. What steps are being taken toward these goals now? <p>To the extent possible, describe the pathway to net zero.</p>	
<p>Offsetting</p> <ol style="list-style-type: none"> 10. Do you allow entities to purchase external offsets toward net zero targets? 11. Do you participate in any emissions trading schemes? 	

<p>12. How do you determine residual emissions, and do you set any limits on how much of a target can be offset externally?</p> <p>13. Do you have a position on what offsets should be used (e.g. regarding issues of permanence, reductions versus removals, allowed categories, etc.)?</p>	
<p>Equity</p> <p>14. Is the timing or stringency of your targets influenced by a certain conception of what a "fair share" is?</p> <p>15. How, if at all, is this incorporated into decision-making?</p>	
<p>Future uncertainties</p> <p>16. Which solutions (including key technologies or behaviors) do you anticipate will be necessary to achieve the net-zero targets, but which do not yet exist, or which are not yet feasible to implement?</p> <p>17. How much uncertainty surrounds the future development of these solutions, and how do your plans address uncertainty in these factors and in other trends?</p>	
<p>Dependence on other actors</p> <p>18. To what extent do your plans depend on other actors doing something? E.g. for a company, are you assuming suppliers will decarbonize? Or for a city, are you assuming a national power provider will go 100% renewable?</p>	
<p>Governance arrangements</p> <p>19. How are targets embedded in long-term decision-making (e.g. for governments, are they in law, or simply political declarations)?</p> <p>20. How will progress be reported on?</p> <p>21. Who is responsible for delivery?</p> <p>22. How does your network or initiative ensure that participants meet their commitments?</p>	

[From the pdf file "Defining the 'Starting Line' Minimum criteria required for participation in the Race to Zero campaign" which is accessible at the webpage "Race to Zero Campaign" (at <https://unfccc.int/climate-action/race-to-zero-campaign#eq-1>) (actual pdf file is at <https://unfccc.int/sites/default/files/resource/Minimum-criteria-for-participation-in-RTZ.pdf>) (in section "Appendix: Questionnaire on criteria for net zero targets for networks or initiatives joining the Race to Zero campaign", all of Appendix)]

206) Article "Investor Guide to Deforestation and Climate Change" (Ceres) (June, 2020)

"Identifying investments in sectors that are sourcing high-risk commodities is a key first step in assessing portfolio-wide exposure to deforestation risk. Palm oil, soybeans, beef and timber are the most common commodities discussed in association with deforestation, but there are many other commodities that

may be produced on deforestation land including leather, rubber, wood pulp for paper, cocoa and coffee. As a result, companies in many sectors are exposed to deforestation risk.”

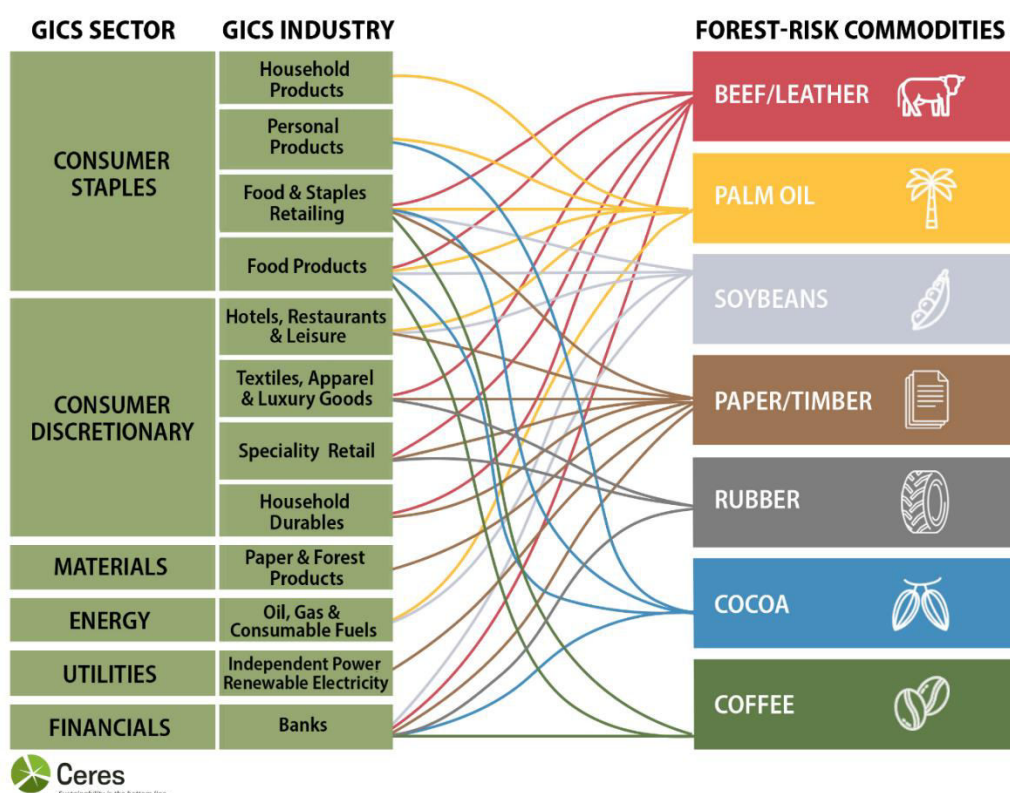


Figure 2 Sector and industry exposure to deforestation due to agriculture and forest commodity sourcing. A broad swath of industries are exposed to deforestation due to their use of commodities that are drivers of deforestation.

[From article “Investor Guide to Deforestation and Climate Change” by Ceres (June 30, 2020) at the Ceres website (at <https://www.ceres.org/resources/reports/investor-guide-deforestation-and-climate-change>) (paragraph 15 and Figure 2)

207) Article: “How to Retire Early: Making Accelerated Coal Phaseout Feasible and Just” (Paul Bodnar, Tamara Grbusic, Sam Mardell, Caroline Ott, and Uday Varadarajan) (Rocky Mountain Institute) (June, 2020)

“For over a century, growing presence of coal smokestacks worldwide signified economic development and progress. Coal supplied our homes with electricity and our factories with power. At the same time, this workhorse of the industrial era caused serious harm to our health and the environment. Today, the costs of continuing to operate coal-fired power plants include not only its health and environmental impacts, but also a hit to the wallets of consumers who are paying more for coal power than they would for renewables.”

“In a new report, Rocky Mountain Institute, the Carbon Tracker Initiative, and the Sierra Club present an analysis of nearly 2,500 coal plants around the world. This analysis shows that the cost of clean energy has fallen so far that new renewables outcompete new coal virtually everywhere. Furthermore, it is cheaper today to build new renewable energy capacity including battery storage than to continue operating 39 percent of the world’s existing coal capacity. And the competitiveness of coal is sinking rapidly elsewhere.”

“An analysis of nearly 2,500 coal plants around the world shows that the cost of clean energy has fallen so far that new renewables outcompete new coal virtually everywhere.”

The Cost of Coal

“Continuing to run uncompetitive coal plants comes at a cost to consumers and taxpayers. If we were to phase out the share of existing global capacity already uncompetitive with new renewables, we would save \$39 billion in 2020. In just five years, 73 percent of the global coal fleet will be uncompetitive with new renewables plus storage, equating to a savings of \$141 billion in 2025.”

“Though global numbers inevitably mask regional variation, our findings hold true across a diverse set of geographies. The United States could help customers save up to \$10 billion annually if 79 percent of its currently uncompetitive fleet were phased out today. In other large coal power regions—Europe, China, and India—the percentage of uncompetitive coal plants is rising fast and will average over 90 percent by 2025. Savings for these three regions combined start at \$30 billion per year in 2020 and more than quadruple to \$136 billion per year in 2025. In a group of other developing economies with aggregate coal capacity similar to that of the United States, 51 percent of the existing coal fleet will become uncompetitive with new renewables plus storage by 2026.”

How to Transition

“Immediately retiring and replacing uncompetitive coal assets should be a foregone conclusion. However, long-term contracts and noncompetitive tariffs insulate 93 percent of global coal capacity from market competition with cheaper and cleaner renewables. To keep the Paris Agreement’s temperature targets within reach, global coal use must decline by 80 percent below 2010 levels by 2030. This will require rapid transition in OECD countries over the next decade and phase-out in the rest of the world by 2040—long before many of these long-term contracts expire and/or coal plant investors have been fully repaid.”

“What can be done? Governments and public finance institutions can accelerate coal phaseout for assets with legacy contracts or tariffs through an integrated three-part approach:

- Refinance to fund the coal transition and save customers money on day one;
- Reinvest in clean energy; and
- Provide transition financing for workers and communities.”

“Our report describes several innovative financial approaches such as ratepayer backed securitization and debt forgiveness via reverse auctions that capture all three elements of the transition. These financing solutions are incentive-based and can be structured as voluntary programs for both governments and asset owners. As such, they can help establish common ground among many stakeholders without precluding complementary policy and regulatory approaches.”

“Where new renewables plus storage already outcompetes existing coal, the three-part coal phaseout can be achieved without public subsidies. However, in places where coal is still competitive, public subsidy may be needed in the short term to accelerate action. In such cases, governments and public finance institutions—green banks, multilateral and national development banks, and development finance institutions—could create financing packages for three-part coal phaseout as part of their development and climate priorities.”

What Comes Next?

“By 2025, simply operating nearly three-quarters of the global coal fleet will be more expensive than building brand new renewables and storage. So in 2025, the question is not whether renewables will

replace the global coal fleet, but when. And these transitions take time to get right. If we want to stay on track to avert the most disastrous impacts of climate change, and save money while doing so, the time to start is now.”

[From article: “How to Retire Early: Making Accelerated Coal Phaseout Feasible and Just” by Paul Bodnar, Tamara Grbusic, Sam Mardell, Caroline Ott, and Uday Varadarajan (Rocky Mountain Institute) (June 30, 2020) (paragraphs 1-9)]

208) Report “Renewables 2020 Global Status Report” (REN21) (June, 2020)

a) From Press Release “REN21 Report shows renewables' progress limited to power sector: We need a Total Fossil Lockdown for a Climate Revolution”

“Growth in renewable power has been impressive over the past five years. But too little is happening in heating, cooling and transport. Overall, global hunger for energy keeps increasing and eats up progress, according to REN21’s Renewables 2020 Global Status Report (GSR), released today. The journey towards climate disaster continues, unless we make an immediate switch to efficient and renewable energy in all sectors in the wake of the COVID-19 pandemic.”

“Year after year, we report success after success in the renewable power sector. Indeed, renewable power has made fantastic progress. It beats all other fuels in growth and competitiveness. Many national and global organisations already cry victory. But our report sends a clear warning: *The progress in the power sector is only a small part of the picture. And it is eaten up as the world’s energy hunger continues to increase. If we do not change the entire energy system, we are deluding ourselves,*’ says Rana Adib, REN21’s Executive Director.”

“The report shows that in the heating, cooling and transport sectors, the barriers are still nearly the same as 10 years ago. ‘We must also stop heating our homes and driving our cars with fossil fuels,’ Adib claims.

“In the wake of the extraordinary economic decline due to COVID-19, the IEA predicts energy-related CO2 emissions are expected to fall by up to 8% in 2020. But 2019 emissions were the highest ever, 2 | Page and the relief is only temporary. Meeting the Paris targets would require an annual decrease of at least 7.6% to be maintained over the next 10 years. Says Adib: ‘Even if the lock-downs were to continue for a decade, the change would not be sufficient. At the current pace, with the current system and current market rules, it would take the world forever to come anywhere near a no-carbon system.’”

“Recovery packages offer a once-in-a-lifetime chance to make the shift to a low-carbon economy. But according to Adib there is a great risk for this enormous chance to be lost. ‘Many of these packages include ideas that will instead lock us further into a dirty fossil fuel system. Some directly promote natural gas, coal or oil. Others, though claiming a green focus, build the roof and forget the foundation,’ she says. ‘Take electric cars and hydrogen, for example. These technologies are only green if powered by renewables.’”

“The report finds:

- Total final energy demand continues to be on the rise (1.4% annually from 2013 to 2018). Despite significant progress in renewable power generation, the share of renewables in total final energy demand barely increased (9.6% in 2013 to 11% in 2018). Compared to the power sector, the heating,

cooling and transport sectors lag far behind (renewable energy share in power, 26%, heating and cooling, 10%, transport, 3%).

- Today's progress is largely the result of policies and regulations initiated years ago and focus on the power sector. Major barriers seen in heating, cooling and transport are still almost the same a decade on. Policies are needed to create the right market conditions.
- The renewable energy sector employed around 11 million people worldwide in 2018
- In 2019, the private sector signed power purchase agreements (PPAs) for a record growth of over 43% from 2018 to 2019 in new renewable power capacity.
- The global climate strikes have reached unprecedented levels with millions of people across 150 countries. They have pushed governments to step up climate ambitions. As of April 2020, 1490 jurisdictions – spanning 29 countries and covering 822 million citizens – had issued “climate emergency” declarations, many of which include plans and targets for more renewable-based energy systems.
- While some countries are phasing out coal, others continued to invest in new coal-fired power plants. In addition, funding from private banks for fossil fuel projects has increased each year since the signing of the Paris Agreement, totaling USD 2.7 trillion over the last three years.”

“It is clear, renewable power has become mainstream and that is great to see. But the progress in this one sector should not lead us to believe that renewables are a guaranteed success. Governments need to take action beyond economic recovery packages. They also need to create the rules and the environment to switch to an efficient and renewables-based energy system. Globally. Now.” concludes Arthouros Zervos, President of REN21.”

[From Press Release “REN21 Report shows renewables' progress limited to power sector: We need a Total Fossil Lockdown for a Climate Revolution” by REN21 (June 16, 2020) which can be accessed at the webpage of “Renewables 2020 Global Status Report” (at <https://www.ren21.net/reports/global-status-report/>) actual Press Release as a pdf file-- (at https://www.ren21.net/wp-content/uploads/2019/05/gsr_2020_press_release_en.pdf) (paragraphs 1-5, all of section “The Report finds--”, and paragraph 9)]

b) “Notable developments during the year included:

--Climate strikes (driven by young people) took place in at least 150 countries worldwide, reflecting a growing sense among youth of the urgency of action on climate change. By year's end, 1,480 jurisdictions--spanning 28 countries and covering 820 million citizens--had issued “climate emergency” declarations. In parallel, opinion polls across several countries demonstrated increased awareness of climate change and strong public support for renewable energy.

--More institutions committed to divesting either fully or partially from fossil fuels, including the European Investment Bank, Norway's sovereign wealth fund and the US investment bank Goldman Sachs. Combined, global divestment totalled USD 11 trillion of managed assets by year's end. Meanwhile, the first major divest-invest conference in the Global South was held with delegates from more than 44 countries.

--The G5 Sahel heads of state endorsed Desert to Power, an initiative by the African Development Bank that aims to guarantee access to renewable electricity in 11 African countries in the Sahel region.

--Globally, 77 countries, 10 regions and more than 100 cities announced their commitment to net zero carbon emissions by 2050, and the European Commission proposed a European Green Deal roadmap to create the first carbon-neutral continent by 2050.

--The Zero Carbon Buildings for All Initiative, launched in 2019 at the United Nations Climate Action Summit, aims to develop decarbonisation roadmaps for buildings and to mobilise USD 1 trillion in funding by 2050. In the maritime industry, leaders launched the Getting to Zero Coalition with the objective of operating zero emission vessels along deep-sea trade routes by 2030.

--More than half of the countries that have submitted Nationally Determined Contributions (NDCs) towards reducing greenhouse gas emissions under the Paris Agreement have noted interest in implementing a carbon tax; however, by year's end carbon pricing initiatives were in place in only 47 countries around the world, covering 20% of global emissions. Furthermore, although 132 NDC plans mentioned renewables in the context of the power sector and 112 mentioned energy efficiency, only 25 plans mentioned renewable energy in the context of heating and cooling, and in the context of transport.

--Several cities adopted commitments to reduce greenhouse gas emissions, including 94 mayors who announced their support for a Global Green New Deal for cities, committing to limiting global warming to 1.5 degrees Celsius (°C) above preindustrial levels. As of mid-year, nearly 10,000 cities and local governments had committed to jointly reducing emissions through the Global Covenant of Mayors for Climate & Energy."

[From "Renewables 2020 Global Status Report" at the REN21 website (at https://www.ren21.net/wp-content/uploads/2019/05/gsr_2020_full_report_en.pdf) (in section "Global Overview", p. 30, paragraphs 1-8)]

c) Key Graphics

FIGURE 1. Estimated Renewable Share of Total Final Energy Consumption, 2018

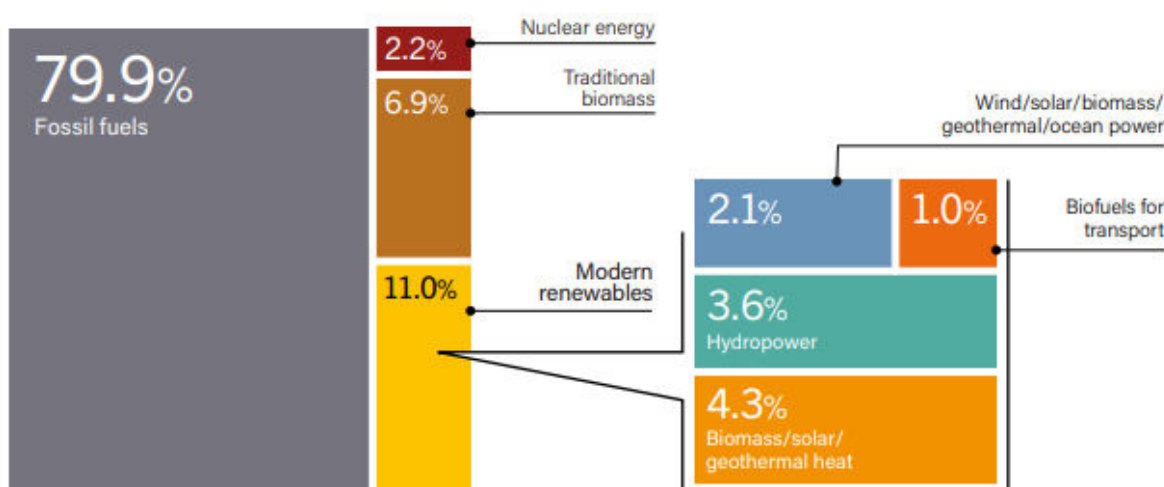
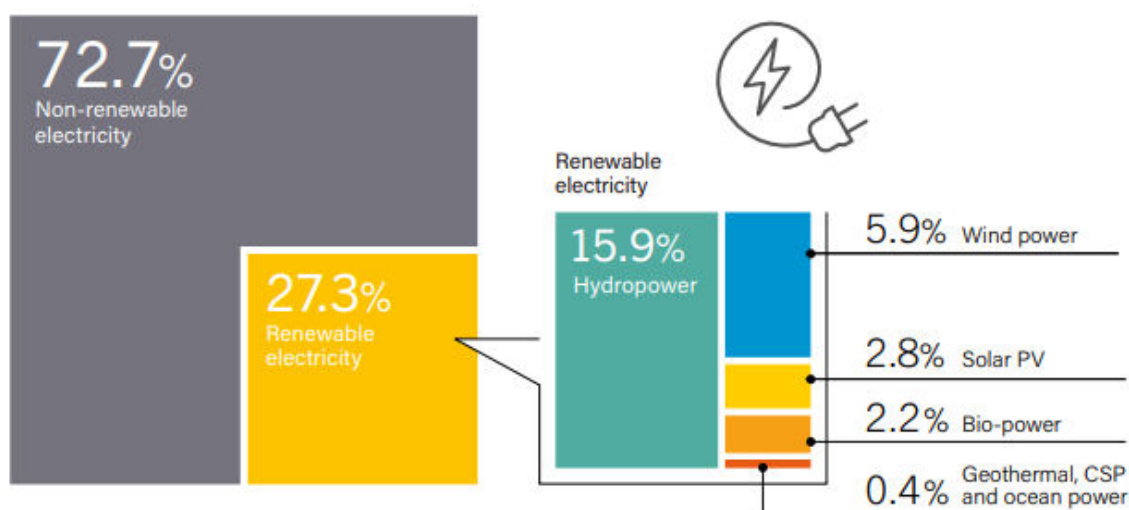


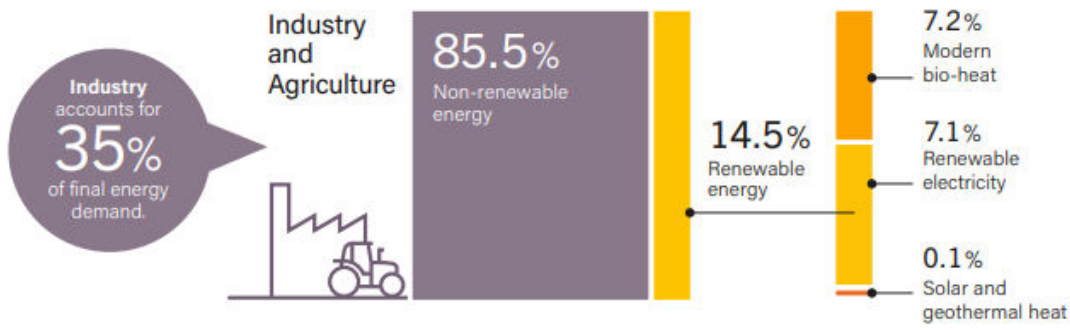
FIGURE 10. Estimated Renewable Energy Share of Global Electricity Production, End-2019



Note: Data should not be compared with previous versions of this figure due to revisions in data and methodology.

Source: See endnote 211 for this chapter.

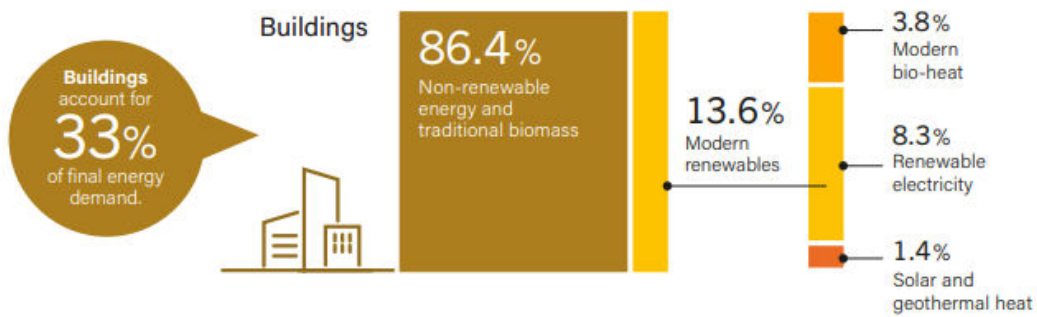
FIGURE 6. Renewable Share of Total Final Energy Consumption in Industry and Agriculture, 2017



Note: Modern bio-heat includes heat supplied by district energy networks. Totals may not add up due to rounding.

Source: Based on IEA data. See endnote 111 for this chapter.

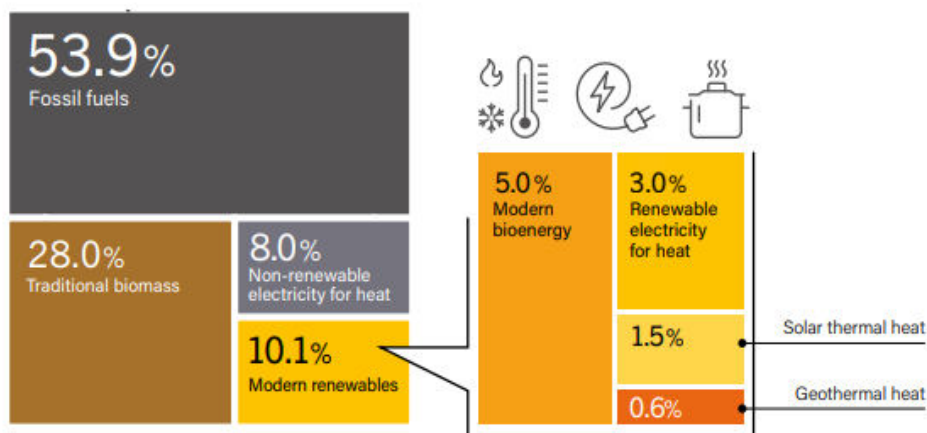
FIGURE 4. Renewable Share of Total Final Energy Consumption in Buildings, 2017



Note: Modern bio-heat includes heat supplied by district energy networks. Totals may not add up due to rounding.

Source: Based on IEA data. See endnote 65 for this chapter.

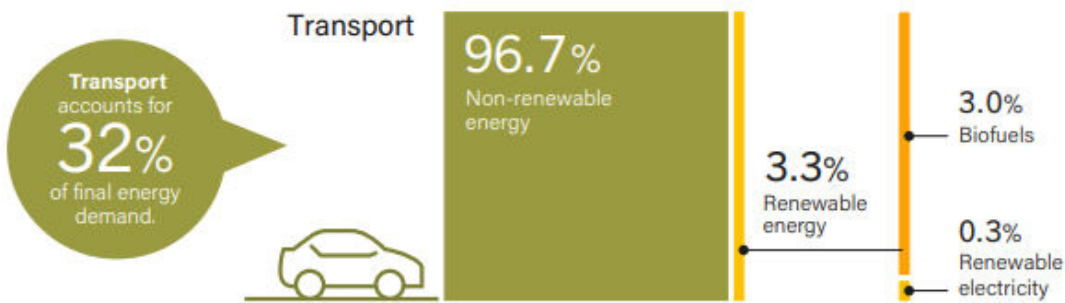
FIGURE 5. Estimated Renewable Share of Heating and Cooling in Buildings, 2018



Note: Includes space heating, space cooling, water heating and cooking. Modern bioenergy includes heat supplied by district energy networks.

Source: Based on IEA data. See endnote 71 for this chapter.

FIGURE 7. Renewable Share of Total Final Energy Consumption in Transport, 2017



Source: Based on IEA data. See endnote 139 for this chapter.

[From “Renewables 2020 Global Status Report” at the REN21 website (at https://www.ren21.net/wp-content/uploads/2019/05/gsr_2020_full_report_en.pdf) in section “Global Overview”: Figure 1 (p. 32); Figure 10 (p. 48); Figure 6 (p. 40); Figure 4 (p. 37); Figure 5 (p. 38); Figure 7 (p. 42)]

209) Article “2020 Is Our Last, Best Chance to Save the Planet” (Justin Worland) (July, 2020)

“We’re standing at a climate crossroads: the world has already warmed 1.1°C since the Industrial Revolution. If we pass 2°C, we risk hitting one or more major tipping points, where the effects of climate change go from advancing gradually to changing dramatically overnight, reshaping the planet. To ensure that we don’t pass that threshold, we need to cut emissions in half by 2030. Climate change has understandably fallen out of the public eye this year as the coronavirus pandemic rages. Nevertheless, this year, or perhaps this year and next, is likely to be the most pivotal yet in the fight against climate change. ‘We’ve run out of time to build new things in old ways,’ says Rob Jackson, an earth system science professor at Stanford University and the chair of the Global Carbon Project. What we do now will define the fate of the planet—and human life on it—for decades.” (paragraph 7)

“We find ourselves on the brink of climate catastrophe in large part because of the decisions made during a past crisis. As the world came out of the Great Depression and World War II, the U.S. launched a rapid bid to remake the global economy—running on fossil fuels. In the first postwar years, Americans moved to suburbs and began driving gas-guzzling cars to work, while the federal government built a highway system to connect the country for those vehicles. The single biggest line item in the Marshall Plan, the U.S. government program that funded the European recovery, went to support oil, which ensured that the continent’s economy would also run on that fossil fuel. Meanwhile, plastic, an oil derivative, became the go-to building block for consumer goods after the U.S. had developed production capacity for use in World War II.” (paragraph 10)

The underlying philosophy of economic development in this time period was a focus on gross national product, a term developed by U.S. government economists during the Depression, which included consumption as a proxy for prosperity: the more we consume, the better off we are, according to this model, which, in the postwar era, the U.S. assiduously spread abroad. The promise of endless growth also required an endless supply of oil to power factories, automobiles and jet planes. In 1945, President Franklin D. Roosevelt sealed a deal with Ibn Saud, the first King of Saudi Arabia, trading security for access to the country’s vast oil reserves. Every U.S. President since, implicitly or explicitly, has continued that exchange. (paragraph 11)

“The International Energy Agency (IEA), for example, calls for an annual \$1 trillion investment in clean energy for the next three years. At a cost of about 0.7% of global GDP, this would represent a small

portion of the funds spent to combat COVID-19 but could be transformative. Expansion and modernization of electric grids would allow for easier flow of renewable energy. Governments could buy out gas-guzzling vehicles, pushing consumers to go electric. Homes and buildings could be retrofitted to consume less energy.” (paragraph 17)

“This spending would also help solve the immediate problem of lost jobs and economic stagnation by creating nearly 10 million jobs worldwide and increasing global GDP by 1.1%, meaning it would add more to the economy than it costs. Importantly, green investment would result in a slew of ‘co-benefits.’ For example, some rural communities would receive access to electricity for the first time. For another, air pollution would decline all over the world. ‘If governments do not make use of this opportunity, they may miss a very important tool for the economic recovery,’ says Fatih Birol, head of the IEA.” (paragraph 18)

“Every country will be combatting climate change for the foreseeable future; the change in climate we’re experiencing today is in large part the result of emissions that happened more than a decade ago. However, we do have a choice of how bad it will get. If we invest in preserving nature and transitioning our energy system today, we will stave off the worst, giving us the ability to manage the hurricanes and floods as they come. If we wait, we’ll be stuck flat-footed when the worst arrives, watching in dismay as the temperature curve ticks up and up.” (paragraph 40)

“The choice is ours. We just don’t have much time to decide.” (paragraph 41)

[From article “2020 Is Our Last, Best Chance to Save the Planet” by Justin Worland (July 9, 2020) at the website of Time Magazine (at <https://time.com/5864692/climate-change-defining-moment/>)]

210) Article “Climate Change Poses ‘Systemic Threat’ to the Economy, Big Investors Warn” (July, 2020)

“Financial regulators should act to avoid economic disaster, according to a letter from pension funds and other investors representing almost \$1 trillion in assets.” (subtitle)

“WASHINGTON--Climate change threatens to create turmoil in the financial markets, and the Federal Reserve and other regulators must act to avoid an economic disaster, according to a letter sent on Tuesday by a group of large investors.”

“‘The climate crisis poses a systemic threat to financial markets and the real economy, with significant disruptive consequences on asset valuations and our nation’s economic stability,’ reads the letter, which was signed by more than three dozen pension plans, fund managers and other financial institutions that together manage almost \$1 trillion in assets.”

“That financial threat, combined with the physical risks posed by climate change, may create ‘disastrous impacts the likes of which we haven’t seen before,’ the letter says. It urges the Fed, the Securities and Exchange Commission and other agencies to ‘explicitly integrate climate change across your mandates.’”

“The letter calls on regulators to adopt the steps Ceres outlined last month in a report that makes 51 recommendations to eight federal agencies. At its core are two demands: that the agencies treat climate

change as a systemic risk, and that the S.E.C. ensures mandatory and consistent disclosure of climate threats facing companies.”

“Sarah Bloom Raskin, a former Federal Reserve governor and deputy secretary of the Treasury who wrote the foreword to Ceres’s list of recommendations, said that regulators in the United States were falling behind their counterparts in other countries, which have already begun imposing stress tests for climate change as well as other steps.”

““You see very credible central banks, like the Bank of England and the European Central Bank, taking the risk of a climate calamity into their mission in a very disciplined and structured way,’ Ms. Raskin said. ‘These aren’t fringe ideas.’”

[From article “Climate Change Poses ‘Systemic Threat’ to the Economy, Big Investors Warn” by Christopher Flavelle (July 21, 2020) at the website for The New York Times (at <https://www.nytimes.com/2020/07/21/climate/investors-climate-threat-regulators.html?action=click&auth=login-email&login=email&module=Latest&pgtype=Homepage>) (paragraphs 1-3, 6, 18-19)]

211) Article “World-first’ legal case: student accuses Australia of misleading investors on climate risk) (Adam Morton) (July, 2020)

“A Melbourne university student has launched what has been described as a world-first legal case against the Australian government, accusing it of misleading investors in sovereign bonds by failing to disclose the financial risk caused by the climate crisis.”

“In a claim filed in the federal court on Tuesday, Katta O’Donnell, a fifth-year law student at La Trobe University, said the government was breaching a legal duty and deceiving investors by not informing them upfront of the climate risk they face.”

“Climate risk refers to assessments of the expected impact of the climate crisis on investments, including the likelihood that fossil fuel investments will lose value and potentially become stranded as the world reduces greenhouse gas emissions.”

“The Reserve Bank of Australia and the country’s corporate and financial regulators have warned that climate change exposes the economy and financial system to risks that will get worse if action is not taken.”

“O’Donnell’s case, backed by David Barnden of Equity Generation Lawyers, argues that the government and its officials have failed in their duty of care by not taking climate change into account when doing their job.”

“The student said the case had been developed after she introduced herself to Barnden when he gave a lecture at La Trobe on climate risk last year. She said it would put the government ‘on trial for misconduct’ for failing to deal responsibly with the climate crisis.”

“‘I’m 23, I look to the future and I can definitely see that climate change is here and is going to get worse,’ O’Donnell said. ‘It’s time the government told the public about the impact climate change will have on our future and the economy.’”

“She said young Australians owned bonds through their superannuation funds but were in the dark about government assessments of the climate risk their investment faced. Sovereign bonds are issued by governments to fund spending. Australia’s are worth more than \$700bn, mostly held by central banks and pension funds.”

“Barnden said he believed it was the first case that dealt with climate change as a material risk to the global sovereign bond market. He said the risk was increasingly being recognised by institutional investors, pointing to the Swedish central bank last year selling bonds from Western Australia, Queensland and the oil-rich Canadian province of Alberta due to their failure to do more to address climate change.”

“‘Australia is on the frontline of sovereign climate risk,’ Barnden said. ‘We confront the harrowing physical impacts of drought and bushfires and we also face the financial risks of an economy over-exposed to fossil fuels being left behind as the world shifts to clean energy.’”

[From article “World-first’ legal case: student accuses Australia of misleading investors on climate risk” by Adam Morton (July 22, 2020) at the Guardian website (at <https://www.theguardian.com/law/2020/jul/22/world-first-legal-case-student-accuses-australia-of-misleading-investors-on-climate-risk>) (paragraphs 1-5, 10-11)]

212) Article “Climate-Driven Flooding at Superfund Sites Puts Communities at Risk—but Administration Ignores the Danger” (Union of Concerned Scientists) (July, 2020)

“WASHINGTON (July 28, 2020)—Hundreds of hazardous Superfund sites across the country are at high risk of flooding as sea levels rise in the coming decades, putting nearby communities in potential danger, according to an analysis based on research that was discontinued by the Trump administration in 2017 but released today by the Union of Concerned Scientists (UCS).”

“The study, ‘A Toxic Relationship: Extreme Coastal Flooding and Superfund Sites,’ was authored by UCS research scientist Jacob Carter, who began the analysis in 2015 while working as a scientist at the U.S. Environmental Protection Agency. President Barack Obama authorized the research through Executive Order 13690, which aimed to understand how climate change was exacerbating flooding risks.”

“Carter left the EPA in 2017 when it became clear that the Trump administration would no longer pursue climate change-focused research. In fact, the White House revoked Executive Order 13690 in August of 2017—just 10 days before Hurricane Harvey’s floodwaters compromised a major Superfund site in Houston, Texas.”

“The new analysis, based on Carter’s work at the EPA, shows that more than 800 Superfund sites near the Atlantic and Gulf coasts are at risk of flooding in the next 20 years, even with low rates of sea level rise. By 2100, if carbon emissions continue on their current trajectory triggering high rates of sea level rise, more than 1,000 sites will be at flooding risk.”

“Millions of people live near those sites, which are contaminated with chemicals that pose severe danger to human health—and the people living near those sites are disproportionately people of color.”

[From article “Climate-Driven Flooding at Superfund Sites Puts Communities at Risk—but Administration Ignores the Danger” by Union of Concerned Scientists (July 28, 2020) at the Union of Concerned Scientists’ website (at <https://www.ucsusa.org/about/news/climate-driven-flooding-superfund-sites-puts-communities-risk-administration-ignores>) (paragraphs 1-5)]

213) Report “State of the Climate 2019” (NOAA--National Centers for Environmental Information) (August, 2020)

“These key findings and others are available from the State of the Climate in 2019 report released online today by the American Meteorological Society (AMS). The 30th annual issuance of the report, led by the National Centers for Environmental Information, is based on contributions from more than 520 scientists from over 60 countries around the world and reflects tens of thousands of measurements from multiple independent datasets. It provides a detailed update on global climate indicators, notable weather events and other data collected by environmental monitoring stations and instruments located on land, water, ice and in space. The report’s climate indicators show patterns, changes and trends of the global climate system. Examples of the indicators include various types of greenhouse gases; temperatures throughout the atmosphere, ocean, and land; cloud cover; sea level; ocean salinity; sea ice extent; and snow cover.”

“Report highlights include these indications of a warming planet:

- Greenhouse gases were highest on record. As they do each year, the major greenhouse gas concentrations, including carbon dioxide (CO₂), methane and nitrous oxide, rose to new record high values during 2019. The global annual average atmospheric CO₂ concentration was 409.8 parts per million (ppm). This was 2.5 ppm greater than 2018 amounts and was the highest in the modern 61-year measurement record and in ice core records dating back as far as 800,000 years.
- Global surface temperature was near-record high. Annual global surface temperatures were 0.79°–1.00°F (0.44°–0.56°C above the 1981–2010 average, depending upon the dataset used. This places 2019 among the three warmest years since records began in the mid- to late 1800s. July became the hottest month in records dating to the mid- to late-1800s. The six warmest years on record have all occurred in the past six years, since 2014. Each decade since 1980 has been warmer than the preceding decade, with the most recent (2010–19) being around 0.2°C warmer than the previous (2000–09).
- Upper atmospheric temperatures were record or near-record setting. In the region of the atmosphere just above the Earth’s surface, the globally averaged annual lower troposphere temperature was third highest to record high and, in the layer above that, the lower stratosphere temperature was third lowest to record low, depending on the dataset analyzed. Even higher in the atmosphere, middle- and upper-stratospheric temperatures were lowest on record since satellite records began in 1979.
- Sea surface temperatures were near-record high. The globally averaged 2019 sea surface temperature was the second highest on record, surpassed only by the record El Niño year of 2016.
- Global upper ocean heat content was record high. Globally, upper ocean heat content reached record highs in 2019 both in the upper layer measured from the surface to 700 m. This record heat reflects the continuing accumulation of thermal energy in the top 2300 feet (700 meters) of the ocean. Ocean heat content was also record high in the deeper layer beneath, from 700 to 2000 m depth. Oceans absorb more than 90 percent of Earth’s excess heat from global warming.
- Global sea level was highest on record. For the eighth consecutive year, global average sea level rose to a new record high and was about 3.4 inches (87.6 mm) higher than the 1993 average, the year that marks the beginning of the satellite altimeter record. This rise represents an increase of 0.24 inches (6.1 mm) from 2018. Global sea level is rising at an average rate of 1.3 inches (3.2 cm) per decade. Melting of glaciers and ice sheets, along with warming oceans, account for the trend in rising global mean sea level.

- Oceans absorbed a record amount of carbon dioxide and pH levels continue to decrease. The ocean absorbed about 2.4 billion metric tons more carbon dioxide than it released in 2019. This is a record high amount and an increase of 0.2 billion metric tons from 2018, continuing a trend that began at the start of the 21st century. As a consequence of the increased oceanic carbon dioxide, surface ocean pH has declined, or become more acidic, by 0.018 ± 0.004 units per decade in most of the ocean since the pre-industrial period, particularly in colder water.”

[From report “State of the Climate 2019) by NOAA (National Oceanic and Atmospheric Agency--U.S.) Centers for Environmental Information (August, 2020) at the NOAA Centers for Environmental Information website (at <https://www.ncdc.noaa.gov/bams#:~:text=A%20new%20State%20of%20the,influence%20early%20in%20the%20year.&text=The%20report's%20climate%20indicators%20show,of%20the%20global%20climate%20system.>) (paragraphs 1, and report highlights bullets 1-7)]

[Note: there is also a American Meteorological Society (AMS) webpage which provides links to the full reports for State of the Climate, from 2011-2019 (at <https://www.ametsoc.org/index.cfm/ams/publications/bulletin-of-the-american-meteorological-society-bams/state-of-the-climate/>)]

214) Open Letter “Letter from economists: to rebuild our world, we must end the carbon economy” (Jeffrey Sachs, Joseph Stiglitz, Mariana Mazzucato, Clair Brown, Indivar Dutta-Gupta, Robert Reich, Gabriel Zucman and others) (August, 2020)

“Governments must actively phase out the fossil fuel industry. Bailouts and subsidies to big oil, gas and coal companies only further delay the essential energy transition, distorting markets while locking us into a future we cannot afford. Instead, a coordinated phaseout of exploration for and extraction of carbon resources allows governments to redeploy funds towards green technology, infrastructure, social programs and good jobs, spurring an economic transition that benefits people and the planet.”

“Institutions of financial power must end their fossil fuel investments and funding. When our largest banks, most influential investors and most prestigious universities place bets on the success of the fossil fuel industry, they provide it with the economic and social capital necessary to maintain the dangerous status quo. Instead, these institutions should divest from fossil fuel companies and end financing of their continued operations while reinvesting those resources in a just and stable future.”

“People must build political power to advocate for a fairer economic system. If we attempt an economic rebuilding whose guiding principle is a return to “business as usual” we will simply substitute one crisis for another. Instead, we must recognize that when crises strike, the disaster amplifies along society’s fault lines, and that when we don’t prepare for disasters, the costs of inaction fall most heavily on the most vulnerable. A green recovery can and must uplift those who need it most, at home and around the world, creating a more resilient and regenerative society in the process.”

“By achieving a large-scale economic transformation that dismantles the carbon economy and brings about a greener world, we have an opportunity to begin the process of economic recovery while working to undo the injustices at the heart of our modern system. As the undersigned experts in economics, we call on our policymakers to recognize the role that meaningful climate action has to play in rebuilding our world – to recognize that a healthy economy and society require a healthy planet.”

“This letter has been signed by more than 100 economists.”

[Full list of signatories at <https://docs.google.com/document/d/1tLtEZQ7ogI7C0s0wIkAZa9ade164BpeT19rWQJj0ucE/edit>]

[From Open Letter “Letter from economists: to rebuild our world, we must end the carbon economy” by Jeffrey Sachs, Joseph Stiglitz, Mariana Mazzucato, Clair Brown, Indivar Dutta-Gupta, Robert Reich, Gabriel Zucman and others (August 4, 2020) at the Guardian website (at <https://www.theguardian.com/commentisfree/2020/aug/04/economists-letter-carbon-economy-climate-change-rebuild>) (paragraphs 5-9)

215) Article “India plans to fell ancient forest to create 40 new coalfields” (Hannah Ellis-Petersen) (August, 2020)

“Over the past decade, Umeshwar Singh Amra has witnessed his homeland descend into a battleground. The war being waged in Hasdeo Arand, a rich and biodiverse Indian forest, has pitted indigenous people, ancient trees, elephants and sloth bears against the might of bulldozers, trucks and hydraulic jacks, fighting with a single purpose: the extraction of coal.”

“Yet under a new “self-reliant India” plan by the prime minister, Narendra Modi, to boost the economy post-Covid-19 and reduce costly imports, 40 new coalfields in some of India’s most ecologically sensitive forests are to be opened up for commercial mining.”

“Among them are four huge blocks of Hasdeo Arand’s 420,000 acres of forest in the central Indian state of Chhattisgarh, which sit above an estimated 5bn tonnes of coal.”

“It marks a significant shift. The coal industry in India is state-owned, but this auction of 40 new coal blocks will see the creation of a privatised, commercial coal sector in India. Among those bidding for it are India’s rich and powerful industrial giants, including the \$14bn (£11bn) Adani group run by the Indian billionaire Gautam Adani, who operates India’s largest coal power plants and has close ties to Modi.”

“But India’s joint secretary for coal, Maddirala Nagaraju, said that all the country’s projections showed that demand for coal would increase and insisted that increased domestic coalmining was the ‘cheapest way of meeting the energy needs of the people’.”

“‘We are the country with the fourth largest coal reserves in the world and we need to provide energy security for over a billion people: coal is the only way,’ said Nagaraju. He conceded that there would be ‘costly trade-offs’ in opening up protected forest areas for mining, but said this had the support of local communities who ‘want the land to be acquired because they get high compensation packages’.”

“He added: ‘Yes, some people have objected, but the mining will bring a lot of development, employment and money to these areas. How else will we develop these Adivasi people in central India?’”

[From article “India plans to fell ancient forest to create 40 new coalfields” by Hannah Ellis-Petersen) (August 8, 2020) at the Guardian website (at https://www.theguardian.com/world/2020/aug/08/india-prime-minister-narendra-modi-plans-to-fell-ancient-forest-to-create-40-new-coal-fields?CMP=share_btn_tw) (paragraphs 1-4, 15-17)]

216) Article “All talk, no walk: ‘Green’ financiers still support Amazon beef industry” (Fernanda Wenzel, Naira Hofmeister, Pedro Papini and Juliana Lopez) (Translated by Maya Johnson) (August, 2020)

(lead--key points)

- *“Regulatory initiatives to promote responsible investment are falling short, even in Europe, where the most rigid rules haven’t been able to prevent investors continuing to pump money into the Brazilian beef industry.*
- *In the U.S., similarly, financial giants like BlackRock tout their green investment credentials while still investing hundreds of millions of dollars in the top three meatpackers buying cattle from the Amazon.*
- *In Brazil, investment guides, manuals and recommendations by various market groups, along with rules issued by the central bank, have had little effect on the flow of investments into meatpackers JBS, Marfrig and Minerva.”*

“In December 2015, after four years of negotiations, leaders of 195 nations decided to unite to slow down global warming. They signed the Paris Agreement, in which they committed to take measures that would contain the global temperature rise to 2° Celsius (3.6° Fahrenheit) above pre-industrial levels. Each nation defined its own targets for meeting this goal. The European Union prepared itself to reduce greenhouse gas emissions by 40%, while Brazil aimed for a 43% reduction by 2030. To get there, the country must stop illegal deforestation while restoring 12 million hectares (30 million acres) of forest that has already been cut down.”

“But while President Jair Bolsonaro has threatened to leave the Paris Agreement, and Brazil recorded its greatest amount of deforestation in 10 years in the Amazon in 2019, Europe has begun to take action, using the financial market as one of its main lines of leverage. ‘The financial market plays a key role in reaching these objectives, as large amounts of private capital will have to be directed toward sustainable investments,’ it says in its action plan on financing sustainable growth.”

“There’s an increasingly common understanding that no efforts to contain climate change will be sufficient if those who have the money keep funding the sectors that emit huge volumes of CO₂. One such sector is the production of beef in the Amazon, financed by large European institutions like Deutsche Bank, HSBC, Santander and Credit Suisse. In 2018, cattle ranching was responsible for 19% of Brazil’s CO₂ emissions. Accounting for deforestation in the Amazon, where two-thirds of the forest cleared is to open up pastureland, the sector becomes responsible for up to 45% of Brazil’s greenhouse gas emissions.”

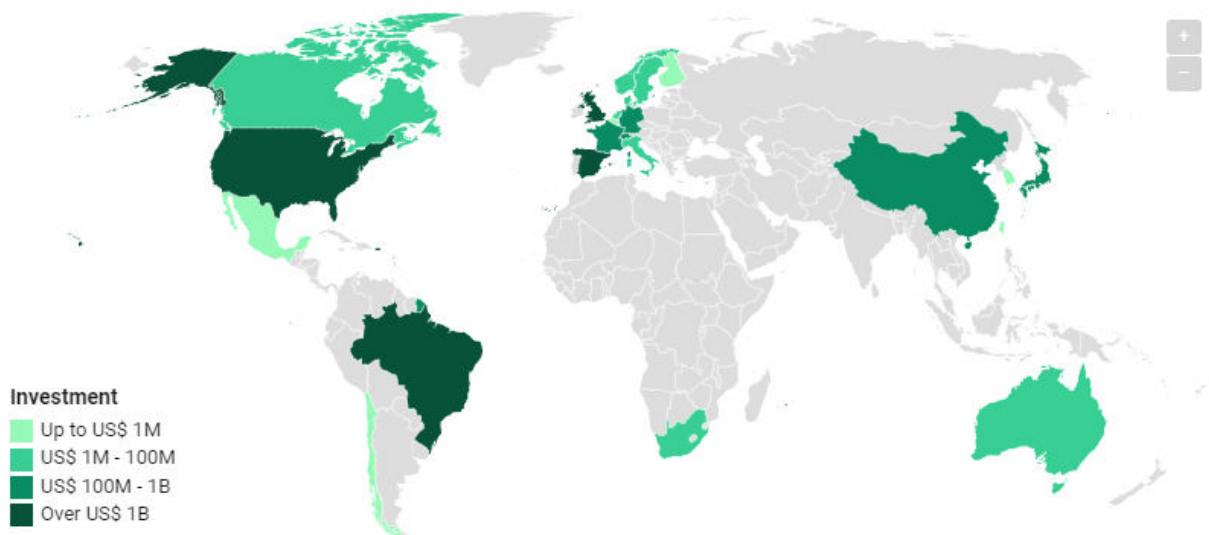
“In March this year, the European Commission released its EU Taxonomy as an orientation tool for investors making the transition to a low-carbon economy. The guide classifies economic sectors according to their environmental impact and creates a standard measure for comparing the sustainability of each one. ‘By classifying the companies, the Taxonomy will allow investors to know how much a certain company is contributing to the mitigation and adaptation of climate change,’ says Natalie Unterstell, public administrator and director at Talanoa, a Brazilian think tank that produces climate risk mitigation studies and projects. ‘It is a sophisticated tool that goes far beyond what any other country has done before. It is absolutely powerful.’”

“Beginning in December 2021, European financial institutions and large corporations will be required to include this green indicator when they release information about where they are investing. Since 2018,

companies have been obliged to include in their annual reports information on their conduct with regard to environmental protection, social responsibility, diversity on their administrative boards, respect for human rights, and anti-corruption measures.”

Origin of investments in meat packers operating in the Amazon

Origins of the companies that financed JBS, Marfrig and Minerva between 2013 and 2019. See the list of companies [here](#).



“The ineffectiveness of regulatory efforts shows that interest in addressing deforestation will have to come from investors themselves — and their decisions are influenced by two keywords: risk and profit. This is where the consumer’s role comes in, especially in putting pressure on the beef industry. Companies like JBS interact directly with the public because their brands are displayed on supermarket shelves. ‘These companies are at risk for consumer pushback,’ said Martin from Fitch Solutions. He added deforestation will be a growing problem for meatpackers in the Amazon.”

“The government could also change rules, create taxes on beef according to environmental damage, or approve new legislation on animal well-being, which would increase company costs and reduce profit,’ he said. ‘It seems to me that this is what will catch the attention of investors.’”

[From article “All talk, no walk: ‘Green’ financiers still support Amazon beef industry” by Fernanda Wenzel, Naira Hofmeister, Pedro Papini and Juliana Lopez) (Translated by Maya Johnson) (August 13, 2020) at the MongaBay website (at <https://news.mongabay.com/2020/08/all-talk-no-walk-green-financiers-still-support-amazon-beef-industry/>) (three bullets, paragraph 1-5, Figure 1, and 31-32)]

217) Review “13 major climate change reports released so far in 2020: These free studies and reports contain the latest authoritative information about food security, U.S. flood risks, renewable energy, and much more” (Michael Svoboda, Ph.D.) (August, 2020)

“In this edition of our bookshelf feature, Yale Climate Connections highlights a baker’s dozen of these reports, selected to reflect the broad range of concerns that intersect with climate change, including water, national security, media, health, food, finance, energy, and climate and environmental justice.”

“Readers can also find a link to [a much longer list of reports](#), which provides a measure of depth rather than breadth. Food security, for example, is the subject of six separate reports released since the start of the year, but only one is included in this month’s baker’s dozen.”

[From review “13 major climate change reports released so far in 2020: These free studies and reports contain the latest authoritative information about food security, U.S. flood risks, renewable energy, and much more” by Michael Svoboda, Ph.D. (August 19, 2020) (at the website of Yale Climate Connections (at <https://yaleclimateconnections.org/2020/08/13-major-climate-change-reports-released-so-far-in-2020/>) (paragraphs 2 and 3)]

218) California Wildfires 2020 (August, 2020 and ongoing)

a) “The 2020 California wildfire season is a series of ongoing wildfires that are burning across the state of California. The season is a part of the 2020 Western United States wildfire season. As of October 27, 2020, over 8,836 fire have burned 4,359,517 acres (1,764,234 ha) more than 4% of the state's roughly 100 million acres of land, making 2020 the largest wildfire season recorded in California's modern history (according to the California Department of Forestry and Fire Protection), though roughly equivalent to the pre-1800 levels which averaged around 4.4 million acres yearly and up to 12 million in peak years. The intensity of the fires has been increased by drying and heating from human-induced climate change, as well as decades of poor forest management.”

“On August 19, 2020, California Governor Gavin Newsom reported that the state was battling 367 known fires, many sparked by intense thunderstorms on August 16–17 caused by moisture from the remnants of Tropical Storm Fausto. Response and evacuations were complicated by a historic heatwave and the ongoing COVID-19 pandemic.”

[From the Wikipedia webpage for “2020 California wildfires” (at https://en.wikipedia.org/wiki/2020_California_wildfires) (paragraphs 1 and 2)]

b) Tweet by Governor of California (U.S.) Gavin Newsom on August 19, 2020
(at <https://twitter.com/GavinNewsom/status/1296166535115898880>)

Gavin Newsom  @GavinNewsom · Aug 19 ⋮

CA has experienced 10,849 lightning strikes in the last 72 hours and WORLD RECORD heat temperatures.

We're currently battling 367 known fires.

Grateful for our firefighters, first responders, and everyone on the frontlines protecting Californians during this time.

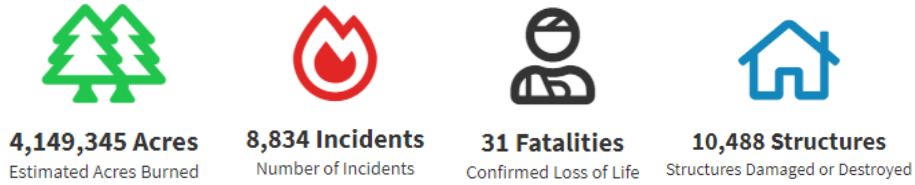
 1K  11.6K  41.9K 

[Note: Gavin Newsom’s Twitter profile: Husband and father. 40th Governor of California. Former Lt. Governor of California. Former San Francisco Mayor. Personal account.]

c)

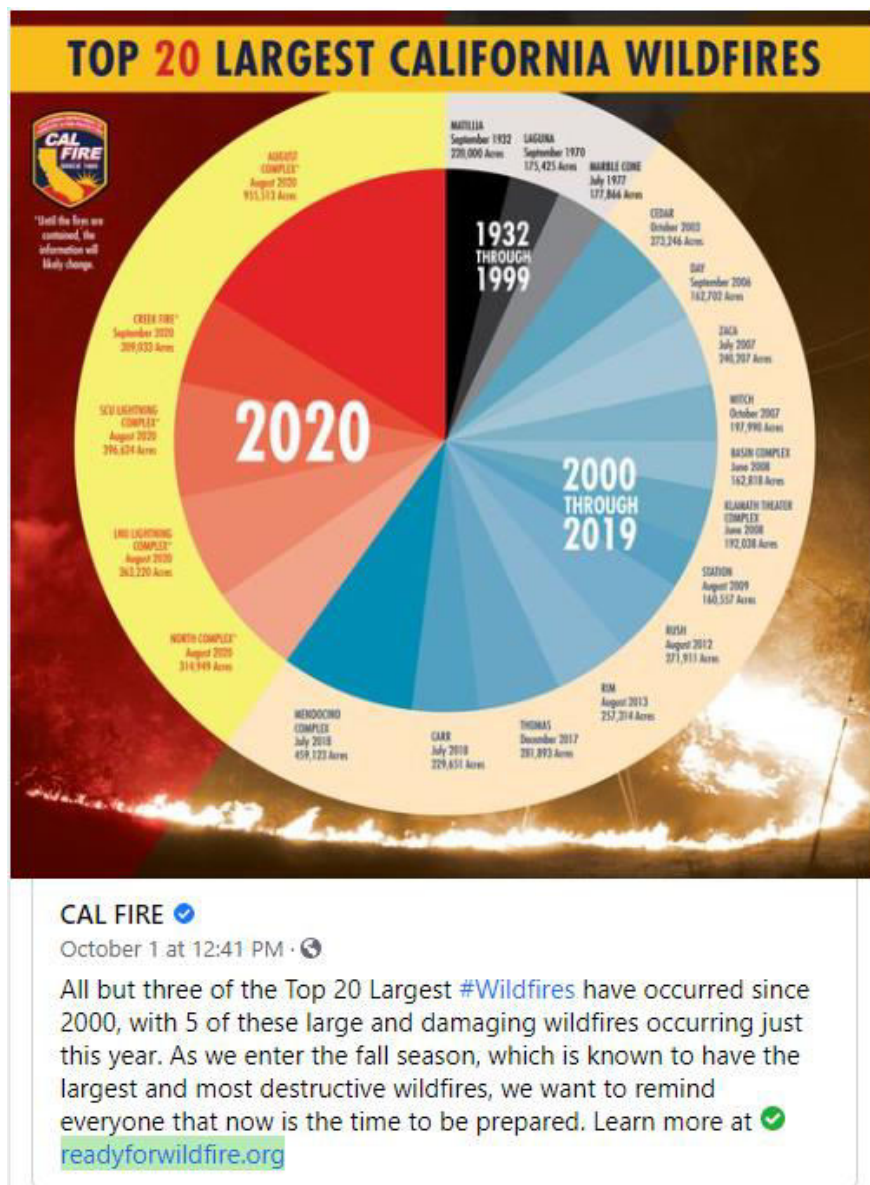
2020 Incident Archive

A summary of all 2020 incidents,
including those managed by Cal Fire and other partner agencies



[From the webpage “2020 Incident Archive” at the website for CAL FIRE (California Department of Forestry and Fire Protection) (at <https://www.fire.ca.gov/incidents/2020/>)]

d) Facebook post by CAL FIRE (California Department of Forestry and Fire Protection) on October 1, 2020



[Note: the image above can be seen in a larger version at <https://www.facebook.com/CALFIRE/photos/all-but-three-of-the-top-20-largest-wildfires-have-occurred-since-2000-with-5-of/10158753820557390/> ; the text above can be confirmed at <https://m.facebook.com/CALFIRE/photos/a.157450722389/10158753820557390/?type=3&source=48>]

219) Article “Earth has lost 28 trillion tonnes of ice in less than 30 years” (Robin McKee) (August, 2020)

“A total of 28 trillion tonnes of ice have disappeared from the surface of the Earth since 1994. That is stunning conclusion of UK scientists who have analysed satellite surveys of the planet’s poles, mountains and glaciers to measure how much ice coverage lost because of global heating triggered by rising greenhouse gas emissions.”

“The scientists--based at Leeds and Edinburgh universities and University College London--describe the level of ice loss as “staggering” and warn that their analysis indicates that sea level rises, triggered by melting glaciers and ice sheets, could reach a metre by the end of the century.”

“‘To put that in context, every centimetre of sea level rise means about a million people will be displaced from their low-lying homelands,’ said Professor Andy Shepherd, director of Leeds University’s Centre for Polar Observation and Modelling.”

“The scientists also warn that the melting of ice in these quantities is now seriously reducing the planet’s ability to reflect solar radiation back into space. White ice is disappearing and the dark sea or soil exposed beneath it is absorbing more and more heat, further increasing the warming of the planet.”

“In addition, cold fresh water pouring from melting glaciers and ice sheets is causing major disruptions to the biological health of Arctic and Antarctic waters, while loss of glaciers in mountain ranges threatens to wipe out sources of fresh water on which local communities depend.”

[From article “Earth has lost 28 trillion tonnes of ice in less than 30 years” by Robin McKee (August 23, 2020) at the Guardian website (at <https://www.theguardian.com/environment/2020/aug/23/earth-lost-28-trillion-tonnes-ice-30-years-global-warming>) (paragraphs 1-5)]

220) Article “Chemical fire breaks out in Hurricane Laura's wake; Louisiana governor says ‘shelter in place’” (CBS News) (August, 2020)

“A large chemical fire has broken out over Lake Charles, Louisiana, hours after the eye of Hurricane Laura passed directly over the city. Louisiana State Police say they're responding to a chlorine leak at a company that makes chemicals along Interstate 10 just west of Lake Charles, which was hard-hit when the storm slammed into the Gulf Coast early Thursday.”

“Louisiana Governor John Bel Edwards said the fire was burning Thursday morning just outside the city and advised storm survivors to shelter in place. He tweeted to residents in the area: ‘Shelter in place, close your windows and doors and TURN OFF YOUR AIR CONDITIONING UNITS.’”

“Police say the chlorine leak is at the BioLab chemical manufacturing facility in Westlake. Authorities say they're working with plant managers to try and contain the leak.”

“The city of Sulphur said in a Facebook post it was ‘issuing a shelter in place until further notice’ because of the dangerous cloud created by the chemicals.”

“BioLab's Lake Charles plant was built in 1979 and manufactures trichloroisocyanuric acid, chlorinating granules and other chemicals used in such household cleaners as Comet bleach scrub and chlorine powder for swimming pools.”

“Both trichloroisocyanuric acid and chlorine are potentially acutely toxic to people and animals if ingested or inhaled. Chlorine gas, which can appear in the air as a greenish yellow cloud, was used as a chemical weapon in World War I. It is a potent irritant to the eyes, throat and lungs.”

[From article “Chemical fire breaks out in Hurricane Laura's wake; Louisiana governor says ‘shelter in place’” by CBS News (August 27, 2020) at the website of CBS News (at <https://www.cbsnews.com/news/chemical-plant-fire-hurricane-laura-lake-charles-louisiana/>) (paragraphs 1-6)]

221) Article “Quantifying national responsibility for climate breakdown: an equality-based attribution approach for carbon dioxide emissions in excess of the planetary boundary” (Jason Hickel) (September, 2020)

Summary

Background

“This analysis proposes a novel method for quantifying national responsibility for damages related to climate change by looking at national contributions to cumulative CO₂ emissions in excess of the planetary boundary of 350 ppm atmospheric CO₂ concentration. This approach is rooted in the principle of equal per capita access to atmospheric commons.”

Methods

“For this analysis, national fair shares of a safe global carbon budget consistent with the planetary boundary of 350 ppm were derived. These fair shares were then subtracted from countries' actual historical emissions (territorial emissions from 1850 to 1969, and consumption-based emissions from 1970 to 2015) to determine the extent to which each country has overshoot or undershot its fair share. Through this approach, each country's share of responsibility for global emissions in excess of the planetary boundary was calculated.”

Findings

“As of 2015, the USA was responsible for 40% of excess global CO₂ emissions. The European Union (EU-28) was responsible for 29%. The G8 nations (the USA, EU-28, Russia, Japan, and Canada) were together responsible for 85%. Countries classified by the UN Framework Convention on Climate Change as Annex I nations (i.e., most industrialised countries) were responsible for 90% of excess emissions. The Global North was responsible for 92%. By contrast, most countries in the Global South were within their boundary fair shares, including India and China (although China will overshoot soon).”

Interpretation

“These figures indicate that high-income countries have a greater degree of responsibility for climate damages than previous methods have implied. These results offer a just framework for attributing national responsibility for excess emissions, and a guide for determining national liability for damages related to climate change, consistent with the principles of planetary boundaries and equal access to atmospheric commons.”

[From article “Quantifying national responsibility for climate breakdown: an equality-based attribution approach for carbon dioxide emissions in excess of the planetary boundary” by Jason Hickel (September 1, 2020) at the website of The Lancet Planetary Health (at [https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(20\)30196-0/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30196-0/fulltext)) (From “Summary” section, paragraphs 1-4)]

(Special Section--Sunrise Movement and the Green New Deal)

222) Sunrise Movement and the Green New Deal

[Note: “All trainings are currently online because of the Covid-19 pandemic. We’ll skill up so we are ready to take climate action in mass numbers when it is safe to do so!”]

[From <https://www.sunrisemovement.org/take-action/?ms=HowtoTakeActionwithSunrise>]

a) “Sunrise is a youth movement to stop climate change and create millions of good jobs in the process. We’re building an army of young people to make climate change an urgent priority across America, end the corrupting influence of fossil fuel executives on our politics, and elect leaders who stand up for the health and wellbeing of all people.”

[From the webpage “About Sunrise Movement” at the website of Sunrise Movement (at <https://www.sunrisemovement.org/about/?ms>AboutSunriseMovement>) (paragraph 1)]

b) “Hubs do the most important work of the movement: growing participation, elevating the urgency of climate change and challenging to win political power.”

“WE HAVE OVER 400+ HUBS ACROSS THE COUNTRY”

[From the webpage “Join a Sunrise Hub” at the website of Sunrise Movement (at <https://www.sunrisemovement.org/hubs/>) (paragraph 1 and subtitle)]

c) Join Trainings

Trainings are a great place to start. You’ll be provided with guidance, resources, seasoned leaders you can lean on, and you’ll meet allies who are taking their first step just like you and make friends for life! We’ll bring you up to speed on why we need to build power and boost your organizing skills.

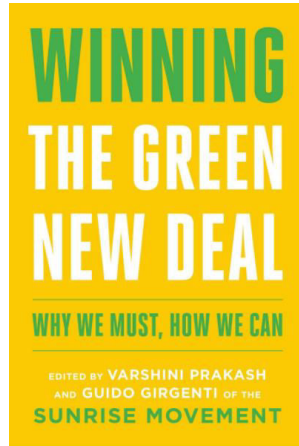
Organize Your Community

Organizing programs are designed for people who are ready to take the next step to plan fun and powerful actions! We’ll provide you with training, coaching, and key resources to give you the knowledge and skills necessary to become a Sunrise leader and organize wherever you live!

[From the webpage “How to Take Action with Sunrise” at the website of Sunrise Movement (at <https://www.sunrisemovement.org/take-action/?ms=HowtoTakeActionwithSunrise>) (from the sections “Join Training” and “Organize Your Community”)]

d) Featured Resource: “Winning a Green New Deal”

“In *Winning a Green New Deal*, leading youth activists, journalists, and policymakers explain why we need a transformative agenda to avert climate catastrophe, and how our movement can organize to win. Featuring essays by Varshini Prakash, cofounder of Sunrise Movement; Rhiana Gunn-Wright, Green New Deal policy architect; Joseph Stiglitz, Nobel Prize–winning economist; Bill McKibben,



internationally renowned environmentalist; Mary Kay Henry, the President of the Service Employees International Union, and others we’ll learn why the climate crisis cannot be solved unless we also confront inequality and racism, how movements can redefine what’s politically possible and overcome the opposition of fossil fuel billionaires, and how a Green New Deal will build a just and thriving economy for all of us.”

Authors:

“Varshini Prakash is the executive director and cofounder of the Sunrise Movement and a leading voice for young Americans in the fight to stop climate change. Her work has been featured in *The New Yorker*, *The New York Times*, *The Washington Post*, on the BBC, and more. Varshini was one of *Time*’s 100 Most Influential People and *Forbes*’s 30 Under 30 in 2019. She currently lives in Boston, Massachusetts.”

“Guido Girgenti is the Media Director for Justice Democrats and a founding Board Member of the Sunrise Movement, a youth-led movement to stop climate change and win a Green New Deal. He is a lifelong organizer for racial, economic, and climate justice, and lives in his hometown of Brooklyn, NY.”

[From the webpage for “Winning the Green New Deal” at the Amazon website (at https://www.amazon.com/Winning-Green-New-Deal-Must/dp/198214243X/ref=sr_1_1?crid=13NNMQK2Y7H22&dchild=1&keywords=winning+the+green+new+deal&qid=1604008827&srefix=winning+the+green%2Caps%2C208&sr=8-1) (in Description section, paragraph 4; and in “About the Author” section, paragraphs 1-2)]

(End of Special Section--Sunrise Movement and the Green New Deal)

223) Article “U.S. Debt Is Set to Exceed Size of the Economy Next Year, a First Since World War II: Coronavirus spending, shrinking GDP and tax-revenue decline push government toward milestone” (Kate Davidson) (September, 2020)

“WASHINGTON--U.S. debt has reached its highest level compared to the size of the economy since World War II and is projected to exceed it next year, the result of a giant fiscal response to the coronavirus pandemic.”

“The Congressional Budget Office said Wednesday that federal debt held by the public is projected to reach or exceed 100% of U.S. gross domestic product, the broadest measure of U.S. economic output, in the fiscal year that begins on Oct. 1. That would put the U.S. in the company of a handful of nations with debt loads that exceed their economies, including Japan, Italy and Greece.”

“This year the ratio is expected to be 98%, also the highest since World War II.”

“The surge in borrowing so far isn’t creating angst among investors or hampering the U.S.’s ability to borrow more. Investors have gobbled up U.S. Treasury assets, drawn to their relative safety. Moreover, interest rates are expected to remain low, suggesting the government still has plenty of room to borrow.”

“The last time the U.S. debt level exceeded economic output was in 1946, when it stood at 106% after years of financing military operations to help end World War II.”

“Policy makers have compared the fight against the coronavirus to a military war effort, and approved roughly \$2.7 trillion in spending since March for testing and vaccine research, aid for hospitals and economic relief for businesses, households and state and local governments. Federal revenue fell 10% from April through July, compared with a year earlier, as fears of the virus and widespread business shutdowns brought economic activity to a standstill, and firms laid off millions of workers.”

“The combination of those factors sent the federal deficit soaring and caused government debt as a share of economic output to jump.”

“By the end of June, total debt had swelled to \$20.5 trillion from \$17.7 trillion at the end of March, a 16% increase over just three months, according to Treasury Department data. Meanwhile, the economy shrank 9.5% in the second quarter, bringing debt as a share of GDP to 105.5%, compared with 82% in the first quarter.”

“After World War II, federal debt levels remained relatively stable for years and a booming 1950s economy helped cut the debt-to-GDP ratio in half, to 54%, by the end of the decade. That isn’t expected to happen this time.”

“Deficits and debt were already projected to rise over the coming decades as an aging population pushes up the costs of Social Security and Medicare. In the years before the virus, Congress also approved a handful of measures that widened the budget gap, including two bipartisan budget deals that lifted government spending above previously enacted caps and a Republican tax cut that has constrained revenues.”

“While debt has risen in most advanced economies, the U.S. is the only country whose debt-to-GDP ratio is expected to continue rising after 2021, according to the International Monetary Fund’s Fiscal

Monitor Report. It is also expected to record the biggest jump in debt-to-GDP this year among advanced economies, including Germany, France, Italy and the U.K.”

“Interest costs are expected to eat up a larger share of the federal budget, topping out at \$1 trillion a year by the end of the next decade, Mr. Riedl estimates.”

“The larger the debt grows, the more sensitive it becomes to even small shifts in interest rates, and the more likely it is to crowd out private investment, he added.”

[From Article “U.S. Debt Is Set to Exceed Size of the Economy Next Year, a First Since World War II: Coronavirus spending, shrinking GDP and tax-revenue decline push government toward milestone” by Kate Davidson (September 2, 2020) at the website for The Wall Street Journal (at https://www.wsj.com/articles/u-s-debt-is-set-to-exceed-size-of-the-economy-for-year-a-first-since-world-war-ii-11599051137?mod=hp_lead_pos1) (paragraphs 1-4, 7-10, and 18-20)]

[Related: article “The National Debt, Visualized: How big is this thing anyway?” by Brian McGill (August 3, 2019--*with numbers that update in real time*) at the website of The Wall Street Journal (at <https://www.wsj.com/graphics/us-national-debt-visualized/>)]

224) Report “Future Food Systems: For people, our planet, and prosperity” (Global Panel on Agriculture and Food Systems for Nutrition) (September, 2020)

“Food systems are locked in a spiral of decline with environmental systems: they are also major causes of degradation of the environmental systems on which they themselves depend (including biodiversity, freshwater, oceans, land, and soils). They are the largest cause of anthropomorphic greenhouse gas (GHG) emissions (28% between 2007 and 2016), while agriculture alone accounts for 70% of freshwater use. Even without projected global population growth, food systems are operating well beyond planetary boundaries. The pressures placed on natural resources by food production have left 25% of the globe’s cultivated land area degraded, while deforestation for agriculture is recognised as a major and irreversible cause of biodiversity loss.” (p. 7, paragraph 5)

“This situation is simply unsustainable. There is a very substantial risk that the world will irreversibly cross multiple planetary boundaries as a direct outcome of current agricultural and food system practices which are underpinned by often perverse incentive structures. The threat posed by these transgressions to food systems, food security, diet quality, and nutrition in the decades ahead is immense.” (p. 7, paragraph 6)

“Powerful actors pull in different directions, motivated by factors unrelated to health or food system sustainability. The private sector plays a crucial role in feeding the world, but at the same time often promotes foods which are not conducive to healthy diets and profits from a food system that over-exploits natural resources. The benefits accrue mainly to private sector stakeholders while the costs (population-wide ill health, ecological degradation, natural disasters) are mainly borne by the public sector and wider society. That imbalance will have to be addressed during the transition. It is essential that the public and private sectors work together on more clearly articulated common agendas. The private sector must spell out specific, measurable responsibilities for improving diet quality and the sustainability of food systems and be willingly held accountable.” (p. 8, paragraph 6)

“A fragmented approach to policy making and investment in our food systems remains the paramount challenge. This leads to a lack of focus on the quality and affordability of diets; outdated policies that

continue to impede change, or even drive change in the wrong direction; powerful actors pulling in different directions; and a lack of attention to the potential for multi-win policies which support job growth, economic productivity, health, and reduced threats to climate and planetary boundaries.”
(p. 17, paragraph 2)

[From Executive Summary of report “Future Food Systems: For people, our planet, and prosperity” by the Global Panel on Agriculture and Food Systems for Nutrition (September, 2020) Complete report and Executive Summary accessible at the website of United Nations System Standing Committee on Nutrition (UNSCN) (at <https://www.unscn.org/en/news-events/recent-news?idnews=2114>) (Executive Summary pdf at https://www.glopan.org/wp-content/uploads/2020/09/Foresight-2.0_Executive-summary_Future-Food-Systems_For-people-our-planet-and-prosperity.pdf)]

b) “The Panel is an independent international group of leaders who hold, or have held, high office and show strong personal commitment to improving nutrition. It was formally established in August 2013 at the Nutrition for Growth Summit in London and is funded by the UK Foreign, Commonwealth and Development Office (FCDO)... Panel members convene international and regional high-level round table meetings and use their extensive networks in governments, civil society, academia and industry to bring together and influence policymakers from different sectors in the food system.”]

[From the “About the Global Panel” webpage at the website for the Global Panel on Agriculture and Food Systems for Nutrition (at <https://www.glopan.org/about/>) (paragraphs 2 and 4)]

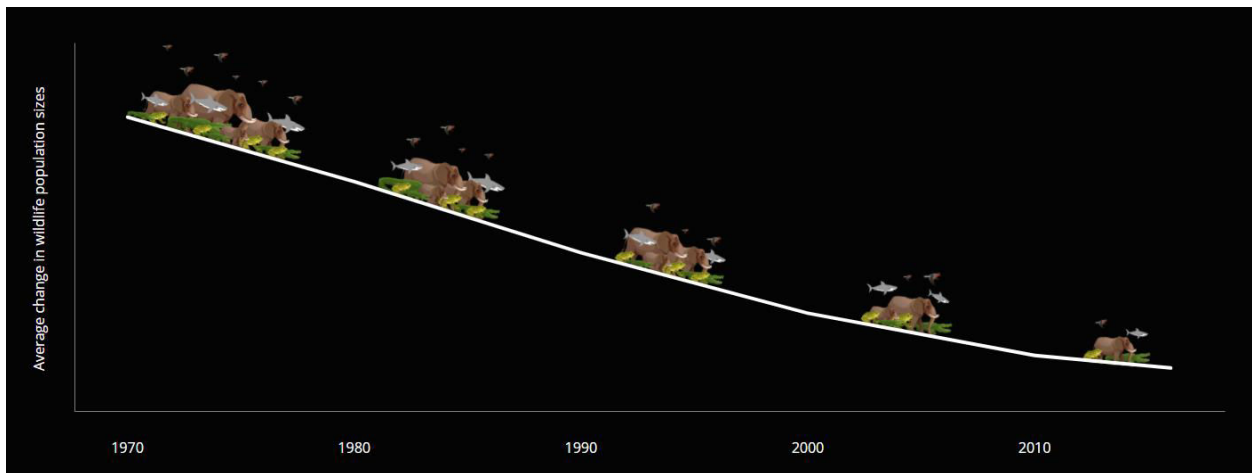
225) Article “WWF’s Living Planet Report reveals two-thirds decline in wildlife populations on average since 1970” (World Wildlife Federation) (September, 2020)

“**10 September, [Gland]** – Global populations* of mammals, birds, amphibians, reptiles and fish have suffered an average two-thirds decline in less than half a century due in large part to the very same environmental destruction which is contributing to the emergence of zoonotic diseases such as COVID-19, according to WWF’s [Living Planet Report 2020](#), released today.”

“The Living Planet Index (LPI), provided by the Zoological Society of London (ZSL), shows that factors believed to increase the planet’s vulnerability to pandemics—including land-use change and the use and trade of wildlife--were also some of the drivers behind the 68 per cent average decline in global vertebrate species populations between 1970 and 2016.”

“‘The Living Planet Report 2020 underlines how humanity’s increasing destruction of nature is having catastrophic impacts not only on wildlife populations but also on human health and all aspects of our lives,’ said Marco Lambertini, Director General, WWF International.”

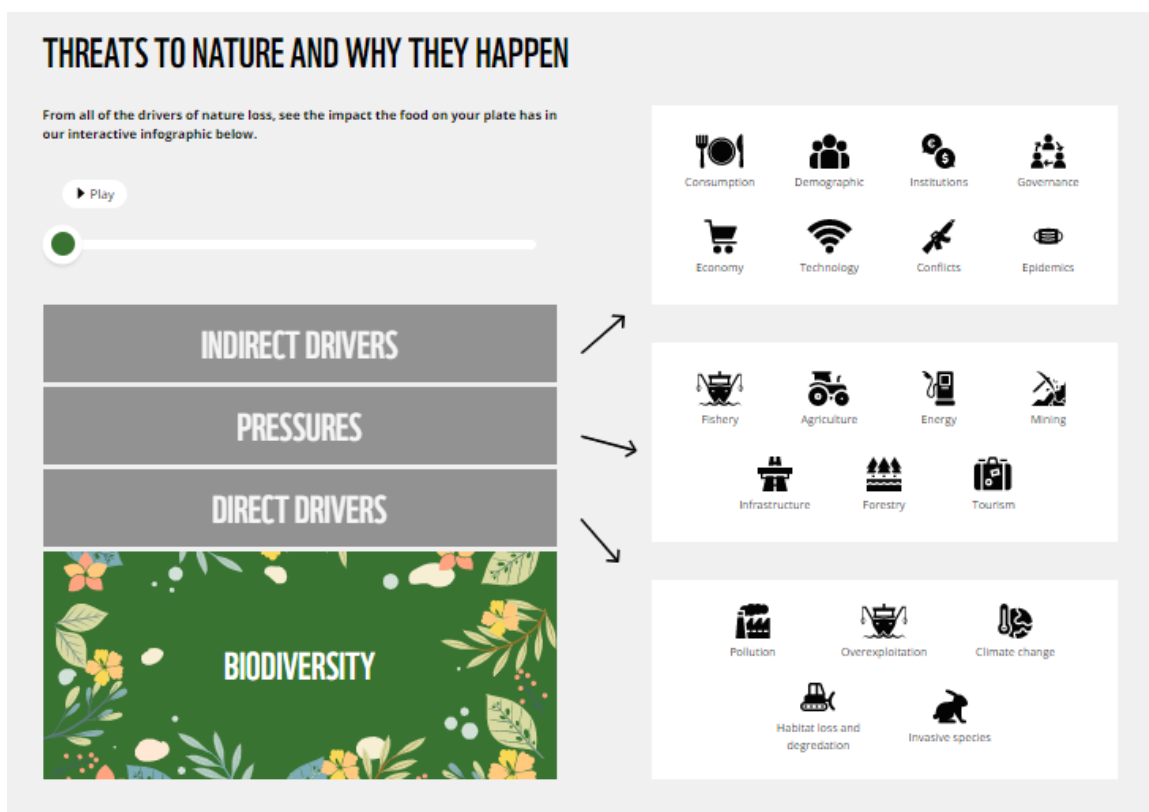
“‘We can’t ignore the evidence--these serious declines in wildlife species populations are an indicator that nature is unravelling and that our planet is flashing red warning signs of systems failure. From the fish in our oceans and rivers to bees which play a crucial role in our agricultural production, the decline of wildlife affects directly nutrition, food security and the livelihoods of billions of people.’”



[Note: Visual above from webpage of the “Living Planet Report 2020” at <https://livingplanet.panda.org/en-us/>]

“The Living Planet Report 2020 presents a comprehensive overview of the state of our natural world through the LPI, which tracks trends in global wildlife abundance, and contributions from more than 125 experts from around the world. It shows that the main cause of the dramatic decline in species populations on land observed in the LPI is habitat loss and degradation, including deforestation, driven by how we as humanity produce food.”

“The LPI, which tracked almost 21,000 populations of more than 4,000 vertebrate species between 1970 and 2016, also shows that wildlife populations found in freshwater habitats have suffered a decline of 84 per cent--the starkest average population decline in any biome, equivalent to 4 per cent per year since 1970. One example is the spawning population of the Chinese sturgeon in China’s Yangtze river, which declined by 97 per cent between 1982 and 2015 due to the damming of the waterway.”



[Visual above from the webpage “Why are we losing nature?” at the Living Planet website (at <https://livingplanet.panda.org/en-US/why-are-we-losing-nature>)]

“The Living Planet Index is one of the most comprehensive measures of global biodiversity,’ said Dr. Andrew Terry, ZSL’s Director of Conservation. ‘An average decline of 68% in the past 50 years is catastrophic, and clear evidence of the damage human activity is doing to the natural world. If nothing changes, populations will undoubtedly continue to fall, driving wildlife to extinction and threatening the integrity of the ecosystems on which we all depend. But we also know that conservation works and

species can be brought back from the brink. With commitment, investment and expertise, these trends can be reversed.”

[From article “WWF’s Living Planet Report reveals two-thirds decline in wildlife populations on average since 1970” (World Wildlife Federation) (September 9, 2020) at the World Wildlife Federation website (at https://wwf.panda.org/wwf_news/press_releases/?793831/WWF-LPR--reveals-two-thirds-decline-in-wildlife-populations-on-average-since-1970) (paragraphs 1-4, 6, and 9--and visuals from the sources cited underneath)]

226) Press Release “State of the Union: Commission raises climate ambition and proposes 55% cut in emissions by 2030” (European Commission) (September, 2020)

The European Commission presented today its plan to reduce EU greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. This level of ambition for the next decade will put the EU on a balanced pathway to reaching climate neutrality by 2050. The new target is based on a comprehensive Impact Assessment of the social, economic and environmental impacts. The Assessment demonstrates that this course of action is realistic and feasible. This raised ambition also underlines the EU's continued global leadership, ahead of the next UN climate conference (COP26).

The new 2030 climate target will help to focus Europe's economic recovery from the coronavirus pandemic. It will stimulate investments in a resource-efficient economy, promoting innovation in clean technology, fostering competitiveness and creating green jobs. Member States can draw on the €750 billion NextGenerationEU recovery fund and the EU's next long-term budget to make these investments in the green transition. To support the necessary investments, the Commission has also adopted today the rules for a new EU Renewable Energy Financing Mechanism, to make it easier for Member States to work together to finance and deploy renewable energy projects.

Achieving 55% greenhouse gas emissions reductions will require action in all sectors of the economy. A climate-neutral transition can only be accomplished with contributions from everyone. CO₂ emissions from the burning of fossil fuels are the largest source of greenhouse gas emissions in the EU. Together with fugitive non-CO₂ emissions in the energy system, they are responsible for just over 75% of EU greenhouse gas emissions. This underlines the energy system's central role in the transition to a climate neutral economy. Buildings and transport are, alongside industry, the main energy users and source of emissions. Decarbonising both energy supply and demand is key to achieving climate neutrality.



► Policies to Achieve 55% Emissions Cuts by 2030

The Commission has assessed the policies needed to achieve a 55% emissions reduction by 2030. Our current policies and national measures, if fully implemented, would take us to a 45% emissions reduction. We therefore need to step up our action to meet this new ambition. We will present legislative proposals by June 2021, focusing on the following areas:



EU Emissions Trading System (ETS)

- A strengthened cap on overall emissions under the EU ETS
- Aim to expand the use of emission trading to the maritime, buildings and road transport sectors
- Look into the integration of all emissions from fossil fuel combustion



Energy Efficiency

- Review the current EU energy efficiency target of 32.5% by 2030
- Launch a renovation wave to improve housing quality in the EU
- Strengthen the role of Eco-design standards to ensure EU consumers have access to efficient products



Renewable Energy

- Review the current target of 32% of renewables in the EU energy mix by 2030
- Review and revisit the biomass sustainability criteria
- New European terminology and certification system for all renewable and low-carbon fuels



Road transport CO₂ emissions

- Revisit and strengthen the CO₂ standards for cars and vans for 2030 and beyond
- Reflection on phase-out target date for internal combustion engines



Agriculture, Land Use, Land Use Change and Forestry (LULUCF)

- Integrated approach to reduce emissions from agriculture, provide bio-based materials for our economy, protect and enhance the natural carbon sink and improve the resilience of the EU's forests and agriculture to climate change



Effort Sharing

- Options range from reduced scope to potential future repeal if all emissions are covered by other policy instruments, while taking into account distributional concerns between Member States

[From Press Release “State of the Union: Commission raises climate ambition and proposes 55% cut in emissions by 2030” by European Commission (September 17, 2020) at the website of the European Commission (at https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1599) (paragraphs 1, 7, and 9--and graphics from two page [Factsheet - Policy Tools for the 2030 Climate Target Plan](#) (which can be downloaded at the European Commission link, in the “More Information” section.)]

227) Media Briefing “Confronting Carbon Inequality: Putting climate justice at the heart of the COVID-19 recovery” (by Tim Gore) (September, 2020)

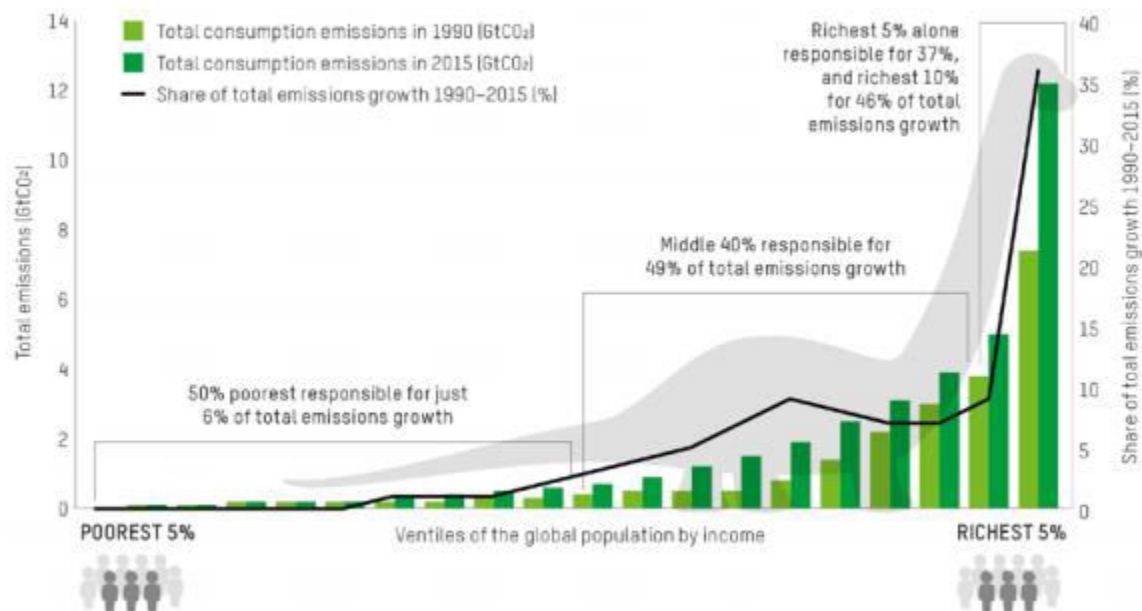
“New research by Oxfam and the Stockholm Environment Institute (SEI) reveals the extreme carbon inequality in recent decades that has driven the world to the climate brink. From 1990 to 2015, a critical period in which annual emissions grew 60% and cumulative emissions doubled, we estimate that:

- The richest 10% of the world’s population (c.630 million people) were responsible for 52% of the cumulative carbon emissions – depleting the global carbon budget by nearly a third (31%) in those 25 years alone (see Figure 1);
- The poorest 50% (c.3.1 billion people) were responsible for just 7% of cumulative emissions, and used just 4% of the available carbon budget (see Figure 1);
- The richest 1% (c.63 million people) alone were responsible for 15% of cumulative emissions, and 9% of the carbon budget – twice as much as the poorest half of the world’s population (see Figure 1);
- The richest 5% (c.315 million people) were responsible for over a third (37%) of the total growth in emissions (see Figure 2), while the total growth in emissions of the richest 1% was three times that of the poorest 50% (see Figure 6).”

(Right Sidebar Text, p. 2)

“It took about 140 years to use 750Gt of the global carbon budget, and just 25 years from 1990 to 2015 to use about the same again – over half of which linked to the consumption of just the richest 10% of people. The remainder will be entirely used up by 2030, without urgent action now.”

Figure 2: The 'dinosaur graph' of unequal carbon emissions growth 1990-2015



“This is an injustice which is felt most cruelly by two groups who have contributed least to the climate crisis: the world's poorest and most vulnerable people around the world today--already experiencing the impacts of a world that is 1C hotter--and future generations who will inherit a depleted carbon budget and an even more dangerous climate.”

(right sidebar text, p. 4)

“Doubling the per capita footprint of the poorest 50% of the world's population from 1990 to 2015 would have increased total global emissions by less than the growth in emissions associated with the richest 1% in this period.”

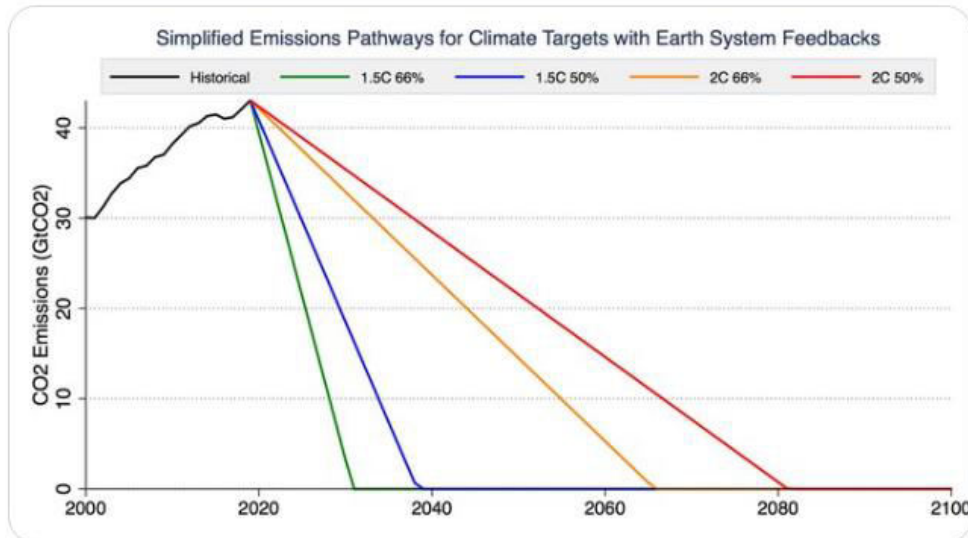
[From Media Briefing “Confronting Carbon Inequality: Putting climate justice at the heart of the COVID-19 recovery” by Tim Gore (September 21, 2020) at the website for Oxfam (at <https://www.oxfam.org/en/research/confronting-carbon-inequality>)(where pdf file can be downloaded) (direct access to pdf file at <https://oxfamilibrary.openrepository.com/bitstream/handle/10546/621052/mb-confronting-carbon-inequality-210920-en.pdf>) (from “Summary” on p. 2, paragraph 2 and the four following bullets; right sidebar text from p. 2; Figure 2 from p. 4; last paragraph from p. 4; and right sidebar text from p. 4)]

228) Tweet from Zeke Hausfather at the Twitter Platform (September 24, 2020)

(at <https://twitter.com/hausfath/status/1309191505815285762>)

Zeke Hausfather @hausfath · Sep 24

However, these climate model-based budgets do not account for some earth system feedbacks from melting permafrost and methane released from wetlands. The SR15 suggests that including these would reduce all the carbon budgets by around 100 GtCO₂. Here is what that looks like: 8/11



[Note: Zeke Hausfather’s profile at Twitter: “Climate scientist working on temperature records, climate and energy system models. Director of Climate and Energy @TheBTI. Also: @CarbonBrief, @BerkeleyEarth” (“The BTI”: “Breakthrough Institute is a global research center seeking technological solutions to environmental problems.”)]

229) Article “What China's plan for net-zero emissions by 2060 means for the climate: Though the country is a huge polluter, it leads the world in the clean technologies that could make this feasible” (Barbara Finnamore) (October, 2020)

“... in perhaps the most important news of 2020 that you may have missed, China has stepped up on its own as a climate leader. On 22 September, President Xi Jinping announced in a video address to the UN general assembly that China would aim to become ‘carbon neutral’ before 2060 – Beijing’s first long-term target. In so doing it joins the European Union, the UK and dozens of other countries in adopting mid-century climate targets, as called for by the Paris agreement.”

“China is currently responsible for 28% of the world’s greenhouse gas emissions, more than the United States and the European Union combined. As a practical matter, becoming ‘carbon neutral’ means that China will have to reduce its carbon emissions by as much as 90%, and offset the rest through natural systems or technologies that absorb more carbon from the atmosphere than they emit. If successful, this effort alone will shave around 0.2C to 0.3C from global warming projections, making Xi’s pledge the world’s single largest climate commitment to date.”

“Achieving this goal will be a colossal undertaking for a nation that is still heavily dependent on fossil fuels. China burns half the world’s coal and is still building new coal power plants, though they are increasingly uneconomic and unnecessary. It also burns coal directly in factories that produce half the

world's steel and cement. One notable aspect of my smog-filled days in Beijing was the virtual absence of private cars--the streets were mostly filled with bicycles. China has since become the largest global automobile market, as well as the world's largest importer of crude oil."

"But here's the paradox: it also leads the world in the very clean technologies that make Xi's plans feasible. China is by far the largest [investor](#), [producer](#) and [consumer](#) of renewable energy. [One out of every three solar panels](#) and [wind turbines](#) in the world are in China. It is also home to [nearly half the world's electric passenger vehicles](#), [98% of its electric buses](#) and [99% of its electric two-wheelers](#). The country [leads in the production of batteries](#) to power electric vehicles and store renewable energy on power grids. By 2025, its battery facilities will be [almost double the capacity of the rest of the world combined](#)."

"To reach carbon neutrality, China will need to rapidly accelerate all that it has done so far. It must double its annual investment in solar and triple or quadruple its investment in wind. It will also need to channel enormous efforts toward developing the next generation of expensive but potentially transformative technologies such as green hydrogen, energy storage and offshore wind. China is already in a race with the EU to take the lead here. These efforts will transform our global climate fight by helping to make essential next-generation climate technologies available and affordable in every country."

"Can we trust these ambitious promises? I think so. China has a track record of underpromising and overdelivering on its climate commitments. It's highly unlikely that Xi would have made the announcement himself in such a major international forum unless it was supported by strong evidence that the target is achievable. The timing was also clearly designed to take advantage of the lack of US climate leadership at the international level – and perhaps to preempt pressure to act on climate from a new US administration. But we shouldn't forget that Xi's words were also intended for domestic consumption. It sends a powerful domestic signal to everyone in China that addressing climate change is a top priority."

[From article "What China's plan for net-zero emissions by 2060 means for the climate: Though the country is a huge polluter, it leads the world in the clean technologies that could make this feasible" by Barbara Finnamore) (October 5, 2020) at the Guardian website (at <https://www.theguardian.com/commentisfree/2020/oct/05/china-plan-net-zero-emissions-2060-clean-technology>) (paragraphs 2-5, and 7-8)]

[Note: "Barbara Finnamore is a senior director at the Natural Resources Defense Council and is the author of Will China Save the Planet?" (added at the end of the Guardian article)]

230) Article "Amazon near tipping point of switching from rainforest to savannah--study: Climate crisis and logging is leading to shift from canopy rainforest to open grassland" (Fiona Harvey) (October, 2020)

"Rainforests are highly sensitive to changes in rainfall and moisture levels, and fires and prolonged droughts can result in areas losing trees and shifting to a savannah-like mix of woodland and grassland. In the Amazon, such changes were known to be possible but thought to be many decades away."

"New research shows that this tipping point could be much closer than previously thought. *As much as 40% of the existing Amazon rainforest is now at a point where it could exist as a savannah instead of as rainforest, according to a study published in the journal Nature Communications.*"

“Any shift from rainforest to savannah would still take decades to take full effect, but once under way the process is hard to reverse. Rainforests support a vastly greater range of species than savannah and play a much greater role in absorbing carbon dioxide from the atmosphere.”

“Parts of the Amazon are receiving much less rain than they used to because of the changing climate. Rainfall in about 40% of the forest is now at a level where the rainforest could be expected to exist as savannah instead, according to the study, led by the Stockholm Resilience Centre, based on computer models and data analysis.”

“Arie Staal, lead author of the study, said the ecology of rainforests meant that although they effectively produce their own self-sustaining rainfall in the right climate, they are also prone to drying out in the wrong conditions.”

“‘As forests grow and spread across a region, this affects rainfall,’ he explained. ‘Forests create their own rain because leaves give off water vapour and this falls as rain further downwind. Rainfall means fewer fires leading to even more forests.’”

“But if large areas of rainforest are lost, rainfall levels in the region decline accordingly. This reduced level of ‘atmospheric moisture recycling’ was simulated in the computer models used in the study.”

[From article “Amazon near tipping point of switching from rainforest to savannah—study: Climate crisis and logging is leading to shift from canopy rainforest to open grassland” by Fiona Harvey (October 5, 2020) at the Guardian website (at <https://www.theguardian.com/environment/2020/oct/05/amazon-near-tipping-point-of-switching-from-rainforest-to-savannah-study>) (paragraphs 2-5, and 7-9)]

231) Article “Mapping the Coal Ash Contamination: 738 coal ash units in 43 states and Puerto Rico have reported information in compliance with federal coal ash safeguards since 2015. Here’s what the data said.” (Earthjustice) (October, 2020)

“Beginning in 2018, coal-fired electric utilities were compelled to publicly report groundwater monitoring data for the first time ever, following transparency requirements imposed by federal coal ash regulations, known formally as the Coal Combustion Residuals Rule.”

“For decades, utilities have disposed of coal ash dangerously, dumping it in unlined ponds and landfills where the toxins leak into groundwater.”

“According to industry’s own data, more than 95% of the coal ash ponds in the United States are unlined.”

“Almost all of them are contaminating groundwater with toxins above levels that the U.S. Environmental Protection Agency deems safe for drinking water.”

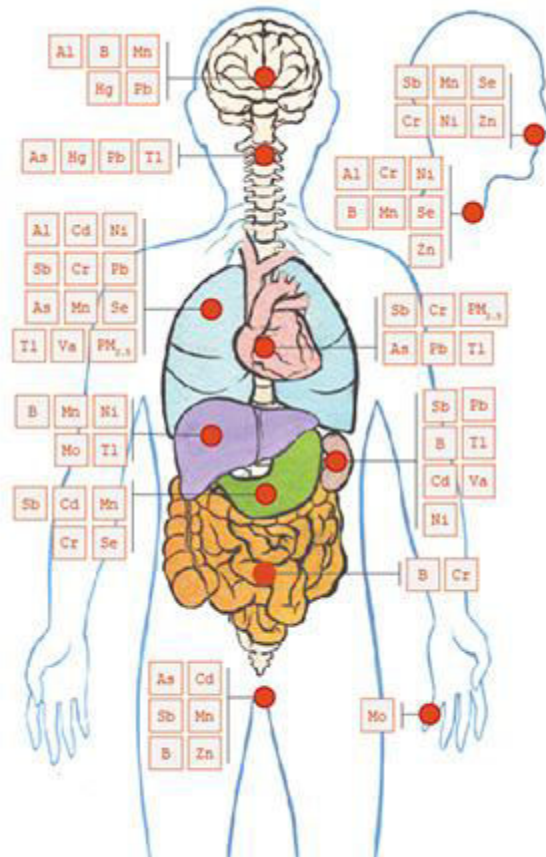
“Much of industry’s disclosure of the data has been in abstruse and non-standard formats. The data can be difficult to find, despite the requirement that the information be publicly accessible. Some utilities fail to post the required information entirely or conceal it behind sign-in walls to prevent search engines from locating the disclosures.”

“Legal and technical experts from Earthjustice, the Environmental Integrity Project, and partner organizations located and analyzed the data disclosures.”

“More than 550 units--at 265 plants--reported groundwater monitoring data.”

“Based on that data, 91% of these plants are contaminating groundwater with toxic substances at levels exceeding federal safe standards.”

“The 2015 Coal Combustion Residuals Rule is the first-ever federal safeguards against coal ash pollution. The protections were the result of [more than a decade of litigation by Earthjustice](#), on behalf of our clients and alongside our partners.”



“Harm to human health from breathing and ingesting coal ash toxicants. [Open infographic.](#)”

“Coal ash, the toxic remains of coal burning in power plants, contains a hazardous brew of toxic pollutants including arsenic, boron, cadmium, chromium, lead, radium, selenium, and more.”

“The toxics in coal ash can cause cancer, heart disease, reproductive failure, and stroke, and can inflict lasting brain damage on children.”

“Earthjustice fights in the courts for a long-term solution to this toxic menace. And we act on behalf of dozens of clients and coalition partners to defeat legislative attempts to subvert federally enforceable safeguards of coal ash.”

[From article “Mapping the Coal Ash Contamination: 738 coal ash units in 43 states and Puerto Rico have reported information in compliance with federal coal ash safeguards since 2015. Here’s what the data said” by Earthjustice (October 6, 2020) at the website for Earthjustice (at <https://earthjustice.org/features/map-coal-ash-contaminated-sites>) (paragraphs 1-12 and graphic)]

232) Article “Fifth of countries at risk of ecosystem collapse, analysis finds: Trillions of dollars of GDP depend on biodiversity, according to Swiss Re report” (Damian Carrington) (October, 2020)

“One-fifth of the world’s countries are at risk of their ecosystems collapsing because of the destruction of wildlife and their habitats, according to an analysis by the insurance firm Swiss Re.”

“Natural ‘services’ such as food, clean water and air, and flood protection have already been damaged by human activity.”

“More than half of global GDP--\$42tn (£32tn)--depends on high-functioning biodiversity, according to the report, but the risk of tipping points is growing.”

“Countries including Australia, Israel and South Africa rank near the top of Swiss Re’s index of risk to biodiversity and ecosystem services, with India, Spain and Belgium also highlighted. Countries with fragile ecosystems and large farming sectors, such as Pakistan and Nigeria, are also flagged up.”

“The Swiss Re index is built on 10 key ecosystem services identified by the world’s scientists and uses scientific data to map the state of these services at a resolution of one square kilometre across the world’s land. The services include provision of clean water and air, food, timber, pollination, fertile soil, erosion control, and coastal protection, as well as a measure of habitat intactness.”

“Those countries with more than 30% of their area found to have fragile ecosystems were deemed to be at risk of those ecosystems collapsing. Just one in seven countries had intact ecosystems covering more than 30% of their country area.”

[From article “Fifth of countries at risk of ecosystem collapse, analysis finds: Trillions of dollars of GDP depend on biodiversity, according to Swiss Re report” by Damian Carrington (October 12, 2020) at the Guardian website (at <https://www.theguardian.com/environment/2020/oct/12/fifth-of-nations-at-risk-of-ecosystem-collapse-analysis-finds#:~:text=One%2Dfifth%20of%20the%20world's,been%20damaged%20by%20human%20activity.>) (paragraphs 1-4, and 11-12)]

233) Article “More than 7,000 extreme weather events recorded since 2000, says UN: Sharp rise in number of droughts, floods and wildfires has claimed 1.23 million lives and affected 4.2 billion people” (Reuters in Geneva) (October, 2020)

“Extreme weather events have increased dramatically in the past 20 years, taking a heavy human and economic toll worldwide, and are likely to wreak further havoc, the UN has said.”

“Heatwaves and droughts will pose the greatest threat in the next decade, as temperatures continue to rise due to heat-trapping gases, experts said.”

“China (577) and the US (467) recorded the highest number of disaster events from 2000 to 2019, followed by India (321), the Philippines (304) and Indonesia (278), the UN said in a report issued on Monday, the day before the International Day for Disaster Risk Reduction. Eight of the top 10 countries are in Asia.”

“Globally, 7,348 major disaster events were recorded, claiming 1.23 million lives, affecting 4.2 billion people and causing \$2.97tn (£2.3tn) in economic losses during the two-decade period.”

“Drought, floods, earthquakes, tsunamis, wildfires and extreme temperature fluctuations were among the events causing major damage.”

[From article “More than 7,000 extreme weather events recorded since 2000, says UN: Sharp rise in number of droughts, floods and wildfires has claimed 1.23 million lives and affected 4.2 billion people” by Reuters in Geneva (October 12, 2020) at the Guardian website (at <https://www.theguardian.com/world/2020/oct/12/un-highlights-dramatic-global-rise-in-extreme-weather-since-2020>) (paragraphs 1-5)]

234) Report “World Energy Outlook 2020” [International Energy Agency (IEA)] (October, 2020)

a) From the webpage “World Energy Outlook 2020” at <https://www.iea.org/reports/world-energy-outlook-2020>

i) From the section “... but the downturn creates risks for the backbone of today’s power systems”

“Electricity grids could prove to be the weak link in the transformation of the power sector, with implications for the reliability and security of electricity supply. The projected requirement for new transmission and distribution lines worldwide in the STEPS is 80% greater over the next decade than the expansion seen over the last ten years. The importance of electricity networks rises even more in faster energy transitions. However, the financial health of many utilities, especially in developing economies, has worsened as a result of the crisis. There is a disparity in many countries between the spending required for smart, digital and flexible electricity networks and the revenues available to grid operators, creating a risk to the adequacy of investment under today’s regulatory structures.”

ii) From the section “Getting to net zero will require unwavering efforts from all”

“To reach net-zero emissions, governments, energy companies, investors and citizens all need to be on board – and will all have unprecedented contributions to make. The changes that deliver the emissions reduction in the SDS are far greater than many realise, and need to happen at a time when the world is trying to recover from Covid-19. They rely on continuous support from key constituencies across the world, while also meeting the development aspirations of a growing global population. Achieving net-zero emissions globally by 2050 goes well beyond this, both in terms of the actions within the energy sector and those that would be required elsewhere. For any pathway to net zero, companies will need clear long-term strategies backed by investment commitments and measurable impact. The finance sector will need to facilitate a dramatic scale up of clean technologies, aid the transitions of fossil fuel companies and energy-intensive businesses, and bring low-cost capital to the countries and communities that need it most. Engagement and choices made by citizens will also be crucial, for example in the way they heat or cool their homes, or how they travel.”

[From report “World Energy Outlook 2020” [International Energy Agency (IEA)] (released October 13, 2020) at the webpage “World Energy Outlook 2020” of the IEA website (at <https://www.iea.org/reports/world-energy-outlook-2020>)]

b) From article “Our midcentury climate goals require radical change today: Achieving ‘net-zero’ emissions will require ‘unparalleled changes’ in the next decade” (James Temple) (October, 2020)

“Climate scientists have found that any scenario that prevents the planet from shooting past 1.5 °C of warming requires effectively eliminating greenhouse-gas emissions by around midcentury.”

“But can that still be done after decades of delayed action on climate change?”

“In its annual report released on Tuesday, the International Energy Agency (IEA) has taken a detailed look at what it may take for the world to achieve ‘net zero’ emissions by 2050. (Net zero means that any emissions remaining at that point would need to be offset with carbon removal efforts such as tree planting.) The scenario is stark, demanding ‘unparalleled changes across all parts of the energy sector,’ the research agency found.”

“And these radical overhauls would have to begin soon. In just the next decade the world would need to:

- i) Slash global carbon dioxide emissions by 45% from 2010 levels.
- ii) Increase the share of renewables like wind, solar, and geothermal power in worldwide electricity generation from 27% to 60%.
- iii) Nearly quintuple annual additions of solar power.
- iii) Cut coal demand by 60%.
- iv) Ensure that half of all air conditioners sold are the most efficient models available.
- v) Reduce demand for “primary energy” (all energy sources in their raw form) by 17%.
- vi) The IEA’s net-zero scenario also entails major changes in personal behavior, including replacing all flights of an hour or less with low-emissions options (like hydrogen trains or buses), and sticking to walking or biking for any trips under 3 kilometers (1.9 miles).”

“Many scientists believe that the goal of preventing 1.5 °C of warming over preindustrial temperatures is already well out of reach.”

“Even achieving net zero emissions by 2070, the milestone needed to keep warming to around 2 °C, would require dramatic changes and far more aggressive climate policies, the IEA finds. In the next decade, coal demand would still need to fall by nearly 40%, solar capacity would have to more than triple, and clean vehicles would need to exceed 40% of all new sales.”

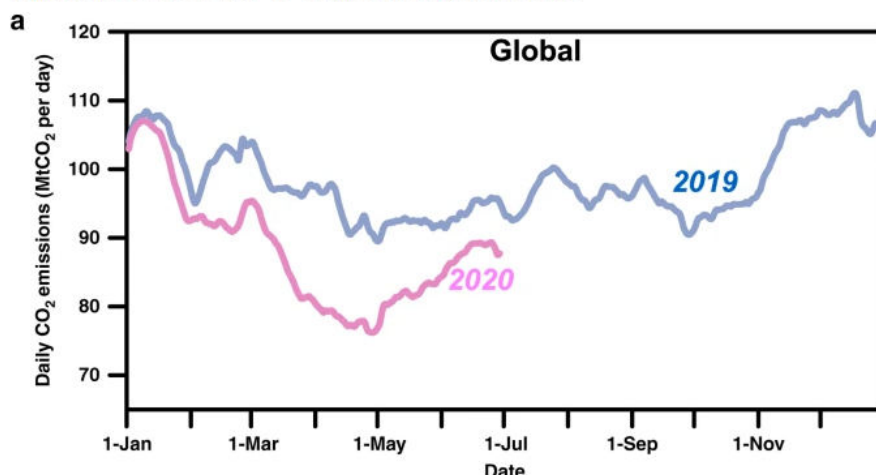
[From article “Our midcentury climate goals require radical change today: Achieving ‘net-zero’ emissions will require ‘unparalleled changes’ in the next decade” by James Temple (October 13, 2020) at the website for the MIT Technology Review (at https://www.technologyreview.com/2020/10/13/1010219/our-midcentury-climate-goals-require-radical-change-today/amp/?_twitter_impression=true) (paragraphs 1-7)]

235) Article “Near-real-time monitoring of global CO₂ emissions reveals the effects of the COVID-19 pandemic” (Zhu Liu, Philippe Ciais, Hans Joachim Schellnhuber) (October, 2020)

a) Figure 1 shows the substantial COVID-related decreases in CO₂ emissions between January 1st and June 30th of 2020 as compared to 2019. In the aggregate, emissions were 8.8% lower (1551 Mt CO₂). The range of seasonal, weekly, and daily variations in CO₂ emissions in 2019 and January through June of 2020 are remarkably large, as seen in Fig. 1a, b, mainly related to heating and cooling demands inferred

from heating and cooling degree days (HDD15 and CDD) as well as to periodical seasonal and weekend differences in activities and lower emissions during holidays.

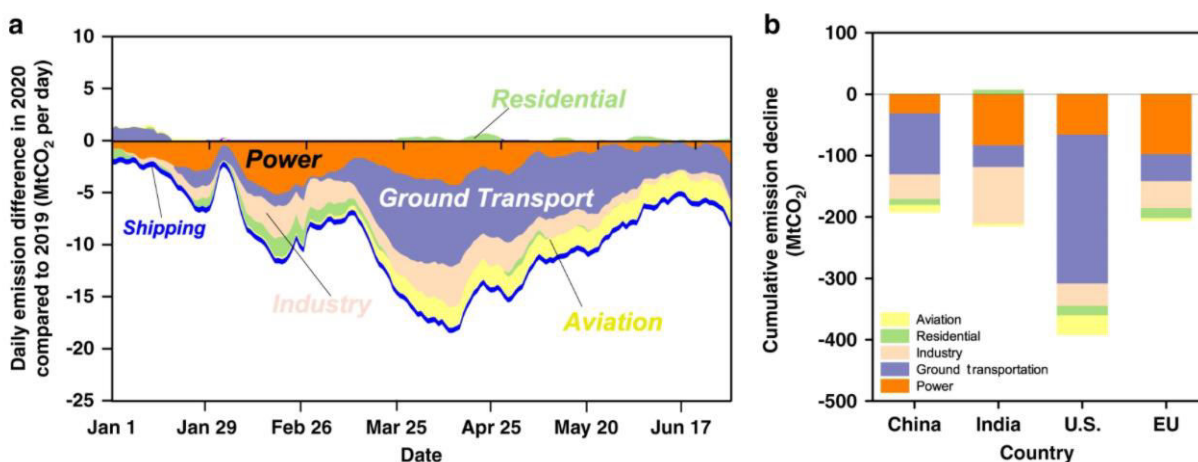
Fig. 1: Effects of COVID-19 on global CO₂ emissions.



b) The decrease is mainly due to the ground transportation sector (-18.6%) and domestic (-35.8%) and international aviation (-52.4%) (Figs. 3, 4). Figure 3 shows the breakdown of daily emissions changes by sectors. The largest contributions to the global decrease in emissions in 2020 come from ground transportation (-613.3 Mt CO₂, 40% of the total decrease; purple in Fig. 3a) and the power sector (-341.4 Mt CO₂, 22% of the total decrease; orange in Fig. 3a), with somewhat smaller decreases from the industry sector (-263.5 Mt CO₂, 17% of the total decrease; warm orange in Fig. 3a) and the aviation sector (including domestic aviation and international aviation, -200.8 Mt CO₂, 13% of the total decrease; yellow in Fig. 3a), and relatively small decreases in international shipping (-89.1 Mt CO₂, 6% of the total decrease; blue in Fig. 3a) in residential sector emissions, which include residential, public and commercial buildings (-42.5 Mt CO₂, 3% of the total decrease; green in Fig. 3a)

Fig. 3: Sectoral effects of COVID-19 on CO₂ emissions.

From: Near-real-time monitoring of global CO₂ emissions reveals the effects of the COVID-19 pandemic



a Sector-specific effects of the COVID-19 pandemic on CO₂ emissions globally, shown as the 7-day running mean of daily differences between January 1st and June 30th of 2019 and 2020, and b the cumulative decline by sectors in each of China, India, U.S., and EU27 & UK in the first half year of 2020.

[From article “Near-real-time monitoring of global CO₂ emissions reveals the effects of the COVID-19 pandemic” by Zhu Liu, Philippe Ciais, and Hans Joachim Schellnhuber (October 14, 2020) at the website of Nature Communications (at <https://www.nature.com/articles/s41467-020-18922-7>) (a) in the “Results” section, paragraph 2 and Figure 1; b) in the “Results” section, paragraph 6 and Figure 3)]

236) Article “Influential academics reveal how China can achieve its ‘carbon neutrality’ goal” (Lauri Myllyvirta) (October, 2020)

“China’s electricity system would need to reach net-zero CO₂ emissions by 2050 if the country is to meet its recently announced target of “carbon neutrality” before 2060.

“This is one of the key insights from new scenarios and policy recommendations for meeting the goal, published separately by two leading--and highly influential--Chinese climate research institutes.

“The scenarios hint at the thinking behind Chinese leader Xi Jinping’s announcement and offer a glimpse of what it might mean for the energy system in China – and the world. China accounts for almost 30% of the world’s CO₂ emissions, more than half of its coal use and half of coal-fired power capacity.

“Both scenarios come close to phasing out fossil fuels, with more than 85% of all energy and more than 90% of electricity coming from non-fossil sources--renewables and nuclear--by 2050.

“The energy pathways unveiled since the goal was [announced](#) on 22 September show how the thinking on China’s future energy system is already shifting, but also highlight some of the questions that are still left open by the one-sentence announcement, where, according to the official translation, Xi said: “We aim to have CO₂ emissions peak before 2030 and achieve carbon neutrality before 2060.”

From section “New Scenarios”

“The first of the new scenarios is from Tsinghua University Institute for Climate Change and Sustainable Development (ICCSA) and 18 other Chinese research institutes, which released their ‘China Low-Carbon Development Strategy and Transformation Pathways” ([presentation](#), English) on 12 October.

9. Leading the global climate governance in the post-pandemic era

- **There is a growing consensus that a "green economic recovery" is important in the post-pandemic era. Addressing climate change will remain a race for major countries.**
 - Antonio Guterres: Climate change is the deeper environmental emergency facing the planet and addressing climate risks should be at the heart of all recovery measures.
- **China's targets of striving to peak CO₂ emissions by 2030 and achieving carbon neutrality by 2060 will play an important role in accelerating the country's post-pandemic green low-carbon transition and the implementation of long-term low-carbon strategies as well as facilitating the process of global climate governance.**
 - Promoting the much-needed low-carbon transition at home has become an important target of socialist modernization in the new era and is at the core of building an ecological civilization.
 - Internationally, China's pledge will boost the confidence and willingness to act against climate change, lead global economic and technological transformation, and show that China is acting responsibly as a major country for the common cause of all mankind.
- **Setting ambitious and powerful targets to peak CO₂ emissions and achieve carbon neutrality and rolling out supporting policies and actions are vital for China to align its overall strategies both at the national and international level.**

2020.10.12. 10:00:00 AM



[last slide in presentation in Tsinghua University before “Thank You!” slide;
link in last sentence above,
and at https://mp.weixin.qq.com/s/S_8ajdq963YL7X3sRJSWGg]

“Meanwhile, Prof Zhang Xiliang of Tsinghua University’s Institute of Energy, Environment and Economy (Tsinghua 3E) recently gave a presentation ([in Chinese](#), starting from 3:46) on the energy and economic implications of reaching carbon neutrality by 2050, 2060 or 2070, which appears to have informed the 2060 target date.

“Both scenarios indicate that the electricity sector would need to get to zero emissions by 2050 and start delivering “negative emissions” thereafter--assumed to come from bioenergy with carbon capture and storage (BECCS)--to offset hard-to-eliminate emissions from industrial processes, agriculture and other sectors.

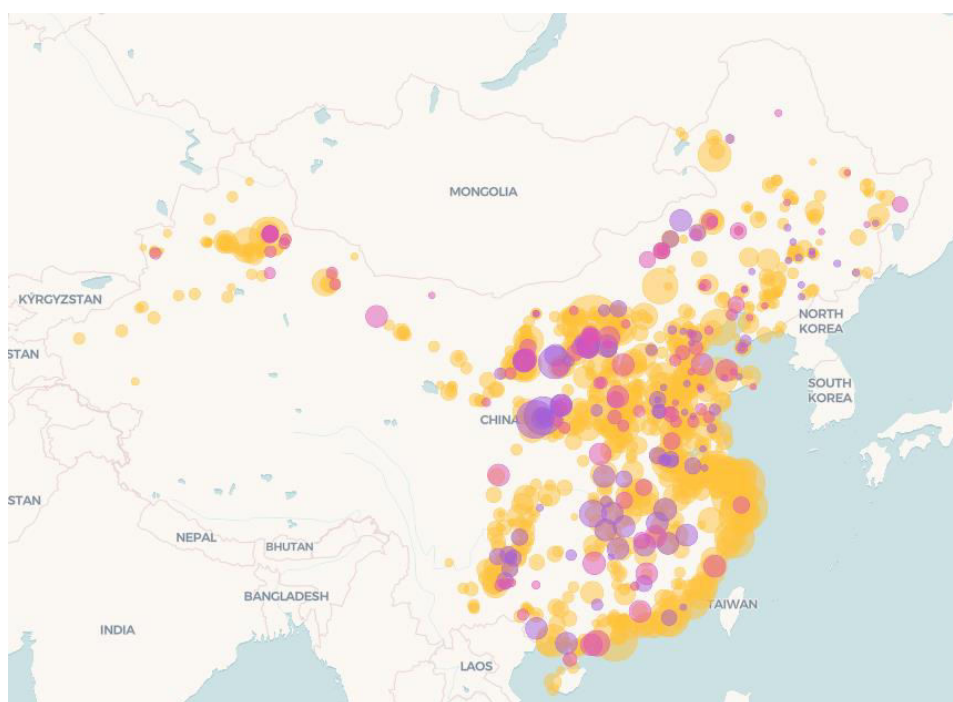
“The Tsinghua 3E scenario foresees power generation from coal without carbon capture and storage (CCS) essentially ending in 2050, but it maintains a significant amount of coal use outside the power sector until 2060. In the ICCSD scenario, the share of coal in the overall energy mix already falls below 5% in 2050.

From section “Higher ambition”

“The 2060 announcement is clearly creating room for more ambitious energy plans. This becomes clear when comparing the latest scenarios towards 2060 with earlier projections.

“For example, last year’s China Renewable Energy Outlook 2019 by the National Renewable Energy Center--a thinktank under China’s top economic planning ministry the NDRC--saw non-fossil energy reaching only 65% in 2050. Yet this annual report has a history of presenting a bullish case for renewables.

“In the new scenarios, the main strategy for phasing out fossil fuels outside of the power sector is electrification, which means that emissions-free power generation will need to replace not only China’s [coal-fired power plants](#) --half of the world’s total--but also much of the coal and oil consumption in industry, transport and heating sectors.



[From “Mapped: The world’s coal power plants” by Carbon Brief (March 26, 2020)

(at <https://www.carbonbrief.org/mapped-worlds-coal-power-plants>)

(key: yellow = operating; orange = new; magenta = under construction; purple = planned)]

“Both sets of scenarios find that getting to a 1.5C compatible pathway--and to carbon neutrality--requires significant investment in negative emissions from the power sector, which they plan to realise with biomass CCS (BECCS).

From section “Challenges”

“The Chinese economic model is very good at mobilising large amounts of investment, so scaling up clean energy, electrified transport and other new, clean technologies might not be the largest challenge in reaching carbon neutrality by 2060.

“Instead, managing the economic, regional and political impacts of phasing out fossil fuels is likely to be a bigger issue for the country.

“By 2050, in the ICCSD low-carbon development pathway, coal would supply less than 5% of China’s energy--and much less than 10% in the power sector. This would mean closing down all but a few of the 3,000 coal-fired power units and 5,000 coal mines operating in China today.

“It is also clear that realising the carbon-neutrality vision will require work on deep decarbonisation options in sectors that are currently viewed as “hard to address”, particularly steel, cement and chemical industry process emissions, as well as agriculture and aviation.

“These initial studies take a simplified approach and assume that BECCS (Bio-energy with Carbon Capture and Storage) will be an easier or more affordable solution than decarbonising these sectors, but more affordable mitigation options could emerge.

From section “All Eyes on China”

“Xi Jinping has also emphasised the importance of a green recovery from the crisis. If such a green recovery is translated into domestic policy action, then it could put the country on the path to carbon neutrality much faster. [Carbon Brief is [tracking](#) how governments around the world are introducing ‘green recovery’ stimulus measures.]”

[From article “Influential academics reveal how China can achieve its ‘carbon neutrality’ goal” by Lauri Myllyvirta (October 14, 2020) at the Carbon Brief website (at <https://www.carbonbrief.org/influential-academics-reveal-how-china-can-achieve-its-carbon-neutrality-goal#:~:text=China's%20electricity%20system%20would%20need,%E2%80%9Ccarbon%20neutrality%E2%80%9D%20before%202060.&text=China%20accounts%20for%20almost%2030,of%20coal%2Dfired%20power%20capacity.>) (first section, paragraph 1-5; from section “New Scenarios”, paragraphs 1-4; from section “Higher ambition”, paragraphs 1-3, and 10; from section “Challenges”, paragraphs 1-3, and 9-10; and from section “All Eyes on China”, paragraph 2)]

237) Article “What’s causing climate change, in 10 charts: Different ways of looking at the problem.” (David Roberts) (October, 2020)

“With heat waves, wildfires, intense hurricanes, and other extreme weather events in the headlines, the ravages of climate change have become undeniable and unavoidable. Who or what is responsible for this?”

“It seems like a simple enough question, but like so many things about climate change, it gets more complicated the more you look into it. It turns out there are a number of ways of divvying up the blame.”

“To illustrate the point, I’ve borrowed some charts from a recent research note by the investment firm Morgan Stanley (with permission). They help distinguish who is emitting in the present from who emitted in the past, who’s emitting more and less over time, and which fuels and activities are driving the change.”

“None of this data is original--it’s all public--but putting these charts in one place can help us wrap our minds around the many different ways that questions about responsibility for climate change can be phrased.”

Exhibit 7: Global carbon emissions in 2018; total area = 36.6 billion tonnes of carbon dioxide



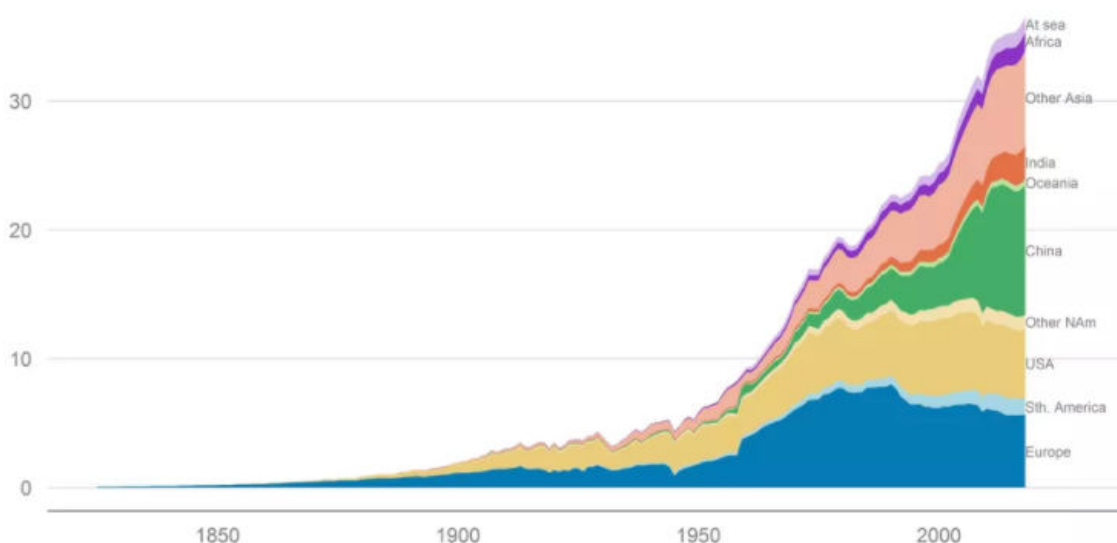
Source: Global Carbon Project

Morgan Stanley

Exhibit 4:

Annual carbon emissions, by region

In billions of tonnes of CO₂, 1825-2018



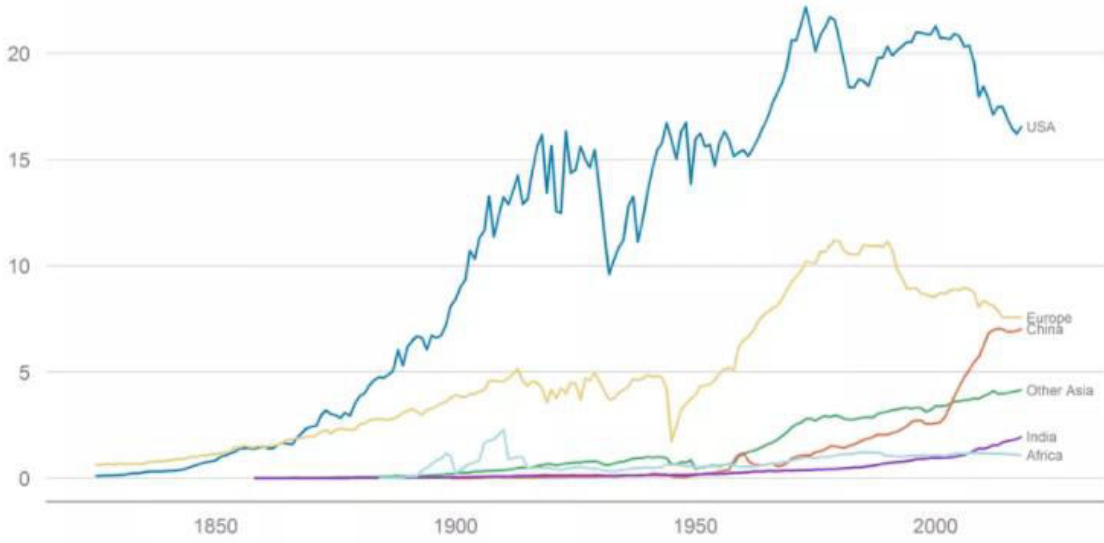
Source: Carbon Dioxide Information Analysis Center (CDIAC), Global Carbon Project (GCP)

Morgan Stanley

Exhibit 10:

Per capita carbon emissions

Average emissions per head, in tonnes of CO₂, 1825-2018



Source: Carbon Dioxide Information Analysis Center (CDIAC), Global Carbon Project (GCP), Gapminder

Morgan Stanley

Who has contributed most to global CO₂ emissions?



Cumulative carbon dioxide (CO₂) emissions over the period from 1751 to 2017. Figures are based on production-based emissions which measure CO₂ produced domestically from fossil fuel combustion and cement, and do not correct for emissions embedded in trade (i.e. consumption-based). Emissions from international travel are not included.

North America
457 billion tonnes CO₂
29% global cumulative emissions



Asia
457 billion tonnes CO₂
29% global cumulative emissions



EU-28
353 billion tonnes CO₂
22% global cumulative emissions



Europe
514 billion tonnes CO₂
33% global cumulative emissions



Oceania
20 billion tonnes CO₂
1.2% global emissions

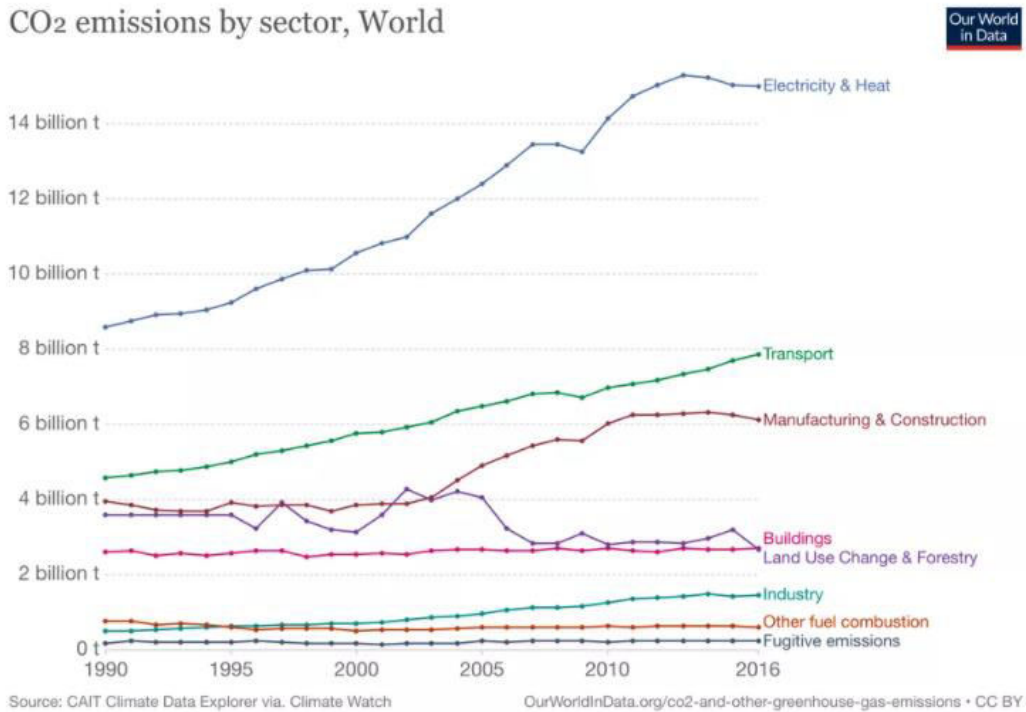
Figures for the 28 countries in the European Union have been grouped as the 'EU-28' since international targets and negotiations are typically set as a collaborative target between EU countries. Values may not sum to 100% due to rounding.

Data source: Calculated by Our World in Data based on data from the Global Carbon Project (GCP) and Carbon Dioxide Analysis Center (CDIAC). This is a visualization from OurWorldInData.org, where you find data and research on how the world is changing.

Licensed under CC-BY by the author Hannah Ritchie.

Our World in Data

CO2 emissions by sector, World



Our World in Data

“In the end, the conversation about responsibility leads where all climate conversations lead: The only hope of avoiding catastrophic damage is most every country decarbonizing as rapidly as they are capable, regardless of their histories and rivalries.”

“Whoever’s fault it is, we either all chip in to solve it or we all suffer.”

[From article “What’s causing climate change, in 10 charts: Different ways of looking at the problem.” (David Roberts) (October, 2020) at the website Vox (at <https://www.vox.com/energy-and-environment/21428525/climate-change-cause-charts-china-us-responsible>) (paragraphs 1-4, 19, 21--and five charts)]

238) Article “Revealed: Covid recovery plans threaten global climate hopes--Exclusive: analysis finds countries pouring money into fossil fuels to fight recession” (Fiona Harvey) (November, 2020)

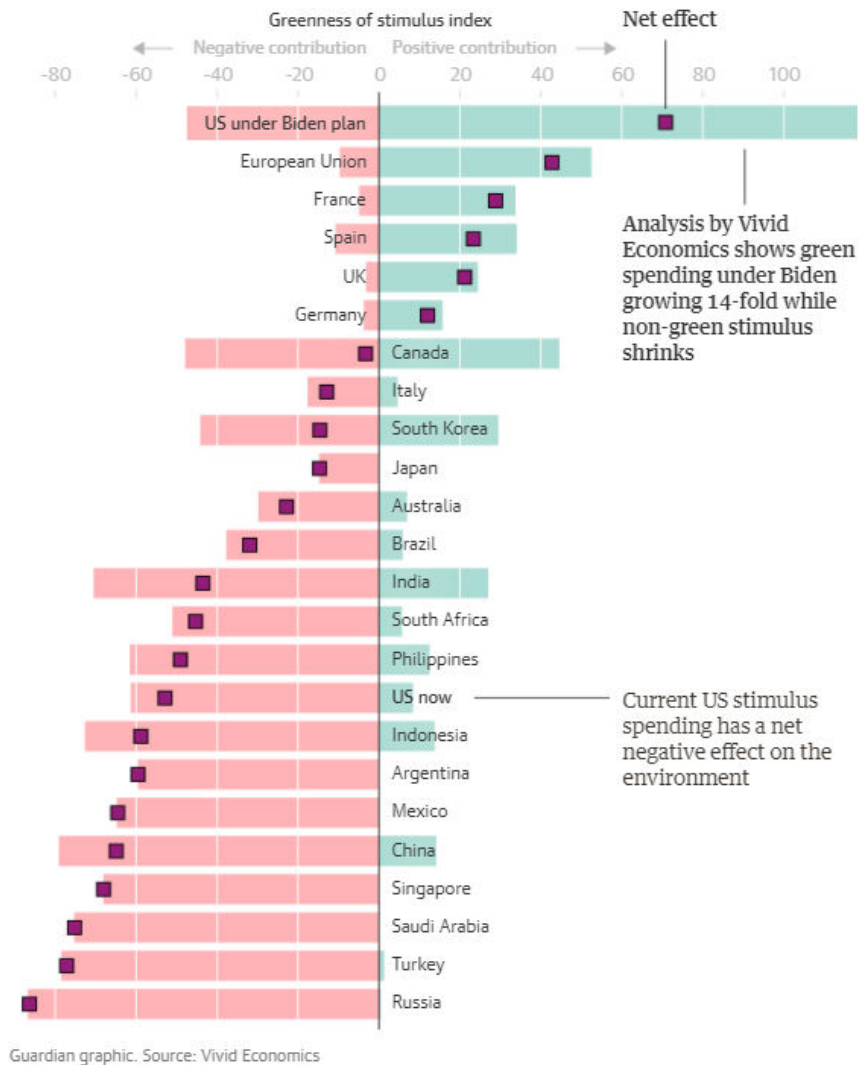
“The prospect of a global green recovery from the coronavirus pandemic is hanging in the balance, as countries pour money into the fossil fuel economy to stave off a devastating recession, an analysis for the Guardian reveals.”

“Meanwhile, promises of a low-carbon boost are failing to materialise. Only a handful of major countries are pumping rescue funds into low-carbon efforts such as renewable power, electric vehicles and energy efficiency.”

“A new Guardian ranking finds the EU is a frontrunner, devoting 30% of its €750bn (£677bn) Next Generation Recovery Fund to green ends. France and Germany have earmarked about €30bn and €50bn respectively of their own additional stimulus for environmental spending.”

“On the other end of the scale, China is faring the worst of the major economies, with only 0.3% of its package--about £1.1bn--slated for green projects. In the US, before the election, only about \$26bn (£19.8bn), or just over 1%, of the announced spending was green.”

Greenness of Stimulus Index (Vivid Economics)



“In at least 18 of the world’s biggest economies, more than six months on from the first wave of lockdowns in the early spring, pandemic rescue packages are dominated by spending that has a harmful environmental impact, such as bailouts for oil or new high-carbon infrastructure, outweighing the positive climate benefits of any green spending, according to the analysis.”

“Only four countries--France, Spain, the UK and Germany--and the EU have packages that will produce a net environmental benefit.”

“‘The natural environment and climate change have not been a core part of the thinking in the bulk of recovery plans,’ said Jason Eis, chief executive of Vivid Economics, which compiled the index for the Guardian. ‘In the majority of countries we are not seeing a green recovery coming through at all.’”

“Even countries that have boasted of green recovery plans are frequently spending much more on activities that will maintain or increase greenhouse gas emissions. South Korea set out plans for a green new deal in July, worth about \$135bn. But its continued spending on fossil fuels and carbon-intensive industries means it ranks only eighth in the world for the greenness of its stimulus.”

“Countries failing to initiate a green recovery were missing out on the potential to create millions of jobs, added Ed Barbier, professor of economics at Colorado State University, whose landmark study of the 2008 financial crisis pegged that recovery as about 16% green. “There is huge potential for boosting employment, particularly in construction,” he said, pointing to measures such as installing home insulation, solar panels and electric car charging infrastructure, which are labour-intensive and often ‘shovel-ready’.”

[From article “Revealed: Covid recovery plans threaten global climate hopes--Exclusive: analysis finds countries pouring money into fossil fuels to fight recession” by Fiona Harvey (November 9, 2020) (at the Guardian website (at https://www.theguardian.com/environment/2020/nov/09/revealed-covid-recovery-plans-threaten-global-climate-hopes?CMP=tw_t_a-environment_b-gdneco) (paragraphs 1-8, 14--and graphic)]

239) Article “BlackRock CEO backs mandatory climate reporting, urges U.S. action” (Simon Jessop and Matthew Green) (November, 2020)

“LONDON (Reuters) - Larry Fink, chief executive of the world’s largest asset manager BlackRock, said on Tuesday he backed the UK’s recent move to make the reporting of corporate risk related to climate change mandatory, and urged the United States to follow suit.”

“‘We welcome the UK Chancellor’s announcement yesterday (of) mandatory TCFD reporting,’ Fink told the Green Horizon Summit in London, referring to the Taskforce on Climate-Related Financial Disclosures, which will be required from large companies and financial institutions by 2025.”

“As climate change drives a ‘tectonic shift’ in capital allocation across the financial system, Fink said he welcomed the decision by the UK government to join the growing number of countries to issue green bonds.”

“‘We see clear demand for such assets from investors worldwide.’”

[From article “BlackRock CEO backs mandatory climate reporting, urges U.S. action” by Simon Jessop and Matthew Green (November 10, 2020) at the Reuters website (at <https://www.reuters.com/article/climate-change-blackrock/blackrock-ceo-backs-mandatory-climate-reporting-urges-u-s-action-idUSKBN27R073>) (paragraphs 1-2, and 8-9)]

240) Activism/Statistics “Climate Emergency Declarations”

a) “1,830 jurisdictions in 31 countries have declared a climate emergency. Populations covered by jurisdictions that have declared a climate emergency amount to over 820 million citizens, with 60 million of these living in the United Kingdom. This means in Britain now around 90 per cent of the population lives in areas that have declared a climate emergency, over 480 councils all together. In New Zealand, the percentage is nearly as high: 75 per cent of the population.”

[From the webpage for “Climate Emergency Declarations” at the website Climate Emergency Declaration (November 5, 2020) (at <https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/>) (paragraph 1)]

b) “In an emergency we all tend to pull together in whatever way we can for the common good. In an emergency, ‘normal’ expectations are temporarily on hold and solving the emergency is given priority. Wartime mobilisations have shown us that nations can restructure their economies amazingly quickly when there is an existential threat. That is exactly the scale and speed of action we need now to protect our future.”

[From the webpage “Strategies for Action” at the website Cedamia (at <https://www.cedamia.org/campaigns/>) (from paragraph 4)]

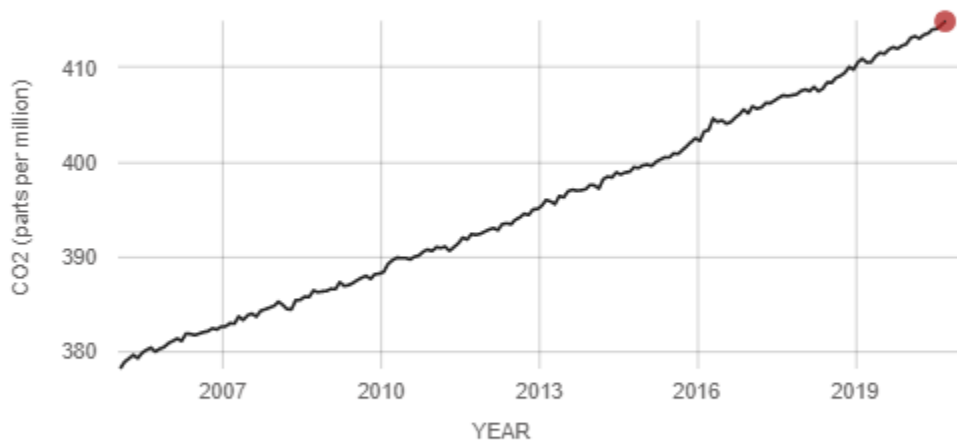
Appendix

Quick Reference to Key Graphs and Charts

1. The amount of CO₂ in the atmosphere is not decreasing, or leveling off as in reaching a peak, it is still rising.

DIRECT MEASUREMENTS: 2005-PRESENT

Data source: Monthly measurements (average seasonal cycle removed). Credit: NOAA



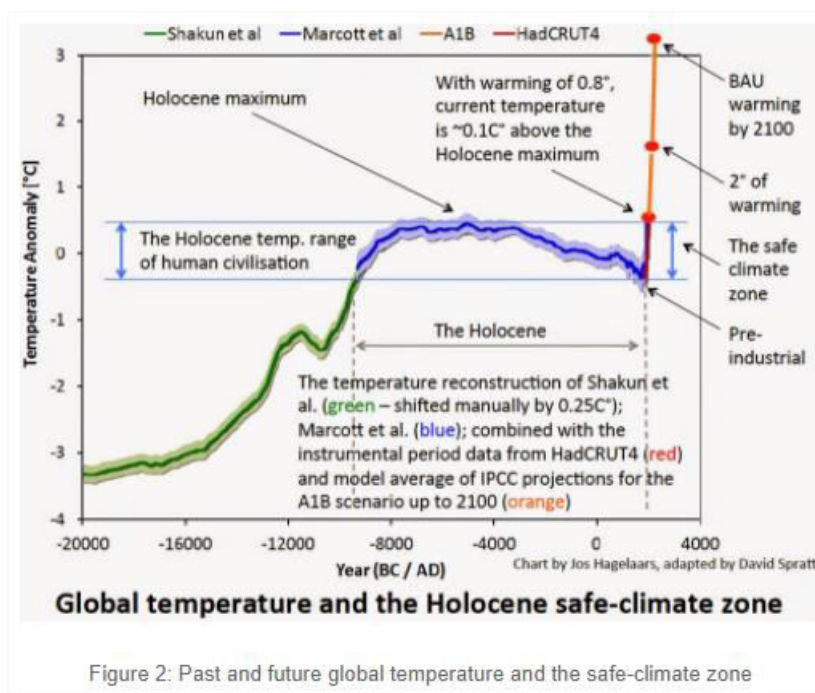
Click+drag to zoom

RESET

Get Data: [FTP](#) | Snapshot: [PNG](#)

[From the webpage titled "Facts" in the subsection titled "Carbon Dioxide" at the website for the National Aeronautics and Space Administration (see <https://climate.nasa.gov/vital-signs/carbon-dioxide/>)]

2. We have left the 10,000-year climate "safe zone" that gave rise to human civilization.



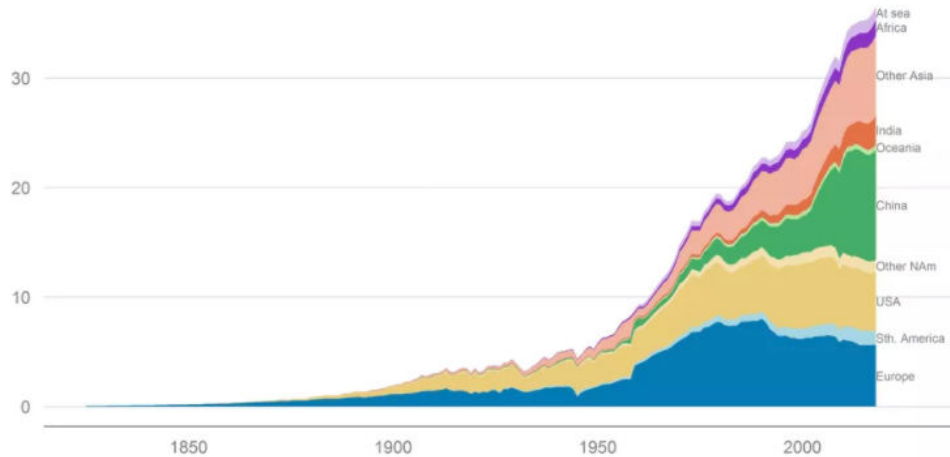
[From article "The real budgetary emergency and the myth of "burnable carbon" (David Spratt) (May 22, 2014) at <http://www.climatecoded.org/2014/05/the-real-budgetary-emergency-burnable.html>]

3. While it has taken approximately 170 years to get to this point...

Exhibit 4:

Annual carbon emissions, by region

In billions of tonnes of CO₂, 1825-2018

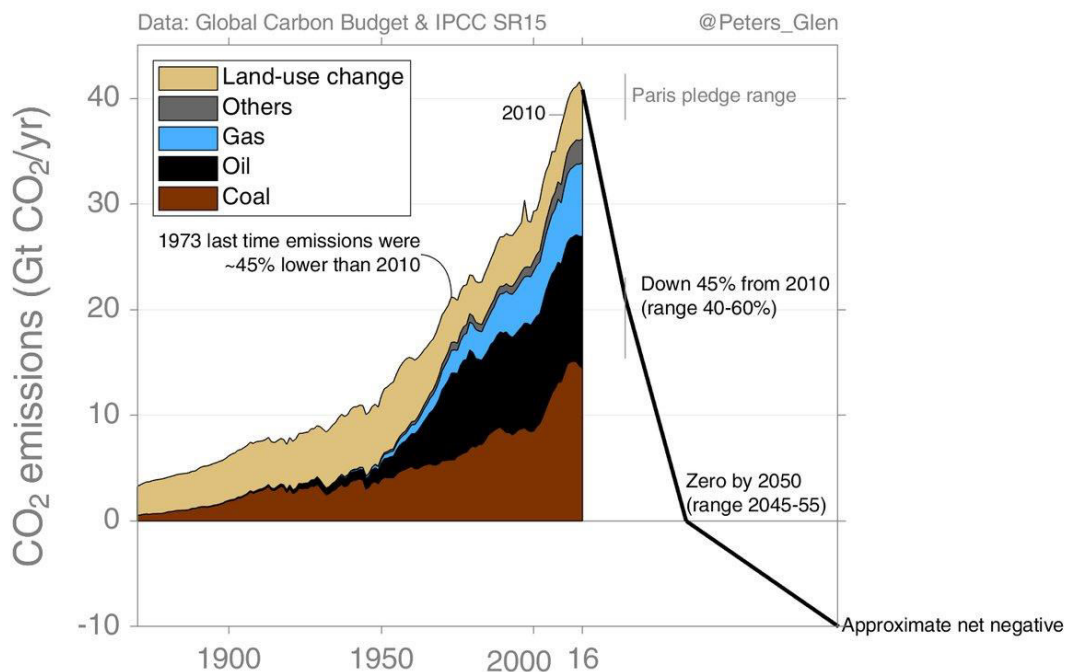


Source: Carbon Dioxide Information Analysis Center (CDIAC), Global Carbon Project (GCP)

Morgan Stanley

[From article “What’s causing climate change, in 10 charts: Different ways of looking at the problem.” (David Roberts) (October, 2020) at the website Vox (at <https://www.vox.com/energy-and-environment/21428525/climate-change-cause-charts-china-us-responsible>)]

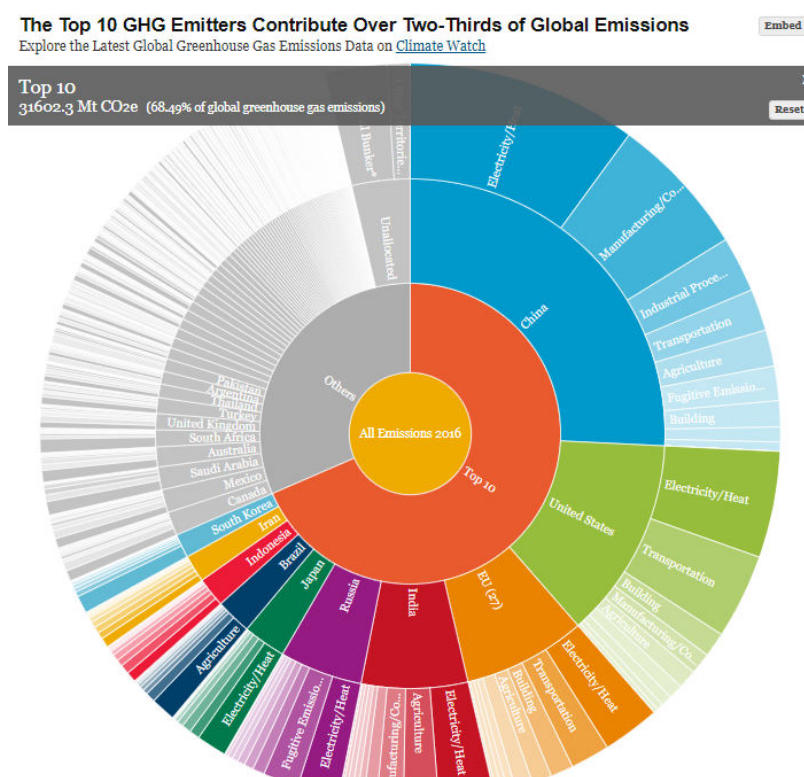
4. ... we now have less than 20 years (due to increasing concerns about negative tipping points) to get to Zero Carbon.



[From a tweet by Glen Peters @Peters_Glen (October 12, 2018) on the Twitter Platform (at https://twitter.com/Peters_Glen/status/1050651292178075648)]

[Note: from Glen Peters Twitter Profile: “Research Director at @CICERO_klima (Center for International Climate Research--Oslo, Norway) on past, current, & future trends in energy use & GHG emissions.”]

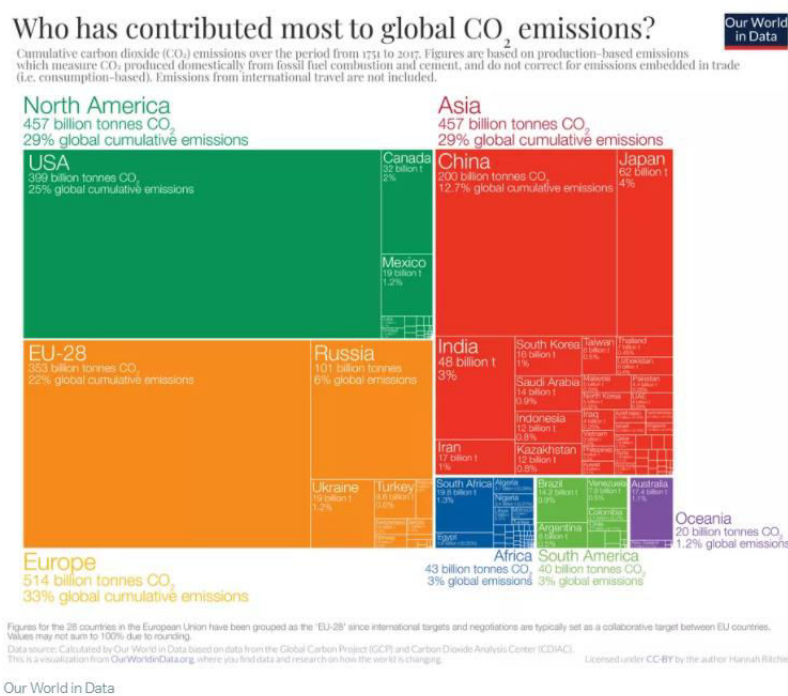
5. There are key regions in the world which have much work to do...



Carbon Dioxide Makes Up Most, but Not All, Greenhouse Gas Emissions

[From article “4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors” by Mengpin Ge and Johannes Friedrich (February 6, 2019) at the World Resources Institute website (at https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector?utm_source=twitter&utm_medium=worldresources&utm_campaign=socialmedia&utm_term=e93c0580-6270-4921-afb6-07c2f0c40960) (Note: at the above link, this chart is interactive.)]

6. ... and some regions which have a more historical responsibility than others....



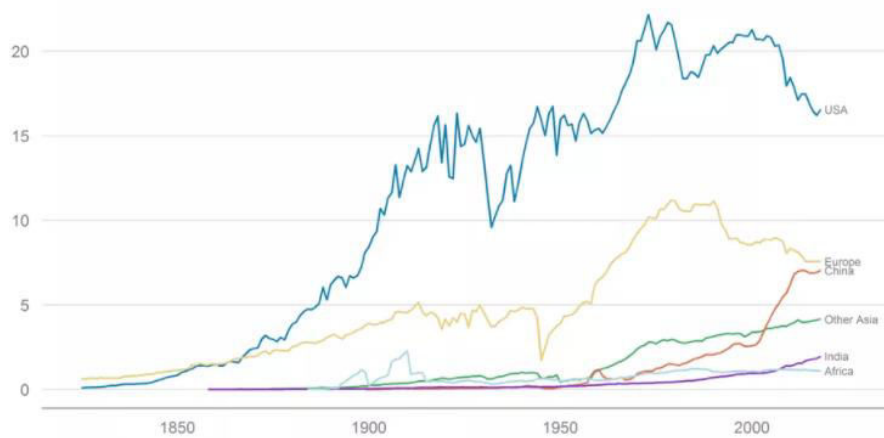
[From article “What’s causing climate change, in 10 charts: Different ways of looking at the problem.” (David Roberts) (October, 2020) at the website Vox (at <https://www.vox.com/energy-and-environment/21428525/climate-change-cause-charts-china-us-responsible>)]

7. Some ways of life contribute more to Greenhouse Gase Emissions than others....

Exhibit 10:

Per capita carbon emissions

Average emissions per head, in tonnes of CO₂, 1825-2018



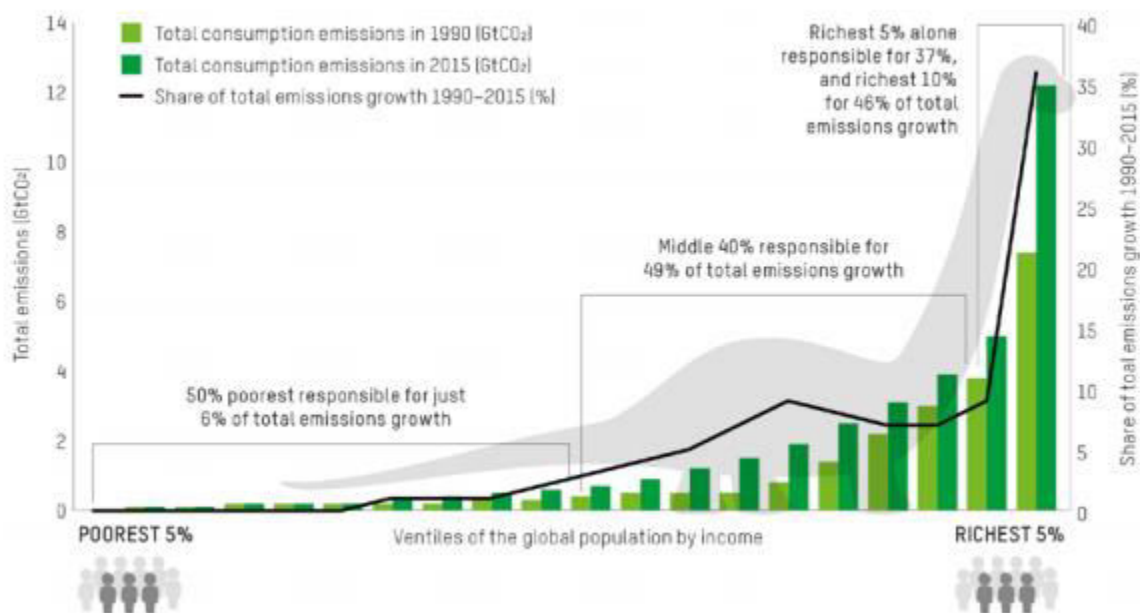
Source: Carbon Dioxide Information Analysis Center (CDIAC), Global Carbon Project (GCP), Gapminder

Morgan Stanley

[From article “What’s causing climate change, in 10 charts: Different ways of looking at the problem.” (David Roberts) (October, 2020) at the website Vox (at <https://www.vox.com/energy-and-environment/21428525/climate-change-cause-charts-china-us-responsible>)]

8. ... and some less.

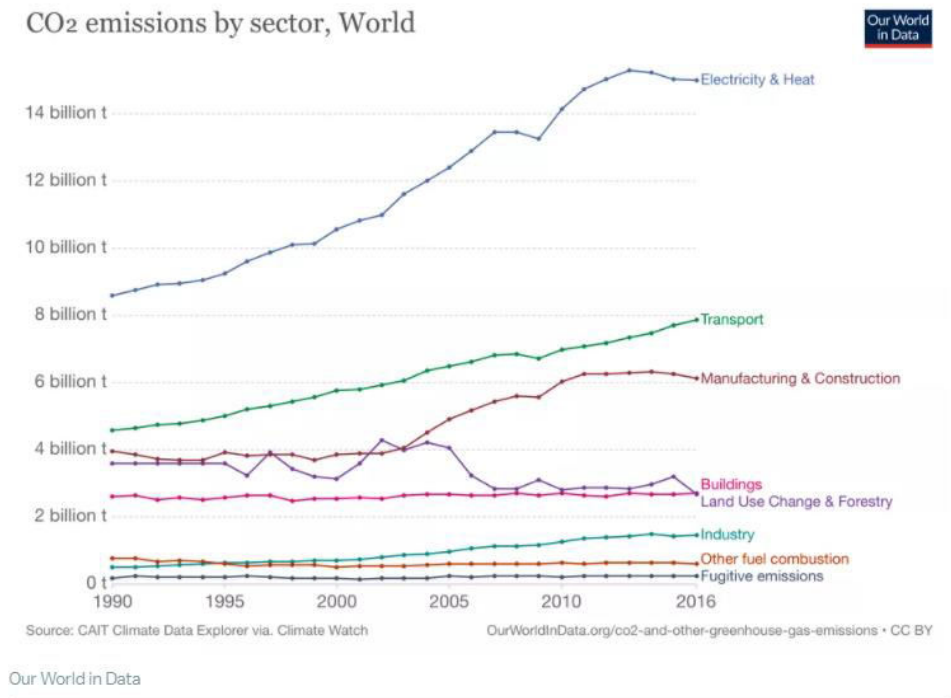
Figure 2: The 'dinosaur graph' of unequal carbon emissions growth 1990-2015



[From Media Briefing “Confronting Carbon Inequality: Putting climate justice at the heart of the COVID-19 recovery” by Tim Gore (September 21, 2020) at the website for Oxfam (at <https://www.oxfam.org/en/research/confronting-carbon-inequality>) (where pdf file can be downloaded) (direct access to pdf file at <https://oxfamilibrary.openrepository.com/bitstream/handle/10546/621052/mb-confronting-carbon-inequality-210920-en.pdf>)]

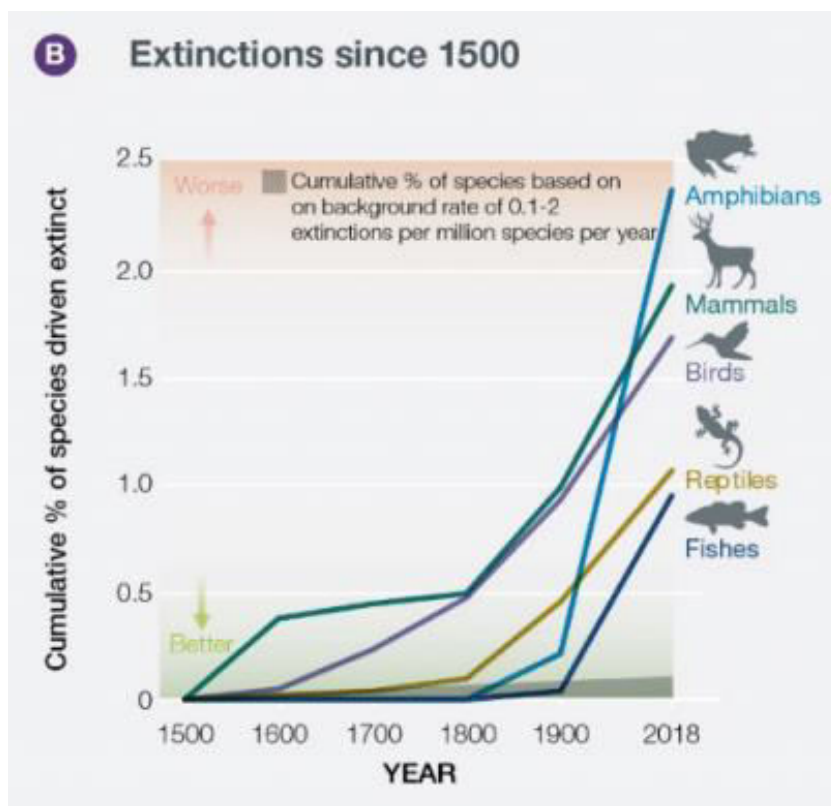
9. Some sectors which are driving emissions more than others...

This chart from Our World in Data makes it even clearer that, globally, the rising demand for electricity and heating is the main driver of emissions, with transport rising at a distant second.



[From article “What’s causing climate change, in 10 charts: Different ways of looking at the problem.” (David Roberts) (October, 2020) at the website Vox (at <https://www.vox.com/energy-and-environment/21428525/climate-change-cause-charts-china-us-responsible>)]

10. ... and consequences for other living beings (not just human beings).



11. However, all readers of this paper have to do is think of what kind of difficulties we may, or will, face in the unprecedented cultural transformation ahead of us... and it will dawn upon them how much they will be hoping that the people they need to cooperate with in their local community have been inspired--somehow--to think carefully, act honestly, work diligently, and have compassion for their fellow human beings, as best they can, in all of the everyday circumstances of community life.
