

## CLIMATE CHANGE: SCIENCE AND SOLUTIONS

### Annotated Bibliographies (Updated, 12/27/22)

#### REFERENCE MATERIALS: CLIMATE OVERVIEW

The volume of climate-related information and resources is huge and it continues to grow. In this document we highlight selected reports, articles, and organizations concerned with the status of the climate crisis, overall strategies for change, and plans of action to reduce greenhouse gas emissions and carbon in the atmosphere.

Column “Topic” indicates whether the resource is “global”, i.e., about climate worldwide, or specific to either the USA or Massachusetts; “Topic” also highlights the content category, e.g., overall status and action steps or specific areas such as sea level rise, transportation or behavior change. The other columns provide titles, links and brief descriptions; for lengthy studies and articles, the links will open summaries as well as full reports.

The 350 Mass Science Working Group is continuing to add resources related to climate overall and our campaigns addressing buildings/housing, transportation, and energy. To access all the documents with reference materials, go to the [Working Group's page](#) on the 350 Mass website.

#### A. Overview Materials on Climate: Status, Goals, Strategies, Actions

TOPIC	RESOURCE TITLE, HYPERLINKED	DESCRIPTION
Global Climate, Status	NASA. <a href="#">Global Climate Change: Vital Signs of the Planet.</a>	Facts, monitoring, articles, images, and reports on global climate, the atmosphere, temperature, water levels, etc.
Global Climate, Status	<a href="#">CO<sub>2</sub> Earth.</a> Global Vital Signs.	Tracking, monitoring and presenting up-to-date readings for atmospheric CO <sub>2</sub> , global temperature, global emissions, and pH in seawater.
Global Climate, Status, Temperature	<a href="#">Berkeley Earth. Global Warming.</a> Temperature Updates. <a href="#">Global Temperature Report for 2021.</a> Jan. 2022. Monthly reports also available.	Tracks and projects average temperatures over time and by region.

Global Climate, Status, Projections	Milman O, Witherspoon A, Liu R, Chang A. <a href="#">The climate disaster is here</a> . The Guardian, October 14, 2021.	Dire projections for this century of the implications of rising temperatures on heatwaves, floods, wildfires, crop failure, and the world as we've known it.
Global Climate, Overview	<a href="#">The Science of Climate Change Explained: Facts, Evidence and Proof</a> . Definitive answers to the big questions. J. Rosen, NY Times, 2021.	Well-written scientific explanations of the causes and effects of climate change, presented in a Q&A format.
Global Climate, Overview	<a href="#">Science Moms</a> . A nonpartisan group of climate scientists and mothers. ... <a href="#">Climate 101</a> .	Information, videos, and materials to demystify climate change, talk honestly about how it will affect our children and give moms the facts they need to take action.
Global Climate, Overview	PBS. <a href="#">Global Weirding: Climate, Politics, and Religion</a> with Katharine Hayhoe, climate scientist (and <a href="#">Science Mom</a> ). Series of 30 short videos produced 2017-2019.	5-10 minute archived videos provide direct, accessible answers to climate questions; suitable for students, children, and adults looking for basic information.
Global Climate, Overview	TED and Future Stewards, with Countdown Global Launch. <a href="#">Countdown</a> . Launched October 2020. Videos. A global initiative to accelerate solutions to the climate crisis.	Multiple videos of varying lengths addressing the state of the climate; roles for governments, cities and businesses; transforming energy, transportation, industry and infrastructure systems; and more.
Global Climate, History	Ben Franta. TEDxStanford. Video: <a href="#">Global Warming: From Scientific Warning to Corporate Casualty</a> . July 20, 2021. ... Article: Franta B. <a href="#">Weaponizing economics: Big Oil, economic consultants, and climate policy delay</a> . Environmental Politics, August 2021. ... Related: Cook et al. <a href="#">America Misled: How the fossil fuel industry deliberately</a>	12-minute video (and 21-page article) presenting the history of the fossil fuel industry's campaign to hide and deny the science of climate change.

	<a href="#">misled Americans about climate change</a> . 2019. (14-page report)	
Global Climate, Status, Actions	<a href="#">The Intergovernmental Panel on Climate Change (IPCC)</a> . ... IPCC is the United Nations body for assessing the science related to climate change. ... Report: <a href="#">Sixth Assessment Report (AR6)</a> ... Part 1 of AR6 by Working Group I: <a href="#">Climate Change 2021: The Physical Science Basis</a> . August 2021. <a href="#">Summary</a> (text). ... <a href="#">Summary</a> (video). ... Part 2, Working Group II. <a href="#">Impacts, Adaptation and Vulnerability</a> . February 2022. ... Related: Helpful summaries. Carbon Brief. <a href="#">IPCC articles</a>	IPCC reports are comprehensive assessments of global climate change, mitigation pathways, policy responses, and more. Part 1 report (Aug 2021) documents that climate change is widespread, rapid, and intensifying. Part 2 (Feb 2022) assesses the impacts of climate change, and vulnerabilities and limits in the natural world and human societies to adapt.
Global Climate, Status, Actions	<a href="#">The Intergovernmental Panel on Climate Change (IPCC)</a> . Part 3, Working Group III. <a href="#">Climate Change 2022: Mitigation of Climate Change</a> . April 2022. ... Related: Helpful summary. Carbon Brief. <a href="#">In-depth Q&amp;A: The IPCC's sixth assessment on how to tackle climate change</a> . April 5, 2022.	IPCC Part 3 report on mitigation discusses strategies for how the necessary reduction of emissions can be accomplished. These include “substantial” reductions in fossil fuel use, energy efficiency, electrification, the rapid uptake of low-emission energy sources – particularly renewables – and the use of alternative energy carriers, such as hydrogen.
Global Climate, Energy, Status, Actions	<a href="#">International Energy Agency, IEA</a> . ... Report ... Report: <a href="#">World Energy Outlook 2021</a> . October 2021. ... Related news report: <a href="#">IEA says clean energy progress remains 'far too slow.'</a> CNBC, October 13, 2021.	380-page report provides critical analysis and insights on trends in energy demand and supply, and what they mean for the climate, energy security and economic development. One scenario is the Announced Pledges Scenario that assumes all climate commitments made by governments around the world will be met in full and on time.

Global Climate, Energy, Status	UN Environment Programme (UNEP). <a href="#">2021 Production Gap Report</a> . October 20, 2021. ... Press Release: <a href="#">Governments' fossil fuel production plans dangerously out of sync with Paris limits</a> . Oct. 20, 2021.	100-page report finds that Despite increased climate ambitions and net-zero commitments, governments still plan to produce more than double the amount of fossil fuels in 2030 than what would be consistent with limiting global warming to 1.5°C.
Global Climate, Status, Actions	<a href="#">International Energy Agency. IEA</a> . ... Report: <a href="#">Net Zero by 2050: A Roadmap for the Global Energy Sector</a> . May 2021.... Related article: <a href="#">The International Energy Agency Issues a Landmark Statement About Fossil Fuels</a> . Bill McKibben, May 18, 2021.	200+-page report presents a technically feasible, cost-effective and socially acceptable pathway to reach net zero by 2050; includes more than 400 milestones spanning all sectors and technologies.
Global Climate, Status, Actions	Potsdam Institute for Climate Impact Research. Lila Warszawski et al, <a href="#">All options, not silver bullets, needed to limit global warming to 1.5°C: a scenario appraisal</a> . Environmental Research Letters (2021). ... Related summary article: <a href="#">Few realistic scenarios left to limit global warming to 1.5°C</a> . May 14, 2021.	Scenarios to limit global warming to 1.5°C apply mitigation levers, including reduction of global energy demand, decarbonization of energy production, development of land-management systems, and the pace and scale of deploying carbon dioxide removal (CDR) technologies. This study considers challenges in meeting the goal; few scenarios are still attainable.
Global Climate, Status, Actions	<a href="#">Rocky Mountain Institute (RMI)</a> . Working to transform global energy systems with a focus on energy production and use. ... <a href="#">Impact: Climate</a>	Informative and full website with reports and news items. Topics include carbon-free buildings, electricity, and mobility.

Global Climate, Status, Actions	<a href="#">Breakthrough Energy</a> ... Established in 2015 by Bill Gates and a coalition of private investors, Breakthrough Energy supports the innovations that will lead the world to net-zero emissions. Topics include electricity, transportation, buildings, agriculture, carbon removal, and more. ... <a href="#">Our Outlook on 2022</a> . January 31, 2022.	Breakthrough Energy is a network of entities and initiatives, including investment funds, nonprofit and philanthropic programs, and policy efforts linked by a common commitment to scale the technologies we need to achieve a path to net zero emissions by 2050.
Global Climate, Status, Actions	<a href="#">Project Drawdown</a> . ... Drawdown <a href="#">Solutions</a>	Technical and analytic information regarding more than 80 drawdown solutions, including their relevant sector(s)—electricity, industry, agriculture, land sinks, etc.—and their impact on reducing heat-trapping gases.
Global Climate, Status, Actions	<a href="#">Project Drawdown</a> . ... <a href="#">Climate Solutions 101</a> . Posted March 2021.	Excellent 6-unit course with videos, conversations, and resources, with a focus on solutions.
Global Climate, Status, Actions	<a href="#">MIT Climate Portal</a> .	Learn about climate change straight from MIT experts. The science, solutions, explainers, podcasts, and more.
Global Climate, Status, Actions	<a href="#">Union of Concerned Scientists. Climate Change</a> . ... Interview with Brenda Ekwurzel, director of climate science for the UCS Climate and Energy Program. <a href="#">Avoiding Climate Catastrophe: The Steps We Need to Take Now</a> . Union of Concerned Scientists, Catalyst (magazine) V. 20, Fall 2020, pp 12-13.	Information and resources about climate science, climate impacts, disinformation, and solutions and policies. Plus 2-page interview, includes five climate actions for all countries.

Global Climate, Status, Actions	Seibert MK, Rees WE. <a href="#">Through the Eye of a Needle: An Eco-Heterodox Perspective on the Renewable Energy Transition</a> . Energies. July 2021; 14(15):4508.	19-page pessimistic paper re-characterizes the climate crisis within its broader context of ecological overshoot, and highlights numerous collectively fatal problems with so-called renewable energy technologies. Describing the Green New Deal as a disastrous shared illusion, it suggests alternative solutions that entail a contraction of the human enterprise and new responsive leadership.
Global Climate, Status, Actions	Soergel, B., Kriegler, E., Weindl, I. et al. <a href="#">A sustainable development pathway for climate action within the UN 2030 Agenda</a> . Nature Climate Change. Aug. 2, 2021; 11, 656–664. ... Related: <a href="#">Summary article</a> ... <a href="#">Another summary</a>	21-page article asserts that climate policies alone will not achieve the 17 sustainable development goals adopted in Paris. Instead, we need a new integrated strategy that combines ambitious climate action with dedicated policies for development, food and energy access, global and national equity, and environmental sustainability.
Global Climate, Status, Actions	Schor, J. <a href="#">[Eco]nomics</a> . April-May 2022. Series of 4 videos, 18-30 minutes each, on the economics of climate change.	In this four-part lecture series, Professor Juliet Schor (Boston College) guides us through the economics of climate change.
Global Climate, Status	<a href="#">The Climate Reality Project</a> . Resource: <a href="#">Climate 101</a> .	Information on climate change and opportunities for activists. The Project, founded by Al Gore, seeks to recruit, train, and mobilize people to become powerful activists, and to provide the skills, campaigns, and resources to push for aggressive climate action and high-level policies that accelerate a just transition to clean energy.

Global Climate, Status	Future Earth et al, <a href="#">10 New Insights in Climate Science 2020</a> . 2021.	30-page report that highlights and discusses climate trends, developments in research and science, their implications, and policy considerations that emerged in 2020.
Global Climate, Status	<a href="#">Climate Emergency: Feedback Loops</a> . Videos; discussion guides. ... Video: Discussion with Film's Writers, <a href="#">GlobeDocs Presents: 'Earth Emergency'</a> . January 25, 2022. (45 minutes.)	Series of 5 short (10-15 minutes) films discussing natural warming loops, including permafrost, forests, atmosphere, and albedo. Discussion guides and resource lists also posted.
Global Climate, Status	Slide presentation. <a href="#">Extreme Weather</a> . Jim Brown, 350 Mass member, August 2021.	Discussion of global jet streams and ocean currents affected by conditions in the Arctic, contributing to weather crises.
Global Climate, Status, Pollution	Fuller R, Landrigan P, et al. <a href="#">Pollution and health: a progress update</a> . Lancet Public Health. May 17, 2022. ... Related: <a href="#">Study Identifies Outdoor Air Pollution as the 'Largest Existential Threat to Human and Planetary Health'</a> . Inside Climate News, May 17, 2022. ... Related report: <a href="#">Ten Million a Year. David Wallace-Wells on polluted air</a> . London Review of Books, v.43, n.23-2, December 2021.	The number of deaths that can be attributed to ambient air pollution has increased by about 55 percent—to 4.5 million from 2.9 million—since the year 2000. Global efforts and large-scale, rapid transition away from all fossil fuels to clean, renewable energy is an effective strategy for preventing pollution while also slowing down climate change.
Global Climate, Status, Actions	National Centre for Climate Restoration, Australia. <a href="#">Climate Reality Check</a> . Oct. 2020.	20 critical understandings, observations and insights on current impacts, major risks, and critical actions. A short, alarming report about the global crisis.
Global Climate, Status, Actions	McKinsey & Company. <a href="#">Featured Insights: Climate Change</a> ... Report: <a href="#">Climate Risk and Response: Physical Hazards and Socioeconomic</a>	Collection of reports and articles on climate change: risks, sustainability, the energy transition, and approaches to meet the challenges.

	<a href="#">Impacts</a> . McKinsey Global Institute. January 2020.	...Highlighted report focuses on understanding the nature and extent of the risks arising from the physical effects of climate change over the next one to three decades, including the potential effects on people, communities, natural and physical capital, and economic activity, and the implications for companies, governments, financial institutions, and individuals.
Global Climate, Status, Actions	Bill McKibben. <a href="#">Newsletter, The Crucial Years</a> . Founder of 350.org; faculty, Middlebury College.	Informative writings about the climate crisis, recent developments, and related matters of interest.
Global Climate, Status, Actions	<a href="#">Netting Zero</a> , a Virtual Event Series on Climate Change. New York Times. Archived videos, starting July 2020.	Each episode of Netting Zero brings together New York Times journalists with climate experts from business, policy, government, and civil society. 60-90-minute videos.
Global Climate, Status, Actions	The Guardian. <a href="#">Carbon Bombs</a> . May 2022. ... Includes: <a href="#">Revealed: the 'carbon bombs' set to trigger catastrophic climate breakdown</a> . Carrington D, Taylor M. May 11, 2022.	Oil and gas firms are planning massive projects that threaten to exacerbate the climate crisis. If governments do not act, these firms will continue to cash in as the world burns.
Global Climate, Actions	<a href="#">Rapid Transition Alliance</a> (UK). Website. A network of international organisations that are engaged in practical work, research and campaigning to tackle the climate emergency.	Resources describing clear, quantifiable changes in our values, behaviors, attitudes, and use of resources, energy, technology, finance and infrastructure, to prevent climate breakdown. Topics include clean energy, better homes, livable cities, good food, decent work, and more.



Global Climate, Actions	<a href="#">Rapid Transition Alliance</a> (UK). Website. Resources regarding rapid, transformative changes necessary to prevent climate breakdown and create the conditions for people to thrive together.	Resources describing clear, quantifiable changes in our values, behaviors, attitudes, and use of resources, energy, technology, finance and infrastructure. Topics include clean energy, better homes, livable cities, good food, decent work, and more.
Global Climate, Actions	Girardin C, et al. Comment: <a href="#">Nature-based solutions can help cool the planet — if we act now</a> . Nature. v.593. May 13, 2021.	Analysis shows that nature-based solutions can have a powerful role in reducing temperatures in the long term. Strategies: protect forests, grasslands and more; manage lands for crops, grazing and timber; and restore forests and wetlands and more.
Global Climate, Status	<a href="#">Deaths from fossil fuel emissions higher than previously thought</a> . Harvard School of Engineering and Applied Sciences, Feb. 9, 2021	Brief article that reviews a research report showing that fossil fuel air pollution was responsible for more than 8 million people worldwide in 2018.
Global Climate, Denial and Inaction	Lamb W, et al. <a href="#">Discourses of climate delay</a> . Global Sustainability, 3, E17, 1-5. July 1, 2020. ... Related: The Guardian. <a href="#">Big oil's 'wokewashing' is the new climate science denialism</a> . September 9, 2021.	Analysis of “discourses of climate delay” used by proponents to justify inaction or inadequate efforts by focusing on the negative social effects of climate policies and raising doubt that mitigation is possible.
Global Climate, Fossil Fuels	Welsby D, et al. <a href="#">Unextractable fossil fuels in a 1.5 °C world</a> . Nature. 597, 230–234, September 8, 2021.	Authors find that nearly 60 per cent of oil and fossil methane gas, and 90 per cent of coal must remain unextracted to keep within a 1.5 °C carbon budget. Most regions must reach peak production now or during the next decade, rendering many operational and planned fossil fuel projects unviable.

Global Climate, Status, Food Systems	Study: <a href="#">Food systems are responsible for a third of global anthropogenic GHG emissions</a> . Nature Food, 2021. ... <a href="#">Summary article</a> .	The study presents EDGAR-FOOD – the first database to break down emissions from each stage of the food chain. In 2015, food-system emissions amounted to 34% of total GHG emissions (CO <sub>2</sub> and methane).
Global Climate, Status, Food Systems	U.N. Food and Agriculture Organization. <a href="#">The impact of disasters and crises on agriculture and food security: 2021</a> . ... <a href="#">Summary</a> .	245-page report documenting the impact of disasters and crises on agriculture and food security, and presenting strategies for resilience and disaster risk reduction – especially data gathering and analysis for evidence-informed action.
Global Climate, Biodiversity	Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). <a href="#">Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change</a> . June 24, 2021. ... <a href="#">Workshop Report</a> . ... Related article: International Institute for Sustainable Development. <a href="#">Addressing Biodiversity Loss and Climate Change: Three ways adaptation planning can help</a> . August 10, 2021.	256-page report summarizes the emerging state of knowledge involving climate change and biodiversity with the objective to inform decision making and highlight options for action, and to identify knowledge gaps to be filled by scientific research.
Global Climate, Plants	Bridle, J. <a href="#">If we can farm metal from plants, what else can we learn from life on Earth?</a> The Guardian, April 15, 2022.	There is so much intelligence on this planet other than ours, in plants and animals. Realizing that will be key to adapting to climate breakdown.

Global Climate, Status, Materials, Actions	<a href="#">Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future</a> . Hertwich, E., et al. A report of the International Resource Panel. United Nations Environment Programme. 2020	Full 170-page report and accompanying information on the role of material efficiency strategies applied to buildings and vehicles as a way to reduce greenhouse gas emissions. Includes more intensive use of homes, design with less materials, improved recycling of construction materials, and production and disposal of cars.
Global Climate, Industry, Status, Actions	<a href="#">Mission Possible Partnership. Industry leaders back plan for zero-emissions aluminum, ammonia and steel</a> . September 21, 2022. Includes Sector Transition Strategies for each material.	New plans for production of near-zero emissions materials – aluminium, ammonia and steel – have won support from companies around the world.
Global Climate, Climate Engineering	EPFL International Risk Governance Center (IRGC). Florin, M.-V.(Ed.), et al. <a href="#">International Governance Issues on Climate Engineering. Information for Policymakers</a> , 2020. Summary, and link to download.	150-page report discusses climate engineering techniques of carbon dioxide removal (CDR), and solar radiation modification (SRM), their potential contributions, costs, risks and uncertainties. Authors consider possible options for international governance.
Global Climate, Climate Engineering	EPFL International Risk Governance Center (IRGC). Florin, M.-V.(Ed.), et al. <a href="#">Combating climate change through a portfolio of approaches</a> . 2021. Followup report to IRGC's 2020 report on governance issues on climate engineering. Summary, and link to download.	7-page article argues for more study of carbon dioxide removal (CDR) and solar radiation modification (SRM), and preparation to deploy these technologies.

Global Climate, Solar Geoengineering, CO <sub>2</sub> Removal or Drawdown	Keith D. <a href="#">What's the Least Bad Way to Cool the Planet?</a> NY Times, October 1, 2021.	Director of Harvard's solar engineering research program argues that to cool the planet in this century, along with emissions cuts, humans must either remove carbon from the air or use solar geoengineering; he describes the pros and cons of these two options.
Global Climate, CO <sub>2</sub> Removal or Drawdown	Hausfather Z, Flegel J. <a href="#">We need to draw down carbon—not just stop emitting it.</a> MIT Technology Review, July 5, 2022.	Carbon removal is no substitute for reducing climate pollution. But it is now a necessary tool to keep temperatures in check.
Global Climate, CO <sub>2</sub> Removal or Drawdown	J Wilcox, B Kolosz, & J Freeman. <a href="#">Carbon Dioxide Removal (CDR) Primer</a> . 2021. Full book can be read online.	A broad, multi-disciplinary introduction to removing carbon dioxide from the atmosphere. approaches and technologies, plus tools for analyzing and conceptualizing proposed CO <sub>2</sub> removal strategies.
Global Climate, CO <sub>2</sub> Removal or Drawdown	Global CCS (Carbon Capture and Storage) Institute. <a href="#">Technology Readiness and Costs of CCS</a> . March 2021.	50-page report examines CCS' technology readiness and factors influencing costs. Technological development will be a key element driving future cost reductions in CCS and applying CCS to hard-to-abate sectors such as cement, steel and direct air capture.
Global Climate, CO <sub>2</sub> Removal or Drawdown	Insider. <a href="#">The world's biggest carbon-removal plant just opened. In a year, it'll negate just 3 seconds' worth of global emissions.</a> September 25, 2021.	Article about the recently-opened world's largest carbon capture and storage facility. Direct air capture is in its infancy. Article reviews the debate over this technology.

Global Climate, CO <sub>2</sub> Removal or Drawdown	IEEE Spectrum. <a href="#">Carbon-Removal Tech Grabs Elon Musk's Check</a> . May 28, 2022. ... Related: <a href="#">XPrize Carbon Removal</a> competition.	Gigaton-scale carbon removal will be needed to avoid the worst effects of climate change. 15 winners, out of 1,100 teams, have been announced in a competition to develop methods to pull CO <sub>2</sub> from air and lock it away.
Global Climate, Carbon Capture and Storage	<a href="#">Center for International Environmental Law</a> . Using the power of law to protect the environment, promote human rights, and ensure a just and sustainable society ... <a href="#">Carbon Capture and Storage</a> .	Information, resources, and reasons to reject carbon capture and storage.
Global Climate, Carbon Capture and Storage	Webinar: <a href="#">Climate Capture and Storage</a> . Better Path Presents Mark Jacobson and Sandra Steingraber, August 11, 2021.	1-hour discussion about carbon capture and storage and why it is a false climate solution.
Global Climate, Carbon Capture and Storage	Video: Charles Harvey. <a href="#">Why Are We Spending Billions on Carbon Capture &amp; Storage?</a> Sept. 20, 2022	30-minute video. Charles Harvey, Ph.D., Professor of Civil and Environmental Engineering, MIT. Despite the hype, carbon capture and storage (CCS) is not a solution to the CO <sub>2</sub> problem that has caused global warming. Dr. Harvey discusses how these ineffective CCS projects continue to be promoted and he explains the necessity of shifting to renewable energy, which can be done now and with much less expense.
Global Climate, Solar Geoengineering	National Academies of Sciences, Engineering, and Medicine. <a href="#">Reflecting Sunlight: Recommendations for Solar Geoengineering Research and Research Governance</a> . 2021. ... <a href="#">Summary article</a> .	300-page report on solar geoengineering strategies designed to cool Earth. The report concludes that a strategic investment in research is needed to enhance policymakers' understanding of climate response options.

Global Climate, Geoengineering	<a href="#">Geoengineering Monitor</a> . ... A collaboration of groups opposing climate geoengineering ... <a href="#">Seven Reasons to Question Carbon Capture</a> . March 2020	Resources and information critical of proposed geoengineering technologies, and concerned about their anticipated effects.
Global, Energy, Net Zero	<a href="#">The Conversation: Environment &amp; Energy</a> . Articles on climate and environment, science and politics. ... <a href="#">Climate scientists: concept of net zero is a dangerous trap</a> . Dyke J, et al. April 22, 2021.	Prominent academics, including a former IPCC chair, round on governments worldwide for using the concept of net zero emissions to 'greenwash' their lack of commitment to solving global warming.
Global, Energy, Net Zero	<a href="#">Guest post: The problem with net-zero emissions targets</a> . Prof. Duncan McLaren. September 2019. ... Related research article: <a href="#">Beyond “Net-Zero”: A Case for Separate Targets for Emissions Reduction and Negative Emissions</a> . McLaren et al. Frontiers in Climate. August 2019.	Climate statements call for both reductions in greenhouse gas emissions and negative emissions through technologies that remove carbon and store it. The author argues that these net-zero plans have hampered climate policy, and the two strategies must be separated.
Global, Energy, Net Zero	<a href="#">Climate Home News. Net Zero ... 10 myths about net zero targets and carbon offsetting, busted</a> . By 41 scientists, Nov. 12, 2020.	Carbon neutrality targets are often not as ambitious as they sound, relying on problematic carbon offsets and unproven technologies. The idea of carbon offsetting, which underpins so-called net zero targets, is founded on a number of myths.
Global, Carbon Pricing	Verbruggen A. <a href="#">Pricing Carbon Emissions: Economic Reality and Utopia</a> . 2021. Download entire book or single chapters; view chapter abstracts online.	The book provides an economic critique on the utopian idea of a uniform carbon price for addressing rising carbon emissions, exposing the flaws in the economic propositions. It is written for a broad audience interested in climate policy eager

		to understand why decarbonizing progress is slow as it is.
Global Climate, Behavior Change & Lifestyle	Cambridge (UK) Sustainability Commission on Scaling Behaviour Change. <a href="#">Changing Our Ways? Behaviour Change and the Climate Crisis</a> . 2021.	70-page report and accompanying archived webinar discussing roles and opportunities for behavior change among individuals, businesses, governments and influential and high-consuming social groups within societies to achieve an ecosystem of transformation in this decade.
Global Climate, Behavior Change & Lifestyle	The Intergovernmental Panel on Climate Change (IPCC). Part 3, <a href="#">Working Group III. Climate Change 2022: Mitigation of Climate Change</a> . April 2022. <a href="#">Chapter 5: Demand, services and social aspects of mitigation</a> . ... Related: <a href="#">IPCC Mitigation Report 2022 Analysis—Part One: Debunking Demand, an Ode to Chapter Five</a> . April 5, 2022. Drilled News.	Assessment of how social norms, culture, and individual choices interact with infrastructure and other structural changes over time. This provides new insight into climate change mitigation strategies, and how economic and social activity might be organized across sectors to support emission reductions.
Global Climate, Behavior Change & Lifestyle	Finnish Innovation Fund Sitra. Finding solutions to the ecological sustainability crisis. 1. <a href="#">1.5-Degree Lifestyles. Targets and options for reducing lifestyle carbon footprints – A summary</a> . 2019. ... 2. <a href="#">Pathways to 1.5-degree Lifestyles by 2030</a> . 2020.	First item discusses changes in consumption patterns and dominant lifestyles, proposing clear targets and quantifiable benefits. ... 2 <sup>nd</sup> item presents four alternative lifestyles that will help meet the 2030 targets to reduce our personal carbon footprints.
Global Climate, Behavior Change & Lifestyle	<a href="#">JUMP Campaign</a> . ... <a href="#">Six key lifestyle changes can help avert the climate crisis, study finds</a> . Canada's National Observer. March 2022. ... <a href="#">Study: The six key lifestyle changes that can help avert the climate crisis</a> . Irish Examiner, March 2022	Six lifestyle changes to help achieve a two-thirds reduction in the impact of consumption in rich countries by 2030.



Global Climate, Behavior Change & Lifestyle	Akenji L, Bengtsson M, et al. <a href="#">1.5-Degree Lifestyles: Towards A Fair Consumption Space for All</a> . Hot or Cool Institute, Berlin, 2021. ... Press Release: <a href="#">Governments in G20 countries must enable 1.5 aligned lifestyles</a> . October 3, 2021.	160-page report finds that G20 countries exceed the lifestyle carbon footprint for 2050, requiring rapid and radical reductions. The report explores policies governments can implement to pave the way for greener lifestyles, rather than focusing on individual behavior changes, which will not be sufficient to achieve these reductions.
Global Climate, Behavior Change & Lifestyle	Wiedmann T, et al. <a href="#">Scientists' warning on affluence</a> . Nature Communications, 11, 3107, 2020.	Current environmental impact mitigation neglects over-consumption from affluent citizens as a primary driver. The authors highlight the role of bottom-up movements to overcome structural economic growth imperatives spurring consumption by changing structures and culture towards safe and just systems.
Global Climate, Societal Change, Degrowth Scenarios	Keyßer, LT, Lenzen, M. <a href="#">1.5 °C degrowth scenarios suggest the need for new mitigation pathways</a> . Nature Communications. 12, 2676, May 11, 2021. ... <a href="#">Related article</a> with summary.	Authors explore degrowth scenarios to achieve climate goals, calling for reduced production and consumption in the global North, as a necessary complement to established pathways relying on renewable energy, energy efficiency and carbon dioxide removal.
Global Climate, Societal Change, Degrowth Scenarios	Bokat-Lindell, S. <a href="#">Do We Need to Shrink the Economy to Stop Climate Change?</a> NY Times, Sept. 16, 2021.	Article reviews the debate over calls for degrowth vs. models showing ongoing economic and GDP growth.
Global Climate, Societal Change, Degrowth, Housing	Eco-houses information: <a href="#">Wikipedia</a> ... <a href="#">Pre-fab eco-home kits</a> ... <a href="#">ECOHouse Architecture</a> ... <a href="#">BrightBuilt Home</a> ; Download: <a href="#">Building a Green Home in New England</a> .	Information and resources about Eco-houses, environmentally low-impact homes designed and built using materials and technology that reduce their



	<a href="#">an Introductory Guide ... Inhabitat</a> , a green design and lifestyle site ...	carbon footprint and lower their energy needs.
Global Climate, Environment, Assorted topics	<a href="#">Podcast. How to Save A Planet</a> . Launched July 2020. ... Episode February 11, 2021: <a href="#">Party Like It's 2035: Reaching 100% clean electricity in the U.S. by 2035</a> .	More than 30 podcast episodes, c. 30-50 minutes each, as of April 2021. Wide range of topics, asking “what do we need to do to solve the climate crisis, and how do we get it done?”
Global Climate and USA, Status, Goals, Strategies	<a href="#">Center for Climate and Energy Solutions</a> . An independent, nonpartisan, nonprofit organization working to forge practical solutions to climate change.... <a href="#">Climate Basics</a> .	Expansive collection of information and resource links addressing climate science, education, solutions, and policies at all levels – local, state, federal and international.
Global Climate and USA, Status, Goals, Strategies	<a href="#">Inside Climate News</a> . ... Articles organized in sections: Science, Politics & Policy, Justice, Fossil Fuels, and Clean Energy.	Nonpartisan news organization that provides essential reporting and analysis on climate change, energy and the environment, for the public and for decision makers. Articles posted daily.
Global Climate and USA, Status, Goals, Strategies	<a href="#">Climate Central</a> ... An independent organization of leading scientists and journalists researching and reporting the facts about our changing climate and its impact on the public.	Reports and articles addressing climate science, sea level rise, extreme weather, energy, and related topics.
USA, Status	National Oceanic and Atmospheric Administration. <a href="#">U.S. saw its 4th-warmest year on record, fueled by a record-warm December</a> . January 10, 2022. ... Boston Globe, <a href="#">Summary</a> .	The year 2021 was marked by extremes across the U.S., including exceptional warmth, devastating severe weather and the second-highest number of billion-dollar weather and climate disasters on record.
USA, Status	Phillips A, Brady D, et al. <a href="#">Summer in America is becoming hotter, longer and</a>	Climate change is fundamentally altering the summer months, into stretches of extreme heat, dangerously polluted air, anxiety,

	<a href="#">more dangerous</a> . Washington Post, July 2, 2022.	and lost traditions. Global warming is driving the shift to hotter summers, experts say, but urban growth is also to blame.
USA and Global, Status	National Centers for Environmental Information (NCEI) of the National Oceanic and Atmospheric Administration. <a href="#">Data Archive</a> .	One of the most significant archives for environmental data on Earth; comprehensive atmospheric, coastal, oceanic, and geophysical data.
USA, Status, Goals, Strategies	US Environmental Protection Agency (EPA). <a href="#">Climate Change</a> . ... Related article: <a href="#">Climate Change Is Making Big Problems Bigger</a> . NY Times, May 12, 2021	A wealth of information, data, reports, and programs: climate indicators, clean energy programs, links to other government offices, and more.
USA, Status, Goals, Strategies	The White House. <a href="#">Biden Administration Releases Agency Climate Adaptation and Resilience Plans from Across Federal Government</a> . October 7, 2021. ... <a href="#">Federal Climate Adaptation Plans</a> . ... Related article, <a href="#">6 Aspects of American Life Threatened by Climate Change</a> . NY Times, October 7, 2021.	Large federal agencies developed adaptation and resilience plans to address their most significant climate risks and vulnerabilities. The plans reveal the dangers posed by a warming planet to every aspect of American life, and the difficulty of coping with those threats.
USA, Financial Regulation	Congressional Research Service, Insight: <a href="#">Climate Change and U.S. Financial Regulators: Overview and Recent Actions</a> . August 26, 2021.	3-page summary of plans by financial regulators to address financial risks associated with climate change: Department of the Treasury, the Securities and Exchange Commission (SEC), and the Federal Reserve.
USA, Status, Goals, Strategies. Coal and Gas	<a href="#">Sierra Club. Beyond Coal</a> . Problem, solutions, campaign.	Information on fossil fuel and renewable energy sources, and strategies to achieve clean energy. Focus on coal and gas.

USA, Status, Goals, Strategies	National Academies of Sciences, Engineering, and Medicine. <a href="#">Accelerating Decarbonization of the U.S. Energy System</a> . 2021. ... <a href="#">Summary press release</a> .	The 198-page report, the first of two, presents a technical blueprint and policy road map for the next 10 years of the nation's transition to net-zero carbon emissions. "Achieving net-zero carbon emissions in the U.S. by 2050 is feasible and would not only help address climate change but also build a more competitive economy, increase high-quality jobs, and help address social injustice in the energy system."
USA, Status, Goals, Strategies	Bistline J, Abhyankar N, et al. <a href="#">Actions for reducing US emissions at least 50% by 2030</a> . Science. May 26, 2000; v 376 (6596):922-924. ... Related coverage: <a href="#">News Release</a> and <a href="#">Inside Climate News</a> .	A six-model intercomparison of potential actions to reach the US GHG emissions target highlights the central roles of clean electricity and electrification and the large scale of deployment needed.
USA, Status, Goals, Strategies	Princeton Environmental Research. <a href="#">Net-Zero America: Potential Pathways, Infrastructure, and Impacts</a> . Dec. 2020. ... <a href="#">Overview</a> .	This 345-page study provides "granular guidance on what getting to net-zero really requires and on the actions needed to translate these pledges into tangible progress."
USA, Goals, Strategies	<a href="#">Carbon-Neutral Pathways for the United States</a> . James H. Williams, et al. AGU Advances, March 2021. First published: 14 January 2021.... <a href="#">Summary press release</a> .	20-page article presents a detailed blueprint for the US to become carbon neutral by 2050. "By methodically increasing energy efficiency, switching to electric technologies, utilizing clean electricity (especially wind and solar power), and deploying a small amount of carbon capture technology, the US can reach zero emissions without requiring changes to behavior. Cost is significantly less than estimates from a few years ago because of recent technology progress."

USA, Goals, Strategies	<a href="#">Climate Xchange</a> . ... Many resources: research and policy, webinars, podcasts... Webinar: <a href="#">The Road to 100% Renewable Energy</a> . Feb. 2021. ... Policy Primer: <a href="#">The Grid Isn't Broken, But Still Needs Fixing</a> . September 23, 2022.	1-hour webinar on policies to achieve 100% renewable energy or net-zero: the difference between 100% renewable, net-zero, and carbon neutrality; job protection; vulnerable populations; needed technology; legislative action.
USA, Energy, Electricity	Visual Capitalist. <a href="#">Road to Decarbonization: The United States Electricity Mix</a> . August 31, 2021.	Graphics breaking down the US' electricity mix, by state.
USA, Energy, Customer Action	Sergici S, Hledik R, et al. <a href="#">The Customer Action Pathway to National Decarbonization</a> . The Brattle Group, September 7, 2021.	39-page report quantifies the significant decarbonization impact of customers adopting new technologies and energy consumption behaviors in the next 10-20 years. Includes the potential scale of customer action as it relates to gas and electric energy efficiency, rooftop solar, EV adoption, and water and heating electrification.
USA, Clean Energy	Evergreen Collaborative. <a href="#">A Roadmap to 100% Clean Electricity by 2035</a> . Feb. 2021.	57-page report: Subtitle: Power Sector Decarbonization through a Federal Clean Electricity Standard and Robust Clean Energy Investments and Justice-Centered Policies
USA, Clean Energy	UC Berkeley's Center for Environmental Public Policy. <a href="#">2035 Report: Electricity</a> . Plummeting Solar, Wind, and Battery Costs Can Accelerate Our Clean Energy Future. June 2020. ... Summary: Key Findings	37-page report. With strong policies, "the US can deliver 90 percent clean, carbon free electricity nationwide by 2035, dependably, at no extra cost to consumer bills and without the need for new fossil fuel plants."

USA, Energy	Jacobson M, et al. <a href="#">Zero air pollution and zero carbon from all energy at low cost and without blackouts in variable weather throughout the U.S. with 100% wind-water-solar and storage</a> . Renewable Energy, January 2022, v.184.	Authors analyze the future performance of the energy grid once renewables are fully deployed; they cite the benefits compared to business-as-usual.
USA, Transportation	UC Berkeley's Center for Environmental Public Policy. <a href="#">2035 Report: Transportation</a> . Plummeting Costs and Dramatic Improvements in Batteries Can Accelerate Our Clean Transportation Future. April, 2021. ... Summary: Key Findings	65-page report. "With the right policy, it is technically and economically feasible for all new car and truck sales to be electric by 2035, saving lives, cutting transportation costs, and creating millions of jobs."
USA, Public Engagement	<a href="#">Yale University Program on Climate Change Communication</a> . <a href="#">Climate Change in the American Mind</a> . Leiserowitz et al. April 2022. ... <a href="#">All publications</a> .	Ongoing studies of public opinion and behavior, to educate the public about climate change and help build public and political will for climate action. A majority think global warming is happening and are at least somewhat worried. Responses to these and other questions presented and discussed.
USA and Massachusetts, Energy, Status	<a href="#">U.S. Energy Information Administration</a> . ... <a href="#">Energy Explained</a> . ... <a href="#">Massachusetts profiles, data, reports</a> .	A wealth of information, data, reports, analysis and projections on US energy, including renewable and nonrenewable sources.
Global, Oceans	Cheng L, et al. <a href="#">Another Record: Ocean Warming Continues through 2021 despite La Niña Conditions</a> . Advances in Atmospheric Sciences. January 11, 2022. ... CNN, <a href="#">summary</a> .	13-page article finds that, due to the increased concentration of greenhouse gases in the atmosphere, the world ocean, in 2021, was the hottest ever recorded by humans; the long-term ocean warming is larger in the Atlantic and Southern Oceans than in other regions.

Global, Ocean Currents, Sea Level Rise	Boers, N. <a href="#">Observation-based early-warning signals for a collapse of the Atlantic Meridional Overturning Circulation</a> . Nature Climate Change. 11, 680–688, August 5, 2021. ... <a href="#">Full text</a> .... Related article, <a href="#">CNN, August 6, 2021</a> . ... Earlier article, <a href="#">The Guardian, February 26, 2021</a> .	The Atlantic Meridional Overturning Circulation (AMOC), the ocean current system that underpins the Gulf Stream in the Atlantic, is weakening. Effects will include rising seas in the U.S. and more severe storms in Europe.
USA and Massachusetts, Sea Level Rise	National Oceanic and Atmospheric Administration (NOAA). <a href="#">U.S. coastline to see up to a foot of sea level rise by 2050</a> . Feb. 15, 2022. ... Report: <a href="#">2022 Sea Level Rise Technical Report</a> . ... Boston Globe. <a href="#">Northeast is likely to experience more than a century's worth of sea level rise from 2000 to 2050, report finds</a> . Feb. 15, 2022. and <a href="#">Here's what rising sea levels mean for Boston</a> . Feb. 16, 2022.	Updated projections available through 2150 for all U.S. coastal waters. Northeast region will likely experience significantly higher tides and so-called sunny-day flooding than much of the rest of the US coastline.
USA and Massachusetts, Sea Level Rise	First Street Foundation. <a href="#">The 3rd National Risk Assessment. Infrastructure on the Brink</a> . October 2021. ... Porter, Jeremy R., <a href="#">Community Flood Risk and Infrastructure: Examining National Flood Impacts Using a High Precision Risk Assessment Tool, October 1, 2021</a> . Available at SSRN. ... Related article: Boston Globe, <a href="#">Flooding could shut down Logan airport, hospitals, and other critical infrastructure in Mass., and the risk is only growing, report says</a> . October 17, 2021.	This study provides a nation-wide model of community flooding risk currently and in 30 years; millions of additional properties will be at risk. Some properties are in Massachusetts.

USA and Massachusetts, Sea Level Rise, Status, Strategies	NASA Jet Propulsion Lab. <a href="#">Study Projects a Surge in Coastal Flooding, Starting in 2030s</a> . July 7, 2021. ... The NASA Sea Level Change Team (N-SLCT). <a href="#">Flooding Days Projection Tool</a> . Locations include Boston.	Analysis projects that In the mid-2030s, every U.S. coast will experience rapidly increasing high-tide floods, when a lunar cycle will amplify rising sea levels caused by climate change.
USA and Massachusetts, Sea Level Rise, Status, Strategies	<a href="#">Climate Central's Program on Sea Level Rise ... Surging Seas Risk Finder ... Massachusetts ... Picturing Our Future</a> .	Information on status and causes of sea level rise, reports, maps, plans and actions, and links to resources.
USA and Massachusetts, Sea Level Rise, Status, Strategies	<a href="#">Sea Level Rise.Org</a> . Forecasts, causes, risks, solutions. ... <a href="#">Massachusetts status</a> .	Information on America's sea level: forecast, causes, risks, and solutions. National, regional, and state-specific.
Massachusetts and New England, Climate Status	Young SS, Young JS. <a href="#">Overall Warming with Reduced Seasonality: Temperature Change in New England, USA, 1900–2020</a> . Climate. 2021; 9(12):176. ... Boston Globe. <a href="#">New England is warming faster than the rest of the planet, new study finds</a> . December 30, 2021.	24-page article shows New England is warming significantly faster than global average temperatures, and that rate is expected to accelerate as more greenhouse gases are pumped into the atmosphere and dangerous cycles of warming exacerbate climate change.
Massachusetts, Status, Goals, Strategies	MA Executive Office of Energy and Environmental Affairs. <a href="#">MA Decarbonization Roadmap</a> . Report, Dec. 2020. Technical reports by Sector: Buildings, Transportation, Energy, Land, Non-Energy, etc.	Long-range analyses: on achieving net zero emissions by 2050. 90-page Final Report, plus detailed sector-specific technical reports.
Massachusetts, Status, Goals, Strategies	MA Executive Office of Energy and Environmental Affairs. <a href="#">Massachusetts Clean Energy and Climate Plan (CECP) for 2025 and 2030</a> . June 30, 2022. <a href="#">Full report here</a> . ... Summary:	Report provides details on the actions the Commonwealth will undertake through the next decade to ensure the 2025 and 2030 emissions limits are met, and to put the state on a pathway



	WBUR. <a href="#">What to know about Mass.' new 2025, 2030 'Clean Energy and Climate Plan'.</a>	to achieve net zero greenhouse gas emissions by 2050.
Massachusetts, Status, Goals, Strategies	MA Executive Office of Energy and Environmental Affairs. <a href="#">Massachusetts Clean Energy and Climate Plan (CECP) for 2050</a> . December 2022. ... Related: <a href="#">MA Clean Energy and Climate Dashboard</a> . Key performance indicators relevant to CECP.	192-page report. Goals and actions, specific to each of the sectors of the economy, to reduce GHG emissions and conserve and enhance carbon sequestration on natural and working lands to help achieve Net Zero in 2050.
Massachusetts, Status, Goals, Strategies	MA Executive Office of Energy and Environmental Affairs & others. Resilient MA Action Team (RMAT). <a href="#">Resilient MA: Climate Change Clearinghouse for the Commonwealth</a> . Includes the Municipal Vulnerability Preparedness Program (MVP); the State Hazard Mitigation & Climate Adaptation Plan (SHMCAP); and thousands of resources with data and information.	The RMAT is tasked with monitoring and tracking the State Hazard Mitigation and Climate Adaptation Plan implementation process, making recommendations to and supporting agencies on plan updates, and facilitating coordination across State government and with stakeholders. The website offers extensive tools and data that can be filtered and searched.
Massachusetts, Status, Goals, Strategies	Greater Boston Research Advisory Group. Douglas E, Kirschen P. <a href="#">Climate Change Impacts and Projections for the Greater Boston Area</a> . May 2022. ... Related: Boston Globe. <a href="#">More heat waves, rising seas, and intensifying storms will pummel the Boston area, new report finds</a> . June 1, 2022.	140-page report summarizes the most recent (as of late 2021) scientific understanding of climate risk factors pertinent to Greater Boston. Chapters focus on storms, precipitation, flooding, and groundwater; sea level rise; and temperature.
Massachusetts, Status, Goals, Strategies	Elders Climate Action, Mass. Chapter. Archived Webinars: <a href="#">Getting to Net Negative – A Massachusetts Approach</a> . 5-part series, Nov. 2020-Feb. 2021.	Excellent, comprehensive educational series aimed at Massachusetts climate activists. Each video is 60-90 minutes, discussing overall and sector-specific context and



		strategies. White papers on related topics also available.
Massachusetts, Status, Goals, Strategies	Boston Globe. <a href="#">Into The Red</a> . Collected articles on the climate crisis.	Climate stories from the Boston Globe that “shine light on obstacles to decisive action, illuminate paths toward solutions, and hold to account elected leaders responsible for guiding us to a better future.”
Massachusetts, Forests	Noor D. <a href="#">To curb the climate crisis, transforming forestry is key, UN says</a> Boston Globe, May 7, 2022.	Forests cover more than 60 percent of land in Massachusetts. To avert the most dire consequences of climate change, those woodlands must be protected, a recent report from the United Nations’ climate change body warns.
Massachusetts, Policy and Politics	<a href="#">Climate Xchange, State Policy Climate Network, Massachusetts.</a>	Legislative and policy updates about climate action in Massachusetts.
Massachusetts, Programs and Resources	<a href="#">Massachusetts Clean Energy Center (MassCEC) ... Clean Energy Lives Here (solutions for residents)</a>	A state economic development agency dedicated to accelerating the growth of the clean energy sector across the Commonwealth. A wealth of resources for residents, businesses, non-profits, and government.
Massachusetts, Consumer Resources	<a href="#">Green Energy Consumers Alliance</a> . Information for New England energy consumers. ... <a href="#">The Energy Consumers Bulletin</a> : Blog posts on several topics.	Easy-to-navigate website offering useful and practical information to help consumers make green energy choices.
Massachusetts, Cities and Town, Climate Action	<a href="#">Newton Climate Action Plan</a> . Acting Now to Secure Our Sustainable Future. August 2019.	Detailed, thorough 120-page assessment and action plan: “how to bend the greenhouse gas emissions curve to carbon neutrality.”

Massachusetts, Cities and Town, Climate Action	<a href="#">Arlington's Net Zero Action Plan</a> . A roadmap to reduce greenhouse gas pollution to net zero by 2050.	A 44-page report with specific and concrete proposals to achieve net zero buildings, zero emissions mobility, and clean energy.
General, Recommended Books	<a href="#">12 best books on climate change</a> , shared by climate activists. NBC News, April 2021.	Recommended readings on climate change and what individuals can do, from 12 climate activists.

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