

ENVIRONMENTAL & FINANCIAL IMPACT OF CLIMATE CHANGE AND GLOBAL WARMING

**EXAMINATION OF FACT AND MYTH, SCIENCE AND
RHETORIC, PROBLEMS AND SOLUTIONS**

BONUS CONTENT

ROBERT D SEARS AND CHERIE S TUCKER

CCGW Bonus Content

Overview

Discover more insights and deepen your understanding with the bonus content for "Environmental and Financial Impact of Climate Change and Global Warming: Examination of Fact and Myth, Science and Rhetoric, Problems, and Solutions."

Delve into the list of abbreviations for quick reference, expand your vocabulary with the comprehensive glossary, and explore the extensive reference section for further reading.

Additionally, gain visual perspectives with curated YouTube videos supplementing key concepts discussed in the book. Enhance your knowledge and engage with the multifaceted dimensions of climate change through these supplementary resources.

YouTube Videos

<https://www.youtube.com/watch?v=uynhvHZUOOo>

<https://www.youtube.com/watch?v=FkSg-JboyAI>

<https://www.youtube.com/watch?v=MBKZWKeKYqE>

<https://www.youtube.com/watch?v=dlsicG7hTmo>

List of Abbreviations

AI: Artificial intelligence

AIoT: Artificial intelligence of things

AMOC: Atlantic Meridional Overturning Circulation

ASA: Advertising Standards Authority

CDM: Clean Development Mechanism

CFCs: Chlorofluorocarbons

COP: Conference of the Parties

CSA: Climate smart agriculture

EGD: European Green Deal

EPA: Environmental Protection Agency

ESG: Environmental, social and governance

ENSO: El Niño Southern Oscillation

ESA: European Space Agency

ESD: Education for Sustainable Development

GCOS: Global Climate Observation System

GDP: Gross domestic product

GEMS Air: Global Environmental Monitoring System for Air

GEOSS: Global Earth Observation System of Systems

GHG: Greenhouse gasses

GRACE: Gravity Recovery and Climate Experiment

HFC: Hydrofluorocarbon

IEA: International Energy Agency

ILO: International Labor Organization

IoT: Internet of Things

IPCC: Intergovernmental Panel on Climate Change

IRA: Inflation Reduction Act, 2022 (US)

IUCN: International Union for the Conservation of Nature

NAO: North Atlantic Oscillation

NASA: North American Space Agency

NCAR: National Center for Atmospheric Research

NDCs: Nationally-determined contributions

NGO: Non-government organization (usually a non-profit)

NOAA: National Oceanic and Atmospheric Administration

OECD: Organization for Economic Cooperation and Development

OPEC: Organization of Petroleum Exporting Countries

OTEC: Ocean thermal energy conversion

PDO: Pacific Decadal Oscillation

REDD+: Reducing Emissions from Deforestation and Forest Degradation

RFSTE: Research Foundation for Science, Technology, and Ecology

SGDGs: Sustainable Development Goals

TIROS: Television Infrared Observation Satellite

UN: United Nations

UNDP: United Nations Development Program

UNEP: United Nations Environmental Program

UNESCO: United Nations Educational, Scientific, and Cultural Organization

UNFCCC: United Nations Framework Convention on Climate Change

WEF: World Economic Forum

WHO: World Health Organization

WWF: World Wildlife Fund

Glossary

Abrupt Change: Dramatic, widespread change in the climate system that happens within just a few decades and continues to persist.

Adaptation: Process of adjustment to the actual or anticipated impacts of climate change. Interventions implemented in good time can help to reduce the effects of climate change on human communities.

Aerosols: Small droplets in the atmosphere that reflect or absorb carbon dioxide depending on their chemical composition.

Alternative Energy: Energy derived from non-fossil fuel sources. This includes renewable sources, such as sun, wind, wave action, or geothermal.

Anthropogenic: Resulting from human activities.

Carbon Capture and Storage: New technologies that capture carbon emissions at source and then transport them for reuse or inject them into geological formations underground.

Black Carbon: Particulate, high carbon matter that absorbs the most carbon, which results from the incomplete burning of fossil fuels, e.g. soot.

Carbon Cycle: Natural movement of carbon through natural systems. Carbon is held and stored in the atmosphere, natural ecosystems, such as marine or aquatic systems, and soils. Carbon moves between these reservoirs when it is released.

Carbon Dioxide: A naturally-occurring gas in the atmosphere that is also released when fossil fuels are burnt.

Carbon Dioxide Equivalent (CO_e): Measurement of other greenhouse gases (see below), assessed for their potential for global warming in comparison to carbon dioxide.

Carbon Dioxide (CO₂) Removal: Taking carbon dioxide out of the air by increasing natural storage capacity, for example, by planting more trees or improving soil health, or using carbon capture and storage technologies.

Carbon Footprint: Amount of greenhouse gases that are emitted into the atmosphere as a result of human activities. These may be emitted by individuals, businesses, or communities.

Carbon Neutral (Net Zero) Emissions: When anthropogenic carbon emissions are balanced by the amount of carbon removed from the atmosphere over a specific period of time.

Carbon Sequestration or Storage: The ability of certain systems to absorb carbon dioxide and other forms of carbon, and store it rather than allowing it to escape into the atmosphere. Examples include trees, soils, and the ocean.

Chlorofluorocarbons: Gases produced by industrial and chemical processes that escape into the atmosphere and which have been implicated in ozone depletion.

Climate Feedback: Natural processes that either exacerbate or reduce warming or cooling effects of climate change.

Fossil Fuels: Fuels created by fossilized plants or animal remains dating back millions of years. The main fossil fuels are coal, oil, and natural gas.

Fugitive Emissions: Usually applied to oil and gas production, this refers to unintentional, unexpected leaks from pipelines, incorrectly capped wells, and similar sources.

Greenhouse Effect: When heat generated by solar radiation is trapped in the atmosphere by warming gasses, such as carbon dioxide, methane, and water vapor. This keeps the planet warm enough to support life.

Greenhouse Gas (GHG): Gasses that absorb solar radiation in the atmosphere.

Greenwashing: Making a product, activity, or policy appear more environmentally-friendly and less environmentally-damaging than it actually is. This misleads consumers who want to purchase sustainably produced products and services.

Halocarbons: Chemical compounds that include chlorine, bromine, or fluorine and carbon. These are all powerful GHGs in the atmosphere.

Hydrocarbons: Substances containing only hydrogen and carbon, such as fossil fuels.

Indirect Emissions: Emissions from a business, building, or home that are caused by the electricity they use coming from a fossil-fueled source such as coal.

Least Developed Country: Country with low socio-economic indicators.

Methane: A hydrocarbon greenhouse gas that has a shorter life in the atmosphere than carbon dioxide but a much more pronounced warming effect.

Mitigation: Steps taken to prevent climate change from escalating, for example, by installing solar panels to reduce reliance on coal-fired power or driving electric vehicles rather than vehicles powered by gasoline.

Natural Variability: Variations on the average state of the climate caused by natural processes and events, such as volcanic eruptions and variations in solar radiation.

Ocean Acidification: Increased carbon dioxide concentrations in the ocean lead to a rise in acidity.

Ozone: A gas made up of three molecules of oxygen. In the stratosphere, it forms the ozone layer, which protects the Earth from the harmful effects of solar radiation. At ground level it is a pollutant and may be toxic.

Particulate Matter: Miniscule pieces of aerosols, dust, fumes, or soot that are present in the atmosphere. The way they combine with one another and other chemicals determines their warming effects.

Parts Per Million (ppm): Portions of a chemical found in one million parts of another gas, liquid, or solid.

Permafrost: Continuously frozen ground located in the polar regions.

Radiative Forcing: Measure of the influence of a particular substance or event, such as an aerosol, greenhouse gas, or land use change on the Earth's energy balance.

Reflectivity: Ability of a surface, such as clouds or the ocean, to reflect sunlight.

Residence Time: Average time a particular molecule remains in the atmosphere.

Resilience: Ability to predict, prepare for, respond, and recover from several threats or hazards with minimal impacts on personal wellbeing, the economy, and the environment.

Salt Water Intrusion: When salt water enters fresh surface or groundwater, usually in coastal areas or estuaries.

Sea Surface Temperature: Temperature of the first few feet of the ocean's upper levels.

Sink: Natural process or activity that removes carbon dioxide and other greenhouse gasses from the atmosphere.

Soil Carbon: Amount of carbon present in the soil.

Thermal Expansion: Increase in volume of water due to warming.

Thermohaline Circulation: Enormous, planetary-wide ocean circulatory system, moving warm water from the equatorial regions to the poles, where it sinks and circles back to the equator.

Tipping Point: Climate changing suddenly and irrevocably, even when the apparent cause has disappeared. Beyond this point, there is no turning back.

Sustainable Development: Using natural resources in such a way that they are not depleted and continue to be available to others for many generations to come. This is good for the planet, natural systems and biodiversity, people, and communities.

Unprecedented Transition: Tackling climate in a new way over a specific time period so that the situation changes completely and climate change is arrested or reversed. This can include a rapid, global uptake of renewable energy solutions, for instance.

Water Vapor: Gaseous form of water found in the atmosphere. This is an important greenhouse gas, although derived naturally. Water vapor in the atmosphere increases under climate change, exacerbating warming and severe weather events, such as tropical storms.

References

- A 15-Year Quest to Protect Polar Bears* (2023, September 27). Polar Bears International. <https://polarbearsinternational.org/news-media/articles/quest-to-protect-polar-bears>
- A-Z Quotes. (n.d.). *Kofi Annan Quote*. A-Z Quotes. <https://www.azquotes.com/quote/534917?ref=ecosystems>
- Interface. (n.d.) *Commercial Carpet Tile & Resilient Flooring* <https://www.interface.com/US/en-US/more-from-interface/about.html>
- About the Movement—Transition Network* (2018, February 11). Transition Network.org. <https://transitionnetwork.org/about-the-movement/>
- AccuWeather. (2020, February 16). *The best climate change quotes that will inspire you*. <https://www.accuweather.com/en/accuweather-ready/climate-change-quotes-that-will-inspire-you/681080>
- Admin. (2014, April 15). *A fierce green fire | Timeline of environmental movement and history*. PBS American Masters. <https://www.pbs.org/wnet/americanmasters/a-fierce-green-fire-timeline-of-environmental-movement/2988/>
- Akbarzai, S., & Paddison, L. (2024, February 6). *Wildfires that are turning neighborhoods to ash are likely Chile's deadliest on record, UN agency says*. CNN. <https://edition.cnn.com/2024/02/06/climate/chile-wildfires-deadliest-climate-intl/index.html>
- Aksu, K. (2023, July 17). *Tesla's electrification revolution*. Digitopia. <https://digitopia.co/blog/teslas-electrification-revolution-unleashing-causality-between-digital-transformation-and-sustainability/>
- Aldo Leopold*. (n.d.). Conservation History. <https://conservationhistory.org/conservation-heroes/aldo-leopold/>
- Aldo Leopold Nature Center. (2013, February 20). *Who was Aldo Leopold?* <https://aldoleopoldnaturecenter.org/about-us/all-about-aldo/who-was-aldo-leopold/>
- Alter, L. (2022, April 12). *Individual actions can reduce emissions up to 70%, says IPCC report*. Treehugger. <https://www.treehugger.com/individual-actions-reduce-emissions-by-70-percent-5225478>
- Anderson, K. (2023a, March 10). *What was the Industrial Revolution's environmental impact?* Greenly. <https://greenly.earth/en-us/blog/ecology-news/what-was-the-industrial-revolutions-environmental-impact>

Anderson, K. (2023b, April 21). *Why are bees so important for people and the environment?* Greenly. <https://greenly.earth/en-us/blog/ecology-news/why-are-bees-so-important-for-people-and-the-environment>

Anderson, K. (2023c, August 29). *5 best practices for water conservation.* Greenly. <https://greenly.earth/en-us/blog/company-guide/5-best-practices-for-water-conservation>

AP News. (2024, February 6). *Thousands of vehicles stuck on highways in China as snow snarls Lunar New Year travel.* <https://apnews.com/article/china-traffic-hubei-snow-new-year-travel-ed6ce9c3fe8167b47d29177f367b769e>

APlanet. (2023, November 2). *2022 sustainability and CSR trends.* Aplanet. <https://aplanet.org/resources/sustainability-and-csr-trends/>

Australian Marine Conservation Society. (2023, December 7). *What is coral bleaching and what causes it—fight for our reef.* Australian Marine Conservation Society. <https://www.marineconservation.org.au/coral-bleaching/>

Avelar, L. (2021, July 12). *How to bridge the gap between climate rhetoric and action.* World Economic Forum. <https://www.weforum.org/agenda/2021/07/fight-climate-change-with-technology/>

Barasi, L. (2018, October 5). *Climate change apathy, not denial, is the biggest threat to our planet | Leo Barasi.* The Guardian. <https://www.theguardian.com/commentisfree/2018/oct/05/climate-change-apaty-not-denial-threat-planet>

Barboza, T. (2021, April 22). *A brief timeline of U.S. climate pledges made, and discarded.* Los Angeles Times. <https://www.latimes.com/environment/story/2021-04-22/three-decades-of-us-climate-pledges-and-inaction>

Barman, D. (2022, November 16). *11 critical sustainability challenges to address.* Vantage Fit. <https://www.vantagefit.io/blog/sustainability-challenges/>

Beck, E. C. (1979, January). *The Love Canal tragedy.* US EPA. <https://www.epa.gov/archive/epa/aboutepa/love-canal-tragedy.html>

Benami, E., Ho, D. E., & McDonough, A. (2020, February). *Innovations for environmental compliance: emerging evidence and opportunities.* Stanford Institute for Economic Policy Research. <https://siepr.stanford.edu/publications/policy-brief/innovations-environmental-compliance-emerging-evidence-and-opportunities>

Bennett, P. (2023, October 12). *Climate change is costing the world \$16 million per hour: study.* World Economic Forum. <https://www.weforum.org/agenda/2023/10/climate-loss-and-damage-cost-16-million-per-hour/>

Berry, W. (n.d.). *Environmentalism quotes (527 quotes)*. GoodReads.
<https://www.goodreads.com/quotes/tag/environmentalism>

Berwyn, B. (2021, September 15). *The rate of global warming during next 25 years could be double what it was in the previous 50, a renowned climate scientist warns*. Inside Climate News.
<https://insideclimatenews.org/news/15092021/global-warming-james-hansen-aerosols/>

Berwyn, B. (2024, January 28). *With the world stumbling past 1.5 degrees of warming, scientists warn climate shocks could trigger unrest and authoritarian backlash*. Inside Climate News.
<https://insideclimatenews.org/news/28012024/with-world-warming-scientists-warn-of-unrest-and-authoritarian-backlash/>

Betts, R. (2021, March 22). *Met Office: Atmospheric CO2 now hitting 50% higher than pre-industrial levels*. World Economic Forum. <https://www.weforum.org/agenda/2021/03/met-office-atmospheric-co2-industrial-levels-environment-climate-change/>

Bill McKibben. (2014). 350.org. <https://350.org/bill/>

Bjelland, O., & Mehta, R. (2021, July 16). *Here's how India can lead the world in solar-based growth*. World Economic Forum. <https://www.weforum.org/agenda/2021/07/india-can-lead-the-world-in-solar-based-growth/>

Blakemore, E. (2019, April 26). *The shocking river fire that fueled the creation of the EPA*. History. <https://www.history.com/news/epa-earth-day-cleveland-cuyahoga-river-fire-clean-water-act>

Borgia, G. (2023a, May 9). *Keystone species*. National Geographic Education.
<https://education.nationalgeographic.org/resource/keystone-species/>

Borgia, G. (2023b, October 19). *The influence of climate change on extreme environmental events*. National Geographic Education.
<https://education.nationalgeographic.org/resource/influence-climate-change-extreme-environmental-events/>

Boslaugh, S. E. (2024). *Silent Spring | Work by Carson*. Encyclopædia Britannica.
<https://www.britannica.com/topic/Silent-Spring>

Brightest. (n.d.). *The three pillars of sustainability*. <https://www.brightest.io/three-pillars-sustainability>

Broom, D. (2023, September 21). *5 smart renewable energy innovations*. World Economic Forum. <https://www.weforum.org/agenda/2023/09/renewable-energy-innovations-climate-emergency/>

Brown, C. S. (2024, February 21). *The Industrial Revolution*. Khan Academy. <https://www.khanacademy.org/humanities/big-history-project/acceleration/bhp-acceleration/a/the-industrial-revolution>

Brown, T. (2023, October 19). *The Keeling Curve*. National Geographic Education. <https://education.nationalgeographic.org/resource/keeling-curve/>

Browne, A. (2022, October 26). *What Is sustainability and why is it important?* Earth.org. <https://earth.org/what-is-sustainability/>

Bruin, W. B. de. (2022, February 28). *A quick guide to climate change jargon – what experts mean by mitigation, carbon neutral and 6 other key terms*. The Conversation. <https://theconversation.com/a-quick-guide-to-climate-change-jargon-what-experts-mean-by-mitigation-carbon-neutral-and-6-other-key-terms-167172>

Bryson, J. (2023, May 12). *Green energy projects awarded £91m in government funding*. BBC News. <https://www.bbc.com/news/uk-england-leeds-65571033>

Buis, A. (2019, July 23). *Climate change puts pressure on sea turtles*. Climate Change: Vital Signs of the Planet. <https://climate.nasa.gov/news/2879/climate-change-puts-pressure-on-sea-turtles/>

Burdon, E. (2023, August 16). *What are the challenges of sustainability in business?* Know ESG. <https://www.knowesg.com/featured-article/what-are-the-challenges-of-sustainability-in-business>

Calder, E. (2021, September 6). *Economic cost of climate change could be six times higher than previously thought*. UCL News. <https://www.ucl.ac.uk/news/2021/sep/economic-cost-climate-change-could-be-six-times-higher-previously-thought>

Calgaro, S. (2017, September 15). *The greatest restoration effort ever made in the Amazon rainforest*. Believe Earth. <https://believe.earth/en/greatest-restoration-effort-ever-made-amazon-rainforest/>

Carrington, D. (2016, May 9). *One in five of world's plant species at risk of extinction*. The Guardian. <https://www.theguardian.com/environment/2016/may/10/one-in-five-of-worlds-plant-species-at-risk-of-extinction>

CES. (2021, May 10). *10 tech companies working to combat climate change*. Consumer Technology Association. <https://www.ces.tech/articles/2021/may/10-tech-companies-working-to-combat-climate-change.aspx>

Chandler, D. (2020, September 25). *Radiative forcing*. MIT Climate Portal. <https://climate.mit.edu/explainers/radiative-forcing>

Chetan-Welsh, H., & Hendry, L. (2022). *How are climate change and biodiversity loss linked?* Natural History Museum. <https://www.nhm.ac.uk/discover/how-are-climate-change-and-biodiversity-loss-linked.html>

Cho, R. (2018, December 27). *The 35 easiest ways to reduce your carbon footprint*. State of the Planet. <https://news.climate.columbia.edu/2018/12/27/35-ways-reduce-carbon-footprint/>

Cho, R. (2022, January 27). *How climate change will affect plants*. State of the Planet. <https://news.climate.columbia.edu/2022/01/27/how-climate-change-will-affect-plants/>

Chrobak, U. (2021, September 15). *How sea otters can fight climate change*. BBC News. <https://www.bbc.com/future/article/20210914-how-sea-otters-help-fight-climate-change>

Coffey, R. (2021, October 8). *What Is Arctic amplification? Definition, causes, and environmental implications*. Treehugger. <https://www.treehugger.com/what-is-arctic-amplification-5203873>

Cogswell, N., & Warszawski, N. (2022, March 14). *5 challenges the UNFCCC must overcome to spur climate action*. World Resources Institute. <https://www.wri.org/insights/5-challenges-unfccc-must-overcome-climate-action>

Cohen, S. (2022, September 19). *The growing awareness and prominence of environmental sustainability*. State of the Planet. <https://news.climate.columbia.edu/2022/09/19/the-growing-awareness-and-prominence-of-environmental-sustainability/>

Conley, T., & Botwright, K. (2023, March 13). *What do green subsidies mean for the future of climate and trade?* World Economic Forum. <https://www.weforum.org/agenda/2023/03/what-do-green-subsides-mean-for-the-future-of-climate-and-trade-099a016307/>

Cuff, M. (2023, July 25). *Vital Atlantic Ocean current could collapse as soon as 2025*. New Scientist. <https://www.newscientist.com/article/2384094-vital-atlantic-ocean-current-could-collapse-as-soon-as-2025/>

Cwienk, J. (2024, January 22). *How a German town wants to reinvent clean energy sharing*. DW.com. <https://www.dw.com/en/german-town-siegburg-pioneers-new-model-for-renewable-energy/a-67872004>

Dahlman, L., & Lindsey, R. (2023, September 6). *Climate change: Ocean heat content*. Climate.gov. <https://www.climate.gov/news-features/understanding-climate/climate-change-ocean-heat-content>

de Bruin, W. B. (2021, November 12). *Confused by climate change jargon? A quick guide to 7 common terms*. Ideas TED. <https://ideas.ted.com/a-quick-guide-to-common-climate-change-jargon-terms/>

Derentz, L. (2023, December 15). *COP28's legacy will be measured by emissions reduction, not "historic" text*. Atlantic Council. <https://www.atlanticcouncil.org/blogs/energysource/cop28s-legacy-will-be-measured-by-emissions-reduction-not-historic-text/>

Derrick, M. (2024, January 7). *Five climate tech trends to look out for in 2024*. Energydigital.com. <https://energydigital.com/articles/five-climate-tech-trends-to-look-out-for-in-2024>

Destin, D. C. S. (n.d.). *The Argo revolution*. NOAA Climate.gov. <https://www.climate.gov/news-features/features/argo-revolution>

Deutz, A. M. (2017, August 31). *The coming rise of urban infrastructure: Turning Infrastructure green*. The Nature Conservancy. <https://www.nature.org/en-us/what-we-do/our-insights/perspectives/the-coming-rise-of-urban-infrastructure-turning-infrastructure-green/>

Dexter, E. (2023, August 9). *Grassroots activism: Mobilizing communities behind shared goals*. Good Party. <https://goodparty.org/blog/article/grassroots-activism-mobilizing>

Diaz, M. J. (2023, April 13). *3 reasons why countries must take faster action to reduce short-lived climate pollutants*. World Resources Institute. <https://www.wri.org/insights/short-lived-climate-pollutant-reductions>

Dickie, G. (2022, February 28). *How climate change will impact the world's regions differently*. Reuters. <https://www.reuters.com/business/cop/how-climate-change-will-impact-worlds-regions-differently-2022-02-28/>

Donald, R. (2024, January 13). *Human "behavioural crisis" at root of climate breakdown, say scientists*. The Guardian. <https://www.theguardian.com/environment/2024/jan/13/human-behavioural-crisis-at-root-of-climate-breakdown-say-scientists>

Dossal, A. (2023, November 6). *Unlocking the power of international cooperation in the fight against climate change*. Saïd Business School. <https://www.sbs.ox.ac.uk/oxford-answers/unlocking-power-international-cooperation-fight-against-climate-change#:~:text=Through%20its%20agreements%20and%20protocols>

Dunstone, J. (2024, January 2). *I believe that we will win—a round up of climate success stories*. Curious Earth. <https://curious.earth/blog/climate-success-stories/>

Earth Day. (2023, October 30). *5 climate change facts to scare you into action this Halloween*. <https://www.earthday.org/5-terrifying-climate-change-facts-scare-halloween/>

Earth Day.org. (2019). *The history of Earth Day*. <https://www.earthday.org/history/>

EIA. (2020, August 11). *Where greenhouse gases come from*. U.S. Energy Information Administration. <https://www.eia.gov/energyexplained/energy-and-the-environment/where-greenhouse-gases-come-from.php>

Elisha, B. (2019, November 17). *How Is climate change deadly for Australia's koala population?* WorldAtlas. <https://www.worldatlas.com/articles/how-is-climate-change-deadly-for-australia-s-koala-population.html>

Elliott, L. (2024a). *Environmentalism - history of the environmental movement*. Encyclopædia Britannica. <https://www.britannica.com/topic/environmentalism/History-of-the-environmental-movement>

Elliott, L. (2024b). *Environmentalism | Ideology, History, & Types*. Encyclopædia Britannica. <https://www.britannica.com/topic/environmentalism>

Emmert, A. (2021, July 8). *The rise of the eco-friendly consumer*. Strategy Business. <https://www.strategy-business.com/article/The-rise-of-the-eco-friendly-consumer>

Endangered species: 6 stories of success. (n.d.). National Wildlife Federation. <https://www.nwf.org/Educational-Resources/Wildlife-Guide/Understanding-Conservation/endangered-species-success-stories>

EPA. (2016, July). *Next generation compliance: EPA embraces technology and transparency to promote compliance with environmental laws*. US Environmental Protection Agency. <https://www.epa.gov/sites/default/files/2016-09/documents/article-next-gen-embraces-technology-and-transparency.pdf>

EPA. (2018, December 31). *How we use water*. US Environmental Protection Agency. <https://www.epa.gov/watersense/how-we-use-water>

EPA. (2022a, October 19). *Climate change impacts on the ocean and marine resources*. US Environmental Protection Agency. <https://www.epa.gov/climateimpacts/climate-change-impacts-ocean-and-marine-resources#what>

EPA. (2022b, November 9). *Effects of ocean and coastal acidification on marine life*. US Environmental Protection Agency. <https://www.epa.gov/ocean-acidification/effects-ocean-and-coastal-acidification-marine-life>

EPA. (2023a, April 25). *Causes of climate change*. US Environmental Protection Agency. <https://www.epa.gov/climatechange-science/causes-climate-change>

EPA. (2023b, September 15). *Start saving*. US Environmental Protection Agency. <https://www.epa.gov/watersense/start-saving>

EPA. (2023c, November 16). *Climate change Impacts on agriculture and food supply*. US Environmental Protection Agency. <https://www.epa.gov/climateimpacts/climate-change-impacts-agriculture-and-food-supply>

EPA. (2023d, November 16). *Sources of greenhouse gas emissions*. US Environmental Protection Agency. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#land-use-and-forestry>

EPA. (2023e, November 22). *National overview: Facts and figures on materials, wastes and recycling*. US Environmental Protection Agency. <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#NationalPicture>

EPA. (2024, February 11). *Basic information about landfill gas*. US Environmental Protection Agency. <https://www.epa.gov/lmop/basic-information-about-landfill-gas>

Ettinger, J. (2021, August 23). *EV batteries are a recycling nightmare, Tesla says it's found a solution*. Ethos. <https://the-ethos.co/tesla-ev-batteries-recycling/>

European Environment Agency. (2020, October 28). *Blockchain and the environment*. <https://www.eea.europa.eu/publications/blockchain-and-the-environment>

European Parliament. (2023). *Interactive timeline: a guide to climate change negotiations*. https://www.europarl.europa.eu/infographic/climate-negotiations-timeline/index_en.html

European Space Agency. (2021, October 4). *First Copernicus satellite exceeds design working life*. https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-1/First_Copernicus_satellite_exceeds_design_working_life

Fahys, J. (2019, December 6). *Supercomputers, climate models and 40 years of the world climate research program*. Inside Climate News. <https://insideclimatenews.org/news/06122019/climate-models-supercomputer-world-research-program-agu-100-anniversary-cheyenne-wyoming/>

Fairs, M. (2021, June 27). *Ten materials that store carbon and help reduce greenhouse gas emissions*. Dezeen. <https://www.dezeen.com/2021/06/27/carbon-negative-carbon-neutral-materials-roundup/>

Fava, M. (2022, May 9). *Ocean plastic pollution an overview: data and statistics*. UNESCO. <https://oceanliteracy.unesco.org/plastic-pollution-ocean/>

Fyrwald, J. E. (2022, January 3). *How farming innovations can feed the world and protect the planet*. World Economic Forum. <https://www.weforum.org/agenda/2022/01/how-farming-innovations-feed-world-protect-planet/>

Gabbatiss, J. (2021, February 9). *IEA: India is on "cusp of a solar-powered revolution."* Carbon Brief. <https://www.carbonbrief.org/iea-india-is-on-cusp-of-a-solar-powered-revolution/>

Gavin, M. (2019, June 6). *5 corporate social responsibility examples that were successful*. Harvard Business School. <https://online.hbs.edu/blog/post/corporate-social-responsibility-examples>

Gearino, D. (2021, April 29). *Inside clean energy: Denmark makes the most of its brief moment at the climate summit*. Inside Climate News. <https://insideclimatenews.org/news/29042021/inside-clean-energy-denmark-renewable-climate-summit/>

Gifford Pinchot (1865-1946). (2023, October 13). Forest History Society. <https://foresthistor.org/research-explore/us-forest-service-history/people/chiefs/gifford-pinchot-1865-1946/>

Gill, I., & Kose, M. A. (2024, January 17). *5 major risks confronting the global economy in 2024*. Brookings. <https://www.brookings.edu/articles/5-risks-global-economy-2024/>

Gillespie, N., Sherman, S., Schroder, P., Elgendy, K., & Wallace, J. (2022, November 2). *Cities of the future*. Chatham House. <https://www.chathamhouse.org/2022/11/cities-future>

Global climate agreements through the years. (2020, November 18). Climate Reality Project. <https://www.climaterealityproject.org/blog/global-climate-agreements-through-years>

Goulet, B. (2017, July 27). *The Transition Movement's grassroots strategies to fight climate change*. PBS SoCal. <https://www.pbssocal.org/shows/earth-focus/saving-the-environment-one-town-at-a-time-an-introduction-to-the-transition-movement>

Grantham Research Institute on Climate Change and the Environment, Sabin Center for Climate Change Law, & Center for Climate Change Economics and Policy. (2023, June). *Global trends in climate change litigation*. C40 Knowledge Community. https://www.c40knowledgehub.org/s/article/Global-trends-in-climate-change-litigation-2023-snapshot?language=en_US

Grassroots climate justice movements get results. (2022, May). Grassroots International. https://grassrootsonline.org/learning_hub/grassroots-climate-justice-movements-get-results/

CLIMA Fund. (n.d.). *Grassroots Movements and Systemic Change*. CLIMA Fund. <https://climasolutions.org/resource/grassroots-systemic-change/>

Gray, W. (2015). *Environmental regulations and business decisions*. IZA World of Labor. <https://doi.org/10.15185/izawol.187>

Greenfield, D. E. (2023, December 8). *Patagonia sustainability: What strategy makes them sustainable?* Sigma Earth. <https://sigmaearth.com/patagonia-sustainability-what-strategy-makes-them-sustainable/>

Greenfield, P., & Weston, P. (2021, October 14). *The five biggest threats to our natural world ... and how we can stop them*. The Guardian. <https://www.theguardian.com/environment/2021/oct/14/five-biggest-threats-natural-world-how-we-can-stop-them-aoe>

Greenpeace International. (2023, December 23). *7 positive environmental news stories to close out 2023*. <https://www.greenpeace.org/international/story/64651/inspiring-environmental-victories-of-2023/>

Griffith, S. (2022, September 26). *How to fix climate change (a sneaky policy guide)*. The MIT Press Reader. <https://thereader.mitpress.mit.edu/how-to-fix-climate-change-a-sneaky-policy-guide/>

Guy, J. (2020, September 30). *Around 40% of the world's plant species are threatened with extinction*. CNN. <https://edition.cnn.com/2020/09/30/world/kew-gardens-plants-report-scli-intl-gbr-scn/index.html>

Hahn, J. (2021, April 22). *Seven key materials designers are relying on to create more sustainable products*. Dezeen. <https://www.dezeen.com/2021/04/22/sustainable-materials-design-earth-day/>

Hancock, L. (n.d.). *Everything you need to know about coral bleaching—and how we can stop it*. WWF. <https://www.worldwildlife.org/pages/everything-you-need-to-know-about-coral-bleaching-and-how-we-can-stop-it>

Harrabin, R. (2020, May 20). *Top 10 tips for combating climate change revealed*. BBC News. <https://www.bbc.com/news/science-environment-52719662>

Hayes, A. (2022, November 11). *The troubles of pollution: Environmental Impact of Industrialization*. The Collector. <https://www.thecollector.com/environmental-impact-industrial-revolution-pollution/>

Heck, N., Agnostini, V., Pflieger, B., Murche, K., Kirsch, L., & Beck, M. W. (2020). *Fisheries at risk: Vulnerability of fisheries to climate change*. The Nature Conservancy. <https://www.nature.org/content/dam/tnc/nature/en/documents/Fisheries-at-Risk-Technical-Report.pdf>

Henry David Thoreau. (n.d.). The Walden Woods Project. <https://www.walden.org/what-we-do/library/thoreau/>

Henry David Thoreau · 19. environmental steps: Environmental education and action at Lehigh University. (n.d.). Leigh Library & Technology Services <https://exhibits.lib.lehigh.edu/exhibits/show/envirosteps/ewe/hdt>

History.com Editors. (2009, October 27). *Dust bowl*. <https://www.history.com/topics/great-depression/dust-bowl>

Holden, E. (2019, February 7). *What is the green New Deal and is it technically possible?* The Guardian. <https://www.theguardian.com/environment/2018/dec/29/green-new-deal-plans-proposal-ocasio-cortez-sunrise-movement>

How does climate change affect biodiversity? (n.d.). The Royal Society. <https://royalsociety.org/news-resources/projects/biodiversity/climate-change-and-biodiversity/>

How is climate change affecting leatherback turtles? (2016, February 11). Canadian Wildlife Federation Blog. <https://blog.cwf-fcf.org/index.php/en/how-is-climate-change-affecting-leatherback-turtles/>

Howard, B. C. (2019, April 22). *49 environmental victories since the first Earth Day*. National Geographic. <https://www.nationalgeographic.com/science/article/160422-earth-day-46-facts-environment?loggedin=true&rnd=1708606127489>

Husain-Naviatti, A. (2023, November 27). *The psychology of climate negotiations: How to move countries from national self-interest to global collective action*. The Conversation. <https://theconversation.com/the-psychology-of-climate-negotiations-how-to-move-countries-from-national-self-interest-to-global-collective-action-214121>

IISD. (2024, January 6). *Summary report 30 November–13 December 2023*. IISD Earth Negotiations Bulletin. <https://enb.iisd.org/united-arab-emirates-climate-change-conference-cop28-summary>

Ijjasz-Vasquez, E., Wahba, S., & Kaza, S. (2018, September 20). *Here's what everyone should know about waste*. World Bank Blogs. <https://blogs.worldbank.org/sustainablecities/here-s-what-everyone-should-know-about-waste>

Imolore, D. (2023, March 31). *The importance of the Amazon rainforest for climate regulation: Everything you need to know*. Fund the Planet. <https://fundtheplanet.net/rainforest-conservation/the-importance-of-the-amazon-rainforest-for-climate-regulation-everything-you-need-to-know/#:~:text=The%20Amazon%20rainforest%2C%20the%20largest>

Elliot, T.S. (1969). *Preludes. Inscapes*. Oxford University Press.

Ionita, A. (2023, September 6). *10 climate tech trends in Europe: A sneak peek into 2024*. The Recursive. <https://therecursive.com/7-climate-tech-trends-2024-europe/>

IPCC. (2018, October 8). *Summary for policymakers of IPCC special report on global warming of 1.5°C approved by governments*. IPCC. <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>

IUCN. (2019). *Ocean deoxygenation*. IUCN. <https://www.iucn.org/resources/issues-brief/ocean-deoxygenation>

IUCN. (2021, February 3). *Nature's future, our future—the world speaks*. International Union for the Conservation of Nature. <https://www.iucn.org/news/protected-areas/202102/natures-future-our-future-world-speaks>

Jacob, D. J., Varon, D. J., Cusworth, D. H., Dennison, P. E., Frankenberg, C., Gautam, R., Guanter, L., Kelley, J., McKeever, J., Ott, L. E., Poulter, B., Qu, Z., Thorpe, A. K., Worden, J. R., & Duren, R. M. (2022). *Quantifying methane emissions from the global scale down to point sources using satellite observations of atmospheric methane*. *Atmospheric Chemistry and Physics*, 22(14), 9617–9646. <https://doi.org/10.5194/acp-22-9617-2022>

Jaeger, J., Walls, G., Clarke, E., Altamirano, J.-C., Harsono, A., Mountford, H., Burrow, S., Smith, S., & Tate, A. (2021, October 18). *The green jobs advantage: How climate-friendly investments are better job creators*. World Resources Institute. <https://www.wri.org/research/green-jobs-advantage-how-climate-friendly-investments-are-better-job-creators>

James E. Hansen | *Climate science, awareness and solutions*. (n.d.). Earth Institute - Columbia University. <https://csas.earth.columbia.edu/about/people/james-e-hansen>

Johnson, J. N. (2024, January 18). *Tesla's winter woes: A storm of challenges and disruption*. Entrepreneur. <https://www.entrepreneur.com/finance/teslas-winter-woes-a-storm-of-challenges-and-disruption/468482>

Semple, R.S. (2023, June 12). *America has a chance to make farming more climate friendly*. *The New York Times*. <https://www.nytimes.com/2023/06/12/opinion/climate-change-farm-bill-farmers.html>

Karen. (2017, November 7). *Patagonia's mission against climate change*. Technology and Operations Management. <https://d3.harvard.edu/platform-rctom/submission/patagonias-mission-against-climate-change/>

Katz, C. (2013, February 21). *To control floods, the Dutch turn to nature for inspiration*. Yale E360. https://e360.yale.edu/features/to_control_floods_the_dutch_turn_to_nature_for_inspiration

Kaufman, A. (2023, May 25). *What is the Inflation Reduction Act? Everything to know about one of Biden's big laws*. USA Today. <https://www.usatoday.com/story/money/2023/05/25/guide-to-the-inflation-reduction-act/70249464007/>

Kawabata, T. (2022, January 25). *In battle against climate crisis, don't overlook the blockchain*. UNEP. <https://www.unep.org/news-and-stories/story/battle-against-climate-crisis-dont-overlook-blockchain>

Keenor, S. G., Rodrigues, A. F., Mao, L., Latawiec, A. E., Harwood, A. R., & Reid, B. J. (2021). *Capturing a soil carbon economy*. *Royal Society Open Science*, 8(4). <https://doi.org/10.1098/rsos.202305>

Kemp, E. (2023, December 6). *COP 28, Climate-smart agriculture & the U.S. global food security response*. InterAction. <https://www.interaction.org/blog/cop28-climate-smart-agriculture-the-u-s-global-food-security-response/>

Kerlin, K. (2022, February 16). *How politics, society, and tech shape the path of climate change: The social and political determinants of global warming in the 21st Century*. ScienceDaily. <https://www.sciencedaily.com/releases/2022/02/220216112307.htm>

Khattak, R. (2023, March 14). *Minimizing landfill waste: What can we do?* Earth.org. <https://earth.org/minimising-landfill-waste/>

Kilduff, T. (2019, February 1). *The difficulties of enforcing global environmental law*. Georgetown Law. <https://www.law.georgetown.edu/environmental-law-review/blog/214/>

King, M. W. (2019, March 8). *How brain biases prevent climate action*. BBC Future. <https://www.bbc.com/future/article/20190304-human-evolution-means-we-can-tackle-climate-change>

Knorr, W. (2022). *Climate change and human behavior*. Nature Human Behavior, 6. <https://doi.org/10.1038/s41562-022-01490-9>

Knutson, T. (2021). *Global warming and hurricanes—geophysical fluid dynamics Laboratory*. Noaa.gov. <https://www.gfdl.noaa.gov/global-warming-and-hurricanes/>

Kruger, E. (2019). *Polar Bear*. WWF. <https://www.worldwildlife.org/species/polar-bear>

Krupp, F. (2022, August 12). *The biggest thing Congress has ever done to address climate change*. Environmental Defense Fund. <https://www.edf.org/blog/2022/08/12/biggest-thing-congress-has-ever-done-address-climate-change>

Kunnas, J. (2013, March 16). *Climate change: The lessons from history*. E-International Relations. <https://www.e-ir.info/2013/03/16/climate-change-the-lessons-from-history/>

Lambert, F. (2022, May 9). *Tesla explains its approach to sourcing lithium, nickel, and cobalt directly from mines in impressive detail*. Electrek. <https://electrek.co/2022/05/09/tesla-sourcing-lithium-nickel-cobalt-directly-mines-details/>

Lambert, F. (2023, January 27). *Tesla's energy storage business is booming, and it's just the beginning*. Electrek. <https://electrek.co/2023/01/27/tesla-energy-storage-business-booming-just-beginning/>

Laud, S. (2023, April 18). *The role of technology in community engagement*. Sarah Laud.org. <https://sarahlaud.org/the-role-of-technology-in-community-engagement/>

Lemonick, M. D. (2010, March 22). *The secret of sea level rise: It will vary greatly by region*. Yale E360. https://e360.yale.edu/features/the_secret_of_sea_level_rise_it_will_vary_greatly_by_region

Lineberry, C. (2022, April 20). *How Rachel Carson's "Silent Spring" awakened the world to environmental peril*. History. <https://www.history.com/news/rachel-carson-silent-spring-impact-environmental-movement>

Livingston, R. (2019). *Aral Sea—environmental consequences*. Encyclopædia Britannica. <https://www.britannica.com/place/Aral-Sea/Environmental-consequences>

London School of Economics. (2023, February 8). *What is the Intergovernmental Panel on Climate Change (IPCC)?* Grantham Research Institute on Climate Change and the Environment. <https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-intergovernmental-panel-on-climate-change-ipcc/>

Luhn, A. (2022, November 22). *COP27 boosts carbon trading and "non-market" conservation: But can they save forests?* Mongabay Environmental News. <https://news.mongabay.com/2022/11/cop27-boosts-carbon-trading-and-non-market-conservation-but-can-they-save-forests/>

Makower, J. (2016, June 6). *Inside Interface's bold new mission to achieve "Climate Take Back."* GreenBiz. <https://www.greenbiz.com/article/inside-interfaces-bold-new-mission-achieve-climate-take-back>

Marsh |, J. (2021, June 19). *Top 20 environmental quotes to inspire and motivate you*. Bioenergy Consult. <https://www.bioenergyconsult.com/environmental-quotes/>

Martin. (2019, April 3). *Green economy could create 24 million new jobs*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/blog/2019/04/green-economy-could-create-24-million-new-jobs/#>

Matthias, M. (2024). *Al Gore | Biography & Facts*. Encyclopædia Britannica. <https://www.britannica.com/biography/Al-Gore>

McCarthy, J. (2017, September 28). *15 grassroots organizations that are saving the planet*. Global Citizen. <https://www.globalcitizen.org/en/content/15-grassroots-organizations-saving-the-planet/>

McCloy, J. (2019, June 10). *54 inspirational and shocking quotes on climate change*. Green Coast. <https://greencoast.org/quotes-on-climate-change/>

McVeigh, T. (2014, February 16). *The Dutch solution to floods: live with water, don't fight it*. The Guardian. <https://www.theguardian.com/environment/2014/feb/16/flooding-netherlands>

McWhinney, J. (2023, December 30). *Top green investing opportunities*. Investopedia. <https://www.investopedia.com/articles/stocks/07/green-industries.asp>

Melillo, J., & Gribkoff, E. (2021, April 15). *Soil-based carbon sequestration*. MIT Climate Portal. <https://climate.mit.edu/explainers/soil-based-carbon-sequestration>

Merriam-Webster. (2023). *Definition of greenwashing*. Merriam-Webster. <https://www.merriam-webster.com/dictionary/greenwashing>

Mersmann, K. (2019, April 1). *Launch of TIROS 1, world's 1st weather satellite—this week in Goddard history: March 31–April 6*. NASA Explore. <https://www.nasa.gov/history/launch-of-tiros-1-worlds-1st-weather-satellite-this-week-in-goddard-history-march-31-april-6/>

Millar, K. (2019, November 1). *Interconnectedness: An overlooked solution to the environmental crisis*. IONS50. <https://noetic.org/blog/interconnectedness-overlooked-solution-environmental-crisis/>

Milman, O. (2022, December 30). *US response to the climate emergency: Key moments of 2022*. The Guardian. <https://www.theguardian.com/environment/2022/dec/30/key-us-climate-emergency-moments-2022>

Murray, S. (2021, October 31). *How climate change became political*. The Financial Times. <https://www.ft.com/content/4bac715b-2812-4610-a528-dc8db9ecd635>

NASA. (2021, April 23). *NASA technology helps in fight against climate change*. NASA Spinoff. <https://spinoff.nasa.gov/climate-change>

NASA. (2024a, January 30). *Responding to climate change*. NASA Climate Change. <https://climate.nasa.gov/solutions/adaptation-mitigation/>

NASA. (2024b, January 30). *What Is the greenhouse effect?* NASA Climate Change. <https://climate.nasa.gov/faq/19/what-is-the-greenhouse-effect/>

National Geographic. (2022, July 19). *Role of keystone species in an ecosystem*. National Geographic Education. <https://education.nationalgeographic.org/resource/role-keystone-species-ecosystem/>

National Park Service. (2019). *National Park Service history: National Park System Timeline*. https://www.nps.gov/parkhistory/hisnps/NPSHistory/timeline_annotated.htm

NCAR-Climate data guide. (n.d.). NCAR Climate Data Guide. <https://climatedataguide.ucar.edu/>

Neela-Stock, S. (2023, July 2). *How to advocate for climate change action*. Mashable. <https://mashable.com/article/how-to-advocate-for-climate-change-action>

Neiger, C. (2022, September 30). *Tesla is right to sell directly to consumers—here's why*. The Motley Fool. <https://www.fool.com/investing/2022/09/30/tesla-is-right-to-sell-directly-to-consumers-heres/>

Nemeth, A. (2023, March 14). *10 climate tech social enterprises giving us hope in 2023*. Moving Worlds. <https://blog.movingworlds.org/10-climate-tech-social-enterprises-giving-us-hope-in-2023/>

NOAA. (2020, April 1). *Ocean acidification*. National Oceanic and Atmospheric Administration. <https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification>

NOAA. (2022, June 28). *U.S. supercomputers for weather and climate forecasts get major bump*. National Oceanic and Atmospheric Administration. <https://www.noaa.gov/news-release/us-supercomputers-for-weather-and-climate-forecasts-get-major-bump>

NOAA Fisheries. (2019). *Leatherback turtle*. NOAA Fisheries. <https://www.fisheries.noaa.gov/species/leatherback-turtle>

Nuccitelli, D. (2022, February 28). *New IPCC report highlights urgency of climate change impacts*. Yale Climate Connections. <https://yaleclimateconnections.org/2022/02/new-ipcc-report-highlights-urgency-of-climate-change-impacts/>

Nugent, C. (2021, August 18). *Climate change won't kill tourism, but the industry is in for a painful reckoning*. Time. <https://time.com/6090722/tourism-climate/>

OECD. (n.d.-a). *Opportunities and threats for agriculture*. Organization for Economic Cooperation and Development. <https://www.oecd.org/agriculture/understanding-the-global-food-system/opportunities-and-threats-for-agriculture/>

OECD. (n.d.-b). *Saving biological diversity: Economic incentives—executive summary*. <https://www.oecd.org/env/resources/2089495.pdf>

OECD. (2022). *Agriculture and climate change*. Organization for Economic Cooperation and Development. <https://www.oecd.org/agriculture/ministerial/documents/Agriculture%20and%20Climate%20Change.pdf>

Office of Governor Newsome. (2022, August 11). *Governor Newsom Announces Water Strategy For a Hotter, Drier California*. <https://www.gov.ca.gov/2022/08/11/governor-newsom-announces-water-strategy-for-a-hotter-drier-california/>

Omondi, S. (2019, December 12). *What Is the role of sea otters In the ecosystem?* WorldAtlas. <https://www.worldatlas.com/articles/what-is-the-role-of-sea-otters-in-the-ecosystem.html>

Osaka, S. (2022, January 6). *Is the US uniquely bad at tackling climate change?* Grist. <https://grist.org/politics/is-american-democracy-uniquely-bad-at-tackling-climate-change/>

Palmer, T. (2014). *Climate forecasting: Build high-resolution global climate models*. *Nature*, 515(7527), 338–339. <https://doi.org/10.1038/515338a>

Panepinto, D., Riggio, V. A., & Zanetti, M. (2021). *Analysis of the emergent climate change mitigation technologies*. *International Journal of Environmental Research and Public Health*, 18(13), 6767. <https://doi.org/10.3390/ijerph18136767>

Parker, L. (2023, November 27). *Ocean trash: 5.25 trillion pieces and counting, but big questions remain*. National Geographic Education. <https://education.nationalgeographic.org/resource/ocean-trash-525-trillion-pieces-and-counting-big-questions-remain/>

Parker, L., Bourgoïn, C., Martinez-Valle, A., & Läderach, P. (2019). *Vulnerability of the agricultural sector to climate change: The development of a pan-tropical Climate Risk Vulnerability Assessment to inform sub-national decision making*. Plos One, 14(3), e0213641. <https://doi.org/10.1371/journal.pone.0213641>

Patagonia. (2023). *Environmental Responsibility Programs*. <https://www.patagonia.com/our-responsibility-programs.html>

Pattee, E., & Liu, R. (2022, June 2). *Can the tourism industry survive the climate crisis?* The Guardian. <https://www.theguardian.com/environment/2021/dec/02/tourism-industry-climate-crisis>

Paul, A. (2023, April 26). *Tesla's carbon footprint is much larger than it previously disclosed*. Popular Science. <https://www.popsci.com/technology/tesla-impact-report-2022/>

Perrault, J. (2020, June 9). *Climate change threatens leatherback sea turtles*. Earth Day. <https://www.earthday.org/climate-change-threatens-leatherback-sea-turtles/>

Peters, A. (2023, December 15). *10 climate tech innovations that give us hope for 2024*. Fast Company. <https://www.fastcompany.com/90992666/10-climate-tech-innovations-that-give-us-hope-for-2024>

Petruzello, M. (2020, May 8). *Love Canal: A toxic tragedy*. Saving Earth | Encyclopedia Britannica. <https://www.britannica.com/explore/savingearth/love-canal>

Petruzello, M. (2024). *John Muir*. Encyclopædia Britannica. <https://www.britannica.com/biography/John-Muir>

Pettinger, T. (2021, October 19). *In the face of chaos, why are we so nonchalant about climate change?* The Conversation. <https://theconversation.com/in-the-face-of-chaos-why-are-we-so-nonchalant-about-climate-change-166040>

Pfluger, F. (2020, February 11). *A new security challenge: The geopolitical implications of climate change*. Atlantic Council. <https://www.atlanticcouncil.org/blogs/energysource/a-new-security-challenge-the-geopolitical-implications-of-climate-change/>

Pollardy, R. (2024). *Vandana Shiva*. Encyclopædia Britannica. <https://www.britannica.com/biography/Vandana-Shiva>

Pollution Solutions. (2021, June 23). *How does industry contribute to climate change?* <https://www.pollutionsolutions-online.com/news/air-clean-up/16/breaking-news/how-does-industry-contribute-to-climate-change/55503>

Potsdam Institute for Climate Impact Research. (2024, January 25). *Researchers argue that fostering global cooperation is critical to safeguard critical Earth system functions.* Phys.org. <https://phys.org/news/2024-01-fostering-global-cooperation-critical-safeguard.html>

PricewaterhouseCoopers. (2023, October 2). *Embracing sustainable innovation: understanding the environmental impacts of blockchain technology.* PwC. <https://www.pwc.com/us/en/services/digital-assets/blockchain-environmental-impact.html>

Pross, C. (2021, December 20). *Rising violence against environmental activists threatens us all.* SEI. <https://www.sei.org/perspectives/violence-environmental-activists-threatens/>

Ptak, T. (2021, November 22). *The average person's daily choices can still make a big difference in fighting climate change – and getting governments and utilities to tackle it, too.* The Conversation. <https://theconversation.com/the-average-persons-daily-choices-can-still-make-a-big-difference-in-fighting-climate-change-and-getting-governments-and-utilities-to-tackle-it-too-170442>

Rafferty, J. P. (2019). *An Inconvenient Truth.* Encyclopædia Britannica. <https://www.britannica.com/topic/An-Inconvenient-Truth>

Rafferty, J. P. (2023). *Dust Bowl.* Encyclopædia Britannica. <https://www.britannica.com/place/Dust-Bowl>

Rafferty, J. P. (2024a). *Montreal Protocol.* Encyclopædia Britannica. <https://www.britannica.com/event/Montreal-Protocol>

Rafferty, J. P. (2024b). *Paris Agreement—Negotiations and agreement.* Encyclopædia Britannica. <https://www.britannica.com/topic/Paris-Agreement-2015/Negotiations-and-agreement>

Ranniger, G. (2020, June 4). *How does plastic waste affect the environment?* Environmental Health News. <https://www.ehn.org/plastic-pollution-101-2646027569/how-does-plastic-waste-affect-the-environment>

Rapid Transition Alliance. (2021, March 11). *The Sunrise Movement: how a US grassroots youth movement helped set the national climate agenda for rapid change.* Resilience. <https://www.resilience.org/stories/2021-03-11/the-sunrise-movement-how-a-us-grassroots-youth-movement-helped-set-the-national-climate-agenda-for-rapid-change/>

Reckmann, N. (2023, September 5). *What is corporate social responsibility?* Business News Daily. <https://www.businessnewsdaily.com/4679-corporate-social-responsibility.html>

Reuters. (2022, February 28). *Germany aims to get 100% of energy from renewable sources by 2035*. Reuters. <https://www.reuters.com/business/sustainable-business/germany-aims-get-100-energy-renewable-sources-by-2035-2022-02-28/>

Ritchie, H. (2021, February 4). *Deforestation and forest loss*. Our World in Data. <https://ourworldindata.org/deforestation>

Ritchie, H., Roser, M., & Samborska, V. (2023). *Plastic pollution*. Our World in Data. <https://ourworldindata.org/plastic-pollution>

Roberts, D. (2019, January 24). *Climate change policy can be overwhelming. Here's a guide to the policies that work*. Vox. <https://www.vox.com/energy-and-environment/2018/11/16/18096352/climate-change-clean-energy-policies-guide>

Robinson, D. (2021, September 10). *What are feedback loops?* Earth.org. <https://earth.org/what-are-feedback-loops/>

Rosalie Barrow Edge-Feminist, naturalist and conservationist. (2021, April 7). Audubon Center for Birds of Prey. <https://cbop.audubon.org/news/rosalie-barrow-edge-feminist-naturalist-and-conservationist>

Rotman, D. (2023, December 2). *Climate tech is back—and this time, it can't afford to fail*. MIT Technology Review. <https://www.technologyreview.com/2023/12/02/1084059/climate-tech-startups-are-back-and-this-time-they-might-survive/>

Russo, A. (2020, January 19). *Half of world's GDP moderately or highly dependent on nature, says new report*. World Economic Forum. <https://www.weforum.org/press/2020/01/half-of-world-s-gdp-moderately-or-highly-dependent-on-nature-says-new-report/>

Saba, V., Stock, C., Spotila, J., Paladino, F., & Tomilio, P. S. (2012, August 2). *Climate change threatens eastern Pacific leatherback turtles*. Princeton Research. <https://research.princeton.edu/news/climate-change-threatens-eastern-pacific-leatherback-turtles>

Sabherwal, A., & Linden, S. van der. (2021, February 4). *Greta Thunberg effect: People familiar with young climate activist may be more likely to act*. The Conversation. <https://theconversation.com/greta-thunberg-effect-people-familiar-with-young-climate-activist-may-be-more-likely-to-act-154146>

Safdie, S. (2023, March 28). *Our 2023 guide to environmental regulations in the US*. Greenly. <https://greenly.earth/en-us/blog/company-guide/our-2023-guide-to-environmental-regulations-in-the-us>

Samaan, M. (2018, June 20). *Climate negotiations timeline*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/climate-negotiations-timeline/>

Schuknecht, C. (2016, May 26). *10 things you didn't know about the Sierra Club's founding*. Sierra Club. <https://www.sierraclub.org/sierra/2016-3-may-june/green-life/10-things-you-didn-t-know-about-sierra-club-s-founding>

Scott, A., & Cunningham, R. (2022, January 27). *Why it's so hard to pass climate crisis legislation in the U.S.* Marketplace. <https://www.marketplace.org/2022/01/27/why-its-hard-pass-climate-crisis-legislation-u-s/>

Scotti, V. (2021, April 29). *The countries most and least prepared for the economic shock of climate change*. Swiss Re. <https://www.swissre.com/risk-knowledge/mitigating-climate-risk/countries-economic-shock-climate-change.html>

Sea Otter Foundation & Trust. (2023, August 24). *Why sea otters are so important to their ocean habitat: The role of sea otters in ecosystem balance*. Sea Otter Foundation & Trust. <https://seaotterfoundationtrust.org/why-sea-otters-are-so-important-to-their-ocean-habitat-the-role-of-sea-otters-in-ecosystem-balance/>

Shine, I. (2023, August 14). *Rising global temperatures are already affecting the tourism industry-here's how*. World Economic Forum. <https://www.weforum.org/agenda/2023/08/temperatures-tourism-climate-impact/>

Sidoti, G. (2024, January 19). *Navigating the green revolution: A guide to sustainable investments*. Forbes. <https://www.forbes.com/sites/forbesfinancecouncil/2024/01/19/navigating-the-green-revolution-a-guide-to-sustainable-investments/?sh=2606d2f22630>

Simmons, D. (2020, July 29). *What is "climate justice"?* Yale Climate Connections. <https://yaleclimateconnections.org/2020/07/what-is-climate-justice/>

Smith, S. (2021, September 3). *Renewables in Denmark to reach nearly 100% share*. Energy Global. <https://www.energyglobal.com/special-reports/03092021/globaldata-renewables-in-denmark-to-reach-nearly-100-share/>

Sohn, H.-S., & Calleja, R. (2022, November 8). *Global cooperation for development: Current failures and the case for collaboration*. Center for Global Development. <https://www.cgdev.org/blog/global-cooperation-development-current-failures-and-case-collaboration>

Solar powers India's clean energy revolution. (2017, June 29). World Bank. <https://www.worldbank.org/en/news/immersive-story/2017/06/29/solar-powers-india-s-clean-energy-revolution>

Spencer, E. (2023, October 27). *How does climate change affect fisheries?* Ocean Conservancy. <https://oceanconservancy.org/blog/2023/10/27/how-climate-change-affect-fisheries/>

Speth, J. G. (2021, September 15). *They knew: How the U.S. government helped cause the climate crisis*. Yale E360. <https://e360.yale.edu/features/they-knew-how-the-u-s-government-helped-cause-the-climate-crisis>

Spiliakos, A. (2022, January 21). *What does “sustainability” mean in business?* Harvard Business School. <https://online.hbs.edu/blog/post/what-is-sustainability-in-business>

StartUs Insights. (2024, January 9). *Top 10 renewable energy trends & innovations in 2022*. <https://www.startus-insights.com/innovators-guide/top-10-renewable-energy-trends-2022/>

Stratton, S. (2024, January 22). *Biodiversity: What is it and how can we protect it?* UN News. <https://news.un.org/en/story/2024/01/1145772>

Summary report 7–19 December 2009. (2023, December 15). IISD Earth Negotiations Bulletin. <https://enb.iisd.org/copenhagen-climate-change-conference-cop15/summary-report>

Swiss Re. (2021, April 22). *World economy set to lose up to 18% GDP from climate change if no action taken, reveals Swiss Re Institute’s stress-test analysis*. <https://www.swissre.com/media/press-release/nr-20210422-economics-of-climate-change-risks.html>

Syed, M. (2024, January 10). *Top climate tech innovations for 2024*. Climate Insider. <https://climateinsider.com/2024/01/10/top-climate-tech-innovations-for-2024/>

Symons, A. (2024, February 13). *Positive environmental stories from 2024 so far*. Euronews.Green. <https://www.euronews.com/green/2024/02/13/positive-environmental-stories-from-2024>

Tandon, A. (2022, December 15). *Polar bears and climate change: What does the science say?* World Economic Forum. <https://www.weforum.org/agenda/2022/12/polar-bears-and-climate-change-what-does-the-science-say/>

Tesla. (2019, July 29). *Introducing Megapack: Utility-scale energy storage*. <https://www.tesla.com/blog/introducing-megapack-utility-scale-energy-storage>

Tesla. (2022). *Environmental impact*. <https://www.tesla.com/impact/environment>

Tesla’s 2022 impact report: Paving the way for a sustainable future. (2023, April 24). [teslanorth.com. https://teslanorth.com/2023/04/24/tesla-2022-impact-report/](https://teslanorth.com/2023/04/24/tesla-2022-impact-report/)

The Goldman Environmental Prize. (2021, September 1). *How grassroots environmental activism has changed the course of history*. Goldman Environmental Foundation. <https://www.goldmanprize.org/blog/grassroots-environmental-activism/>

The Importance of wolves. (n.d.). California Wolf Center. <https://www.californiawolfcenter.org/biodiversity>

The Leatherback Trust. (2023). *Conservation*. <https://www.leatherback.org/conservation>

The role of government In fostering a circular economy. (2023, July 26). Circular In Blogs. <https://www.circularin.com/blogdetail/the-role-of-government-in-fostering-a-circular-economy>

Theodore Roosevelt. (2021, February 14). Conservation History. <https://conservationhistory.org/conservation-heroes/theodore-roosevelt-2/>

Thompson, E. A. (2021, November 7). *Key role in addressing climate change—materials day symposium*. MIT Department of Mechanical Engineering. <https://meche.mit.edu/news-media/materials%E2%80%99-key-role-addressing-climate-change-focus-materials-day-symposium>

Thorsby, D. (2023, February 10). *22 sustainable building materials to consider for your home*. US News & World Report. <https://realestate.usnews.com/real-estate/articles/sustainable-building-materials-to-consider-for-your-home>

Tikkanen, A. (2024). *Wangari Maathai | Biography*. Encyclopædia Britannica. <https://www.britannica.com/biography/Wangari-Maathai>

Timis, D. A. (2023, June 12). *The future of green jobs and work in the sustainable economy*. World Economic Forum. <https://www.weforum.org/agenda/2023/06/the-future-of-work-in-the-green-economy/>

Top 25 environmentalism quotes. (n.d.). A-Z Quotes. <https://www.azquotes.com/quotes/topics/environmentalism.html>

UN Climate Change. (2019). *What is the Kyoto Protocol?* UNFCCC. https://unfccc.int/kyoto_protocol

UN Environment. (2018, October 29). *About Montreal Protocol*. UN Environmental Program. <https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol>

UNDP. (2022, May 18). *What are carbon markets and why are they important?* UNDP Climate Promise. <https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important>

UNEP. (2019, February 13). *Five ways behavioural science can transform climate change action*. UNEP. <https://www.unep.org/news-and-stories/story/five-ways-behavioural-science-can-transform-climate-change-action>

UNEP. (2020, June 4). *Why international cooperation is key to preserving the world's oceans*. UNEP. <https://www.unep.org/news-and-stories/story/why-international-cooperation-key-preserving-worlds-oceans>

UNEP. (2021a, November 23). How digital technology and innovation can help protect the planet. *UN Environmental Program*. <https://www.unep.org/news-and-stories/story/how-digital-technology-and-innovation-can-help-protect-planet>

UNEP. (2021b, December 16). *10 ways you can help fight the climate crisis*. UNEP. <https://www.unep.org/news-and-stories/story/10-ways-you-can-help-fight-climate-crisis>

UNEP. (2023, July 27). *Climate litigation more than doubles in five years, now a key tool in delivering climate justice*. UN Environmental Program. <https://www.unep.org/news-and-stories/press-release/climate-litigation-more-doubles-five-years-now-key-tool-delivering>

UNEP. (2024, January 18). *Why bees are essential to people and planet*. UN Environmental Program. <https://www.unep.org/news-and-stories/story/why-bees-are-essential-people-and-planet>

UNESCO. (2023, April 20). *UNESCO declares environmental education must be a core curriculum component by 2025*. <https://www.unesco.org/en/articles/unesco-declares-environmental-education-must-be-core-curriculum-component-2025>

Unilever. (2022). *Why investing in sustainable business is good for business*. <https://www.unilever.com/news/news-search/2022/why-investing-in-sustainable-business-is-good-for-business/>

United Nations. (1992). *United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3-14 June 1992*. United Nations. <https://www.un.org/en/conferences/environment/rio1992>

United Nations. (2021a). *COP26: Together for our planet*. <https://www.un.org/en/climatechange/cop26>

United Nations. (2021b). *How is climate change impacting the world's ocean*. <https://www.un.org/en/climatechange/science/climate-issues/ocean-impacts>

United Nations. (2021c, June 10). *Solving world's problems requires "global cooperation based on agreed rules", European Union high representative tells Security Council*. United Nations Meetings Coverage and Press Releases. <https://press.un.org/en/2021/sc14547.doc.htm>

United Nations. (2023, November 3). *Explainer: How AI helps combat climate change*. UN News. <https://news.un.org/en/story/2023/11/1143187>

United Nations Development Program. (2023, April 24). *What is a circular economy and why does it matter?* UNDP Climate Promise. <https://climatepromise.undp.org/news-and-stories/what-is-circular-economy-and-how-it-helps-fight-climate-change>

University of Kansas. (2019, August 13). *How media around the world frame climate change news: Rich countries politicize issue, while poor countries present climate change as*

international concern. ScienceDaily.
<https://www.sciencedaily.com/releases/2019/08/190813130431.htm>

University of Minnesota. (2024). *Climate variability & change*. University of Minnesota Climate Adaptation Partnership. <https://climate.umn.edu/our-changing-climate/climate-variability-change>

Urbanization Effects. (2021, May 3). National Geographic Environment.
<https://www.nationalgeographic.com/environment/article/urban-threats?loggedin=true&rnd=1708106966238>

EPA. (2016). *Glossary of climate change terms*. US Environmental Protection Agency.
https://19january2017snapshot.epa.gov/climatechange/glossary-climate-change-terms_.html

USDA Climate Hubs. (2013). *Vulnerabilities in agriculture and forestry*.
[Www.climatehubs.usda.gov](https://www.climatehubs.usda.gov). <https://www.climatehubs.usda.gov/vulnerabilities-agriculture-and-forestry#>

Vahlsing, C., & Liscow, Z. (2023, March 14). *The importance of measuring the fiscal and economic costs of climate change*. The White House. <https://www.whitehouse.gov/omb/briefing-room/2023/03/14/the-importance-of-measuring-the-fiscal-and-economic-costs-of-climate-change/>

Varro, L., & Kamiya, G. (2021, March 25). *5 ways big tech could have big impacts on clean energy transitions*. IEA. <https://www.iea.org/commentaries/5-ways-big-tech-could-have-big-impacts-on-clean-energy-transitions>

Vasquez, K. (2021, April 20). *How Charles Keeling measured the rise of carbon dioxide*. JSTOR Daily. <https://daily.jstor.org/how-charles-keeling-measured-rise-carbon-dioxide/>

Viglione, G. (2021, May 11). *Land use change has affected “almost a third” of world’s terrain since 1960*. Carbon Brief. <https://www.carbonbrief.org/land-use-change-has-affected-almost-a-third-of-worlds-terrain-since-1960/>

Visual Capitalist. (2020, November 16). *These are the biggest threats to the Earth’s biodiversity*. World Economic Forum. <https://www.weforum.org/agenda/2020/11/wwf-living-planet-report-2020-biodiversity-threat/>

Wahba, S. (2023, June 15). *The climate crisis puts geopolitical security at risk*. Forbes. <https://www.forbes.com/sites/forbesfinancecouncil/2023/06/15/the-climate-crisis-puts-geopolitical-security-at-risk/?sh=7e17ceaa2316>

Waldholz, R. (2023, August 16). *A year in, landmark U.S. climate policy drives energy transition but hurdles remain*. NPR. <https://www.npr.org/2023/08/16/1193726242/a-year-in-landmark-u-s-climate-policy-drives-energy-transition-but-hurdles-remain>

Warren, S. (2015). *How does climate change impact koalas?* 1 Million Women. <https://www.1millionwomen.com.au/blog/how-climate-change-effects-koalas>

Watts, J. (2024, February 6). *World “not prepared” for climate disasters after warmest ever January*. The Guardian. <https://www.theguardian.com/environment/2024/feb/06/world-not-prepared-for-climate-disasters-after-warmest-ever-january>

Welle, D. (2015, April 27). *Denmark’s wind power flowering: A small country with big dreams of a fossil-free future*. DW.com. <https://www.dw.com/en/denmarks-wind-power-flowering-a-small-country-with-big-dreams-of-a-fossil-free-future/a-18398487>

What is sustainability? (n.d.). Sustainability for all. Acciona. https://www.activesustainability.com/sustainable-development/what-is-sustainability/?_adin=11551547647

WHO. (2023, October 12). *Climate change*. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

Wikipedia. (2023a, June 30). *Global Earth Observation System of Systems*. Wikipedia. https://en.wikipedia.org/wiki/Global_Earth_Observation_System_of_Systems

Wikipedia. (2023b, November 27). *Global Climate Observing System*. Wikipedia. https://en.wikipedia.org/wiki/Global_Climate_Observing_System

Wikipedia. (2024, January 5). *GRACE and GRACE-FO*. Wikipedia. https://en.wikipedia.org/wiki/GRACE_and_GRACE-FO

Wikipedia Contributors. (2023a, July 10). *History of the National Park Service*. Wikipedia; https://en.wikipedia.org/wiki/History_of_the_National_Park_Service

Wikipedia Contributors. (2023b, November 20). *Global Covenant of Mayors for Climate & Energy*. Wikipedia. https://en.wikipedia.org/wiki/Global_Covenant_of_Mayors_for_Climate_%26_Energy

Wikipedia Contributors. (2023c, December 27). *Special report on global warming of 1.5 °C*. Wikipedia. https://en.wikipedia.org/wiki/Special_Report_on_Global_Warming_of_1.5_%C2%B0C

Wikipedia Contributors. (2024a, January 22). *IPCC Third Assessment Report*. Wikipedia. https://en.wikipedia.org/wiki/IPCC_Third_Assessment_Report

Wikipedia Contributors. (2024b, February 10). *Tipping points in the climate system*. Wikipedia. https://en.wikipedia.org/wiki/Tipping_points_in_the_climate_system

Wikipedia Contributors. (2024c, February 11). *Chernobyl disaster*. Wikipedia. https://en.wikipedia.org/wiki/Chernobyl_disaster

Wikipedia Contributors. (2024d, February 12). *Paleoclimatology*. Wikipedia. <https://en.wikipedia.org/wiki/Paleoclimatology>

Wikipedia Contributors. (2024e, February 21). *Climate justice*. Wikipedia. https://en.wikipedia.org/wiki/Climate_justice

Will, M., & Prothero, A. (2022, November 18). *Teens know climate change Is real. They want schools to teach more about it*. Education Week. <https://www.edweek.org/teaching-learning/teens-know-climate-change-is-real-they-want-schools-to-teach-more-about-it/2022/11>

Williams, C. (2013, September 26). *Strategy and tactics in the environmental movement*. Truthout. <https://truthout.org/articles/strategy-and-tactics-in-the-environmental-movement/>

Wong, A. (2021, October 15). *The interconnectedness of sustainable Development Goals: Boom or gloom*. Earth.org . <https://earth.org/the-interconnectedness-of-sustainable-development-goals/>

World Bank. (2023). *Reality check: Lessons from 25 policies advancing a low-carbon future*. World Bank. <https://openknowledge.worldbank.org/server/api/core/bitstreams/b98ee473-12bb-4ff7-bb46-9fcdcb7d72c6/content>

World Economic Forum. (2020, September 22). *Why we need international cooperation now more than ever*. <https://www.weforum.org/agenda/2020/09/global-cooperation-international-united-nations-covid-19-climate-change/>

World Economic Forum. (2024). *The Global Cooperation Barometer 2024*. In *World Economic Forum*. World Economic Forum. https://www3.weforum.org/docs/WEF_The_Global_Cooperation_Barometer_2024.pdf

WWF. (2019). *Sustainable agriculture*. WWF. <https://www.worldwildlife.org/industries/sustainable-agriculture>

Ye, J. (2023, October 13). *Short-lived climate pollutants*. Center for Climate and Energy Solutions. <https://www.c2es.org/content/short-lived-climate-pollutants/>

Yeo, S. (2020, April 22). *How the largest environmental movement in history was born*. Future Planet. <https://www.bbc.com/future/article/20200420-earth-day-2020-how-an-environmental-movement-was-born>

York, G., Sahanatien, V., Polet, G., & Koopmans, Femke. (2014). *WWF Polar bear action plan 2014 - 2020*. WWF. https://wwfeu.awsassets.panda.org/downloads/polar_bear_sap_web.pdf

Young, G. L. (n.d.). *Pinchot, Gifford (1865 – 1946)*. Encyclopedia.com. <https://www.encyclopedia.com/environment/encyclopedias-almanacs-transcripts-and-maps/pinchot-gifford-1865-1946-american-conservationist-and-forester>

Zeidan, A. (2023). *Bhopal disaster*. Encyclopædia Britannica.
<https://www.britannica.com/event/Bhopal-disaster>

Zillman, J., & Sherwood, S. (2017, November 7). *The enhanced greenhouse effect*. Australian Academy of Science. <https://www.science.org.au/curious/earth-environment/enhanced-greenhouse-effect>