

# GREEN ENERGY USE IN THE UNITED STATES

Chad Hyer

## FOOTNOTES

1. "What Is Carbon Neutrality and How Can It Be Achieved by 2050?" European Parliament, June 24, 2021, <https://www.europarl.europa.eu/news/en/headlines/society/20190926STO62270/what-is-carbon-neutrality-and-how-can-it-be-achieved-by-2050>.
2. "What Is Cap and Trade?" Investopedia, December 5, 2020, <https://www.investopedia.com/terms/c/cap-and-trade.asp>.
3. "What Is Climate Change?" United Nations, accessed December 13, 2021, <https://www.un.org/en/climatechange/what-is-climate-change>.
4. "Environmental Protection Agency (EPA)," Investopedia, July 17, 2021, <https://www.investopedia.com/terms/e/environmental-protection-agency.asp>.
5. "Fossil Fuels," National Geographic Society, accessed December 13, 2021, <https://www.nationalgeographic.org/encyclopedia/fossil-fuels/>.
6. "Overview of Greenhouse Gases," United States Environmental Protection Agency, accessed December 13, 2021, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>.
7. "What Is Green Energy?" National Grid, accessed December 13, 2021, <https://www.nationalgrid.com/stories/energy-explained/what-is-green-energy>.
8. "The Paris Agreement," United Nations accessed December 13, 2021, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.
9. "Petroleum," Investopedia, updated October 7, 2021, <https://www.investopedia.com/terms/p/petroleum.asp>.
10. "What Is Green Energy? Definitions, Types, and Examples," TWI, accessed December 13, 2021, <https://www.twi-global.com/technical-knowledge/faqs/what-is-green-energy>.
11. "The Current State of the Climate," Summary for Policymakers, in *Climate Change 2021: The Physical Science Basis*, 41 (A.1.2), IPCC, August 7, 2021, [https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Full\\_Report\\_smaller.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report_smaller.pdf).
12. "The Current State of the Climate," IPCC, A.2.2.
13. Ibid, A.1.5.
14. Ibid, A.1.7.
15. Ibid, A.3.5.
16. Ibid, A.3.4.
17. Ibid, A.1.3.
18. Ibid, A.1.1.
19. Ibid, A.2.1.
20. Ibid, SPM.1.
21. "Sources of Greenhouse Gas Emissions," United States Environmental Protection Agency, accessed December 13, 2021, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.
22. "Renewable Energy Generation, World," Our World in Data, accessed December 13, 2021, [https://ourworldindata.org/grapher/modern-renewable-energy-consumption?country=~OWID\\_WRL](https://ourworldindata.org/grapher/modern-renewable-energy-consumption?country=~OWID_WRL).
23. "Global CO2 Emissions by Region," Global Carbon Project, 2020, slide 67, <https://folk.universitetetioslo.no/roberan/GCB2020.shtml>.

24. "Petroleum and Other Liquids," US Energy Information Administration (EIA), accessed December 13, 2021, <https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-petroleum-and-other-liquids-production>.
25. "Oil Consumption," Our World in Data, updated December 12, 2021, <https://ourworldindata.org/grapher/oil-consumption-by-country?tab=chart>.
26. "Natural Gas," EIA, accessed December 13, 2021, <https://www.eia.gov/international/data/world/natural-gas/dry-natural-gas-production>.
27. "Sources of Greenhouse Gas Emissions," EPA.
28. "Americans Have Texas-Sized Carbon Footprints—Here's Why," Ars Technica, April 22, 2020, <https://arstechnica.com/science/2020/04/americans-have-texas-sized-carbon-footprints-heres-why/>.
29. <https://www.eia.gov/energyexplained/us-energy-facts/>
30. "What Is The Kyoto Protocol?" United Nations, accessed December 13, 2021, [https://unfccc.int/kyoto\\_protocol](https://unfccc.int/kyoto_protocol).
31. "The Paris Agreement," United Nations.
32. "World's Largest Survey of Public Opinion on Climate Change: A Majority of People Call for Wide-Ranging Action," United Nations Development Programme, January 27, 2021, <https://www.undp.org/press-releases/worlds-largest-survey-public-opinion-climate-change-majority-people-call-wide>.
33. Trump Twitter Archive, 2021, <https://www.thetrumparchive.com/?results=1&searchbox=%22hoax+%2B+global+warming%22>.
34. Michael Shear, June 1, 2017, "Trump Will Withdraw US from Paris," <https://www.nytimes.com/2017/06/01/climate/trump-paris-climate-agreement.html>.
35. Anthony Leiserowitz et al., "International Public Opinion on Climate Change," Yale Program on Climate Change Communication and Facebook Data for Good, 2021, <https://climatecommunication.yale.edu/wp-content/uploads/2021/06/international-climate-opinion-february-2021d.pdf>.
36. Leiserowitz et al., "International Public Opinion on Climate Change."
37. "Energy," Gallup Poll, accessed December 14, 2021, <https://news.gallup.com/poll/2167/energy.aspx>.
38. "Congress Climate History," Center for Climate and Energy Solutions, accessed December 14, 2021, <https://www.c2es.org/content/congress-climate-history/>.
39. "Congress Climate History," Center for Climate and Energy Solutions.
40. Ibid.
41. Ibid.
42. Dana Nuccitelli, "The Trump ERA Strategy to Undo the Clean Power Plan," Yale Climate Connections, June 21, 2019, <https://yaleclimateconnections.org/2019/06/the-trump-epa-strategy-to-undo-the-clean-power-plan/>.
43. Cayli Baker, "The Trump Administration's Major Environmental Deregulations," Brookings, December 15, 2020, <https://www.brookings.edu/blog/up-front/2020/12/15/the-trump-administrations-major-environmental-deregulations/>.
44. "USA," Climate Action Tracker, updated November 4, 2021, <https://climateactiontracker.org/countries/usa/policies-action/>.
45. "USA," Climate Action Tracker.
46. Ibid.

47. "US Energy System Factsheet," *Center for Sustainable Systems*, University of Michigan, accessed December 14, 2021, <https://css.umich.edu/factsheets/us-energy-system-factsheet>.
48. "US Energy Facts Explained," EIA, accessed December 14, 2021, <https://www.eia.gov/energyexplained/us-energy-facts/>.
49. "US Energy Facts Explained," EIA.
50. Ibid.
51. Daniel Workman, "United States Top 10 Exports," *World's Top Exports*, accessed December 14, 2021, <https://www.worldstopexports.com/united-states-top-10-exports/>
52. "US Energy Facts Explained," EIA.
53. "Use of Energy Explained: Energy Use for Transportation," EIA, accessed December 14, 2021, <https://www.eia.gov/energyexplained/use-of-energy/transportation.php>.
54. "Sources of Greenhouse Gas Emissions," EPA.
55. "Hydrogen Fueling Stations," US Department of Energy," accessed December 14, 2021, [https://afdc.energy.gov/fuels/hydrogen\\_stations.html](https://afdc.energy.gov/fuels/hydrogen_stations.html).
56. "What Is an Electric Car?" *Conserve Energy Future*, accessed December 14, 2021, <https://www.conserve-energy-future.com/advantages-and-disadvantages-of-electric-cars.php>.
57. "International," EIA, accessed December 14, 2021, <https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-petroleum-and-other-liquids-production>.
58. Workman, "United States Top 10 Exports."
59. Ibid.
60. "International," EIA.
61. "US Energy Facts Explained," EIA.
62. "Natural Gas Explained: Use of Natural Gas," EIA, accessed December 14, 2021, <https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php>.
63. "How Much Carbon Dioxide Is Produced when Different Fuels Are Burned?" EIA, accessed December 14, 2021, <https://www.eia.gov/tools/faqs/faq.php?id=73&t=11>.
64. "Energy," Gallup.
65. Valerie Volcovici, Kate Abnett, and Matthew Green, "Explainer: Cleaner but Not Clean—Why Scientists Say Natural Gas Won't Avert Climate Disaster," August 18, 2020, <https://www.reuters.com/article/us-usa-gas-climatebox-explainer/explainer-cleaner-but-not-clean-why-scientists-say-natural-gas-wont-avert-climate-disaster-idUSKCN25E1DR>.
66. Alejandra Borunda, "Natural Gas Is a Much 'Dirtier' Energy Source than We Thought," *National Geographic*, February 19, 2020, <https://www.nationalgeographic.com/science/article/super-potent-methane-in-atmosphere-oil-gas-drilling-ice-cores?loggedin=true>.
67. "US Energy Facts Explained," EIA.
68. "Sources of Greenhouse Gas Emissions," EPA.
69. "How Much Carbon Dioxide Is Produced . . . ?" EIA.
70. Leiserowitz et al., "International Public Opinion on Climate Change."
71. Ibid.
72. "The Peoples' Climate Vote," *United Nations Development Programme*, figure 3, January 26, 2021, <https://www.undp.org/publications/peoples-climate-vote>.
73. "Natural Gas Solutions," *American Petroleum Institute*, accessed December 21, 2021, <https://www.api.org/news-policy-and-issues/natural-gas-solutions>.
74. Borunda, "Natural Gas Is a Much 'Dirtier' Energy Source than We Thought."
75. Volcovici, Abnett, and Green, "Explainer: Cleaner but Not Clean."
76. Ibid.

77. Charles Waugh, "The Politics and Culture of Climate Change: US Actors and Global Implications," in *Environmental Change and Agricultural Sustainability in the Mekong Delta*, eds. Mart Stewart and Peter Coclanis (Logan, UT: Springer Science+Business Media, 2011), 83–99, [https://digitalcommons.usu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1788&context=english\\_facpub](https://digitalcommons.usu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1788&context=english_facpub).
78. Phoebe Keane, "How the Oil Industry Made Us Doubt Climate Change," *BBCNews*, September 20, 2020, <https://www.bbc.com/news/stories-53640382>.
79. Alvin Powell, "Tracing Big Oil's PR War to Delay Action on Climate Change," *The Harvard Gazette*, September 28, 2021, <https://news.harvard.edu/gazette/story/2021/09/oil-companies-discourage-climate-action-study-says/>.
80. Benjamin Franta, "Weaponizing Economics: Big Oil, Economic Consultants, and Climate Policy Delay," *Environmental Politics* (2021): <https://www.tandfonline.com/doi/full/10.1080/09644016.2021.1947636?src=recsys>.
81. Hiroko Tabuchi, "House Panel Expands Inquiry into Climate Disinformation by Oil Giants," *The New York Times*, September 16, 2021, <https://www.nytimes.com/2021/09/16/climate/exxon-oil-disinformation-house-probe.html>.
82. "Clean Energy Myths & Facts: The Truth about Alternative Energy," Inspire, March 9, 2017, <https://www.inspirecleanenergy.com/blog/clean-energy-101/3-clean-energy-myths>.
83. "Lazard's Levelized Cost of Energy Analysis," Lazard, 2018, 7, <https://www.lazard.com/media/450784/lazards-levelized-cost-of-energy-version-120-vfinal.pdf>
84. Susan Tierney and Lori Bird, "Setting the Record Straight about Renewable Energy," World Resources Institute, May 12, 2020, <https://www.wri.org/insights/setting-record-straight-about-renewable-energy>.
85. Emmanuel Lagarrigue, "Renewable Energy: Common Myths Debunked," World Economic Forum, March 1, 2021, <https://www.weforum.org/agenda/2021/03/renewable-energy-myths-debunked/>.
86. Karin Kirk, "3 Clean Energy Myths, Debunked," Yale Climate Connections, February 21, 2019, <https://yaleclimateconnections.org/2019/02/3-clean-energy-myths-debunked/>.
87. Tierney and Bird, "Setting the Record Straight."
88. Brian Kennedy, "US Concern about Climate Change Is Rising, But Mainly among Democrats," Pew Research Center, April 16, 2020, <https://www.pewresearch.org/fact-tank/2020/04/16/u-s-concern-about-climate-change-is-rising-but-mainly-among-democrats/>.
89. John Cook, "Understanding and Countering Misinformation about Climate Change," in *Handbook of Research on Deception, Fake News, and Misinformation Online*, eds. I Chiluya and S Samoilenko (Hershey, PA: IGI-Global, 2019), 281–396, [https://www.climatechangecommunication.org/wp-content/uploads/2019/06/Cook\\_2019\\_climate\\_misinformation-1.pdf](https://www.climatechangecommunication.org/wp-content/uploads/2019/06/Cook_2019_climate_misinformation-1.pdf).
90. "Political Polarization in the American Public: How Increasing Ideological Uniformity and Partisan Antipathy Affect Politics, Compromise, and Everyday Life," Pew Research Center, June 12, 2014, <https://www.pewresearch.org/politics/2014/06/12/political-polarization-in-the-american-public/>.
91. Timothy Gardner, "Republicans Defeat Green New Deal in US Senate Vote Democrats Call a Stunt," Reuters, March 26, 2019, <https://www.reuters.com/article/us-usa-climate-greennewdeal/republicans-defeat-green-new-deal-in-u-s-senate-vote-democrats-call-a-stunt-idUSKCN1R71BZ>.
92. Dana Nuccitelli, "The Trump EPA Strategy to Undo the Clean Power Plan," Yale Climate Connections, June 21, 2019,

<https://yaleclimateconnections.org/2019/06/the-trump-epa-strategy-to-undo-the-clean-power-plan/>

93. “US Policies and Action,” Climate Action Tracker, November 4, 2021, <https://climateactiontracker.org/countries/usa/policies-action/>.
94. “The Current State of the Climate,” IPCC, A.1.3.
95. Ibid, A.1.1.
96. Ibid, A.1.5.
97. Ibid, A.1.7.
98. Ibid, A.3.5.
99. Ibid, A.3.4.
100. Rebecca Lindsey, “Climate Change: Global Sea Level,” Climate.gov, August 14, 2020, <https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level>.
101. Lindsey, “Climate Change.”
102. Ibid.
103. “The Current State of the Climate,” IPCC, A.1.7.
104. Tiffany Means, “Climate Change and Droughts: What’s the Connection?” Yale Climate Connections, August 18, 2021, <https://yaleclimateconnections.org/2021/08/climate-change-and-droughts-whats-the-connection/>.
105. “A Third of the US Faces Drought,” Earth Observatory, August 11, 2020, <https://earthobservatory.nasa.gov/images/147118/a-third-of-the-us-faces-drought>.
106. “Here’s How Climate Change Affects Wildfires,” accessed December 30, 2021, <https://www.edf.org/climate/heres-how-climate-change-affects-wildfires>.
107. Means, “Climate Change and Droughts.”
108. “Climate Investment Opportunities Total \$23 Trillion in Emerging Markets by 2030, Says Report,” International Finance Corporation, accessed December 30, 2021, [https://www.ifc.org/wps/wcm/connect/news\\_ext\\_content/ifc\\_external\\_corporate\\_site/news+and+events/news/new+ifc+report+points+to+%2423+trillion+of+climate-smart+investment+opportunities+in+emerging+markets+by+2030](https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/new+ifc+report+points+to+%2423+trillion+of+climate-smart+investment+opportunities+in+emerging+markets+by+2030).
109. “Energy,” Gallup.
110. “World’s Largest Survey of Public Opinion on Climate Change,” United Nations Development Programme.
111. “Energy,” Gallup.
112. Silvio Marcacci, “Renewable Energy Job Boom Creates Economic Opportunity as Coal Industry Slumps,” Forbes, April 22, 2019, <https://www.forbes.com/sites/energyinnovation/2019/04/22/renewable-energy-job-boom-creating-economic-opportunity-as-coal-industry-slumps/?sh=6db1b80d3665>.
113. Marcacci, “Renewable Energy Job Boom Creates Economic Opportunity.”
114. Silvio Marcacci, “Plunging Renewable Energy Prices Mean US Can Hit 90% Clean Electricity by 2035—At No Extra Cost,” Forbes, June 9, 2020, <https://www.forbes.com/sites/energyinnovation/2020/06/09/plunging-renewable-energy-prices-mean-us-can-hit-90-clean-electricity-by-2035at-no-extra-cost/?sh=21588fb82f9b>.
115. Marcacci, “Renewable Energy Job Boom Creates Economic Opportunity.”
116. “Lazard’s Levelized Cost of Energy Analysis,” Lazard.
117. Marcacci, “Plunging Renewable Energy Prices.”
118. “Bureau of Budget and Planning,” US Department of State, January 20, 2017, <https://2009-2017.state.gov/s/d/rm/index.htm#mission>.
119. “The Paris Agreement,” United Nations Climate Change.
120. “World’s Largest Survey of Public Opinion on Climate Change,” United Nations Development Programme.

121. David Choi, "How World Leaders Are Reacting to Trump's Decision to Leave the Paris Climate Agreement," Insider, June 1, 2017, <https://www.businessinsider.com/paris-climate-agreement-reaction-from-world-leaders-2017-6#russian-president-vladimir-putin-russia-attaches-great-significance-to-it-5>.
122. Valerie Volcovici and Jeff Mason, "Trump Dismays, Angers Allies by Abandoning Global Climate Pact," Reuters, May 31, 2017, <https://www.reuters.com/article/us-usa-climatechange-trump/trump-dismays-angers-allies-by-abandoning-global-climate-pact-idUSKBN18R1J4>.
123. Volcovici and Mason, "Trump Dismays, Angers Allies."
124. Ariel Cohen, "US Withdraws from Paris Accord, Ceding Leadership to China," Forbes, November 7, 2019, <https://www.forbes.com/sites/arielcohen/2019/11/07/us-withdraws-from-paris-accord-ceding-leadership-to-china/?sh=3cd21db473c1>.
125. Cohen, "US Withdraws from Paris Accord."
126. Rush Doshi, "The Long Game: China's Grand Strategy to Displace American Order," The Brookings Institution, August 2, 2021, <https://www.brookings.edu/essay/the-long-game-chinas-grand-strategy-to-displace-american-order/>.
127. Volcovici and Mason, "Trump Dismays, Angers Allies."
128. Cohen, "US Withdraws from Paris Accord."
129. Ibid.
130. Ibid.
131. Volcovici and Mason, "Trump Dismays, Angers Allies."
132. "Mission," American Council on Renewable Energy (ACORE), accessed December 20, 2021, <https://acore.org/mission-history/>.
133. "Mission," ACORE.
134. "Expectations for Renewable Energy Finance in 2021–2024: Growing Confidence in the Aftermath of the Pandemic," ACORE, June 2021, <https://acore.org/wp-content/uploads/2021/06/Expectations-for-Renewable-Energy-Finance-in-2021-2024-ACORE.pdf>.
135. "Expectations for Renewable Energy Finance," ACORE.
136. Ibid.
137. "About Us: Purpose and Values," Enphase, accessed December 30, 2021, <https://enphase.com/about-us>.
138. Nathan Reiff, "Top Solar Stocks for Q1 2022," Investopedia, updated December 24, 2021, <https://www.investopedia.com/investing/top-solar-stocks/>.
139. "About Us," Enphase.
140. "Meet the Enphase Energy System," Enphase, accessed December 30, 2021, <https://enphase.com/homeowners>.
141. "Meet the Enphase Energy System," Enphase.
142. Ibid.
143. Ibid.
144. "About Us: Purpose and Values," Enphase.
145. Ibid.
146. "Environmental, Social, and Governance Report," Enphase Energy, Inc., 2020, [https://enphase.com/sites/default/files/2021-04/ESG\\_Report\\_2020.pdf](https://enphase.com/sites/default/files/2021-04/ESG_Report_2020.pdf).
147. Dan Murtaugh and Maxwell Adler, "Solar's Growth Stumbles Just as the World Needs It Most," Bloomberg, October 24, 2021,

<https://www.bloomberg.com/news/articles/2021-10-25/solar-energy-growth-rate-slows-with-supply-chain-shortages-rising-panel-prices>.

148. "Stock Information," Enphase, updated December 30, 2021, <https://investor.enphase.com/stock-information>.