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SABIN CENTER FOR CLIMATE CHANGE LAW

**Climate Recommendations For a New Democratic President and a New Congress:  
A Compilation**

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**Introduction by Michael B. Gerrard**

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## Introduction and User Guide

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Congress has not enacted a major new environmental law since 1990, when President George H.W. Bush signed the Clean Air Act Amendments and the Oil Pollution Act. He also supported, and the Senate ratified, the United Nations Framework Convention on Climate Change in 1992. The administration of President Bill Clinton supported the Kyoto Protocol, which was designed to achieve the objectives of the Framework Convention, but could not secure Senate ratification. President George W. Bush rejected the Kyoto Protocol and many other actions on climate change. President Barack Obama supported action on climate change; when he was unable to secure Senate passage of climate legislation, his administration utilized existing statutory authority to regulate greenhouse gas emissions and other environmental harms. President Donald Trump has systematically worked to reverse these actions, as followed in the Sabin Center's [Climate Deregulation Tracker](#) and [Silencing Science Tracker](#), though many of these attempts have been stymied by the courts, as followed in our [Climate Change Litigation Databases](#).

The possibility that a Democratic candidate will be elected in November 2020 has led to a flurry of proposals for what a new administration could do, not only to reverse the Trump-era deregulation but also to move further in transitioning the United States away from fossil fuel use and other environmentally destructive practices. Though the presidential campaign of Washington Governor Jay Inslee did not last long, his climate proposals have proven to be very influential and many have found their way into subsequent proposals, including those of former Vice President Joseph Biden. In the hopes that the election will also lead to a Democratic majority in the Senate, there are also many proposals for Congressional action. One of the most detailed to date is a report from the Democratic members of the House Select Committee on the Climate Crisis.

In the last several years many environmental and environmental justice groups, businesses, think tanks, academics and others have issued their own climate and energy proposals. Some are broad-ranging; others are narrowly focused on one or a few specific issues.

The result is a large array of greatly overlapping proposals from a host of sources, making it difficult to grasp the array of options available for federal climate action and to understand who supports what specific idea.

This document attempts to address that problem. We have endeavored to assemble all the major (and some not-so-major) proposals for Presidential and Congressional action on climate change after the 2020 election; organize specific recommendations by subject matter; and

present them all together. We hope that this document will be useful to officials in the new administration (if there is one), to Congressional staffers, and to policy advocates, journalists, and others trying to advance or understand the available options.

Another effort to formulate recommendations has been based on reports issued in 2014 and 2015, [Pathways to Deep Decarbonization in the United States](#), prepared for the Sustainable Development Solutions Network and the Institute for Sustainable Development and International Relations (IDDRI) by Energy + Environmental Economics (E3). It set forth detailed technical pathways for the U.S. to reduce its GHG emissions. Based on this report, Professor John Dernbach and I led a project that led to the publication by the Environmental Law Institute in 2019 of a large book, [Legal Pathways to Deep Decarbonization in the United States](#). This book contains more than 1,500 recommendations for federal, state and local actions to follow the pathways identified by the technical reports, as well as other actions that go beyond those reports. The book also contains detailed descriptions of the current state of the law on the matters it covers and legal analyses of its recommendations. Professor Dernbach and I then launched a project, which I describe in [this](#) article, to recruit pro bono lawyers to draft the model laws recommended by the *Legal Pathways* book. This project has also created a web site, [Model Laws for Deep Decarbonization in the United States](#), where we are posting these model laws as well as large numbers of other existing and model laws and other resources. As of this writing, 1,829 items are posted there. This compilation document includes the relevant recommendations for state action in the *Legal Pathways* book (denoted as “LPDD Recommendations”), and links to the model laws and other resources posted on the web site (denoted as “LPDD Resources”).

This document begins with a detailed table of contents. Its headings have links that will take the reader to the relevant section. After the table of contents is a list of the sources of recommendations, with links to all of them. The recommendations in the document are all keyed to their sources so the reader can find where they came from.

For each topic we begin with a description of the recommendation. Then, where applicable, we indicate who has proposed it, with links to the proposals, followed by the LPDD recommendations; the LPDD resources; a mention of the current or previous moves in the direction of the proposal; the proposal’s co-benefits; the obstacles and shortcomings it is likely to face; and additional resources. We do not claim to be at all exhaustive in our listings of relevant actions and resources, or in our accounts of co-benefits, obstacles and shortcomings, but we hope the information provided will be useful.

Inclusion of a recommendation in this compilation is not an endorsement. Indeed, some of the recommendations contradict each other. Our purpose was to compile the recommendations that others have made, so that readers will have in front of them a large set of potential actions from which to choose.

This document covers proposals that directly concern climate change, and related efforts in the energy, agriculture and forestry sectors that are aimed at reducing greenhouse gas emissions. It

does not include other important environmental issues such as endangered species or the Waters of the United States rule, though some of the cited documents also discuss those.

This document is the work of two people working under my supervision. Clara Greider is a student at Brown University who spent the summer of 2020 working (remotely) for the Sabin Center creating this document. Jordan Gerow is an attorney working with the LPDD project who created the Model Laws for Deep Decarbonization website, and has inserted the LPDD recommendations and resource links. I am most appreciative of the diligent efforts of Clara and Jordan in creating a document that we hope will be helpful in advancing action on climate change after the November 2020 election, depending on its results.

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DNC Environment and Climate Crisis Council. “Environmental and Climate Policy Recommendations for the 2020 Democratic Party Platform.” 2020.

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## GOVERNMENT ORGANIZATION

### White House and Cabinet Organization

#### Description

- Create a climate secretary cabinet position ([E&E News](#)).<sup>1</sup>
- The next President should establish by executive order a new White House office and council within the Executive Office of the President (EOP) charged with leading a national [climate] mobilization. ... The office and council should work across the President's Cabinet agencies to convene, coordinate, drive, and ultimately hold accountable every federal department to this national mission. ([Evergreen Action Plan](#), p. 7)
- Create an Office of Environmental Justice (EJ)
- Create a Department of Climate Change

Proposed by: Joe Biden 2020 Presidential Campaign; [Evergreen Action](#) (p. 7); Kamala Harris 2020 Presidential Campaign (proposed an EJ Office).

#### Previous/Current Implementation

President Obama did not assign a climate secretary, but he did assign a senior adviser to coordinate climate work across federal agencies ([E&E News](#)).<sup>2</sup>

#### Co-benefits

Elevating environmental regulation to a cabinet-level position would elevate the importance of combating climate change.

#### Obstacles/Shortfalls

Adding a climate secretary would require an act of Congress. In addition, without further legislative authority a new climate cabinet official would not have the authority to sign rules and make decisions or to redirect funds or invest in infrastructure. ([E&E News](#)).<sup>3</sup>

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<sup>1</sup> Jenmick, Jean. "[Biden Floats Climate Cabinet Position. That's Complicated.](#)" *E&E News*. April 29, 2020. <https://www.eenews.net/stories/1062988049>

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

## Federal-State Relations

### Description

The next administration should establish “federal interagency Climate Mobilization Councils in every state and territory that include all relevant federal agencies operating in that jurisdiction. ... This new vision for federal-state partnership should involve significantly expanded investments in successful clean energy programs... Through these programs states, cities and Tribal nations can quickly deploy investments into local solutions” ([Evergreen Action Plan](#), pp. 10-11).

Proposed by: [Evergreen Action](#)

### Previous/Current Implementation

- “President Franklin Delano Roosevelt’s National Emergency Council placed field directors in each state to coordinate New Deal economic relief” ([Evergreen Action Plan](#), p. 10).
- “The State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience (Task Force) was established by Executive Order 136531 , Preparing the United States for the Impacts of Climate Change, on November 1, 2013. The President charged the Task Force with providing recommendations on how the Federal Government can respond to the needs of communities nationwide that are dealing with the impacts of climate change by removing barriers to resilient investments, modernizing Federal grant and loan programs to better support local efforts, and developing the information and tools they need to prepare, among other measures.” ([President’s State, Local, and Tribal Leaders Task Force an Climate Preparedness and Resilience](#), November 2014)<sup>4</sup>

### Co-Benefits

Investment through climate mobilization councils would support job creation, particularly in the clean energy sector.

### Additional Resources

Rabe, Barry G. “[Introduction: The Challenges of U.S. Climate Governance.](#)” *Greenhouse Governance: Addressing Climate Change in America.*

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<sup>4</sup> [President’s State, Local, and Tribal Leaders Task Force and Climate Preparedness and Resilience: Recommendations to the President.](#) The Obama Whitehouse. November 2014.  
[https://obamawhitehouse.archives.gov/sites/default/files/docs/task\\_force\\_report\\_o.pdf](https://obamawhitehouse.archives.gov/sites/default/files/docs/task_force_report_o.pdf)

## Tribal Sovereignty, Treaty Rights

### Description

- Proposal to uphold trust and treaty obligations with Tribal nations, to protect Tribal sovereignty, to fund vital programs that benefit Native Americans, to improve the physical infrastructure of Native lands, including through the addition of renewable energy initiatives, and to provide aid in various other forms (Elizabeth Warren, [Honoring and Empowering Tribal Nations and Indigenous Peoples](#)).<sup>5</sup>
- “Congress should establish a Tribal Government Task Force to coordinate with federal departments and agencies that make community development, planning, and infrastructure grants to states, local governments, tribes, and territories to evaluate the full complement of programs to provide greater access and equitable baseline funding to tribal nations and Indigenous communities across their programs for climate adaptation and resilience” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 387).
- “The next President should re-establish the annual White House Tribal Nations Conference first convened under President Barack Obama, and commit federal agencies to prioritize the expansion of Tribal sovereignty, and investment into Tribal communities, including ensuring parity in access to federal resources. This federal agenda should fully empower Tribal nations, through free, prior and informed consent, to reject fossil fuel infrastructure proposals and to engage with them in joint control and protection of their lands, waters, territories and resources. And, wherever possible, it should return treaty and former reservation lands to tribal trust status, and empower Tribes to take a leading role in environmental stewardship and co-management of public lands and waters” ([Evergreen Action Plan](#), p. 11).

Proposed by: [Elizabeth Warren 2020 Presidential Campaign](#); [Honoring Promises to Native Nations Act](#);<sup>6</sup> [Evergreen Action](#) (p. 11); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Joe Biden 2020 Presidential Campaign](#); [Bernie Sanders 2020 Presidential Campaign](#); Pete Buttigieg 2020 Presidential Campaign

### Previous/Current Implementation

- “The right to indigenous self-governance and self-determination has been acknowledged by the federal government through its 2010 endorsement of the U.N. Declaration on the Rights of Indigenous Peoples (UNDRIP 2007), which recognizes the rights of indigenous peoples worldwide to self-determination and self-governance” ([Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences](#), USDA, 2016).<sup>7</sup>

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<sup>5</sup> Warren, Elizabeth. “Honoring and Empowering Tribal Nations and Indigenous Peoples.” *ElizabethWarren.Com*. August 16, 2019. <https://elizabethwarren.com/plans/tribal-nations>

<sup>6</sup> Honoring Promises to Native Nations Act. Legislative Proposal. 2019. <https://www.warren.senate.gov/imo/media/doc/Honoring%20Promises%20One%20Pager%20-%208.15.2019.pdf>

<sup>7</sup> Norton-Smith, Kathryn, et al. Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences. United States Department of Agriculture. October 2016. [https://www.fs.fed.us/pnw/pubs/pnw\\_gtr944.pdf](https://www.fs.fed.us/pnw/pubs/pnw_gtr944.pdf)

- In 2015, the Obama Administration took a step towards restoring tribal homelands through the Land Buy-Back Program for tribal nations and by taking land into trust. From 2013 to 2015, nearly 400,000 total acres were taken into trust as part of President Obama’s goal of placing half-a-million acres into trust for tribes during his Administration ([WhiteHouse.Gov](http://WhiteHouse.Gov))<sup>8</sup>

#### Co-Benefits

Increasing rights for indigenous peoples will better prepare and protect Native communities who are vulnerable to climate change-associated harms. Furthermore, allowing Tribal nations to reclaim land would contribute to a decrease in the exploitation and degradation of natural ecosystems. Traditional indigenous knowledge can also make substantial contributions to the assessment of climate-change impacts and identification of potential solutions for adaptation ([Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences](#), USDA, 2016).

#### Additional Resources

Norton-Smith, Kathryn, et al. “Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences.” United States Department of Agriculture. October 2016.  
[https://www.fs.fed.us/pnw/pubs/pnw\\_gtr944.pdf](https://www.fs.fed.us/pnw/pubs/pnw_gtr944.pdf)

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<sup>8</sup> Executive Office of the President. Building Prosperous & Resilient Tribal Nations. 2015 White House Tribal Nations Conference Progress Report. 2015.  
<https://www.whitehouse.gov/sites/whitehouse.gov/files/images/2015%20Tribal%20Nations%20Conference%20Report.pdf>



## Role of Federal Energy Regulatory Commission

### Description

Requires the FERC to consider climate change when regulating and enacting rules regarding fossil fuel production and energy.

- “Requires the Federal Energy Regulatory Commission (FERC) to initiate a rulemaking to increase the effectiveness of the interregional transmission planning process ... Requires FERC to review and report on its progress in encouraging deployment of transmission technologies that increase the capacity and efficiency of existing transmission infrastructure. ... Clarifies that FERC must consider climate change in its decision-making, resolving any ambiguity and arguments surrounding the District of Columbia Circuit Court’s holding in *Sabal Trail* ” ([CLEAN Future Act](#), Summary, p. 3).
- “The next President should also task federal agencies, such as the Federal Energy Regulatory Commission (FERC)...to apply existing legal authority to reject permits for fossil fuel pipeline projects that are incompatible with ambitious climate progress and environmental protection” ([Evergreen Action Plan](#), p. 58).

Cross-Reference: [Renewable Energy: Mandates](#); [Electricity Transmission and Smart Grid](#); [Demand Response](#); [Electricity Rates and Charges](#); [Natural Gas Production](#)

Proposed by: CLEAN Future Act ([Summary](#) p. 3); [Evergreen Action](#) (p. 58); [Institute for Policy Integrity](#);<sup>9</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 4)

### LPDD Recommendations

- “The federal government should develop a federal siting and permitting scheme for interstate CO<sub>2</sub> pipelines under the jurisdiction of FERC, but provide interstate pipeline developers an opt-out option by which they would instead undergo a multistate or regional process.” ([LPDD](#), p. 739)
- “Congress could enact new legislation to transfer siting approval and eminent domain authority for interstate electric transmission lines from the states to FERC, DOE, or another federal agency.” ([LPDD](#), p. 540)
- “Congress could revise EPCA 2005 to clarify that FERC has authority to grant siting permits for transmission lines within NIETCs if a state has denied a siting permit for the line.” ([LPDD](#), p. 541)
- “Congress should consider opportunities to use private capital to upgrade and expand federal hydropower facilities, including the possibility of shifting jurisdiction to FERC to issue licenses for nonfederal hydropower development at sites that currently are reserved for federal development.” ([LPDD](#), p. 589)
- “Congress should reduce the uncertainty of pumped storage developments at Bureau of Reclamation facilities by clarifying jurisdictional limits and reducing overlapping responsibilities between FERC and the Bureau of Reclamation at these sites.” ([LPDD](#), p. 591)

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<sup>9</sup> Hein, Jayni, Schwartz, Jason and Zevin, Avi. Pipeline Approvals and Greenhouse Gas Emissions. *Institute for Policy Integrity*. April 2019. [https://policyintegrity.org/files/publications/Pipeline\\_Approvals\\_and\\_GHG\\_Emissions.pdf](https://policyintegrity.org/files/publications/Pipeline_Approvals_and_GHG_Emissions.pdf)

- “Congress should reform the hydropower licensing and permitting program by statutorily designating FERC as the lead agency, for purposes of NEPA review, for all licenses and other authorizations required under federal law.” ([LPDD](#), p. 587)
- “Congress should require FERC, together with federal and state resource agencies exercising authority in the licensing or relicensing of nonfederal hydropower, to give “equal consideration” to the climate benefits afforded by hydropower.” ([LPDD](#), p. 584)
- “Congress should clarify authorization of federal agencies such as EPA, FERC, and DOI to support the pricing of the carbon attributes of energy resources.” ([LPDD](#), p. 612)
- “FERC needs to consider the carbon impacts of its approval of electric power and natural gas projects, including the social cost of carbon. In approving policies related to energy markets, FERC needs to be attentive to upstream implications in state approval of new power plants that may produce carbon emissions, including natural gas plants.” ([LPDD](#), p. 616-17)
- “FERC should aggressively monitor compliance with FERC Order 1000 to ensure that state RPS and other policies regarding power generation decisions are taken into account in the regional transmission planning process.” ([LPDD](#), p. 615)
- “FERC should consider the possibility of stranded assets when assessing proposals for fossil fuel infrastructure that will be paid for by ratepayers.” ([LPDD](#), p. 645)

#### Previous/Current Implementation

- The FERC oversees bulk electricity and natural gas infrastructure. Under the Trump Administration and a Republican commissioner, FERC has refused to take climate change into account when overseeing pipeline licenses. On the other hand, for the electricity sector, it has implemented its authority in a manner that has facilitated a cleaner, less GHG-intensive energy mix ([Vox](#)).<sup>10</sup>
- A number of legal cases have challenged the FERC, including *Birkhead v. FERC* (2018). In these cases, the courts have recognized that the environmental impacts of pipeline development are relevant to FERC’s assessment of public convenience and necessity ([Climate Change, FERC, and Natural Gas Pipelines: A New Sabin Center White Paper](#)).<sup>11</sup>

#### Additional Resources

- Glick, Rich & Christiansen, Matthew. “FERC and Climate Change.” *Energy Law Journal*, vol. 40 no. 1, 2019. [https://www.eba-net.org/assets/1/6/%5bGlick\\_and\\_Christiansen%5d%5bFinal%5d.pdf](https://www.eba-net.org/assets/1/6/%5bGlick_and_Christiansen%5d%5bFinal%5d.pdf)
- Webb, Romany W. “Climate Change, FERC, and Natural Gas Pipelines: The Legal Basis for Considering Greenhouse Gas Emissions Under Section 7 of the Natural Gas Act.” *Sabin Center for Climate Change Law*. June 2019. <http://columbiaclimatelaw.com/files/2019/06/Webb-2019-06-Climate-Change-FERC-and-Natural-Gas-Pipelines.pdf>

<sup>10</sup> Roberts, David. “This Federal Agency is Quietly, Profoundly Shaping Climate Policy.” *Vox*. May 22, 2019. <https://www.vox.com/energy-and-environment/2019/5/22/18631994/climate-change-renewable-energy-ferc>

<sup>11</sup> Webb, Romany W. “Climate Change, FERC, and Natural Gas Pipelines: The Legal Basis for Considering Greenhouse Gas Emissions Under Section 7 of the Natural Gas Act.” *Sabin Center for Climate Change Law*. June 2019. <http://columbiaclimatelaw.com/files/2019/06/Webb-2019-06-Climate-Change-FERC-and-Natural-Gas-Pipelines.pdf>

- Hein, Jayni, Schwartz, Jason and Zevin, Avi. Pipeline Approvals and Greenhouse Gas Emissions. *Institute for Policy Integrity*. April 2019.  
[https://policyintegrity.org/files/publications/Pipeline Approvals and GHG Emissions.pdf](https://policyintegrity.org/files/publications/Pipeline_Approvals_and_GHG_Emissions.pdf)
- Weissman, Steven and Webb, Romany. “Addressing Climate Change Without Legislation - Volume 2: FERC.” July 2014.  
[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2599727](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2599727)

## Treatment of Science

### Description

Proposals to strengthen the role of science in federal politics.

- Specific proposals include: an executive order requiring all science agencies to have chief science officers, a requirement that everyone involved in peer review must disclose financial ties to institutions potentially affected by the review, and efforts to increase transparency in scientific decision-making ([Blueprint for Defending Science and Protecting the Public: Presidential Recommendations for 2020](#), pp. 5-8).
- Other efforts include implementing laws to protect whistleblowers and improving the vetting process for appointed scientific officials ([Protecting Science at Federal Agencies: How Congress Can Help](#), p. 4)<sup>12</sup>
- “Congress should require federal science agencies to adopt strong scientific integrity policies, protect the conduct and sharing of research by federal scientists, and ensure the independence of scientific advisory panels and climate assessments. Congress should also require that each science agency appoint a scientific integrity officer (SIO). SIOs should be career employees with backgrounds in science, and they should be vested with adequate authority and convening power to enforce agency scientific integrity policies” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 527)

Proposed by: [Blueprint for Defending Science and Protecting the Public](#); [H.R. 1709 - Scientific Integrity Act 2019](#);<sup>13</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### Current/Past Implementation

Federal agencies have taken steps to establish policies and practices intended to safeguard scientific integrity. Some have instituted a clear procedure for scientific integrity matters, put an official in charge of scientific integrity, and implemented a clear procedure for filing a scientific integrity complaint. For example, the National Oceanic & Atmospheric Administration, the Fish & Wildlife Service, and the US Geological Survey have all made strong progress in each of these categories. However, many agencies have not fully developed the components of a robust scientific integrity policy ([Blueprint for Defending Science and Protecting the Public: Presidential Recommendations for 2020](#), p. 4).

### Co-Benefits

Strengthening scientific integrity would also promote advancements in other scientific realms including medicine, technology, aeronautics, agriculture, and wildlife protection.

### Additional Resources

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<sup>12</sup> Protecting Science at Federal Agencies: How Congress Can Help. November 2018. <https://www.environmentalprotectionnetwork.org/wp-content/uploads/2018/11/Protecting-Science-at-Federal-Agencies-Report.pdf>

<sup>13</sup> Scientific Integrity Act. H.R. 1709, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/1709/text?q=%7B%22search%22%3A%5B%22scientific+integrity+act%22%5D%7D&r=1&s=1>

“Protecting Science at Federal Agencies: How Congress Can Help.” *Environmental Protection Network*. 2018. <https://www.environmentalprotectionnetwork.org/wp-content/uploads/2018/11/Protecting-Science-at-Federal-Agencies-Report.pdf>

Climate Science Legal Defense Fund and Sabin Center for Climate Change Law, [Silencing Science Tracker](#)

## **Campaign Contributions, Lobbying**

### Description

Proposals to ban or discourage campaign contributions from the fossil fuel industry. Proposals also include efforts to increase transparency of donation sources for groups and politicians ([Blueprint for Defending Science and Protecting the Public](#): Presidential Recommendations for 2020, pp. 15-16).

Adopted/proposed by: [Joe Biden 2020 Presidential Campaign](#); [Blueprint for Defending Science and Protecting the Public](#); [H.R. 1: For the People Act of 2019](#);<sup>14</sup> [Elizabeth Warren 2020 Presidential Campaign](#);

### Previous/Current Implementation

- Over 2,000 politicians across the United States have signed the “No Fossil Fuel Money Pledge.” Notable politicians include presidential nominee Joe Biden, Sen. Bernie Sanders, and Rep. Alexandria Ocasio-Cortez ([No Fossil Fuel Money](#)).<sup>15</sup>
- In 2018, the Democratic National Committee passed a resolution to ban fossil fuel donations. However, several months later, the Committee reversed this decision ([Sierra Club](#))<sup>16</sup>.

### Obstacles/Shortfalls

— This reform does not necessarily have policy implications and may at times solely have symbolic meaning.

### Additional Resources

- Powell, Lynda W. *The Influence of Campaign Contributions in State Legislatures*. University of Michigan Press. [https://www.press.umich.edu/2454352/influence\\_of\\_campaign\\_contributions\\_in\\_state\\_legislatures](https://www.press.umich.edu/2454352/influence_of_campaign_contributions_in_state_legislatures)
- Noël, John. “The Chilling Effect of Oil & Gas Money on Democracy.” *Clean Water Action*. Spring 2016.

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<sup>14</sup> For the People Act. H.R. 1, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/1/text>

<sup>15</sup> “Presidential Candidate Signers.” NoFossilFuelMoney.Org. <http://nofossilfuelmoney.org/presidential-signers/>

<sup>16</sup> Mark, Jason. “When Fossil Fuel Money Talks, the DNC Listens.” *Sierra Club*. August 17, 2018. <https://www.sierraclub.org/sierra/when-fossil-fuel-money-talks-dnc-listens>

[https://www.cleanwaterfund.org/sites/default/files/docs/publications/Money in Politics\\_05%2003%2016a\\_web%20-%20FINAL.pdf](https://www.cleanwaterfund.org/sites/default/files/docs/publications/Money_in_Politics_05%2003%2016a_web%20-%20FINAL.pdf)

## Purchasing Policies

### Description

Using government procurement systems to drive the purchase of and investment in clean manufacturing, electric vehicles, clean energy technologies, and plant-centric food. These policies can require agencies to reduce carbon emissions of procured products.

- E.g.: “Congress should direct the federal government to increase its purchase of clean electricity to 100% by 2040” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 83)
- “Congress should authorize federal agencies to enter into contracts for zero-carbon electricity for up to 40 years” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 83)
- “Congress should direct the Comptroller General of the United States to assess how best to maximize net-zero energy implementation at military installations with the goal of achieving net-zero energy by 2030” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 85).

Cross Reference: [Buy Clean Program](#)

Proposed by: All 2020 Democratic Presidential Candidates; [Evergreen Action](#) (p. 9); CLEAN Future Act (2020) ([Summary](#) p. 15); [DNC Environment and Climate Crisis Council](#) (p. 7); [Vision for Equitable Climate Action](#) (pp. 10, 13); [The Smarter Purchasing Act](#) (2020)<sup>17</sup>

### LPDD Recommendations

- “The federal government, at a minimum, should continue prior practices for the procurement of AFV and hybrid vehicles.” ([LPDD](#), p. 375)
- “The federal government should consider enacting procurement rules to ensure that any goods they procure are shipped in an energy-efficient manner.” ([LPDD](#), p. 457)
- “Congress could pass legislation that establishes procurement requirements for the federal government consistent with circular economy and deep decarbonization goals.” ([LPDD](#), p. 193)
- “The General Services Administration should adjust the Federal Acquisition Regulation to specifically contemplate energy procurement, requiring that any contracts related to procurements of electricity or transportation fuel from bioenergy utilize feedstocks that meet decarbonization criteria.” ([LPDD](#), p. 668)
- “Congress should pass and implement a prohibition on government contracts for the purchase of products unless it can be demonstrated that the production of such products did not contribute to deforestation.” ([LPDD](#), p. 668)
- “Congress could pass legislation prioritizing the support of low-carbon agricultural products for all government bodies, including large-scale purchasers such as DOD.” ([LPDD](#), p. 821)

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<sup>17</sup> The Smarter Purchasing Act. 116th Congress. 2020.  
[https://bever.house.gov/uploadedfiles/smarter\\_purchasing\\_act.pdf](https://bever.house.gov/uploadedfiles/smarter_purchasing_act.pdf)

- “The president could issue an Executive Order to (1) direct agencies to purchase a minimum amount of CCS-produced energy; and (2) significantly raise the minimum total amount of clean energy to be purchased by the federal government by 2050.” (LPDD, p. 725)

#### LPDD Resources

- “Using Government Procurement to Support Innovation.” LPDD.Org.  
<https://lpdd.org/pathway/using-government-procurement-to-support-innovation/>

#### Previous/Current Implementation

- The [Energy Policy Act of 2005](#)<sup>18</sup> established federal renewable electricity purchase goals to help drive demand for what were at the time relatively new technologies.
- The state of California enacted a Buy Clean Program in 2017 known as AB 262, which requires Environmental Product Declarations (EPDs) for certain materials used for state building projects. Thus, when an agency contracts to buy steel, flat glass, and mineral wool insulation for infrastructure projects, they must take into account their suppliers’ emissions performances ([U.S. Green Building Council Los Angeles](#)).<sup>19</sup>
- “On January 8, 2018, Representative Beth Doglio of the House Capital Budget Committee introduced ... the Washington State legislature House Bill (HB): 2412 – Creating the Buy Clean Washington Act. Modeled after the Buy Clean California Act, the draft bill would require state-funded building projects to report environmental impact data through facility-specific EPDs for an eligible list of materials that function as part of a structural system or assembly, including concrete, unit masonry, metal of any type, and wood of any type” ([Buy Clean Washington Study](#), 2019).
- More examples: [Buy Clean Washington Study](#), pp. 2-8 to 2-29.
- “King County’s Environmental Purchasing Policy and Program provides County personnel with information and technical assistance to help them identify and evaluate, and ultimately buy, economical and effective environmentally preferable products and services” ([Reducing GHG emissions through Sustainable Public Procurement](#), 2015).<sup>20</sup>
- FAR 23.703 requires that agencies employ acquisition strategies that implement [environmental objectives](#).<sup>21</sup> However, agencies are not required to reduce emissions from the products they procure.

#### Impact on GHGs

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<sup>18</sup> Energy Policy Act of 2005. H.R. 6, 109th Congress. 2005. <https://www.congress.gov/bill/109th-congress/house-bill/6>

<sup>19</sup> “[Buy Clean California](#).” U.S. Green Building Council Los Angeles. 2020. <https://usgbc-la.org/programs/buy-clean-california/>

<sup>20</sup> United Nations Environmental Program. “[Reducing GHG emissions through Sustainable Public Procurement](#).” COP21. December 5, 2015. [https://www.oneplanetnetwork.org/sites/default/files/cop21\\_side\\_event\\_on\\_reducing\\_ghg\\_emissions\\_through\\_sustainable\\_public\\_procurement.pdf](https://www.oneplanetnetwork.org/sites/default/files/cop21_side_event_on_reducing_ghg_emissions_through_sustainable_public_procurement.pdf)

<sup>21</sup> “Environmentally Preferable Products.” *U.S. General Services Administration*. Accessed July 2020. <https://www.gsa.gov/governmentwide-initiatives/sustainability/buy-green-products-services-and-vehicles/buy-green-products/environmentally-preferable-products>



From 2005 to 2015, the U.S. public sector's green procurement in 19 items resulted in 4.8 million tons of CO<sub>2</sub> equivalent GHG emission reduction. King County's Environmental Purchasing Policy and Program has reduced emissions by 18,000 tons of CO<sub>2</sub>e. Portland's purchasing policy has resulted in 1,523 MT of CO<sub>2</sub>e savings ([Reducing GHG Emissions through Sustainable Public Procurement](#)).<sup>22</sup>

### Co-Benefits

Green procurement policies help drive markets in the direction of sustainability.

### Obstacles/Shortfalls

Under current procurement requirements, there are challenges relating to compliance, and agencies may not be accurately reflecting their sustainable acquisition purchases ([Smart Procurement - Going Green: Best Practices for Green Procurement](#)).<sup>23</sup> Green products can also have higher costs.

### Additional Resources

- "Green Procurement Compilation." *U.S. General Services Administration*. Accessed July 2020. <https://www.gsa.gov/tools-overview/buying-and-selling-tools/green-procurement-compilation>
- Ganley, Shawna D. "Federal 'Green' Product Procurement Policy in The United States." Center for Climate Change Law, Columbia Law School. December 2013. [https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/Collaborations-Visiting-Scholars/us\\_product\\_procurement\\_ganley.pdf](https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/Collaborations-Visiting-Scholars/us_product_procurement_ganley.pdf)
- "The Role of Public Procurement in Low-Carbon Innovation." Background paper for the 33rd Round Table on Sustainable Development 12-13 April 2016 OECD Headquarters, Paris. <https://www.oecd.org/sd-roundtable/papersandpublications/The%20Role%20of%20Public%20Procurement%20in%20Low-carbon%20Innovation.pdf>
- Hasanbeigi, Ali, Becqué, Renilde, and Springer, Celia. "Curbing Carbon from Consumption - The Role of Green Public Procurement." *Global Efficiency Intelligence*. August 2019. <https://www.climateworks.org/wp-content/uploads/2019/09/Green-Public-Procurement-Final-28Aug2019.pdf>

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<sup>22</sup> United Nations Environmental Program. "Reducing GHG emissions through Sustainable Public Procurement." COP21. December 5, 2015. [https://www.oneplanetnetwork.org/sites/default/files/cop21\\_side\\_event\\_on\\_reducing\\_ghg\\_emissions\\_through\\_sustainable\\_public\\_procurement.pdf](https://www.oneplanetnetwork.org/sites/default/files/cop21_side_event_on_reducing_ghg_emissions_through_sustainable_public_procurement.pdf)

<sup>23</sup> Organization for Economic Cooperation and Development. [Smart Procurement - Going Green: Best Practices for Green Procurement](#) – United States. 2014. <https://www.oecd.org/governance/procurement/toolbox/search/us-best-practices-green-public-procurement-gpp-monitoring.pdf>

## National Environmental Policy Act (NEPA)

### Description

- The next President should revoke the Council on Environmental Quality's 2020 [regulations](#)<sup>24</sup> that limit the scope of environmental impact assessments under NEPA that federal agencies must undertake before building public infrastructure projects.
- "Congress should amend NEPA to require deeper analysis of the environmental and climate justice impacts of a proposed federal action, including cumulative pollution impacts, and facilitate an inclusive process for individuals in environmental justice and tribal communities" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 309; Also proposed in [The Grijalva-McEachin Environmental Justice for All Act](#),<sup>25</sup> p. 70).
- "To address the growing need of consultations, Congress should direct DOI to hire enough biologists, ecologists, and National Environmental Policy Act (NEPA) staff to properly evaluate species' needs in a timely manner and propose recovery solutions as well as provide adequate funding to achieve this goal" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 443).
- "Congress should direct the NRC to use its existing authority under the National Environmental Policy Act (NEPA) to conduct a rigorous climate assessment of any nuclear reactors seeking license renewals, including thorough review of vulnerabilities to potential climate impacts" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 47).
- "Congress should restore robust NEPA analysis, ESA protection, and other environmental safeguards for forest and fire management exempted by the 2018 omnibus spending bill" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 452).
- "Congress should restore robust environmental review under NEPA for oil and gas leasing by codifying sections of the Obama administration's BLM Instruction Memorandum No. 2010- 117, including a requirement that all lease sales have parcel-specific NEPA compliance" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 497).
- "The next President should direct the Council on Environmental Quality to issue new NEPA Guidance summarizing the best available science on climate impacts and policy implications of new fossil fuel infrastructure" ([Legal Authority for Presidential Executive Action on Climate](#), p. 15)

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<sup>24</sup> 40 C.F.R. pts. 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1515, 1516, 1517, and 1518 (2020).  
<https://www.govinfo.gov/content/pkg/FR-2020-07-16/pdf/2020-15179.pdf>

<sup>25</sup> To restore, reaffirm, and reconcile environmental justice and civil rights, provide for the establishment of the Interagency Working Group on Environmental Justice Compliance and Enforcement, and for other purposes. 116th Congress. 2020.  
<https://naturalresources.house.gov/imo/media/doc/Environmental%20Justice%20for%20All%20Act%20Bill%20Text.pdf>

Proposed by: [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [The Grijalva-McEachin Environmental Justice for All Act](#);<sup>26</sup> [Legal Authority for Presidential Executive Action on Climate](#)

#### LPDD Recommendations:

- "CEQ should reinstate and strengthen its climate change guidance on federal agency consideration of climate change in NEPA documents." ([LPDD](#), p. 334)
- "CEQ and BLM could amend their NEPA regulations to provide that a mitigated FONSI is the preferred method for reviewing certain kinds of renewable projects if specified types of mitigation measures are undertaken and if the particular site does not pose special problems .... CEQ should consider amending its NEPA regulations to require federal agencies with permitting or review roles to address their issues with renewable energy projects on the front-end of the process .... CEQ should modify NEPA regulations to require agencies to consider the positive as well as the negative environmental impacts of proposed actions, including reduced fossil fuel use, when making decisions after environmental review." ([LPDD](#), p. 478-79)
- "CEQ should consider requiring EISs prepared under NEPA for fossil fuel actions to discuss the consistency of such actions with decarbonization goals. CEQ should reinstate its 2016 guidance for considering GHG emissions in NEPA review." ([LPDD](#), p. 644)

#### Previous/Current Implementation

- "In 1994, President Bill Clinton issued a Presidential Memorandum directing federal agencies conducting NEPA reviews to 'analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities.... Mitigation measures outlined or analyzed in an environmental assessment, environmental impact statement, or record of decision, whenever feasible, should address significant and adverse environmental effects of proposed Federal actions on minority communities and low-income communities'" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 309).
- Courts have held that NEPA requires FERC to consider downstream greenhouse gas emissions as 'reasonably foreseeable' indirect effects of a natural gas pipeline ([Sierra Club v. FERC](#), 867 F.3d 1357, 1371 (D.C. Cir. 2017)).<sup>27</sup>

#### Additional Resources

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<sup>26</sup> To restore, reaffirm, and reconcile environmental justice and civil rights, provide for the establishment of the Interagency Working Group on Environmental Justice Compliance and Enforcement, and for other purposes. 116th Congress. 2020. <https://naturalresources.house.gov/imo/media/doc/Environmental%20Justice%20for%20All%20Act%20Bill%20Text.pdf>

<sup>27</sup> Sierra Club v. FERC, 867 F.3d 1357, 1371 (D.C. Cir. 2017). <https://www.leagle.com/decision/infco20170822186>

- Stein, Amy L. “Climate Change Under NEPA: Avoiding cursory considerations of Greenhouse Gases.” *U. Colo. L. Rev.*, Vol. 473. 2010.  
<https://scholarship.law.ufl.edu/cgi/viewcontent.cgi?article=1518&context=facultypub>
- Lieberman, Bruce. “What Trump’s Proposed NEPA Rollback Could Mean for the Climate.” *Yale Climate Connections*, February 20, 2020.  
<https://www.yaleclimateconnections.org/2020/02/what-trumps-proposed-nepa-rollback-could-mean-for-the-climate/>
- Wentz, Jessica and Burger, Michael. “Five Points About the Proposed Revisions to CEQ’s NEPA Regulations.” *Sabin Center for Climate Change Law - Climate Law Blog*. January 10, 2020. <http://blogs.law.columbia.edu/climatechange/2020/01/10/five-points-about-the-proposed-revisions-to-ceqs-nepa-regulations/>

## TARGETS

### Temperature Targets

#### Description

A goal to limit average global temperature rise by 1.5°C above pre-industrial levels.

Proposed by: [Vision for Equitable Climate Action](#); [Joe Biden 2020 Presidential Campaign - Climate](#); [Paris Climate Agreement](#); [Evergreen Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#)

#### Previous/Current Implementation

In 2015, the United States joined the Paris Climate Agreement to substantially reduce greenhouse gas emissions in order to limit global temperature rise by 1.5°C above pre-industrial levels. However, President Trump has moved to remove the U.S. from this agreement ([NPR](#)).<sup>28</sup>

#### Impact on GHGs

As of January 2020, limiting average global temperature rise to 1.5°C above pre-industrial levels would require global emissions to fall by 15% per year until they reach zero ([International Energy Agency](#)).<sup>29</sup> The United States would reduce emissions by 26-28 percent below 2005 levels by 2025 ([Policy Solutions Simulator v 2.1.1](#)).

#### Obstacles/Shortfalls

- While limiting the global temperature rise to 1.5°C above pre-industrial levels is the boldest climate action target to date, it would still lead to several negative environmental outcomes. These outcomes include increased cases of drought, severe weather events, extreme heat, and wildfires, as well as damage to natural ecosystems ([IPCC](#)).<sup>30</sup>
- According to the World Meteorological Organization, there is a 20% chance that the global temperature will reach at least 1.5 °C above pre-industrial levels in the next five years.<sup>31</sup>

#### Studies of Efficacy

- Intergovernmental Panel on Climate Change. “Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related

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<sup>28</sup> Hersher, Rebecca. “U.S. Formally Begins to Leave U.S. Climate Agreement.” *National Public Radio*. November 4, 2019. <https://www.npr.org/2019/11/04/773474657/u-s-formally-begins-to-leave-the-paris-climate-agreement>

<sup>29</sup> Cozzi, Laura and Gould, Tim. “What Would it Take to Limit the Global Temperature Rise to 1.5°C?” *International Energy Agency*. November 17, 2019. <https://www.iea.org/commentaries/what-would-it-take-to-limit-the-global-temperature-rise-to-15c>

<sup>30</sup> Intergovernmental Panel on Climate Change. Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emissions Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty. 2018. [https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15\\_SPM\\_version\\_stand\\_alone\\_LR.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf)

<sup>31</sup> “New Climate Predictions Assess Global Temperatures in Coming Five Years.” *World Meteorological Organization*. July 8, 2020. <https://public.wmo.int/en/media/press-release/new-climate-predictions-assess-global-temperatures-coming-five-years>

Global Greenhouse Gas Emissions Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty.” 2018.

[https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15\\_SPM\\_version\\_stand\\_alone\\_LR.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf)

#### Additional Resources

- Yun Gao, Xiang Gao, and Xiaohua Zhang. “The 2 °C Global Temperature Target and the Evolution of the Long-Term Goal of Addressing Climate Change—From the United Nations Framework Convention on Climate Change to the Paris Agreement.” *Engineering*, Vol. 3 no. 2. 2017. <https://www.sciencedirect.com/science/article/pii/S2095809917303077>

## Energy Targets

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### Description

— A target to achieve a 100% renewable energy economy by between 2030 and 2050 (differs by proposal).

- “Target a just and equitable transition to 100% renewable energy by 2030” ([Vision for Equitable Climate Action](#), p. 6).
- “The United States must have a bold plan to achieve a 100% clean energy economy and net-zero emissions no later than 2050 here at home” ([Joe Biden 2020 Presidential Campaign](#) - Climate).

Proposed by: [Joe Biden 2020 Presidential Campaign](#); [Vision for Equitable Climate Action](#); [CLEAN Future Act](#) (aims to reach 100% clean energy by 2050); [Elizabeth Warren 2020 Presidential Campaign](#) (by 2035); [Center for Climate and Energy Solutions](#) (carbon-neutral by 2050); [Legal Authority for Presidential Executive Action on Climate](#) (by 2030); [Energy Innovation](#) (by 2045); [DNC Environment and Climate Crisis Council](#) (by 2030); [Evergreen Action](#) (by 2035); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (net-zero emissions in electricity by 2040, p. 37); Jay Inslee 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#) (100% renewable energy by 2050)

### Previous/Current Implementation

As of March 2020, 100% clean electricity laws have been adopted in 8 states, Washington, D.C., and Puerto Rico, and 100% clean energy targets have been embraced by a number of other states plus more than 160 American cities and counties ([Evergreen Action Plan](#), p. 12).

### Impact on GHGs

A 100% carbon-free energy standard by 2050 would reduce U.S emissions by 25% in 2050 compared to a BAU baseline (or 30% compared to 2005 levels). In 2030, emissions would only reduce by 3% compared to a BAU baseline (or by 8% compared to 2005 levels). If 100% carbon-free energy is reached by 2030, emissions would drop by 25% in 2030 compared to a BAU baseline (or by 28% compared to 2005 levels) ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Obstacles/Shortfalls

- Some experts say reaching 100% renewable energy production by 2030 would be very costly and/or impossible given socio-political constraints. A [report](#)<sup>32</sup> by Wood Mackenzie calculates the cost to be \$4.5 trillion.
- Achieving 100% clean energy will require advancements in [electricity storage](#) and [transmission](#) as well as increased electrification.

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<sup>32</sup> Shreve, Dan. “Deep Decarbonization: the Multi-Trillion Dollar Question.” Wood Mackenzie. June 27, 2019. <https://www.woodmac.com/news/feature/deep-decarbonisation-the-multi-trillion-dollar-question/>



## TAXATION AND PRICING

### Carbon Tax

#### Description

Imposes a fee on the carbon content of fossil fuels. It charges fossil fuel users for the amount of carbon they release. The price of carbon depends on the proposal, but it would typically increase over time.

- “Congress should consider adopting a carbon tax that begins at \$25 per metric ton, increases over time based on rising damage from climate change, and the revenues from which are spent for some combination of economic efficiency, income redistribution, and climate policy purposes” ([LPDD Resources](#)).<sup>33</sup>

Proposed/Supported by: Andrew Yang 2020 Presidential Campaign; [Vision for Equitable Climate Action](#) (supports with stringent requirements), p. 27; Elizabeth Warren 2020 Presidential Campaign; Julian Castro 2020 Presidential Campaign; Amy Klobuchar 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 286).

#### Additional LPDD Recommendations

- “Congress should consider adoption of a national carbon tax to encourage investment in new low-carbon energy resources, while also aligning carbon pricing with the broader policies related to the pricing of interstate energy markets.” ([LPDD](#), p. 612)
- “The federal government should impose a GHG price through a carbon tax or fee, or through a cap-and-trade program, that allows agricultural producers to earn revenue by storing soil carbon or reducing methane or nitrous oxide emissions.” ([LPDD](#), p. 814)
- “Congress should include border tax adjustments that comply with GATT Articles I and III and the Agreement on Subsidies and Countervailing Measures in a comprehensive carbon tax or other broad climate change policy.” ([LPDD](#), p. 208)
- “Congress should consider adopting a carbon tax in the form of an upstream price on fossil fuels for energy production plus industrial non-energy carbon emissions (e.g., clinker production), with the tax corrected for carbon that is captured and stored and carbon in feedstocks permanently embodied in products and in compliance with source-specific or cross-sector standards.” ([LPDD](#), p. 309)
- “Congress should impose a carbon tax or other pricing mechanism that would expressly allow negative emissions technologies operators to obtain a financial return on the CO<sub>2</sub> they capture from the atmosphere.” ([LPDD](#), p. 769)
- “Congress should consider a modest carbon tax or GHG cap-and-trade program that recognizes private forest carbon capture as an emission offset, exempts emissions from sustainably produced biomass, and also imposes a tax burden on those who deforest their land through conversion.” ([LPDD](#), p. 843)

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<sup>33</sup> “Carbon Pricing,” *Model Pathways to Deep Decarbonization*. Accessed July 2020.  
<https://lpdd.org/pathway/proposed-carbon-pricing-schemes-us/>



- “Congress should impose a meaningful carbon tax (or auction) and create a CO<sub>2</sub> trading regime in which sequestration in forests, soils, and forest products is specifically recognized.” (LPDD, p. 834)

### LPDD Resources

- LPDD.org, “Carbon Pricing”: <https://lpdd.org/pathway/carbon-pricing/>

### Previous/Current Implementation

A number of international governments have imposed carbon fees. For example, in France, The Law on Energy Transition to Green Growth set a trajectory for the tax rate to gradually increase until 2030, up to the rate of 100 €/tCO<sub>2</sub>. In Japan, the tax base is the amount of CO<sub>2</sub> emissions from fossil fuel use (covering 70% of Japan’s GHG emissions), with some exemptions for agriculture, public transportation, petrochemical industries, and coal-fired power plants in Okinawa ([Model Pathways to Deep Decarbonization](#)).<sup>34</sup>

### Impact on GHGs

- Using the EPA’s average Social Cost of Carbon (which begins at \$42/ton in 2020 and equals \$69/ton by 2050), a carbon tax would reduce U.S. GHG emissions by 12% in 2030, 16% in 2040, and 16% in 2050 compared to a 2020 baseline. Compared to a business-as-usual (BAU) baseline, 2050 emissions would reduce by 20%. This scenario reduces U.S. emissions enough to comply with 2025 Paris Agreement goals. ([Energy Innovation’s U.S. Policy Solutions Simulator v 2.1.1](#)).
- Another model predicts that a \$45/ton carbon tax, starting in 2016 and rising at 2 percent per year in real terms, would reduce US emissions in 2025 by 41 percent relative to BAU, which is equivalent to 45 percent below 2005 levels ([Environmental Taxation, 2016](#), p. 16).<sup>35</sup>

### Studies of Efficacy

Nadel, Steven. “Learning from 19 Carbon Taxes: What Does the Evidence Show?” American Council for an Energy-Efficient Economy. 2016.

[https://www.aceee.org/files/proceedings/2016/data/papers/9\\_49.pdf](https://www.aceee.org/files/proceedings/2016/data/papers/9_49.pdf)

### Co-Benefits

Revenue from a carbon tax can be invested into programs that benefit social welfare or the environment. For example, a \$25/ton carbon tax rising at 2 percent per year in real terms would raise \$1.2 trillion in net revenue over 10 years ([Environmental Taxation, 2016](#), p. 17).<sup>36</sup>

### Obstacles/shortfalls

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<sup>34</sup> “Existing Carbon Pricing Schemes (World).” *Model Pathways to Deep Decarbonization*. Accessed July 2020. <https://lpdd.org/pathway/existing-carbon-pricing-schemes-world/>

<sup>35</sup> Williams, Robert C., III. “Environmental Taxation.” *Resources for the Future*. 2016. <https://perma.cc/QQ6R-R6RS>

<sup>36</sup> Williams, Robert C., III. “Environmental Taxation.” *Resources for the Future*. 2016. <https://perma.cc/QQ6R-R6RS>

- A carbon tax on its own could reduce GDP slightly by increasing fossil fuel prices. However, this can be counteracted if tax revenue is used to boost economic growth ([Environmental Taxation, 2016](#), p. 18).<sup>37</sup>
- “A carbon price addresses the ‘demand side’ by raising the price of fossil energy, but it cannot be effective without simultaneous ‘supply side’ regulations such as a ban on new fossil fuel extraction, exploration, and processing facilities, and a phaseout of existing facilities” ([Vision for Equitable Climate Action](#), p. 28).
- “Environmental justice communities have raised concerns that carbon pricing and other market mechanisms ‘do not guarantee emissions reduction in EJ communities and can even allow increased emissions in communities that are already disproportionately burdened with pollution and substandard infrastructure’” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 287).
- A price on carbon can have a regressive impact by more negatively affecting low income households than high income ones. Funds accumulated through a carbon tax can be used to address these regressive impacts (Guidehouse Inc. [Equality - Shaping an Inclusive Energy Transition](#). Eurelectric).

#### Additional Resources

- Climate Action Council, *Bipartisan Climate Roadmap* (2020), <https://lcouncil.org/Bipartisan-Climate-Roadmap.pdf>
- Buttner, Matt, et al. “Carbon Pricing in Wholesale Electricity Markets.” *Institute for Policy Integrity*. 2020. [https://lpdd.org/wp-content/uploads/2020/04/Carbon\\_Pricing\\_in\\_Wholesale\\_Electricity\\_Markets\\_Report.pdf](https://lpdd.org/wp-content/uploads/2020/04/Carbon_Pricing_in_Wholesale_Electricity_Markets_Report.pdf)
- Williams, Robert C., III. “Environmental Taxation.” *Resources for the Future*. 2016. <https://perma.cc/QQ6R-R6RS>
- Marron, Donald B. and Morris, Adele C. “How to Use Carbon Tax Revenues.” *Tax Policy Center*. 2016. <https://perma.cc/4X2Y-PZRK>
- Kennedy, Kevin, Obeiter, Michael, and Kaufman, Noah. “Putting a Price on Carbon: A Handbook for U.S. Policymakers.” *World Resources Institute*. 2015. <https://perma.cc/RL8K-8VE3>
- Daniel, Kent D., Litterman, Robert D., and Wagner, Demot. “Declining CO<sub>2</sub> Price Paths.” *PNAS*. 2019. <https://perma.cc/9WD7-KWHD>
- Pomerleau, Shuting. “Border Adjustments in a Carbon Tax.” Niskanen Center. July 30, 2020. [https://www.niskanencenter.org/border-adjustments-in-a-carbon-tax/?utm\\_source=Climate+Update&utm\\_campaign=35cc1f4589-EMAIL\\_CAMPAIGN\\_2020\\_07\\_30\\_05\\_13&utm\\_medium=email&utm\\_term=0\\_d3235d9e89-35cc1f4589-EMAIL\\_CAMPAIGN\\_2020\\_07\\_30\\_05\\_13&utm\\_medium=email&utm\\_term=0\\_d3235d9e89-35cc1f4589-296722965](https://www.niskanencenter.org/border-adjustments-in-a-carbon-tax/?utm_source=Climate+Update&utm_campaign=35cc1f4589-EMAIL_CAMPAIGN_2020_07_30_05_13&utm_medium=email&utm_term=0_d3235d9e89-35cc1f4589-EMAIL_CAMPAIGN_2020_07_30_05_13&utm_medium=email&utm_term=0_d3235d9e89-35cc1f4589-296722965)

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<sup>37</sup> Williams, Robert C., III. “Environmental Taxation.” *Resources for the Future*. 2016. <https://perma.cc/QQ6R-R6RS>

## Cap and Trade

### Description

“This approach allocates pollution rights to large-scale polluters according to a desired emissions cap. Polluters are then permitted to trade these rights, thereby achieving a more efficient economic outcome” ([Cap-and-Trade Emissions Regulation: A Strategic Analysis](#), p. 1)<sup>38</sup>.

### Proposed By

Beto O’Rourke 2020 Presidential Campaign

### LPDD Recommendations

- “Congress should consider a carbon cap-and-trade system, in which carbon emitters would obtain allowances to emit certain levels of carbon, but could sell or trade the allowances to others that have reached their cap.” ([LPDD](#), p. 556)
- “Congress should adopt a national clean energy standard, including energy efficiency and a national clean energy credit program that would coordinate a national market for tradable credits.” ([LPDD](#), p. 613)
- “Congress should alternatively consider an emissions trading scheme that operates within strict, multisector emissions limits, with allowances exchanged cross-sector with the potential to expand to other jurisdictions through linked programs, all within a fixed, declining cap that affords minimal or no offsets.” ([LPDD](#), p. 310-11)
- “EPA should use existing authority under the CAA to create an auction cap-and-trade program giving credit for sequestration of carbon in forests, forest products, and soils and recognition that use of low-use wood from sustainably managed forests will not add CO<sub>2</sub> to the atmosphere.” ([LPDD](#), p. 837)
- “When designing and implementing cap-and-trade programs, EPA should incentivize nitrous oxide emission reductions from agricultural and livestock sources by providing offset credit for such reductions .... EPA should not attempt to impose direct emissions caps on agricultural and livestock sources until technologies and approaches are available that make it possible to precisely and accurately verify actual emissions reductions from these sources.” ([LPDD](#), p. 936)

### Existing Implementation

The European Union implemented its Trading Scheme in 2005. California, Connecticut, Oregon, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and Virginia have adopted carbon cap-and-trade programs as a part of the Northeast Regional Greenhouse Gas Initiative (RGGI) and the Western Climate Initiative. Illinois, Iowa, Kansas, Michigan, Minnesota, and Wisconsin signed the Midwestern Regional Greenhouse Gas Reduction Accord and promised to develop cap-and-trade programs ([Union of Concerned Scientists](#)).<sup>39</sup>

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<sup>38</sup> Cheng, Engel, & Wellman, “[Cap-and-Trade Emissions Regulation: A Strategic Analysis](#),” 2019. <https://www.ijcai.org/Proceedings/2019/0027.pdf>

<sup>39</sup> Union of Concerned Scientists. “Existing Cap-and-Trade Programs to Cut Global Warming Emissions.” November 9, 2007. <https://www.ucsusa.org/resources/existing-cap-and-trade-programs-cut-global-warming-emissions>

### Impact on GHG emissions

The extent of GHG emissions reduction depends on the design of the cap-and-trade system. A more restrictive cap will lead to greater reductions. In RGGI states, GHG emissions have reduced by 40% since 2009 ([Nicholas Institute](#)).<sup>40</sup> California's program is expected to contribute to 38% of the state's target emissions reductions between 2020 and 2030 ([Cap-and-Trade in California](#), *Climate XChange*, p. 4).<sup>41</sup>

### Obstacles and shortcomings

While an effective tool to reduce GHG emissions, the cap-and-trade system is not widely supported, particularly because it would raise energy prices significantly and quickly in order to hit 2050 emissions targets ([Vox](#)).<sup>42</sup>

### Studies of efficacy

- Kaufman, Noah. "Carbon Tax vs. Cap-and-Trade: What's a Better Policy to Cut Emissions?" *World Resources Institute*. 2016. <https://www.wri.org/blog/2016/03/carbon-tax-vs-cap-and-trade-what-s-better-policy-cut-emissions>
- Peace, Janet and Stavins, Robert N. "Meaningful and Cost Effective Climate Policy: the Case for Cap and Trade." *Center for Climate and Energy Solutions*. 2010. <https://www.c2es.org/document/meaningful-and-cost-effective-climate-policy-the-case-for-cap-and-trade/>

### Co-benefits

Revenue from a cap-and-trade program can be invested into programs that benefit social welfare or the environment.

### Additional resources

- "Our Impact: Cap-and-Trade Program Design." *Duke University Nicholas Institute*. Accessed July 2020. <https://nicholasinstitute.duke.edu/content/our-impact-cap-and-trade-program-design>
- Schmalensee, Richard and Stavins, Robert. "Learning from Thirty Years of Cap and Trade." *Resources*. 2019. <https://www.resourcesmag.org/archives/learning-thirty-years-cap-trade/>
- Stavins, Robert N. "A U.S. Cap-and-Trade System to Address Global Climate Change." 2007. *The Hamilton Project*. 2007. <https://perma.cc/HMN8-X5F9>

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<sup>40</sup> Our Impact: Cap-and-Trade Program Design. *Duke University Nicholas Institute for Environmental Policy Solutions*. Accessed July 2020. <https://nicholasinstitute.duke.edu/content/our-impact-cap-and-trade-program-design>

<sup>41</sup> Breslow, Mark and Wincele, Ruby. "Cap-and-Trade in California: Health and Climate Benefits Greatly Outweigh Costs." *Climate XChange*. March 2020. [https://climate-xchange.org/wp-content/uploads/2018/08/California\\_Cap\\_and\\_Trade-3-13-2020-spreads.pdf](https://climate-xchange.org/wp-content/uploads/2018/08/California_Cap_and_Trade-3-13-2020-spreads.pdf)

<sup>42</sup> Roberts, David. "At Last, a Climate Policy Platform that Can Unite the Left." *Vox*. July 9, 2020. <https://www.vox.com/energy-and-environment/21252892/climate-change-democrats-joe-biden-renewable-energy-unions-environmental-justice>



## Fossil Fuel Subsidies

### Description

End subsidies for fossil fuel companies:

- “The next President must focus on eliminating subsidies for oil, gas and coal corporations, by working with Congress to repeal tax credits and deductions like those for intangible drilling operations, last-in first-out accounting, royalty payments to foreign governments, accelerated depreciation of gas pipelines, and the carried interest tax exemption on funds according to fossil fuel reserve exposure, among many others. The President should also work with Congress to revise the 45Q tax credit so that it can be applied only where captured carbon is not used for additional fossil fuel production” ([Evergreen Action Plan](#) p. 53).
- “Biden will build on the achievements of the Obama-Biden Administration to get G20 countries to phase out inefficient fossil fuel subsidies” ([Joe Biden 2020 Presidential Campaign](#) - Climate).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - climate; [Vision for Equitable Climate Action](#) (p. 7); [Evergreen Action](#) (p. 53); [DNC Council for Environment & Climate Crisis](#) (p. 5); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 491); [Bernie Sanders 2020 Presidential Campaign](#); Governor Jay Inslee; All 2020 Presidential candidates supported ending fossil fuel subsidies; [Asia Society Policy Institute](#);

### LPDD Recommendations

- “The federal government should provide subsidies for clean energy technologies and remove current subsidies for fossil fuels and other non-sustainable activities and products” ([LPDD](#), p. 119).
- “Congress should eliminate subsidies for coal producers as part of broader decarbonization policy” ([LPDD](#), p. 208).

### LPDD Resources

- LPDD.org. “Eliminating Fossil Subsidies”: <https://lpdd.org/pathway/eliminating-fossil-subsidies/>

### Previous/Current Implementation

The United States provides a number of tax subsidies to the fossil fuel industry. These subsidies include both direct subsidies to corporations as well as other tax benefits to the fossil fuel industry. U.S. direct subsidies to the fossil fuel industry total at least \$20 billion per year, of which 20% is allocated to coal and 80% is allocated to natural gas and crude oil ([Environmental and Energy Study Institute](#)).<sup>43</sup>

### Studies of Efficacy

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<sup>43</sup> “Fact Sheet: Fossil Fuel Subsidies: A Closer Look at Tax Breaks and Societal Costs.” *Environmental and Energy Study Institute*. July 29, 2019. <https://www.eesi.org/papers/view/fact-sheet-fossil-fuel-subsidies-a-closer-look-at-tax-breaks-and-societal-costs>

Whitley, Shelagh and Van der Burg, Laurie. “Fossil Fuel Subsidy Reform: From Rhetoric to Reality.” *The New Climate Economy*. 2015. [http://newclimateeconomy.report/2015/wp-content/uploads/sites/3/2015/11/Fossil-fuel-subsidy-reform\\_from-rhetoric-to-reality.pdf](http://newclimateeconomy.report/2015/wp-content/uploads/sites/3/2015/11/Fossil-fuel-subsidy-reform_from-rhetoric-to-reality.pdf)

### Impact on GHG Emissions

Removing fossil fuel subsidies would reduce global emissions by 1-5% compared to a business as usual scenario ([New Study Questions Impact of Ending Fossil Fuel Subsidies](#)).<sup>44</sup>

### Co-Benefits

- Studies suggest that phasing out fossil fuel subsidies leads to an increase in real income or GDP due to a more efficient allocation of resources that would once have been allocated to subsidies ([Fossil Fuel Subsidy Reform: From Rhetoric to Reality](#)).<sup>45</sup>
- In 2016, the Joint Committee on Taxation estimated that eliminating the tax break that allows oil and gas companies to deduct 100% of their intangible drilling costs would generate \$1.59 billion in revenue in 2017 and \$13 billion over the next 10 years ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 491).
- Ending these subsidies would also indirectly lead to lower emissions of air pollutants such as SO<sub>2</sub>, NO<sub>x</sub> and particulate matter, all of which are harmful to public health and the environment.

### Additional Resources

- Whitley, Shelagh and Van der Burg, Laurie. “Fossil Fuel Subsidy Reform: From Rhetoric to Reality.” *The New Climate Economy*. 2015. [http://newclimateeconomy.report/2015/wp-content/uploads/sites/3/2015/11/Fossil-fuel-subsidy-reform\\_from-rhetoric-to-reality.pdf](http://newclimateeconomy.report/2015/wp-content/uploads/sites/3/2015/11/Fossil-fuel-subsidy-reform_from-rhetoric-to-reality.pdf)
- Aldy, Joseph E. “Proposal 5: Eliminating Fossil Fuel Subsidies.” *The Hamilton Project*. February 2013. [http://www.hamiltonproject.org/assets/legacy/files/downloads\\_and\\_links/THP\\_15WaysFedBudget\\_Prop5.pdf](http://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/THP_15WaysFedBudget_Prop5.pdf)
- Guidehouse Inc. Equality - Shaping an Inclusive Energy Transition. Eurelectric. 2020. <https://www.enelfoundation.org/content/dam/enel-found/e-quality/E-quality%20study%20-%20final%20report.pdf>

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<sup>44</sup> Timperley, Jocelyn. New Study Questions Impact of Ending Fossil Fuel Subsidies. *Carbon Brief*. 2018. <https://www.carbonbrief.org/new-study-questions-impact-ending-fossil-fuel-subsidies#:~:text=The%20study%20found%20the%20removal,substantially%20even%20with%20this%20reduction>

<sup>45</sup> Whitley, Shelagh and Van der Burg, Laurie. “Fossil Fuel Subsidy Reform: From Rhetoric to Reality.” *The New Climate Economy*. 2015. [http://newclimateeconomy.report/2015/wp-content/uploads/sites/3/2015/11/Fossil-fuel-subsidy-reform\\_from-rhetoric-to-reality.pdf](http://newclimateeconomy.report/2015/wp-content/uploads/sites/3/2015/11/Fossil-fuel-subsidy-reform_from-rhetoric-to-reality.pdf)



## Financing Renewable Energy

### Description

Incentivizes renewable energy production and investment through tax concessions and grants.

- “Congress should extend the phase-down period for existing tax credits [for wind and solar projects] two years, until 2024, so these projects can continue to qualify. Geothermal energy, currently eligible for a lower investment tax credit, should be made eligible for the full credit. ... In the case of combined heat and power (CHP), Congress should both extend and raise the existing tax credit and should clarify that waste heat-to-power is a qualifying technology. ...Congress should expand the list of technologies eligible for the existing investment tax credit to include energy storage, offshore wind, and nuclear power” (Center for Climate and Energy Solutions, [Climate Innovation 2050](#), p. 3-4).
- “Congress should reauthorize and increase funding for the Energy Efficiency and Conservation Block Grant Program” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 35).
- “We will spend \$1.52 trillion on renewable energy and \$852 billion to build energy storage capacity” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Vision for Equitable Climate Action](#); [Center for Climate and Energy Solutions Climate Innovation 2050](#) (p. 3); [Energy Innovation](#) (p. 7); [DNC Environment & Climate Crisis Council](#) (p. 1); [Evergreen Action](#) (p. 14); [Elizabeth Warren 2020 Presidential Campaign](#); [Financing Our Future Act of 2019](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Bernie Sanders 2020 Presidential Campaign](#); Kamala Harris 2020 Presidential Campaign; Cory Booker 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; Beto O’Rourke 2020 Presidential Campaign

### LPDD Recommendations

- “Assuming that the production tax credit will not continue past its phaseout date, the federal government should assess the need for new incentives, similar to a production tax credit, which would permit continued growth for renewable technologies .... The federal government should work with state governments and the private sector to continually assess and adjust incentives like the investment tax credit in order to promote the advancement of new technologies” ([LPDD](#), p. 137-38).
- “Congress should continue to use subsidies (preferably without local content rules) in the form of tax credits, accelerated depreciation, or cash grants, in combination with other incentives, to help create a market for renewable energy that would eventually drive down some of the production costs” ([LPDD](#), p. 206).
- “In lieu of existing tax credits that focus on investment or production, Congress could adopt a tax treatment for low-carbon energy projects that is tied to the actual sale or use of energy by low-carbon power supply resources” ([LPDD](#), p. 612).
- “Congress should maintain tax credits favoring investment in distributed solar” ([LPDD](#), p. 708).



- “DOE should encourage through its work on zero energy buildings direct investment in the means of production of renewables or power purchase agreements as preferable to purchase of renewable energy credits” ([LPDD](#), p. 272).
- “The federal government should support financing of carbon reducing technologies through the issuance of green bonds” ([LPDD](#), p. 141).
- “Congress or federal agencies could adopt a lending program similar to the Energy Efficiency and Conservation Loan Program that is directed at rural renewable energy projects” ([LPDD](#), p. 138).
- “Congress could expand the definition of qualified investments for real estate investment trusts to include carbon reduction projects .... Congress could pass the Master Limited Partnerships Parity Act to open up a new source of financing for carbon reduction projects” ([LPDD](#), p. 142).
- “Congress or federal agencies should consider adopting loan programs similar to the Advanced Technology Vehicles Manufacturing Loan Program that are aimed at the development of more efficient renewable energy production.” ([LPDD](#), p. 138)
- “Congress should expand the pool of investors that can claim the tax incentives for investments in renewable energy generation by offering tax incentives in the form of cash grants” ([LPDD](#), p. 145).
- “A national energy-efficiency and renewable energy loan repurchasing organization, if created by Congress, should impose better forms of contract on the market as a necessary step to improving liquidity in the energy finance market” ([LPDD](#), p. 179).
- “Congress should establish an agency that can purchase loans and issue asset-backed securities for residential and small business energy-efficiency and renewable energy loans and provide credit support for clean energy lending, including through SFOs” ([LPDD](#), p. 176).
- “The federal government should provide financial incentives for distributed renewable resources .... Congress should give residential solar installations the same tax credits as commercial or utility installations” ([LPDD](#), p. 495).
- “Congress should adopt future tax credits based on the decarbonization benefits associated with new investments .... Congress should adopt the Master Limited Partnerships Parity Act to extend favorable tax treatment to financing arrangements known as “master limited partnerships” and “yieldcos,” a benefit already available to investors in fossil fuel development, to also include investments in renewable power, energy storage, and demand reduction projects .... Congress should expand the activities that qualify for real estate investment trusts to include low-carbon energy projects related to building efficiency and customer renewable power investments” ([LPDD](#), p. 612).
- “FERC should clarify the continued permissibility of state clean energy incentives and subsidies unless FERC expressly preempts them in a specific context (e.g., via adjudicative order or adoption of a notice-and-comment rule) .... To assist states in promoting sources of renewable energy through feed-in tariffs, FERC should define a clear process for states to seek pre-approval of feed-in tariff incentives” ([LPDD](#), p. 617).

#### LPDD Resources

- LPDD.org. “Financing Large-Scale Projects”: <https://lpdd.org/pathway/financing-large-scale-projects/>
- LPDD.org. “Providing Financial Incentives to Distributed Renewables”: <https://lpdd.org/pathway/providing-financial-incentives-to-distributed-renewables/>

### Previous/Current Implementation

- The Renewable Energy Production Tax Credit (PTC) was established in 1992 and the Business Energy Investment Tax Credit (ITC) was established in 2005. The PTC provides an annual tax deduction for each kWh of a renewable energy project's production in its first 10 years of operation. The ITC provides a tax deduction of 26% of capital invested at the end of a project's first year of operation ([Utility Dive](#)).<sup>46</sup> Federal PTC and ITC are both being phased-out.
- A number of state governments also provide tax credits for renewable energy which range as high as \$54/MWh ([U.S. Policy Solutions Simulator](#)).
- Feed-in Tariffs, which are implemented to a limited extent in the U.S., “guarantee that customers who own a FIT-eligible renewable electricity generation facility, such as a roof-top solar photovoltaic system, will receive a set price from their utility for all of the electricity they generate and provide to the grid” ([EIA](#)).<sup>47</sup>
- “As established by the Energy Independence and Security Act of 2007 and funded through the Recovery Act, the Energy Efficiency and Conservation Block Grant Program (EECBG)<sup>48</sup> enabled states, local governments, and tribes to develop innovative energy efficiency and renewable energy initiatives” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 35).

### Impacts on GHGs

Implementing the highest state-level subsidy of \$54/MWh for renewable electricity production (including nuclear, onshore wind, offshore wind, solar PV, solar thermal, and biomass) at a federal level would reduce 2050 emissions by 8% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

Renewable energy subsidies lower electricity costs for consumers. Subsidies also create jobs in the renewable energy sector.

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<sup>46</sup> Trabish, Herman K. “US wind, solar finance alternatives rise as sector rushes against looming tax credit expiration.” *Utility Dive*. October 15, 2019. <https://www.utilitydive.com/news/us-wind-solar-finance-alternatives-emerge-as-sector-rushes-against-looming/564926/#:~:text=The%20PTC%20provides%20an%20annual,project's%20first%20year%20of%20operation.>

<sup>47</sup> “Feed-In Tariff: A Policy Tool Encouraging Deployment of Renewable Electricity Technologies.” *U.S. Energy Information Administration*. <https://www.eia.gov/todayinenergy/detail.php?id=11471#:~:text=Feed%20in%20tariff%3A%20A%20policy%20tool%20encouraging,deployment%20of%20renewable%20electricity%20technologies&text=Participants%20will%20receive%2015%20cents,all%20electricity%20that%20they%20consume.>

<sup>48</sup> “Energy Efficiency and Conservation Block Grant Program.” *Office of Energy Efficiency and Renewable Energy*. <https://www.energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program>

### Obstacles

Opponents of continued renewable energy tax subsidies argue that “the costs of wind and solar have [already] been reduced to a point where they are competitive with traditional sources of energy” ([Forbes](#)).<sup>49</sup>

### Additional Resources

- Smith, Grant. “[Federal Energy Subsidies: What Are We Getting for Our Money?](#)” EWG: Next Level Energy. 2019. <https://www.ewg.org/energy/22777/federal-energy-subsidies-what-are-we-getting-our-money>

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<sup>49</sup> Maloney, Bill. “Renewable Energy Subsidies -- Yes or No?” *Forbes*. March 23, 2018. <https://www.forbes.com/sites/uhenergy/2018/03/23/renewable-energy-subsidies-yes-or-no/#42c062ce6e23>

## Fossil Fuel/Emitter Liability

### Description

- Ensure that the costs of phasing out fossil fuels are borne by the polluting corporations that have driven the crisis and obstructed solutions, and that those costs are not passed on to others, through appropriate bonding secured by public officials ([Vision for Equitable Climate Action](#), p. 19).
- The next President must be committed to holding polluters accountable, through new, enhanced and restored environmental standards, penalties, and enforcement actions, that address damages from climate change and other ongoing liabilities from our fossil fuel dependence, such as oil spills, decommissioning of coal plants, eliminating fugitive methane emissions from fracked gas wells, and more ([Evergreen Action Plan](#), p. 56).
- “Congress should establish financial assurance requirements under [CERCLA](#)<sup>50</sup> for the toxic releases likely to occur at industrial facilities and coal ash ponds because of extreme weather associated with climate change” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 398)
- “Increase oil and gas bonding and fees to hold industry accountable for cleanup and reclamation” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 498).
- “Massively rais[e] taxes on corporate polluters’ and investors’ fossil fuel income and wealth. Rais[e] penalties on pollution from fossil fuel energy generation. The EPA has historically under-enforced the existing penalties for polluting under the Clean Air Act. As president, Bernie will raise and aggressively enforce those penalties. Requir[e] remaining fossil fuel infrastructure owners to buy federal fossil fuel risk bonds to pay for disaster impacts at the local level. Federal risk bonds can then be paid to counties and municipalities when there are fossil fuel spills, explosions, or accidents” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Vision for Equitable Climate Action](#); [Evergreen Action](#) (p. 56); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Elizabeth Warren 2020 Presidential Campaign](#); [Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 398, p. 498); [Bernie Sanders 2020 Presidential Campaign](#)

### Previous/Current Implementation

- The Polluter Pays Principle originated from the Council of the Organization for Economic Co-operation and Development (OECD) in 1972. 175 countries have adopted it as an environmental management mechanism. For example, the Paris Agreement requires nations to pay for their mitigated emissions ([Clear Seas](#)).<sup>51</sup>
- “The [Comprehensive Environmental Response, Compensation, and Liability Act of 1980](#) (CERCLA), otherwise known as Superfund, makes polluters liable for the costs to clean up releases of environmental contamination at the nation’s worst toxic waste sites” ([The](#)

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<sup>50</sup> “Superfund: CERCLA Overview.” *United States Environmental Protection Agency*. <https://www.epa.gov/superfund/superfund-cercla-overview>

<sup>51</sup> “The Polluter Pays Principle.” *Clear Seas*. Published August 2017. Last updated June 2020. <https://clearseas.org/en/blog/polluter-pays-principle/#:~:text=The%20Polluter%20Pays%20Principle%20is%20often%20applied%20as%20a%20liability,regulations%2C%20and%20avoid%20additional%20costs.>

### Co-Benefits

Funds acquired from liable polluters can be used to remove harmful pollutants from air and waterways, advance renewable energy and clean infrastructure, improve community resources, and more. Polluter liability also benefits taxpayers who would no longer bear the cost of pollution.

### Obstacles

- It can be difficult to measure the pollution that emitters produce, and therefore to calculate how much they are required to pay. Furthermore, because liability is allocated after environmental harm is noticeable or rises to the level of a legally cognizable injury, a long period of time lapses and tracing fault becomes difficult. There are also high costs associated with gathering information/data about pollution levels. ([Analyzing The Polluter Pays Principle Through Law And Economics](#), p. 64).<sup>52</sup>

### Additional Resources

- “The Private Sector & Climate Change: Holding Corporations Accountable.” The Sanders Institute. <https://www.sandersinstitute.com/blog/the-private-sector-and-climate-change-holding-corporations-accountable>
- Sabin Center for Climate Change Law. “Can Fossil Fuel Companies Be Held Liable For Climate Change?” Earth Institute - Columbia University. October 26, 2017. <https://blogs.ei.columbia.edu/2017/10/26/can-fossil-fuel-companies-be-held-liable-for-climate-change/>
- Environmental Law Alliance Worldwide. Holding Corporations Accountable for Damaging the Climate. 2014. <https://elaw.org/system/files/elaw.climate.litigation.report.pdf>
- Hersher, Rebecca. “Climate Liability Lawsuits Could Help With Costs Of Adapting To A Hotter Earth.” *NPR*. September 23, 2019. <https://www.npr.org/2019/09/23/763521108/climate-liability-lawsuits-could-help-with-costs-of-adapting-to-a-hotter-earth>

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<sup>52</sup> Mamlyuk, Boris M. Analyzing The Polluter Pays Principle Through Law And Economics. *Southeastern Environmental Law Journal*, Vol. 18, No. 1. 2010. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1679245](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1679245)

## Green Bank

### Description

- “Green banks are public or nonprofit finance institutions that deploy clean energy technologies and climate-resilient infrastructure by connecting projects with capital in target markets. They use innovative financing tools and structures to lower the cost of capital and leverage more public and private investment. Furthermore, by enabling more flexible financing for individuals, such as lending based on ability to pay rather than credit scores, green banks help fill a financing gap in underserved communities” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 226).
- “Establish a nonprofit National Climate Bank. ... The Bank will mobilize public and private investment to provide financing for low- and zero-emissions energy technologies; renewable energy generation; building efficiency and electrification; industrial decarbonization; grid modernization; agriculture projects; clean transportation; and climate-resilient infrastructure” (CLEAN Future Act, [Summary](#), p. 21).

Proposed by: [Evergreen Action Plan](#); [Vision for Equitable Climate Action](#); [CLEAN Future Act](#); [Coalition for Green Capital](#); <sup>53</sup> [National Climate Bank Act of 2019](#); <sup>54</sup> [National Green Bank Act of 2019](#); <sup>55</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Pete Buttigieg 2020 Presidential Campaign; Kamala Harris 2020 Presidential Campaign

### LPDD Recommendations

- “Congress should establish a national green bank.” ([LPDD](#), p. 140)

### LPDD Resources

- LPDD.org. “Green Banks and Related SFOs”: <https://lpdd.org/pathway/green-banks-and-related-sfos/>
- LPDD.org. “Green Banks”: <https://lpdd.org/pathway/green-banks/>

### Current/Past Implementation:

Several states, cities, and counties have established Green Banks to facilitate investment in clean energy projects. In 2018, these Green Banks invested a cumulative total of \$3.67 billion in clean energy and infrastructure projects ([Green Bank Network](#), p. 6).<sup>56</sup>

### Impact on GHG Emissions

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<sup>53</sup> American Green Bank Consortium. Green Banks in the United States: 2018 Annual Industry Report. Coalition for Green Capital. 2018. <https://greenbanknetwork.org/wp-content/uploads/2019/07/GreenBanksintheUS-2018AnnualIndustryReport.pdf>

<sup>54</sup> National Climate Bank Act of 2019. S. 2057, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/2057>

<sup>55</sup> National Green Bank Act of 2019. H.R. 3423, 116th Congress. 2019. <https://perma.cc/7E8X-Y7ZM>

<sup>56</sup> American Green Bank Consortium. Green Banks in the United States: 2018 Annual Industry Report. Coalition for Green Capital. 2018. <https://greenbanknetwork.org/wp-content/uploads/2019/07/GreenBanksintheUS-2018AnnualIndustryReport.pdf>

New York Green Bank's investments have reduced gross lifetime greenhouse gas emissions by 9.07 to 15.22 million metric tons ([NY Green Bank Metrics, Reporting & Evaluation](#)).<sup>57</sup>

#### Obstacles/Shortfalls

The funding of green banks can divert capital away from one-time grants for energy efficiency projects.

#### Studies of Efficacy

Hyoungkum Park and Jong Dae Kim. Transition Towards Green Banking: Role of Financial Regulators and Financial Institutions. *AJSSR*, vol. 5, no. 5. 2020.

<https://link.springer.com/article/10.1186%2Fs41180-020-00034-3>

#### Additional Resources

- [Green Banks in The United States: 2018 Annual Industry Report](#). Coalition for Green Capital. May 2019. <https://greenbanknetwork.org/wp-content/uploads/2019/07/GreenBanksintheUS-2018AnnualIndustryReport.pdf>
- Bergōō, Bettina and Sims, Doug, NRDC Center for Market Innovation. Green Bank Network Issue Brief - How Green Banks Assess and Report Impacts. NRDC. February 2018. <https://www.nrdc.org/sites/default/files/green-banks-assess-report-impacts-ib.pdf>
- Investing Across Sectors to Reduce Emissions - An Analysis of the National Climate Bank. Coalition for Green Capital. September 2019. <http://coalitionforgreencapital.com/wp-content/uploads/2019/09/Investing-Across-Sectors-to-Reduce-Emissions.pdf>
- Kaufman, Richard. [Can Green Banks Scale Clean Energy?](#) *Yale Insights*. November 26, 2018. <https://insights.som.yale.edu/insights/can-green-banks-scale-clean-energy>
- Energy Investment Partnerships: How State and Local Governments are Engaging Private Capital to Drive Clean Energy Investment. U.S. Department of Energy. December 2015. <https://perma.cc/5JCB-GEF5>

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<sup>57</sup> NY Green Bank. NY Green Bank: Metrics, Reporting & Evaluation. Quarterly Report No. 19. New York State of Opportunity. 2019. <https://greenbank.ny.gov/-/media/greenbanknew/files/2019-Q1-NYGB-Quarterly-Report.pdf>



## Securities Disclosure

### Description

- “Elizabeth [Warren]’s Climate Risk Disclosure Act would require companies to disclose their greenhouse gas emissions and price their exposure to climate risk into their valuations, raising public awareness of just how dependent companies are on fossil fuels and accelerating the transition to clean energy” ([Elizabeth Warren 2020 Presidential Campaign](#)).
- “The next President’s appointees to the SEC – including commissioners and directors of corporate finance and enforcement – must prioritize enforcement action and corporate disclosure of climate change vulnerabilities, and the contributions that corporate operations, supply chains, and investments are making to the global climate crisis and structural economic risk” ([Evergreen Action Plan](#), p. 59).
- “Under provisions of the Dodd–Frank Wall Street Reform and Consumer Protection Act, the 2010 law passed in the wake of the 2008 financial crisis, regulators have broad authority that can be used to require financial institutions to internalize the financial risks associated with lending and investments that drive climate change. ... More accurately pricing the physical risks associated with climate change can better reveal the full cost of failure to take action, while more accurately pricing the transition risks associated with holding carbon assets can raise costs for fossil fuel investments” ([A Regulatory Green Light](#), The Great Democracy Initiative, p. 5).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; [Evergreen Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Legal Authority for Presidential Executive Action on Climate](#); [HR 3623 - Climate Risk Disclosure Act of 2019](#); <sup>58</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 233); [The Great Democracy Initiative](#)

### LPDD Recommendations

- “The Securities Exchange Commission should enforce compliance with its 2010 guidance on disclosure requirements related to climate change. The Securities Exchange Commission should enhance its 2010 guidance on climate change disclosure to require explicitly the possibility that climate regulation will lead to the stranding of corporate assets.” ([LPDD](#), p. 645)

### LPDD Resources

- LPDD.org. “Stranded Assets and Climate Disclosures”: <https://lpdd.org/pathway/stranded-assets/>

### Previous/Current Implementation

- In 2017, the Financial Stability Board’s Task Force on Climate-Related Financial Disclosures, part of an international body monitoring the global financial system, released a

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<sup>58</sup> Climate Risk Disclosure Act of 2019. H.R. 3623, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/3623>



[set of recommendations](#)<sup>59</sup> concerning climate-related financial risk disclosures ([Investing in the Future: How Climate Risk Disclosure Can Drive Sustainable Climate Solutions](#)).<sup>60</sup>

- Sustainability Accounting Standards Board (SASB): this initiative, based in the United States, provides guidance for corporations on how to disclose material sustainability information through their financial reporting. The framework includes 79 industry standards identifying financially material risks, including physical risks from climate change. ([Climate-Resilient Infrastructure](#), OECD).<sup>61</sup>

### Impact on GHGs

Securities disclosure would promote investment in low-emitting companies, thus incentivizing widespread emissions reductions.

### Co-Benefits

Securities disclosure provides benefits to investors, who gain a better understanding of companies' climate-related financial risks ([Union of Concerned Scientists](#);<sup>62</sup> [Task Force on Climate-related Financial Disclosures](#)<sup>63</sup>).

Regulation under the Dodd-Frank Act would:

- “Address the concentration of climate change-driving financial activities in the largest financial institutions;
- Measure and mitigate potential climate change-driven losses across institutions' balance sheets; and
- Seek to manage a transition away from those risks in a manner that protects both financial institutions and the economy at large” ([A Regulatory Green Light](#), The Great Democracy Initiative, p. 16).

### Obstacles/Shortfalls

The following are company-identified obstacles to climate risk disclosure: “Climate is embedded in processes and is challenging to discuss separately in disclosures. Disclosing assumptions is difficult because they include confidential business information. There is a lack of standardized metrics for [certain] industr[ies]” ([Task Force on Climate-related Financial Disclosures](#)).

### Additional Resources

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<sup>59</sup> “Publications.” *Task Force on Climate-Related Financial Disclosures*. <https://www.fsb-tcfd.org/publications/>

<sup>60</sup> Killian, Dumont. “Investing in the Future: How Climate Risk Disclosure Can Drive Sustainable Climate Solutions.” *Center for International Environmental Law*. August 13, 2019. <https://www.ciel.org/investing-in-the-future-climate-risk-disclosure/>

<sup>61</sup> Organisation for Economic Cooperation and Development. *Climate-Resilient Infrastructure: Policy Perspectives*. 2018. <http://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>

<sup>62</sup> Pinko, Nicole. “Climate Risk Disclosure Act is Good for Your Investments.” *Union of Concerned Scientists*. July 25, 2019. <https://blog.ucsusa.org/nicole-pinko/climate-risk-disclosure-act-is-good-for-your-investments>

<sup>63</sup> Task Force on Climate-related Financial Disclosures: Overview. Bloomberg. March 2020. [https://www.fsb-tcfd.org/wp-content/uploads/2020/03/TCFD\\_Booklet\\_FNL\\_Digital\\_March-2020.pdf](https://www.fsb-tcfd.org/wp-content/uploads/2020/03/TCFD_Booklet_FNL_Digital_March-2020.pdf)

- Steele, Graham. “A Regulatory Green Light: How Dodd-Frank Can Address Wall Street’s Role in the Climate Crisis.” The Great Democracy Initiative. January 2020.  
[https://greatdemocracyinitiative.org/wp-content/uploads/2020/01/Final\\_Greenlight\\_Steele.pdf](https://greatdemocracyinitiative.org/wp-content/uploads/2020/01/Final_Greenlight_Steele.pdf)
- Roberts, David. “The Next President Can Force the Financial Sector to Take Climate Change Seriously.” Vox. February 7, 2020. <https://www.vox.com/energy-and-environment/2020/2/7/21127596/climate-change-financial-sector-dodd-frank-risk>
- Hughes, Matt and Noguiera, Fernanda Borges. “How Dodd-Frank Could Curb the Climate Crisis—Right Now.” Roosevelt Institute. January 29, 2020.  
<https://rooseveltinstitute.org/how-dodd-frank-could-curb-the-climate-crisis-right-now/>

## Investment and Divestment

### Description

#### Investment

- “The Department of Energy (DOE) Loan Guarantee and Advanced Technology Vehicle Manufacturing Programs, and the Department of Agriculture (USDA) Rural Utilities Service, together have well over \$50 billion in lending authority that can be swiftly deployed as low cost capital to drive the energy transition. In addition, in March 2020 Congress provided \$500 billion in funding for Federal Reserve programs aimed at urgent economic stabilization, and growth, and it will need to invest much more to provide for economic stability and recovery. The next administration should take swift action to unlock this capital and deploy major clean energy investments that are so promising for economic growth” ([Evergreen Action Plan](#), p. 8)
- The next president should repeal Department of Labor [rule](#)<sup>64</sup> against ESG investing: In June 2020, the Department of Labor proposed a ruling that would prohibit ERISA plan fiduciaries from investing in ESG vehicles that sacrifice investment returns or take on additional risk. This would limit investment in environmentally-beneficial companies and services. The next administration should revoke this ruling if it is enacted.

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<sup>64</sup> Croce, Brian. “DOL Proposal Reinforces Fiduciary Role in ESG Investing.” *Pensions & Investments*. June 23, 2020. <https://www.pionline.com/esg/dol-proposal-reinforces-fiduciary-role-esg-investing>

## TRANSPORTATION

### Passenger Vehicle Emission and Fuel Economy Standards

#### Description

- “The single most important federal pathway for [Alternative Fuel Vehicles] uses the Clean Air Act (CAA) and the Energy Policy and Conservation Act (EPCA) to impose fuel economy standards on auto manufacturers” ([Decarbonizing Light-Duty Vehicles](#), p. 10601).<sup>65</sup> An important legal pathway is to “continue to ratchet up the fuel economy standards until they reach 100 mpg” (p. 10617).
- The Biden Campaign proposes “developing rigorous new fuel economy standards aimed at ensuring 100% of new sales for light- and medium-duty vehicles will be electrified and annual improvements for heavy duty vehicles” ([Joe Biden 2020 Presidential Campaign - Climate](#)). [Cross-reference: [Electric Vehicle Mandates](#)].
- “Congress should direct the EPA to use its existing Clean Air Act authority to set new greenhouse gas emissions standards for passenger cars and light-duty trucks that achieve at least a 6% year-over-year pollution reduction for five years, starting in 2026, relative to baseline. ... Congress should amend Section 177 of the Clean Air Act to allow all states to adopt and enforce California’s motor vehicle emission standards” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 89).

Proposed by: [Biden 2020 Presidential Campaign](#) - Climate; [Evergreen Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Elizabeth Warren 2020 Presidential Campaign](#); Kamala Harris 2020 Presidential Campaign; Cory Booker 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; [DNC Draft 2020 Policy Platform](#)

#### LPDD Recommendation

- “The federal government should continue the recent trend of tightening fuel economy and GHG emissions standards for light-duty motor vehicles.” ([LPDD](#), p. 377).

#### LPDD Resources

- LPDD.org, “Light Duty Vehicle Emissions Standards”: <https://lpdd.org/pathway/light-duty-vehicle-emissions-standards/>

#### Past Implementation

- The EPA and the National Highway Traffic Safety Administration (NHTSA) currently impose emissions and corporate average fuel economy (CAFE) standards on auto manufacturers under the Clean Air Act. CAFE standards issued in 2012 expected the corporate fleet average fuel economy to improve to 35.5 mpg from 2012-2016, and to 54.5 mpg from 2017-2025 ([Decarbonizing Light-Duty Vehicles](#)).<sup>66</sup> In 2020, the Trump

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<sup>65</sup> Stein, Amy L. and Fershee, Joshua. “Decarbonizing Light-Duty Vehicles”. *Environmental Law Reporter*, Vol. 48. 2018. <https://lpdd.org/wp-content/uploads/2019/05/14-LPDD-Light-Duty-Vehicles.pdf>

<sup>66</sup> Ibid.

Administration reduced the target fuel economy to 37 mpg for MYs 2021-2026 ([MYs 2021-2026 CAFE Proposal - by the Numbers](#)).<sup>67</sup>

#### Impact on GHG emissions

The White House estimated that 6 billion metric tons would be avoided over the lifetime of the CAFE standards implemented in 2012 ([A Review of Consumer Benefits from Corporate Average Fuel Economy \(CAFE\) Standards](#), Consumer Reports, p. 5).<sup>68</sup>

#### Co-benefits

Fuel economy standards protect consumers from gas price volatility and reduce their spending on fuel ([A Review of Consumer Benefits from Corporate Average Fuel Economy \(CAFE\) Standards](#), pp. 2, 5).<sup>69</sup>

#### Studies of efficacy

Karplus, Valerie J., Kishimoto, Paul N. and Paltsev, Sergey. The Global Energy, CO<sub>2</sub> Emissions, and Economic Impact of Vehicle Fuel Economy Standards. MIT Joint Program on the Science and Policy of Global Change. 2015.

[https://globalchange.mit.edu/sites/default/files/MITJPSPGC\\_Reprint\\_15-34.pdf](https://globalchange.mit.edu/sites/default/files/MITJPSPGC_Reprint_15-34.pdf)

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<sup>67</sup> MYs 2021-2026 CAFE Proposal - by the Numbers. U.S. Department of Transportation, U.S. Environmental Protection Agency. 2018. <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P100V26H.pdf>

<sup>68</sup> Consumer Reports. A Review of Consumer Benefits from Corporate Average Fuel Economy (CAFE) Standards. June 2013. <https://advocacy.consumerreports.org/wp-content/uploads/2013/06/FuelEconomyStandards.pdf>

<sup>69</sup> Ibid.

## Electric Vehicle Mandates

### Description

Sets a mandate for automobile manufacturers to produce and/or sell non-emitting vehicles. Non-emitting vehicles or zero emission vehicles (ZEVs) include plug-in electric vehicles and hydrogen fuel cell electric vehicles. [Cross-reference: [Passenger Vehicle Emission and Fuel Economy Standards](#)].

- E.g.: By 2030, 100% zero emissions for all new light-duty passenger vehicles, medium-duty trucks, and all buses ([100% Clean Energy for America](#), Elizabeth Warren 2020 Presidential Campaign).<sup>70</sup>

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; Jay Inslee 2020 Presidential Campaign; [Elizabeth Warren 2020 Presidential Campaign](#), [Evergreen Action](#) (p. 17); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 90)

### LPDD Recommendations

- The federal government should consider adoption of California's ZEV mandates ([LPDD](#), p. 377)
- Congress should adopt a national ZEV mandate, to help ease the fleet transition towards electrification. Congress should clarify that states have authority to adopt their own more ambitious ZEV standards and are not preempted by any federal goals .... Congress should authorize NHTSA as well as EPA to adopt credit multipliers for fuel efficiency standards to encourage ZEV alternatives such as electrification. ([LPDD](#), p. 614)

### LPDD Resources

- LPDD.org, "Zero Emission Vehicles": <https://lpdd.org/pathway/zero-emission-vehicles/>

### Previous/Current Implementation:

Several states, including California, Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont have passed zero-emissions vehicle mandates. California plans to deploy 5 million ZEVs by 2030 ([Center for Climate and Energy Solutions](#)).<sup>71</sup> However, in 2020 the EPA passed the SAFE Rule which loosens vehicle emissions regulations and undermines state ability to impose ZEV mandates ([Vox](#)).<sup>72</sup>

### Impact on GHG Emissions

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<sup>70</sup> Warren, Elizabeth. "100% Clean Energy for America." *Medium*. September 3, 2019. <https://medium.com/@teamwarren/100-clean-energy-for-america-de75ee39887d>

<sup>71</sup> "U.S. State Clean Vehicle Policies and Incentives." *Center for Climate and Energy Solutions*. <https://www.c2es.org/document/us-state-clean-vehicle-policies-and-incentives/>

<sup>72</sup> Roberts, David. "Gutting Fuel Economy Standards During a Pandemic is Peak Trump." *Vox*. April 2, 2020. <https://www.vox.com/energy-and-environment/2020/4/2/21202509/trump-climate-change-fuel-economy-standards-coronavirus-pandemic-peak>

Achieving 100% zero emissions for all new light-duty passenger vehicles, medium-duty trucks and all buses by 2030 would reduce U.S. GHG emissions by 7% in 2030, 12% in 2040 and 10% in 2050 compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Studies of Efficacy

A literature review of the efficacy of plug-in electric vehicle policies in the United States:

- Zhou, Yan, Levin, Todd, Plotkin, Steven E. “Plug-in Electric Vehicle Policy Effectiveness: Literature Review.” Argonne National Lab. 2016. <https://www.osti.gov/biblio/1255232>

### Obstacles/Shortfalls

Achieving ZEV deployment goals will require an increase in the availability of charging infrastructure. Success of a mandate may also depend on the existence of consumer incentives.

### Co-Benefits

Electric vehicles reduce emissions of pollutants such as nitrogen oxides, volatile organic compounds, and particulate matter 2.5 which have adverse health and ecological effects ([Berkeley Lab](#)).<sup>73</sup>

### Additional Resources

- Contestabile, Marcello, Alajaji, Mohammed, and Almubarak, Bader. “Will current electric vehicle policy lead to cost-effective electrification of passenger car transport?” *Energy Policy*, vol. 110. November 2017.  
<https://www.sciencedirect.com/science/article/pii/S0301421517304937>
- Sykes, Maxwell and Axsen, Jonn. “No Free Ride To Zero-emissions: Simulating a Region's Need to Implement its Own Zero-emissions Vehicle (ZEV) Mandate to Achieve 2050 GHG Targets.” *Energy Policy*, vol. 110. November 2017.  
[https://www.sciencedirect.com/science/article/pii/S0301421517305347?casa\\_token=s5\\_fBGWomeYAAAAA:7WVP2xaxFQ7ZcXwLdMXCf5OPJoL5Gfqjyi3isbkbozXWGopfoedIwiYeo2lZWJ7hO-4Hl5MHZA](https://www.sciencedirect.com/science/article/pii/S0301421517305347?casa_token=s5_fBGWomeYAAAAA:7WVP2xaxFQ7ZcXwLdMXCf5OPJoL5Gfqjyi3isbkbozXWGopfoedIwiYeo2lZWJ7hO-4Hl5MHZA)
- “Regulatory Pathways for Zero-Emission Vehicle Mandates.” International Council of Clean Transportation. July 2019.  
[https://theicct.org/sites/default/files/publications/ICCT\\_zev\\_mandates\\_India\\_20190703.pdf](https://theicct.org/sites/default/files/publications/ICCT_zev_mandates_India_20190703.pdf)

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<sup>73</sup> Chen, Allen. “New Research Quantifies Health Benefits of Reducing Greenhouse Gas Emissions.” *Berkeley Lab*. November 18, 2014. [https://newscenter.lbl.gov/2014/11/18/new-research-quantifies-health-benefits-of-reducing-greenhouse-gas-emissions/#:~:text=New%20Research%20Quantifies%20Health%20Benefits%20of%20Reducing%20Greenhouse%20Gas%20Emissions,-News%20Release%20Allan&text=Reducing%20greenhouse%20gas%20\(GHG\)%20emissions,\(PM\)%20in%20these%20emissions.](https://newscenter.lbl.gov/2014/11/18/new-research-quantifies-health-benefits-of-reducing-greenhouse-gas-emissions/#:~:text=New%20Research%20Quantifies%20Health%20Benefits%20of%20Reducing%20Greenhouse%20Gas%20Emissions,-News%20Release%20Allan&text=Reducing%20greenhouse%20gas%20(GHG)%20emissions,(PM)%20in%20these%20emissions.)





## Electric Vehicle Charging Infrastructure

### Description

Policies to increase the deployment of public charging infrastructure, particularly outlets. Proposals also include grants to entities that install infrastructure in homes, apartment buildings, private garages, or any other private residential or commercial properties.

- Joe Biden plans to deploy more than 500,000 new public charging outlets by the end of 2030 ([Joe Biden 2020 Presidential Campaign](#)).
- The Clean Cars for America Proposal includes \$45 billion in funding to states, cities, and municipalities to increase charging infrastructure ([Clean Cars for America Summary](#), p.1).<sup>74</sup>
- “Congress should authorize DOT to offer grants or rebates to state, local, and tribal governments and other entities to deploy electric vehicle charging infrastructure along highway corridors and other publicly accessible locations” ([The Congressional Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 95).
- “We will spend \$85.6 billion building a national electric vehicle charging infrastructure network similar to the gas stations and rest stops we have today. We will also ensure that new EV stations are open access and interoperable between all payment systems. Under our plan, drivers will no longer need to worry about where to charge their car or if they can pay for it” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Clean Cars for America proposal](#); [Joe Biden 2020 Presidential Campaign](#); [Vision for Equitable Climate Action](#); [Evergreen Action Plan](#); [Bernie Sanders 2020 Presidential Campaign](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Center for Climate and Energy Solutions](#); [DNC Environment and Climate Crisis Council](#); [CLEAN Future Act \(2020\)](#); [The Congressional Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [Electric Vehicle Freedom Act \(H.R. 5770\)](#);<sup>75</sup> [New Opportunities to Expand Healthy Air Using Sustainable Transportation \(NO EXHAUST\) Act of 2020 \(H.R. 5545\)](#);<sup>76</sup> [Electric Vehicles for Underserved Communities Act of 2020 \(H.R. 5751\)](#);<sup>77</sup> [INVEST Act](#)

### LPDD Recommendations

- Congress, the federal government, states, and PUCs should expand financial and other support infrastructure for expanded use of EVs. The federal government should continue

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<sup>74</sup> Clean Cars for America (Summary). *Senate.Gov*. 2019. <https://www.democrats.senate.gov/imo/media/doc/Clean%20Cars%20for%20America%20-%20Detailed%20Summary.pdf>

<sup>75</sup> Electric Vehicle Freedom Act. H.R. 5770, 116th Congress. 2020. [https://www.congress.gov/bill/116th-congress/house-bill/5770/text/~:text=Introduced%20in%20House%20\(02%2F06%2F2020\)&text=To%20establish%20a%20national%20network,stations%2C%20and%20for%20other%20purposes.&text=A%20BILL-.To%20establish%20a%20national%20network%20of%20electric.stations%2C%20and%20for%20other%20purposes.&text=This%20Act%20may%20be%20cited,the%20%E2%80%9CEV%20Freedom%20Act%E2%80%9D](https://www.congress.gov/bill/116th-congress/house-bill/5770/text/~:text=Introduced%20in%20House%20(02%2F06%2F2020)&text=To%20establish%20a%20national%20network,stations%2C%20and%20for%20other%20purposes.&text=A%20BILL-.To%20establish%20a%20national%20network%20of%20electric.stations%2C%20and%20for%20other%20purposes.&text=This%20Act%20may%20be%20cited,the%20%E2%80%9CEV%20Freedom%20Act%E2%80%9D)

<sup>76</sup> New Opportunities to Expand Healthy Air Using Sustainable Transportation (NO EXHAUST) Act of 2020. H.R. 5545, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5545>

<sup>77</sup> Electric Vehicles for Underserved Communities Act of 2020. H.R. 5751, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5751?s=1&r=1>

to identify critical corridors for Alternative Fuel Vehicles under the FAST Act to prioritize funding and development. (LPDD, p. 367)

- The federal government can work with state governments to standardize the chargers that are being deployed in Alternative Fuel Vehicles and in charging stations by requiring a single standard or by encouraging nongovernmental organizations to work toward a dominant standard. (LPDD, p. 369)

#### LPDD Resources

- LPDD.org, “Expanding EV Charging Infrastructure”, <https://lpdd.org/pathway/expanding-charging-infrastructure/>

#### Previous/Current Implementation

- As of March 2019, the U.S. had 63,000 chargers, just under 20 chargers per 100,000 people. This compares to 111,076 gas stations in 2016 with an average of 8 fuel pumps each, or 275 pumps per 100,000 population (United States Energy Policy Simulator v 2.1.0)
- “The FAST Act required the Federal Highway Administration (FHWA) to ‘designate national electric vehicle charging and hydrogen, propane, and natural gas fueling corridors that identify the near- and long-term need for, and location of, electric vehicle charging infrastructure, hydrogen fueling infrastructure, propane fueling infrastructure, and natural gas fueling infrastructure at strategic locations along major national highways.’ To date, FHWA has received 79 nominations that cover segments of interstates and highways in 46 states” (The Congressional Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America, p. 93).
- Con Edison’s [SmartCharge NY program](#)<sup>78</sup> rewards off-peak charging behavior. The utility is installing 120 curbside chargers across all five New York City boroughs; piloting vehicle-to-grid capability through a five-vehicle electric school bus program in White Plains; and supporting the Metropolitan Transportation Authority’s electric transit bus pilot program.

#### Impact on GHG Emissions

Adding 500,000 new public charging outlets by the end of 2030, or increasing the number of chargers to 178 per 100,000 people, alone would reduce U.S. emissions by <3% in 2030, 4% in 2040, and <2% in 2050 compared to a 2020 baseline.

When implemented with a 100% electric vehicle mandate by 2030, this policy decreases emissions by 7% in 2030, 11.5% in 2040, and <7% in 2050 compared to a 2020 baseline. (United States Energy Policy Simulator v 2.1.0)

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<sup>78</sup> “Electric Vehicle Charging Rewards.” ConEdison. Accessed July 2020. <https://www.coned.com/en/save-money/rebates-incentives-tax-credits/rebates-incentives-tax-credits-for-residential-customers/electric-vehicle-rewards>

## Heavy Duty Vehicles

### Description

- Require zero emissions for new heavy duty (freight) vehicles by 2035 ([Vision For Equitable Climate Action](#), p. 8).
- “Congress should pass legislation creating purchase incentives, such as voucher programs or manufacturer tax credits, for zero-emission heavy-duty vehicles” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 123).
- “Congress should reauthorize the EPA Clean School Bus Program and ensure that electric buses and charging infrastructure qualify as eligible projects” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 119).
- “Congress should increase funding for the [Low-No Grant Program](#) by at least tenfold to meet demand and limit grants to zero-emission buses and associated equipment” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 120).
- “Congress should direct the EPA to use its existing authority under Section 202 of the Clean Air Act to set new greenhouse gas emissions standards for medium- and heavy-duty vehicles that achieve at least a 4% year-over-year pollution reduction, beginning with model year 2028” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 121).
- “Congress should significantly increase funding for the EPA Clean Diesel National Grants Program and consider dedicating a percentage of that additional funding for zero-emission technologies” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 124).

Proposed by: [Joe Biden 2020 Presidential Campaign](#); [Vision for Equitable Climate Action](#); [Evergreen Action](#); [CLEAN Future Act \(2020\)](#); [Center for Climate and Energy Solutions](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Clean Commute for Kids Act of 2019 \(H.R. 2906\)](#); <sup>79</sup> [Moving Forward Act \(H.R. 2\)](#), Section 33311; [Green Bus Act of 2019](#); <sup>80</sup> [Elizabeth Warren 2020 Presidential Campaign](#); [Kamala Harris 2020 Presidential Campaign](#); [Cory Booker 2020 Presidential Campaign](#); [Pete Buttigieg 2020 Presidential Campaign](#); [INVEST Act](#); [DNC Draft 2020 Policy Platform](#); [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations

- “The federal government should focus federal heavy duty vehicle grant programs on funding for development, production, and deployment of advanced engine technologies and the necessary fueling infrastructure to rapidly expand access to zero- and near-zero emission technologies.” ([LPDD](#), p. 404)

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<sup>79</sup> Clean Commute for Kids Act of 2019. H.R. 2906, 116th Congress. 2019. [https://www.congress.gov/bill/116th-congress/house-bill/2906#:~:text=%2F22%2F2019\)-.Clean%20Commute%20for%20Kids%20Act%20of%202019,and%20charging%20and%20fueling%20infrastructure](https://www.congress.gov/bill/116th-congress/house-bill/2906#:~:text=%2F22%2F2019)-.Clean%20Commute%20for%20Kids%20Act%20of%202019,and%20charging%20and%20fueling%20infrastructure)

<sup>80</sup> Green Bus Act of 2019. H.R. 2165, 116th Congress. 2019. [https://www.congress.gov/bill/116th-congress/house-bill/2164#:~:text=%2F09%2F2019\)-.Green%20Bus%20Act%20of%202019,beginning%20on%20October%201%2C%202020](https://www.congress.gov/bill/116th-congress/house-bill/2164#:~:text=%2F09%2F2019)-.Green%20Bus%20Act%20of%202019,beginning%20on%20October%201%2C%202020)

- “Congress could adopt statutory amendments to solidify EPA’s CAA and/or NHTSA’s EISA authority to regulate trailers if the federal courts overturn the trailer part of final Phase 2 heavy-duty GHG rule, or if the Administration voluntarily reconsiders or proposes to repeal it.” (LPDD, p. 396)
- “Congress could amend the CAA to provide EPA with clear and unambiguous authority over gliders and the engines installed into gliders. Alternatively, a different administration could return to EPA’s 2016 interpretation of the CAA and establish limits on the number of gliders that can be produced and on the type and model year of engines that could be installed into gliders.” (LPDD, p. 397)
- “Congress could amend the CAA to provide EPA with the authority to require heavy duty vehicles to meet a more stringent GHG emission standard than the standard to which the vehicle or engine was originally certified .... Congress could enact legislation that would authorize NHTSA or DOT to prohibit the use of heavy duty vehicles based on model year.” (LPDD, p. 398)
- “EPA, with NHTSA, could interpret the CAA and EISA to allow regulations requiring the production and sale of hybrid, fuel cell, or battery-electric HDVs, and establish for heavy duty vehicles a program similar to CARB’s light duty ZEV program .... EPA, with NHTSA, should consider establishing a post-2027 HDV and engine GHG/fuel economy regulatory program.” (LPDD, p. 394)
- “Congress could amend the CAA to require EPA to adopt standards that provide incentives for other types of actions that reduce the overall global warming potential associated with HDVs and engines, such as implementation of alternative air-conditioning refrigerants .... Congress could repeal the portion of EPCA/EISA providing NHTSA with authority to regulate vehicle fuel economy, giving EPA sole authority over heavy duty vehicle GHG emissions. Alternatively, Congress could give NHTSA sole authority to regulate fuel economy for heavy duty vehicles and make corresponding changes to NHTSA’s statutory authority to enable the agency to set more environmentally protective standards.” (LPDD, p. 395)
- “EPA, in partnership with state agencies or municipalities as well as the private sector, could partially or fully fund the cost of replacing older heavy duty vehicles with newer vehicles that are more fuel-efficient and aerodynamic.” (LPDD, p. 400)
- “Congress should adopt a federal tax credit comparable to the American Recovery and Reinvestment Act of 2009 credit for light duty vehicles for hybrid, electric, or fuel cell heavy duty vehicles above 8,500 pounds gross vehicle weight rating.” (LPDD, p. 401)
- “EPA, with its partners, should continue and strengthen its SmartWay program to cost-effectively improve efficiency of heavy duty vehicles currently in use.” (LPDD, p. 402)
  - “Congress should create tax credits to encourage freight carriers to invest in next-generation heavy duty vehicles and necessary infrastructure to reduce fleet GHG emissions.” (LPDD, p. 410)

#### LPDD Resources

- Building Necessary Infrastructure to Support Electric HDVs. *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/building-necessary-infrastructure-to-support-electric-hdvs/>

- Supporting Electric HDVs through Grants Taxes and Rebates. *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/supporting-electric-hdvs-through-grants-taxes-and-rebates/>

#### Previous/Current Implementation

- A number of local governments have regulated HDV emissions. California Air Resources Board's light-duty vehicle zero-emission vehicle (ZEV) program, which requires manufacturers meet a ZEV obligation based on a percentage of the manufacturer's sales, could be used as a model for a future requirement for ZEV vehicles in the HDV space ([LPDD Resources](#)).<sup>81</sup>
- Southern California Edison (SCE) Charge Ready Transport will advance the electrification of medium- and heavy-duty vehicles, including buses and tractor trailers, by offering to install infrastructure to support charging stations at no charge. Utah has implemented a Heavy-Duty Alternative Fuel Vehicle Tax Credit ([LPDD Resources](#))
- In 2020, California adopted a [ruling](#)<sup>82</sup> requiring more than half of all trucks sold in the state to be zero-emissions by 2035.
- More examples: [Heavy Duty Vehicles and Freight](#)<sup>83</sup> - LPDD Resources
- [EPA's Clean School Bus](#)<sup>84</sup> is a national program designed to help communities reduce emissions from older diesel school buses. EPA offers funding, as appropriated annually by Congress, for projects that reduce emissions from existing diesel engines. EPA also provides information on strategies for reducing emissions from older school buses.
- "The [FAST Act](#)<sup>85</sup> authorized \$55 million per year through FY2020 for the Low or No Emission (Low-No) Grant Program, which provides funding to state and local governments for the purchase or lease of zero-emission and low-emission transit buses as well as supporting facilities."
- The [Low-No Program](#)<sup>86</sup> provides funding to State and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses, including acquisition, construction, and leasing of required supporting facilities.
- EPA provides funding under the [Diesel Emissions Reductions Act](#)<sup>87</sup> (DERA) National Grants Program to governmental entities and nonprofit organizations to reduce diesel emissions from school buses, heavy-duty highway vehicles, locomotive engines, marine engines, and

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<sup>81</sup> "California Air Resources Board's Zero Emission Vehicle Program." *Model Laws for Deep Decarbonization*. Accessed July 2020. <https://lpdd.org/resources/california-air-resources-boards-zero-emission-vehicle-program/>

<sup>82</sup> "Advanced Clean Trucks Fact Sheet." *California Air Resources Board*. Accessed July 2020. <https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet>

<sup>83</sup> "Heavy Duty Vehicles and Freight." *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/heavy-duty-vehicles-and-freight/>

<sup>84</sup> "Reducing Diesel Emissions from School Buses." *U.S. Environmental Protection Agency*. Accessed July 2020. <https://www.epa.gov/dera/reducing-diesel-emissions-school-buses>

<sup>85</sup> FAST Act. H.R. 22, 114th Congress. 2015. <https://www.congress.gov/bill/114th-congress/house-bill/22/text>

<sup>86</sup> "Low or No Emission Program (Low-No Program) - FY 2020 Notice of Funding." *Federal Transit Administration*. <https://www.transit.dot.gov/funding/applying/notices-funding/low-or-no-emission-program-low-no-program-fy2020-notice-funding>

<sup>87</sup> "Diesel Emissions Reduction Act (DERA) Funding." *U.S. Environmental Protection Agency*. <https://www.epa.gov/dera>

non-road engines, equipment, or vehicles used in construction, handling of cargo, agriculture, and mining.

#### Impact on GHGs

Following Vision for Equitable Climate Action’s policy recommendation, mandating that all new heavy duty freight vehicles be non-emitting by 2035 would reduce U.S. 2050 emissions by 5.5% compared to a BAU baseline. This corresponds to a 9% reduction compared to 2005 levels. Improving the fuel economy standard for heavy-duty vehicles by 66% would reduce U.S. 2050 emissions by 2% below a BAU baseline and by 4% below 2005 levels. ([U.S. Policy Solutions Simulator v 2.1.1](#))

#### Co-Benefits

Reducing emissions from HDVs will reduce emissions of harmful pollutants, thus providing health and ecological benefits.

#### Obstacles/Shortfalls

Successfully deploying electric HDVs will also require investments in charging infrastructure.

#### Additional Resources

- Zero-Emission Vehicle Program. *California Air Resources Board*. <https://ww2.arb.ca.gov/index.php/our-work/programs/zero-emission-vehicle-program/about>
- Vaidyanathan, Shruti and Langer, Therese. “Energy Efficiency and Greenhouse Gas Emissions REductions through State Freight Planning.” *American Council for an Energy-Efficient Economy*. July 21, 2020. <https://www.aceee.org/white-paper/2020/07/energy-efficiency-and-greenhouse-gas-emissions-reductions-through-state-freight>
- “Electric Truck Fleets Will Need a Lot of Power, But Many Utilities Aren’t Planning for it.” *American Council for an Energy-Efficient Economy*. July 23, 2020. <https://www.aceee.org/blog-post/2020/07/electric-truck-fleets-will-need-lot-power-many-utilities-arent-planning-it>



## Retirement of Old Vehicles

### Description

- “Consumers would receive a substantial cash voucher to trade in their gas-powered cars and buy a US-assembled and affordable plug-in electric, plug-in hybrid, or hydrogen fuel cell car” (Clean Cars for America, [Summary](#), p. 1).
- “Provide \$2.09 trillion in grants to low- and moderate-income families and small businesses to trade in their fossil fuel-dependent vehicles for new electric vehicles. ... Provide \$681 billion for low- and moderate- income families and small businesses for a trade-in program to get old cars off the road” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Clean Cars for America](#); <sup>88</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (pp. 91, 97); [Elizabeth Warren 2020 Presidential Campaign](#); Kamala Harris 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations

- “Congress should expand and guarantee funding for EPA’s national Clean Diesel Grants Program to accelerate turnover of less efficient heavy duty vehicles.” ([LPDD](#), p. 403)
- “The federal government should consider another ‘cash for clunkers’ program that targets the highest emission vehicles and is paid for through a carbon tax.” ([LPDD](#), p. 380)

### Previous/Current Implementation

- The state of California has a vehicle retirement program that allows consumers to retire their old vehicles in exchange for \$1000 to \$1500 per vehicle. The program aims to remove
- high-emitting vehicles with low-emitting ones ([California Bureau of Automotive Repair](#)).<sup>89</sup>
- In 2009, the United States ran a \$3 billion buy-back program known as the [Car Allowance Rebate System](#) (CARS), also known as “cash for clunkers”. The CARS program offered \$3,500 or \$4,500 credits to buyers who traded in light-duty vehicles with a fuel economy of 18 miles per gallon or less for new vehicles with better fuel economy .

### Impact on GHGs

The CARS Act of 2009 had a one-time effect of preventing 4.4 million metric tons of CO<sub>2</sub>-equivalent emissions, about 0.4% of US annual light-duty vehicle emissions ([The Impact of 'Cash for Clunkers' on Greenhouse Gas Emissions: A Life Cycle Perspective](#)).<sup>90</sup>

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<sup>88</sup> Clean Cars for America (Summary). *Senate.Gov*. 2019.  
<https://www.democrats.senate.gov/imo/media/doc/Clean%20Cars%20for%20America%20-%20Detailed%20Summary.pdf>

<sup>89</sup> “Consumer Assistance Program Vehicle Retirement.” *California Bureau of Automotive Repair*. Accessed July 2020. [https://www.bar.ca.gov/Consumer/Consumer\\_Assistance\\_Program/CAP\\_Vehicle\\_Retirement\\_Program.aspx](https://www.bar.ca.gov/Consumer/Consumer_Assistance_Program/CAP_Vehicle_Retirement_Program.aspx)

<sup>90</sup> Lenski, Shoshannah M, Keoleian, Gregory A and Bolon, Kevin M. The Impact of 'Cash for Clunkers' on Greenhouse Gas Emissions: A Life Cycle Perspective. *Environmental Research Letters*, Vol. 5, No. 4. November 4, 2010.  
<https://iopscience.iop.org/article/10.1088/1748-9326/5/4/044003>

### Studies of Efficacy

Sheldon, Tamara and Dua, Rubal. Vehicle Retirement and Replacement Policy: Assessing Impact and Cost-Effectiveness. KAPSARC. May 2018. <https://www.kapsarc.org/wp-content/uploads/2018/05/KS-2018-DP35-Vehicle-Retirement-and-Replacement-Policy-Assessing-Impact-and-Cost-Effectiveness.pdf>

### Obstacles

This policy program can be expensive. While the 2009 CARS program reduced emissions, each ton of reduced CO<sub>2</sub> cost the federal government \$91 to \$365 ([Vehicle Retirement and Replacement Policy: Assessing Impact and Cost-Effectiveness](#), p. 6).<sup>91</sup>

### Additional Resources

- Allen, Alexander, Carpenter, Rachel and Morrison, Geoffrey M. Abating Greenhouse Gas Emissions Through Cash for Clunker Programs. *Transportation Research Record Journal of the Transportation Research Board*. January 2009. [https://www.researchgate.net/publication/46440013\\_Abating\\_Greenhouse\\_Gas\\_Emissions\\_Through\\_Cash-for-Clunker\\_Programs/link/54e4d9700cf29865c3354eee/download](https://www.researchgate.net/publication/46440013_Abating_Greenhouse_Gas_Emissions_Through_Cash-for-Clunker_Programs/link/54e4d9700cf29865c3354eee/download)
- Sandler, Ryan. Clunkers or Junkers? Adverse Selection in a Vehicle Retirement Program. *American Economic Journal: Economic Policy*, Vol 4. No. 4. November 2012. [https://www.jstor.org/stable/23358252?seq=2#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/23358252?seq=2#metadata_info_tab_contents)

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<sup>91</sup> Sheldon, Tamara and Dua, Rubal. Vehicle Retirement and Replacement Policy: Assessing Impact and Cost-Effectiveness. King Abdullah Petroleum and Research Center. May 2018. <https://www.kapsarc.org/wp-content/uploads/2018/05/KS-2018-DP35-Vehicle-Retirement-and-Replacement-Policy-Assessing-Impact-and-Cost-Effectiveness.pdf>



## Public Transit

### Description

Policies to improve the efficiency of and expand public transit systems.

- E.g: “Transform to zero-emission fleets for ... public transportation by 2030” ([Vision for Equitable Climate Action](#), p. 8).
- “To reduce the U.S. transit system’s maintenance backlog and expand public transit access, Congress should build on the funding authorizations in the Moving Forward Act and at least double annual funding for new intercity passenger rail projects and public transit, including bus rapid transit. Federal transit law should incentivize transit agencies to improve service during peak periods and maintain a state of good repair for capital assets” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 104).
- “Congress should direct states to prioritize maintaining and improving existing infrastructure and bringing it up to a state of good repair, including roads, bridges, and tunnels, rather than prioritizing new roads or lanes” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 105).

Proposed by: [Vision for Equitable Climate Action](#); [Evergreen Action](#); [DNC Environment and Climate Crisis Council](#); [Joe Biden 2020 Presidential Campaign](#); [Access to Consumer Energy Information Act \(E-Access Act\) \(H.R. 5796\)](#); <sup>92</sup> [The Moving Forward Act \(H.R. 2\)](#); Andrew Yang 2020 Presidential Campaign; Cory Booker 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#); Julian Castro 2020 Presidential Campaign; Amy Klobuchar 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; Beto O’Rourke 2020 Presidential Campaign; [INVEST Act](#); [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations

- “Congress should add GHG emissions reduction to the list of transportation planning factors. Congress should require transportation plans to establish targets for reducing GHG pollution and VMT consistent with specific goals and require tracking of progress to meet these targets.” ([LPDD](#), p. 335)
- “The federal government should devote a larger share of transportation funding to providing meaningful alternatives to driving, and to increase funding for projects that better connect various modes in order to expand transportation choices.” ([LPDD](#), p. 344)
- “Congress should adopt a “fix it first” approach and place a greater emphasis on the maintenance, repair, and replacement of existing infrastructure.” ([LPDD](#), p. 336)

### LPDD Resources

- LPDD.org, “Reorienting Transportation Planning to Minimize GHGs”: <https://lpdd.org/pathway/reorienting-transportation-planning-to-minimize-ghgs/>

### Previous/Current Implementation

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<sup>92</sup> Access to Consumer Energy Information Act (E-Access Act). H.R. 5796, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5796?s=1&r=8>

- A number of cities have implemented initiatives to electrify public transit: Los Angeles aims to electrify by 2030, and Seattle aims to deploy 120 electric buses by 2020 ([GoEV City](#)).<sup>93</sup>
- “The last major federal transportation legislation authorized an average \$45 billion annual federal expenditure on highways, but provided only \$12.2 billion in average annual transit investments. Furthermore, federal funding will cover 80% of the cost of a highway project, but only 50% of a transit project” ([Evergreen Action Plan](#), p. 17).
- It is currently easier to obtain funding for funding than for new transit projects. Federal law allocates 20% of Highway Trust Fund monies to transit, but state and local governments spend these funds almost entirely on maintenance of existing systems. The American Public Transportation Association has identified at least \$232 billion in critical public transportation projects in need of funding ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 104).

### Impact on GHGs

- “The more passengers that are riding a bus or train, the lower the emissions per passenger mile. For instance, U.S. bus transit, which has about a quarter (28%) of its seats occupied on average, emits an estimated 33% lower greenhouse gas emissions per passenger mile than the average U.S. single occupancy vehicle. The savings increases to 82% for a typical diesel transit bus when it is full with 40 passengers” ([Public Transportation’s Role in Responding to Climate Change](#)).<sup>94</sup>
- Communities with strong public transportation can reduce the nation’s carbon emissions by 37 million metric tons yearly ([Center for Climate and Energy Solutions](#)).

### Co-Benefits

- According to the American Public Transit Association (APTA), the necessary public investments in transit systems could support millions of construction and operations jobs and catalyze nearly \$1 trillion in economic activity during the next 20 years ([Evergreen Action Plan](#), p. 17).
- Public transportation also reduces traffic accidents, road and parking infrastructure costs, automobile costs to customers, and harmful emissions from cars ([Evaluating Public Transit Benefits and Costs](#)).<sup>95</sup>
- Every \$1 billion invested in public transit creates 49,700 jobs and economic returns of \$5 billion of GDP growth over 20 years (American Public Transportation Association. [Economic Impact of Public Transportation Investment](#). April 2020).<sup>96</sup>

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<sup>93</sup> “Electrify Public Transportation: Policy Toolkit.” *GoEV City*. Accessed July 2020. <https://www.goevcity.org/electrify-public-transportation>

<sup>94</sup> Public Transportation’s Role in Responding to Climate Change. U.S. Department of Transportation and Federal Transit Administration. January 2010. <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/PublicTransportationsRoleInRespondingToClimateChange2010.pdf>

<sup>95</sup> Litman, Todd. Evaluating Public Transit Benefits and Costs: Best Practice Guidebook. Victoria Transport Institute. June 5, 2020. <https://www.vtpi.org/tranben.pdf>

<sup>96</sup> American Public Transportation Association. Economic Impact of Public Transportation Investment. April 2020. <https://www.apta.com/wp-content/uploads/APTA-Economic-Impact-Public-Transit-2020.pdf>

### Obstacles/Shortfalls

Barriers to electric buses: Key financial barriers emerge from 1) the difficulties agencies face to make the necessary changes to rigid procurement structures and 2) the lack of long-term, sustainable financing options. Key technological barriers are created by 1) the lack of relevant information for decision-making and 2) the current operational limitations of e-buses and charging infrastructure ([World Resources Institute](#)).<sup>97</sup>

### Additional Resources

- “Electrify Public Transportation: Policy Toolkit.” *GoEV City*.  
<https://www.goevcity.org/electrify-public-transportation>
- American Public Transportation Association. Public Transportation Reduces Greenhouse Gases and Conserves Energy: The Benefits of Public Transportation. 2008.  
[https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/greenhouse\\_brochure.pdf](https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/greenhouse_brochure.pdf)
- Sclar, Ryan, Gorguinpour, Camron, Castellanos, Sebastian, and Li, Xiangyi. Barriers to Adopting Electric Buses. World Resources Institute. May 2019.  
<https://www.wri.org/publication/barriers-adopting-electric-buses>
- Quarles, Neil, Kockelman, Kara M. and Mohamed, Moataz. Costs and Benefits of Electrifying and Automating Bus Transit Fleets. *Sustainability*, Vol. 12. 2020.  
[https://www.caee.utexas.edu/prof/kockelman/public\\_html/TRB18AeBus.pdf](https://www.caee.utexas.edu/prof/kockelman/public_html/TRB18AeBus.pdf)

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<sup>97</sup> Sclar, Ryan, Gorguinpour, Camron, Castellanos, Sebastian, and Li, Xiangyi . [Barriers to Adopting Electric Buses](#). World Resources Institute. May 2019. <https://www.wri.org/publication/barriers-adopting-electric-buses>

## Intercity Transit (High Speed Rail)

### Description

- “It is crucial that the next President and Congress work together to build an integrated American rail system, much like developed nations in Europe and Asia. This would entail major new federal investments in electrifying passenger and rail throughout the country, expanding existing rail lines, and offering federal investments to states and regional partnerships to further develop ultra-high-speed rail” ([Evergreen Action Plan](#), p. 9).
- “The next President can order EPA to [set] emission standards for trains to ensure the transition of this sector to 100% clean and renewable electric power by no later than 2030” ([Legal Authority for Presidential Executive Action on Climate](#), p. 24).
- To expand high speed rail, Joe Biden plans to “tap existing federal grant and loan programs at the U.S. Department of Transportation, and improve and streamline the loan process. In addition, Biden will work with Amtrak and private freight rail companies to further electrify the rail system” ([Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy; [Vision for Equitable Climate Change](#) (p. 8); [Elizabeth Warren 2020 Presidential Campaign](#); [Legal Authority for Presidential Executive Action on Climate](#) (p. 24); [DNC Environment and Climate Crisis Council](#) (p. 5); [Evergreen Action](#) (p. 9); [The Moving Forward Act \(H.R. 2\)](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 134); Cory Booker 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#); [INVEST Act](#)

### Previous/Current Implementation

- High speed rail is currently limited in the U.S. The Amtrak Acela, the singular rail line that reaches high speeds, can travel up to 150 mph for only 7% of its track span. However, there is interest in expanding high speed rail in the U.S.
- Congress provided a total of \$4.17 billion to various high speed rail projects between 1990 and 2007, an average of \$232 million annually. The American Recovery and Reinvestment Act (ARRA) of 2009 provided \$8 billion specifically for intercity passenger rail projects, including high speed rail projects ([The Development of High Speed Rail in the United States: Issues and Recent Events](#), Congressional Research Service, pp. 2-3).<sup>98</sup>

### Impact on GHGs

Electrifying all U.S. trains by 2030 would reduce U.S. emissions by .6% in 2050 compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)). However, if high speed rail reduced vehicle miles traveled as passengers switched to train transport, emissions would reduce further.

### Co-Benefits

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<sup>98</sup> Peterman, David Randall, Frittelli, John, and Mallett, William J. The Development of High Speed Rail in the United States: Issues and Recent Events. Congressional Research Service. December 2013. <https://fas.org/sgp/crs/misc/R42584.pdf>

- Electrifying and expanding high-speed intercity rail would “create jobs, save time and money for working families, and connect disparate rural and urban population centers with more convenient, carbon-free inter-regional transportation” ([Evergreen Action Plan](#), p. 9).
- Expanding high-speed rail would also “reduce pollution, connect workers to good union jobs, slash commute times, and spur investment in communities that will now be better linked to major metropolitan areas” ([Joe Biden 2020 Presidential Campaign](#)).

#### Obstacles/Shortfalls

Developing high speed rail would require significant upfront capital investment.

#### Additional Resources

- Peterman, David Randall, Frittelli, John, and Mallett, William J. “The Development of High Speed Rail in the United States: Issues and Recent Events.” Congressional Research Service. December 2013. <https://fas.org/sgp/crs/misc/R42584.pdf>
- Clewlow, Regina Ruby Lee. “The Climate Impacts of High-Speed Rail and Air Transportation: A Global Comparative Analysis.” Massachusetts Institute of Technology. 2012. [http://web.mit.edu/hsr-group/documents/Clewlow\\_Thesis\\_2012.pdf](http://web.mit.edu/hsr-group/documents/Clewlow_Thesis_2012.pdf)

## Bicycles and Walking

### Description

- “Localities should consider transportation plans that promote biking, walking” ([Evergreen Action Plan](#), p. 19)
- “Align transportation spending with goals to reduce vehicle miles traveled and increase public transit, walking, bicycling, and electric bicycle use. ... [Tie] tax incentives for development or rehabbing low- income, affordable rental housing to transit and walkability criteria (pp. 8, 9)” ([DNC Environment and Climate Crisis Council](#)).
- “Congress should update, reauthorize, and increase funding for the [Transportation Alternatives Program](#)<sup>99</sup> and other programs to make roads safer for bicyclists, pedestrians, and other vulnerable users. ... Congress should create a new grant program for communities to pilot innovative projects to reduce carbon pollution and vehicle miles traveled, such as car-free zones and superblocks.” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 111).
- “Congress should repeal the suspension of the tax exclusion for employer-provided fringe benefits for bicycle commuting and expand the Section 132 bicycle commuter tax benefit to support zero-carbon transportation choices” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 112).

Cross-reference: [Complete Streets](#)

Proposed by: [Vision for Equitable Climate Action](#) (p. 8); [Joe Biden 2020 Presidential Campaign - Climate](#); [DNC Environment and Climate Crisis Council](#) (p. 5); [Complete Streets Act \(H.R. 3663/S. 2077\)](#);<sup>100</sup> [The Moving Forward Act \(H.R. 2\)](#), Section 1107; [The Safe And Friendly for the Environment \(SAFE\) Streets Act \(H.R. 3040\)](#);<sup>101</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### LPDD Recommendations

- “FHwA should modify street design standards to make them more flexible and context-sensitive in order to pro-mote non-motorized transportation.” ([LPDD](#), p. 345)

### LPDD Resources

- LPDD.org, “Promoting Alternatives to Car Transport”:  
<https://lpdd.org/pathway/promoting-alternatives-to-car-transport/>

### Previous/Current Implementation

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<sup>99</sup> USDOT Transportation Alternatives Set-Aside Program. *Adaptation Clearinghouse*. [https://www.adaptationclearinghouse.org/resources/usdot-transportation-alternatives-set-aside-program.html#:~:text=The%20Transportation%20Alternatives%20Program%20\(TAP,mitigation%2C%20and%20creating%20or%20improving](https://www.adaptationclearinghouse.org/resources/usdot-transportation-alternatives-set-aside-program.html#:~:text=The%20Transportation%20Alternatives%20Program%20(TAP,mitigation%2C%20and%20creating%20or%20improving)

<sup>100</sup> The Complete Streets Act. H.R. 3663/S. 2077, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/2077>

<sup>101</sup> The SAFE Streets Act. H.R. 3040, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/3040/text?r=6&s=1>

- “Portland was the first U.S. government to adopt a climate action plan in 1993 in which active transportation was given a central role. Portland has built more than 100 miles of trails and bike lanes just since 2001. This and earlier investments in infrastructure and programming have resulted in a quintupling of bike miles traveled over the last 15 years” ([Walking, Biking and Climate Change](#)).<sup>102</sup>
- As of 2017, there were 119 cities in the U.S. with bike share programs ([Greater Greater Washington](#)).<sup>103</sup>
- Over 1,600 [Complete Streets](#) policies have been passed in the United States, including in 35 states, Puerto Rico, and the District of Columbia ([Smart Growth America](#)).<sup>104</sup>
- NYC’s Go Safe Go Green campaign “provided curricula emphasizing the health and environmental benefits of walking and bicycling through outreach programs and mileage clubs encouraging participants to walk 10,000 steps daily. NYCDOT is promoting pedestrian and bicyclist safety to new immigrant groups through the Safe Kids Coalition injury prevention program” ([U.S. Department of Transportation](#)).<sup>105</sup>
- “The Fixing America’s Surface Transportation (FAST) Act authorized funding for programs and projects defined as transportation alternatives, including pedestrian and bicycle infrastructure, recreational trail projects, and walking paths to schools. The FAST Act set aside \$850 million for each year in FY2018-2020 for these transportation alternatives from the Surface Transportation Block Grant program funding” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), 110).
- The [Transportation Alternatives Set-Aside Program](#)<sup>106</sup> (TA Set-Aside; formerly known as Transportation Alternatives Program, or TAP) is administered by the U.S. Federal Highway Administration (FHWA) and helps states fund a variety of activities related to improving transportation assets, including on- and off-road pedestrian and bicycle facilities, environmental mitigation, and creating or improving recreational trails projects.

### Impact on GHGs

If 14% of the world’s travel in cities is by bike in 2050, emissions from urban transportation will decrease by 11% ([A Global High Shift Cycling Scenario](#)).<sup>107</sup>

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<sup>102</sup>“The Short Trip with Big Impacts: Walking, Biking and Climate Change.” Rails to Trails Conservancy. 2007. <https://www.railstotrails.org/resourcehandler.ashx?id=3766>

<sup>103</sup> Malouff, Dan. “All 119 US Bikeshare Systems, Ranked by Size.” *Greater Greater Washington*. January 26, 2017. <https://gwwash.org/view/62137/all-119-us-bikeshare-systems-ranked-by-size>

<sup>104</sup> “Complete Streets Policies Nationwide.” *Smart Growth America*. <https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/policy-development/policy-atlas/>

<sup>105</sup> “Encourage and Promote Safe Bicycling and Walking.” *U.S. Department of Transportation*. Accessed July 2020. <https://www.transportation.gov/mission/health/Encourage-and-Promote-Safe-Bicycling-and-Walking>

<sup>106</sup> USDOT Transportation Alternatives Set-Aside Program. *Adaptation Clearinghouse*. Accessed July 2020 [https://www.adaptationclearinghouse.org/resources/usdot-transportation-alternatives-set-aside-program.html#:~:text=The%20Transportation%20Alternatives%20Program%20\(TAP,mitigation%2C%20and%20creating%20or%20improving](https://www.adaptationclearinghouse.org/resources/usdot-transportation-alternatives-set-aside-program.html#:~:text=The%20Transportation%20Alternatives%20Program%20(TAP,mitigation%2C%20and%20creating%20or%20improving)

<sup>107</sup> Mason, Jacob, Fulton, Lew, and McDonald, Zane. “A Global High Shift Cycling Scenario: The Potential for Dramatically Increasing Bicycle and E-bike Use in Cities Around the World, with Estimated Energy, CO<sub>2</sub>, and Cost Impacts.” Institute for Transportation & Development Policy and the University of California, Davis. November 12, 2015. [https://itdpdotorg.wpengine.com/wp-content/uploads/2015/11/A-Global-High-Shift-Cycling-Scenario\\_Nov-2015.pdf](https://itdpdotorg.wpengine.com/wp-content/uploads/2015/11/A-Global-High-Shift-Cycling-Scenario_Nov-2015.pdf)



### Obstacles/Shortfalls

- “Only a few bike share systems are economically self-sustaining on system revenues alone (i.e. operating costs are greater than system revenues). Therefore, the organization responsible for the program (city, public agency, non-profit, or private company) must ensure that enough funding is available to support all expenditures related to the implementation of a bike share program (capital purchases, expansion, and ongoing operations)” ([Risks and Benefits of Bike Share](#), p. 24).<sup>108</sup>
- “A major part of operating a bike share system is the rebalancing process (i.e., moving bikes around from full stations to empty stations to ensure the availability of bicycles and empty docks). Typically, in larger systems this operation is undertaken by cargo vans. Because of the relatively high cost and low availability of non-greenhouse gas options for rebalancing vehicles, there are only few operations that utilize electric or other environmentally friendly vehicles. ... While there has not been a conclusive and extensive study on the impact of these vehicles on the overall GHG’s emissions, this negative impact should be noted” ([Risks and Benefits of Bike Share](#), p. 25).<sup>109</sup>

### Additional Resources

- Kuzmyak, Richard J. and Dill, Jennifer. “Walking and Bicycling in the United States - The Who What, Where, and Why.” 2012.  
<https://onlinepubs.trb.org/onlinepubs/trnews/trnews280www.pdf>
- “A Research Roadmap for Transportation and Public Health. Highway Safety Research Center and Injury Prevention Research Center University of North Carolina Chapel Hill, NC.” June 2019.  
[http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_932MethodsBackground.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_932MethodsBackground.pdf)
- “Bike Share and Micromobility Initiative”. National Association of City Transportation Officials. <https://nacto.org/program/bike-share-initiative/>
- “Risks and Benefits of Bike Share.” *Bike Share Feasibility Analysis*. City of Wilmington. 2013. <https://www.wilmingtonde.gov/home/showdocument?id=574>
- Amy E. Turner, “Legal Tools for Achieving Low-Traffic Zones,” 50 ELR 10329 (2020), <https://climate.law.columbia.edu/sites/default/files/content/docs/Legal%20Tools%20for%20Achieving%20Low%20Traffic%20Zones.10329.pdf>

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<sup>108</sup> “Risks and Benefits of Bike Share.” *Bike Share Feasibility Analysis*. City of Wilmington. 2013.  
<https://www.wilmingtonde.gov/home/showdocument?id=574>

<sup>109</sup> “Risks and Benefits of Bike Share.” *Bike Share Feasibility Analysis*. City of Wilmington. 2013.  
<https://www.wilmingtonde.gov/home/showdocument?id=574>



## “Complete Streets”

### Description

Complete streets “are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They allow buses to run on time and make it safe for people to walk to and from train stations” ([Smart Growth America](#)).<sup>110</sup>

- Massively redirect resources and incentives to implementing “complete streets,” which are designed and operated for all users ([Vision for Equitable Climate Action](#) p. 8).
- “Congress should require states to use ‘complete streets’ and context-sensitive principles when designing and implementing transportation projects and provide grant funding to support associated infrastructure investment” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 109).

Proposed by: [Vision for Equitable Climate Action](#) (p. 8); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [The Complete Streets Act \(H.R. 3663/S. 2077\)](#);<sup>111</sup> [The Moving Forward Act \(H.R. 2\)](#), Section 1107

### Previous/Current Implementation

Over 1,600 Complete Streets policies have been passed in the United States, including in 35 states, Puerto Rico, and the District of Columbia ([Smart Growth America](#)).<sup>112</sup>

### Impact on GHGs

- Each commuter who transitions from driving to transit reduces emissions by 4,800 pounds (2 metric tons) each year. Between 1990 and 2003, Boulder, Colorado saw a decrease in the number of solo-drivers and an increase in bicyclists. Transit trips also grew by 500% over this time. As a result, the city’s annual CO<sub>2</sub> emissions reduced by 500 thousand pounds or 226 metric tons ([Complete Streets Fight Climate Change](#), *Smart Growth America*, p. 2).<sup>113</sup>
- Implementing Transportation Demand Management, which reduces public demands for high-emitting modes of transportation, could reduce U.S. emissions by up to 4.6% by 2030 compared to a BAU Baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

Complete streets enhance public safety and equal access to public infrastructure. They also promote mobility, which improves public health. Furthermore, decreased car usage lowers emissions of harmful pollutants such as nitrogen oxides and sulfur dioxide, which have adverse health and ecological impacts. Finally, complete streets provide economic benefits by reducing

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<sup>110</sup> “What are Complete Streets?” *Smart Growth America*. <https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/what-are-complete-streets/>

<sup>111</sup> The Complete Streets Act. H.R. 3663/S. 2077, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/2077>

<sup>112</sup> “Complete Streets Policies Nationwide.” *Smart Growth America*. <https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/policy-development/policy-atlas/>

<sup>113</sup> National Complete Streets Coalition. “Complete Streets Fight Climate Change.” *Smart Growth America*. Accessed July 2020. <https://www.smartgrowthamerica.org/app/legacy/documents/cs/factsheets/cs-climate.pdf>

costs associated with transportation delays, increasing property values, and increasing employment ([Safer Streets, Stronger Economies](#), *Smart Growth America*).<sup>114</sup>

### Studies of Efficacy

- “Measuring the Impact of Complete Streets Projects: Preliminary Field Testing - Final Report.” University of Buffalo Department of Rehabilitation Science and Center for Inclusive Design & Environmental Access. December 2016. <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Transportation/16-19-Measuring-Impact-of-Complete-Streets-Projects.pdf>

### Obstacles and Shortfalls

Depending on the proposed features, complete streets can be costly to implement, despite lowered operational costs and long-term benefits ([American Planning Association](#)).<sup>115</sup>

### Additional Resources

- Complete streets fact sheets:
  - Smart Growth America Fact Sheets.  
[https://smartgrowthamerica.org/resources?resource\\_type=fact-sheet&authors=&category\\_name=complete-streets&s=](https://smartgrowthamerica.org/resources?resource_type=fact-sheet&authors=&category_name=complete-streets&s=)
- In this study of 37 projects, Smart Growth America found that Complete Streets projects tended to improve safety for pedestrians, increased biking and walking, and showed a mix of increases and decreases in automobile traffic, depending in part on the project goals:
  - Anderson, Geoff and Searfoss, Laura. “Safer Streets, Stronger Economies - Complete Streets Project Outcomes from Across the Country.” March 2015. <https://www.smartgrowthamerica.org/app/uploads/2016/08/safer-streets-stronger-economies.pdf>
- This article reveals the need for street planning to focus not solely on engineering fixes, but on communities as well:
  - Toth, Gary. “Are Complete Streets Incomplete?” Project for Public Spaces. November 16, 2011. <https://www.pps.org/article/are-complete-streets-incomplete>

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<sup>114</sup> Anderson, Geoff and Searfoss, Laura. Safer Streets, Stronger Economies - Complete Streets Project Outcomes from Across the Country. March 2015. <https://www.smartgrowthamerica.org/app/uploads/2016/08/safer-streets-stronger-economies.pdf>

<sup>115</sup> APA Policy Guide on Smart Growth. American Planning Association. 2012. <http://www.planning.org/policy/guides/adopted/smartgrowth.htm>

## Transportation Planning

### Description

- “Steps should be taken at the federal, state, regional, and local levels to remove subsidies for driving; send better price signals to help internalize the costs of driving; remove barriers to low and zero-carbon transportation alternatives and provide meaningful rail, transit, bicycling, and walking options; and promote more compact, mixed-use development patterns that can shorten or eliminate trips” ([LPDD Resources](#), ch. 13).
- “Localities should consider transportation plans that promote biking, walking and shared micro-mobility options such as electric scooters and e-bikes” ([Evergreen Action Plan](#), p. 19).
- “The Biden Administration will transform the way we fund local transportation, giving state and local governments, with input from community stakeholders, more flexibility to use any new transportation funds to build safer, cleaner, and more accessible transportation ecosystem” ([Joe Biden 2020 Presidential Campaign](#)).
- “Congress should amend EPCA to encourage states eligible for funding under the DOE State Energy Program to include state energy transportation plans in their energy conservation plans. The state energy transportation plans should focus on vehicle electrification and upgrades to the power grid to manage new demand. Congress should authorize new funding to support states in this additional planning” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 99).
- Create incentives for shared vehicles to replace individually-owned vehicles ([Saving Oil and Reducing Greenhouse Gas Emissions through U.S. Federal Transportation Policy](#)).<sup>116</sup>
- Create incentives for teleworking and flexible/compressed work schedules to reduce peak travel and overall driving (Project Drawdown, [100 Solutions to Reverse Global Warming](#); [Legal Pathways to Deep Decarbonization in the U.S.](#)).

Cross-Reference: [Complete Streets](#), [Bicycles and Walking](#)

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Vision for Equitable Climate Action](#); [DNC Environment and Climate Crisis Council](#); [Center for Climate and Energy Solutions](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Project Drawdown](#); [100 Solutions to Reverse Global Warming](#); [Legal Pathways to Deep Decarbonization in the U.S](#)

### LPDD Recommendations

- “The federal government should pursue reforms that better link transportation and land use, including targeting transportation funding and planning resources to encourage transit-oriented development. The federal government should offer more generous financial incentives and technical assistance to promote infill, renovation, and redevelopment.” ([LPDD](#), p. 347)

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<sup>116</sup> Nigro, Nick and Burbank, Cynthia J. Saving Oil and Reducing Greenhouse Gas Emissions through U.S. Federal Transportation Policy. Center for Energy and Climate Solutions. February 2011.  
<https://www.czes.org/document/saving-oil-and-reducing-greenhouse-gas-emissions-through-u-s-federal-transportation-policy/>

- “Congress should add GHG emissions reduction to the list of transportation planning factors. FHWA should reinstate a 2017 rule requiring state and regional planning agencies to track carbon emissions from vehicles traveling on the National Highway System, to establish targets for reducing these emissions, and to report on progress in meeting targets, or alternatively, Congress should require transportation plans to establish these targets and tracking requirements.” ([LPDD](#), p. 335)

#### Previous/Current Implementation

- In 2020, San Francisco [approved a new development](#)<sup>117</sup> at the former Potrero Power Station. The new development, the Potrero Power Station Mixed-Use Project, will be a 29-acre sustainable community project designed to include walkable blocks, pedestrian and cyclist connections between open spaces, and new shared transportation modes ([LPDD Resources](#)).
- The Central Business District Tolling Program, a congestion pricing proposal, was [approved in 2019 as part of the New York State Budget](#). While pricing, exemptions, and other details of the law have yet to be finalized, the plan seeks to raise \$15 billion for public transit upgrades ([LPDD Resources](#)).
- The Boston Regional Metropolitan Planning Organization’s [Transportation Improvement Program](#),<sup>118</sup> the region’s five-year transportation capital investment plan, uses GHG and VMT reductions as a factor in assessing projects for funding ([LPDD Resources](#)).
- [State laws](#)<sup>119</sup> promote alternatives to car transport, including by incentivizing EVs, designing complete streets, and expanding public transport.

#### Impact on GHGs

- Achieving 100% zero emissions for all new light-duty passenger vehicles, medium-duty trucks and all buses by 2030 would reduce U.S. GHG emissions by 7% in 2030, 11.5% in 2040 and <7% in 2050 compared to a 2020 baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).
- Implementing Transportation Demand Management, which reduces public demands for high-emitting modes of transportation, could reduce U.S. emissions by up to 4.6% in 2030 compared to a BAU Baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

#### Co-Benefits

Transportation planning can increase safety for pedestrians and cyclists, improve air quality by reducing emissions of pollutants from vehicles, increase mobility and thus health outcomes, and reduce costs associated with transportation delays.

#### Obstacles/Shortfalls

- Adding new transportation features can come with high upfront costs.

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<sup>117</sup> “Potrero Power Station.” *San Francisco Planning*. Accessed July 2020. <https://sfplanning.org/potrero-power-station>

<sup>118</sup> Boston Region Metropolitan Planning Organization. Transportation Improvement Program: Federal Fiscal Years 2017–2021. July 28, 2016. <https://perma.cc/R53E-QQZX>

<sup>119</sup> “Promoting Alternatives to Car Transport.” *Model Laws for Deep Decarbonization*. 2020. <https://lpdd.org/pathway/promoting-alternatives-to-car-transport/>

- “One of the largest obstacles to efficient travel management is the lack of information. Many commuters simply do not know the range of travel options available to them, their cost, how to use them, or when they are available. Uncertainty is a tremendous deterrent. Getting information out broadly is a major challenge and can require substantial cost, but it can also bring about the largest return on investment” ([Walking and Bicycling in the United States - The Who What, Where, and Why](#), 2012).

#### Additional Resources

- Kuzmyak, Richard J. and Dill, Jennifer. “Walking and Bicycling in the United States - The Who What, Where, and Why.” 2012.  
<https://onlinepubs.trb.org/onlinepubs/trnews/trnews280www.pdf>

## Clean and Renewable Fuels

### Description

- “The next administration should “transform the post-2022 RFS into a Clean & Renewable Fuel Standard (CRFS) that promotes low-carbon biofuels and more low- and zero-carbon alternative fuels, including electricity” ([Evergreen Action Plan](#), p. 20).
- “Directs the EPA Administrator to approve petitions for renewable fuel pathways if 90 days or more have passed since the date of the petition’s submission and when the fuel type, production process, and feedstock submitted have been approved for sale in at least one state under a program to reduce the carbon intensity of transportation fuel” ([CLEAN Future Act](#), Summary p. 11)
- “Congress should develop a Low Carbon Fuel Standard to build on the Renewable Fuel Standard. The standard should set a technology- and feedstock-neutral benchmark for liquid and non-liquid fuels tied to a life cycle assessment of the carbon intensity of the fuels. The carbon intensity standard should become more stringent (lower) over time. ... The standard should include guardrails to prevent conversion of any non-agricultural lands into cropland, particularly sensitive lands with high carbon sequestration and biodiversity value. For renewable liquid fuels, the LCFS should reward entities in the value chain, including farmers and producers, that use climate-smart practices that reduce carbon emissions, store soil carbon, and reduce nitrous oxide emissions” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 102)

Proposed by: [Evergreen Action](#); [CLEAN Future Act](#) (Summary p. 11); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 102)

### LPDD Recommendations

- “Congress could add hydrogen and synthetic natural gas to the RFS mandate.” ([LPDD](#), p. 669)
- “Congress could convert the RFS volume requirements to “percentage of final demand,” thus allowing for adjust-ments over time that align with declining demand for gasoline as vehicle efficiency and mobility electrification increases. Congress could modify the RFS to phase out credits for grandfathered facilities. If EPA’s authority to do so is limited, Congress could amend the RFS to allow for a ‘multiplier for per-unit emis-sions reductions’ designed to hasten growth in feedstocks that meet the ‘near zero’ criterion.” ([LPDD](#), p. 665)
- “Congress should amend the RFS to move away from promoting cellulosic ethanol—for the reasons stated above— by reducing applicable ethanol blending volumes and increasing volume mandates for biomass-based diesel. Congress should reform the 2010 RFS to move from an absolute volume of mandated production to a percentage of final demand, which will be necessary as overall gasoline demand declines due to the improvements in the transportation sector. Congress should require use of a life-cycle analysis, whether as part of the RFS or a low-carbon fuel standard, to provide an incentive to achieve decarbonization in the production and delivery of liquid fuels.” ([LPDD](#), p. 702)

### LPDD Resources

- LPDD.org, “Renewable Gas Standards”: <https://lpdd.org/pathway/renewable-gas-standards/>
- LPDD.orgm “Financial Incentives for Renewable Gas Production”: <https://lpdd.org/pathway/financial-incentives-for-renewable-gas-production/>
- LPDD.org, “Renewable Fuel Standards”: <https://lpdd.org/pathway/renewable-fuel-standards/>
- LPDD.org, “Low Carbon Fuel Standards”: <https://lpdd.org/pathway/low-carbon-fuel-standards/>

### Previous/Current Implementation

- The National [Renewable Fuel Standard](#)<sup>120</sup> was created by the [Energy Policy Act of 2005](#)<sup>121</sup> and was expanded and extended by the [Energy Independence and Security Act of 2007](#)<sup>122</sup> (EISA).
- California’s [Low Carbon Fuel Standard](#)<sup>123</sup> was adopted in 2009 and aims to reduce the carbon intensity of the transportation fuel pool by at least 20% by 2030.

### Impact on GHGs

Expanding California’s LCFS goal to a national level would reduce U.S. GHG emissions by 3.1% in 2030 compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

Clean fuel use improves air quality (“[Biodiesel Benefits and Considerations](#),” *U.S. Department of Energy*).<sup>124</sup>

### Obstacles/Shortfalls

Biofuels, which are renewable fuels, require land, water, and other resources. “There is debate over the neutrality of bioethanol’s carbon emissions; during production a large amount of carbon dioxide is released. Implementing more bioethanol would require modifications to many vehicles. Many older engines cannot even use 10% ethanol-petrol mixtures. There is large debate about the shift of crop use from food production to fuel production and the fear that it will impact the prices of food around the world. Using higher amounts of ethanol reduces fuel economy” ([Drawbacks of Bioethanol](#), Lafayette.Edu).<sup>125</sup>

### Additional Resources

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<sup>120</sup> Congressional Research Service. The Renewable Fuel Standard (RFS): An Overview. April 14, 2020. <https://fas.org/sgp/crs/misc/R43325.pdf>

<sup>121</sup> “Energy Policy Act of 2005.” *Alternative Fuels Data Center*. U.S. DOE. Accessed July 2020. [https://afdc.energy.gov/laws/epact\\_2005.html](https://afdc.energy.gov/laws/epact_2005.html)

<sup>122</sup> “Summary of Energy Independence and Security Act of 2007.” U.S. Environmental Protection Agency. Accessed July 2020. <https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act>

<sup>123</sup> California Air Resources Board. “Low Carbon Fuel Standard.” <https://ww2.arb.ca.gov/sites/default/files/2020-05/basics-notes.pdf>

<sup>124</sup> “Biodiesel Benefits and Considerations.” *U.S. Department of Energy*. [https://afdc.energy.gov/fuels/biodiesel\\_benefits.html](https://afdc.energy.gov/fuels/biodiesel_benefits.html)

<sup>125</sup> “Drawbacks of Bioethanol.” *Lafayette.Edu*. <https://sites.lafayette.edu/egrs352-sp15-biofuels/drawbacks-of-bioethanol/>

- Congressional Research Service. “The Renewable Fuel Standard (RFS): An Overview.” April 14, 2020. <https://fas.org/sgp/crs/misc/R43325.pdf>
- Stock, James H. “The Renewable Fuel Standard: A Path Forward.” Center on Global Energy Policy - Columbia University. April 2015.  
[https://scholar.harvard.edu/files/stock/files/renewable\\_fuel\\_standard.pdf](https://scholar.harvard.edu/files/stock/files/renewable_fuel_standard.pdf)



## Highway Infrastructure

### Description

Proposed highway infrastructure projects include:

- Promoting the use of renewable energy in highway electricity usage (e.g., in roadway signs and lights, maintenance buildings, rest areas, and other facilities).
- [Adding solar panels to roadways](#).<sup>126</sup>
- [Stiffening roadways](#)<sup>127</sup> to reduce pavement deflection, which can increase truck fuel efficiency.
- “Prioritiz[ing] the repair of existing roads and bridges, which can begin more quickly and create more jobs than building new roads, and can do more to ease congestion, thereby reducing emissions” ([Center for Climate and Energy Solutions](#), p. 2)
- “Set[ting] higher thresholds or criteria for funding of new roadway capacity projects, such as well-defined progress in achieving a state of good repair and meeting certain performance metrics, and ensur[ing] states have a financial plan to maintain the new roadway, lanes, or other infrastructure” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 105).

Proposed by: [Center for Climate and Energy Solutions](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 105); [Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy; [INVEST Act](#).

### LPDD Recommendations

- “FHwA should reinstate a 2017 rule requiring state and regional planning agencies to track carbon emissions from vehicles traveling on the National Highway System, to establish targets for reducing these emissions, and to report on progress in meeting targets.” ([LPDD](#), p. 335)

### Previous/Current Implementation

Some state departments of transportation have chosen to meet a portion of their electricity needs by installing solar energy projects in highway rights-of-way (ROW) and at other state DOT facilities ([Renewable Energy Generation in the Highway Right-of-Way](#)).<sup>128</sup>

### Impact on GHGs

- Road stiffness: researchers at MIT “looked at total emissions over the next 50 years and considered the reductions that would be achieved by improving anywhere from 2 percent of road surfaces to 10 percent each year. With a 10 percent improvement rate, they calculated, a total of 440 megatons of carbon dioxide-equivalent emissions would be avoided over the

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<sup>126</sup> Solar Roadways - A Real Solution. SolarRoadways.Com.  
[https://solarroadways.com/#:~:text=Solar%20Roadways%C2%AE%20\(SR\)%20is,microprocessors%2C%20which%20makes%20them%20intelligent.](https://solarroadways.com/#:~:text=Solar%20Roadways%C2%AE%20(SR)%20is,microprocessors%2C%20which%20makes%20them%20intelligent.)

<sup>127</sup> Chandler, David L. “Stiffer Roadways Could Improve Truck Fuel Efficiency.” *MIT News*. June 11, 2020.  
<http://news.mit.edu/2020/stiffer-roadways-improve-truck-efficiency-emissions-0611>

<sup>128</sup> Renewable Energy Generation in the Highway Right-of-Way. Accessed July 2020. [https://www.ssti.us/wp/wp-content/uploads/2016/07/FHWA-solar\\_ROW.pdf](https://www.ssti.us/wp/wp-content/uploads/2016/07/FHWA-solar_ROW.pdf)

50 years, which is about 0.5 percent of total transportation-related emissions for this period.” ([Stiffer Roadways Could Improve Truck Fuel Efficiency](#)).<sup>129</sup>

#### Co-Benefits

- When compared to conventional roads, solar roads have safer driving conditions (Channi, [Solar Pavement: Smart Means of Transportation](#), 2019). The Solar Roadway could charge the EVs while they’re traveling, which would increase their range ([SolarRoadways.Com](#)).
- “Investing in fully tackling the road and bridge repair backlog could create as many as five million jobs” ([Thirdway.Org](#)).

#### Obstacles/Shortfalls

Solar roadways have high initial costs (Channi, [Solar Pavement: Smart Means of Transportation](#), 2019).<sup>130</sup>

#### Additional Resources

- This webpage describes the benefits of highway renewable energy projects to state DOTs and provides examples:
  - Hodges, Tina and Plovnick, Amy. “Renewable Roadsides.” U.S. Department of Transportation Federal Highway Administration. 2019.  
<https://www.fhwa.dot.gov/publications/publicroads/19winter/04.cfm>
- This report summary gives examples of potential uses for highway rights of way:
  - “Future Uses of Highway Rights of Way.” U.S. Department of Transportation Federal Highway Administration. Office of Transportation Policy Studies. April 2012. <https://www.fhwa.dot.gov/policy/otps/rowstudyproj.cfm>
- This article argues that governments should prioritize rebuild existing roads and bridges to withstand climate impacts:
  - Laska, Alexander. “Resilient and Ready for Recovery: Investing Smart in Surface Transportation.” *Third Way*. April 7, 2020.  
<https://www.thirdway.org/memo/resilient-and-ready-for-recovery-investing-smart-in-surface-transportation>

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<sup>129</sup> Chandler. “Stiffer Roadways.” <http://news.mit.edu/2020/stiffer-roadways-improve-truck-efficiency-emissions-0611>

<sup>130</sup> Channi, Harpreet Kaur. Solar Pavement: Smart Means of Transportation. February 2019.  
[https://www.researchgate.net/publication/331159481\\_Solar\\_Pavement\\_Smart\\_Means\\_of\\_Transportation](https://www.researchgate.net/publication/331159481_Solar_Pavement_Smart_Means_of_Transportation)

## Aviation

### Description

Policies to reduce emissions from air travel:

- Increasing biofuel usage, implementing aviation carbon charges and fuel taxes, improving aviation efficiency, promoting advanced aviation technology, pursuing aviation demand reductions, and reducing operational emissions (LPDD Resources, [ch. 16](#)).
- EPA must promulgate emission standards for GHG emissions from new and existing in-service aircraft engines to achieve a minimum of 50 percent emission reductions by 2031 (CLEAN Future Act, [Summary](#), p. 11).
- Achieve low to zero emissions in the aviation sector by no later than 2050 ([Vision for Equitable Climate Action](#), p. 9).
- “Congress should increase funding for federal RDD&D at NASA, DOE, FAA, and other relevant agencies into sustainable aviation fuels, electrified propulsion systems, advanced materials, and more energy-efficient aviation technology.” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 130).
- “Before the tax credit expires in 2022, Congress should strengthen the sustainable aviation fuels tax credit to include a life-cycle carbon intensity requirement and extend it for at least five years to provide market certainty” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 131)
- “Congress should create a new competitive grant program and/or cost-sharing program at DOT and/or DOE to support projects to develop, transport, or store sustainable aviation fuels that are less carbon-intensive than jet fuel” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 131)
- “Congress should amend the Renewable Fuel Standard or craft a future federal Low Carbon Fuel Standard to provide a credit multiplier for sustainable aviation fuels that meet an ambitious emissions reduction threshold” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 132)
- “Congress should increase funding and expand VALE eligibility to airports located outside of NAAQS attainment areas and projects to reduce or eliminate greenhouse gas emissions, not just criteria air pollutants. Congress should ensure that charging infrastructure for electric propulsion aircraft is eligible for grant support” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 132)

Proposed by: [Vision for Equitable Climate Action](#) (p. 9); [Joe Biden 2020 Presidential Campaign - Climate](#); [DNC Environment and Climate Crisis Council](#) (p. 7); [CLEAN Future Act](#); [H.R. 6606, the Clean Skies Act](#); <sup>131</sup> [The Clean Industrial Technology Act of 2019](#) (H.R. 4230); <sup>132</sup> [Quieter Airplanes Act](#) (H.R. 5450); [GREEN Act of 2020](#) (H.R. 7330); [The Moving Forward Act](#) (H.R. 2);

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<sup>131</sup> Clean Skies Act. H.R. 6606, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/6606>

<sup>132</sup> Clean Industrial Technology Act of 2019. H.R. 3978, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/3978/text>

[The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (pp. 130-132).

#### LPDD Recommendations

- “EPA should adopt and implement the International Civil Aviation Organization CO<sub>2</sub> standard as domestic law. EPA should consider adopting the International Civil Aviation Organization’s Carbon Offsetting and Reduction Scheme for International Aviation into domestic law.” (LPDD, p. 425)
- “Congress could increase taxes on fuel used in domestic aviation, international flights leaving the United States, and passenger tickets.” (LPDD, p. 432)
- “Congress could adopt a requirement that all airlines use a certain and increasing percentage of biofuels in their fuel mix per year.” (LPDD, p. 434)
- “EPA should adopt a CO<sub>2</sub> emissions standard for aircraft that includes a benchmark intensity system with tradable permits. If future EPA regulation of aviation emissions is struck down in the courts, Congress should consider expanding the scope of the CAA to ensure that EPA has the necessary authority to regulate aviation emissions.” (LPDD, p. 434)
- “The United States should negotiate or renegotiate air service agreements with other countries to allow taxation of fuel in international aviation.” (LPDD, p. 440)
- “The United States could lead a call in the UNFCCC process to consider aviation emissions much more closely and set aviation sector-specific reduction goals in light of the Paris temperature goals. The United States could consider working with the EU on a joint aviation emissions reduction measure. Congress should repeal the EU Emissions Trading System Prohibition Act. The U.S. Department of State should issue an interpretation of the air service agreements to state explicitly that the United States interprets “on the basis of reciprocity” to mean that either Party to the international air service agreement can start taxing international aviation fuel at any time.” (LPDD, p. 441)
- “Congress should consider a “frequent flyer levy” in the United States when measures it proposes to reduce aviation emissions raise significant equity concerns.” (LPDD, p. 443)

#### LPDD Resources

- Aviation (ch. 16). *Model Laws for Deep Decarbonization*.  
<https://lpdd.org/pathway/aviation/>

#### Previous/Current Implementation

- A number of individual agencies are working towards reducing aviation emissions. For example, in 2010, ICAO member states [adopted a goal](#)<sup>133</sup> of global annual average fuel efficiency improvements of 2% annually until 2020 and an aspirational global fuel efficiency improvement rate of 2% annually from 2021 to 2050. The International Air Transport Association set [a voluntary goal in 2007 of improving efficiency by at least 25% by 2020](#)

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<sup>133</sup> Resolution A37-19: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change. *International Civil Aviation Organization*. <https://perma.cc/PTK3-BQFY>

[compared to 2005 levels](#),<sup>134</sup> amounting to a 1.5% efficiency gain per year. The Airports Council International Europe runs an [Airport Carbon Accreditation program](#) with a goal of having 100 carbon-neutral airports by 2030. Twenty-seven North American airports have signed up for the program, and one (Dallas Fort-Worth) is already carbon-neutral.

- In 2003, Congress passed the Vision 100—Century of Aviation Reauthorization Act, which established the [FAA’s Voluntary Airport Low Emissions](#)<sup>135</sup> (VALE) Program. VALE is a voluntary program to reduce air pollution at commercial service airports located in areas in nonattainment or maintenance of NAAQS. Through the program, airports can apply for grants to convert to or replace ground support equipment and vehicles with lower-emission technology or cleaner-burning fuels.

### Impact on GHGs

Achieving 100% electrification in U.S. aircraft by 2050 would reduce U.S. emissions in 2050 by 2.6% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Obstacles/Shortfalls

- “There are no substantive legal barriers ..., but there are significant political challenges, including strong opposition from the aviation industry and differences of views among the agencies that regulate aviation in the United States, especially EPA and the Federal Aviation Administration (FAA)” (LPDD Resources, [ch. 16](#)).
- “Commercial aviation may be one of the most difficult sectors to decarbonize, given the energy intensity of the fuel used, the premium placed on airline safety, and the projected growth in emissions” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 128).

### Additional Resources

- This study analyzes how and to which extent aviation ticket taxes can be used to internalise external costs of aviation, with a focus on climate impacts:
  - Faber, Jasper and Huigen, Thomas. “A Study on Aviation Ticket Taxes.” CE Delft. November 2018. <https://perma.cc/9M93-NTJ4>

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<sup>134</sup> “Fuel Efficiency.” *International Air Transportation Association*. <https://perma.cc/S44T-8LEL>

<sup>135</sup> “Voluntary Airport Low Emissions Program (VALE).” *Federal Aviation Administration*. <https://www.faa.gov/airports/environmental/vale/>

## Shipping

### Description

- “By 2030, require ships entering U.S. ports to achieve carbon dioxide emissions per ton of cargo that are half of the average rate of emissions in 2018. Vastly increase R&D to develop more fuel-efficient ships and low- to zero-emission ship propulsion technologies with the goal of eliminating greenhouse gas pollution from shipping” ([Vision for Equitable Climate Action](#), p. 9).
- “Congress should increase funding for META to make decarbonization of the U.S. shipping sector and seaports a top priority. MARAD could use META to research innovative hull designs, advanced propulsion systems and materials, alternative liquid fuels, and other zero-emission vessel technologies” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 137).
- “Congress should ensure that qualifying shipping fuels are eligible for credits under the RFS or a future Low Carbon Fuel Standard, assuming the fuels meet all applicable standards” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 137).
- “Congress should increase funding for DOT and/or EPA grant programs to (1) support retrofitting or replacing diesel vehicles, drayage trucks, and other equipment at ports; (2) upgrade the nation’s inland ports and seaports to improve rail access and support ship-to-shore power; and (3) prepare coastal port infrastructure to service offshore wind development. ... Congress should significantly increase funding for the EPA Clean Diesel National Grants Program and DOE Transportation Electrification Program to reduce emissions from heavy-duty equipment operating at ports. ... Congress should consider crafting legislation to require vessels to plug into shore power where available and when feasible” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 139).
- “Congress should increase funding for DOT programs to support ferry electrification and installation of necessary shoreside charging infrastructure” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 140).

Proposed by: [Vision for Equitable Climate Action](#); [Joe Biden 2020 Presidential Campaign](#); [Evergreen Action](#); [Legal Authority for Presidential Executive Action on Climate](#) (p. 3, 20, 24); [Expanding Maritime Environmental and Technical Assistance Program Act \(S. 4025\)](#); <sup>136</sup>[Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (pp. 137-140); [America’s Transportation Infrastructure Act of 2019 \(S. 2302\)](#); <sup>137</sup>[Water Power Research and Development Act \(H.R. 6084\)](#); <sup>138</sup> H.R. 7024, [the Climate Smart](#)

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<sup>136</sup> Expanding the Maritime Environmental and Technical Assistance Program. S. 4025, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/senate-bill/4025?r=5&s=1>

<sup>137</sup> America’s Transportation Infrastructure Act of 2019. S. 2302, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/2302/text>

<sup>138</sup> Water Power Research and Development Act. H.R. 6084, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/6084/text>



Ports Act; <sup>139</sup> [Climate Action Planning for Ports Act of 2020 \(H.R. 7304\)](#); Pete Buttigieg 2020 Presidential Campaign; Kamala Harris 2020 presidential campaign;

### LPDD Recommendations

- “Congress could impose a tax or credit system on the basis of the ship’s journey to the United States (or from the United States or both ways).” ([LPDD](#), p. 455)
- “Congress should require all ships to track and then report all GHGs emitted from the last port of call to the U.S. port of call, require that information to be made public, and support the development of efficiency rankings.” ([LPDD](#), p. 455)
- “The United States could propose and work to develop consensus for an international fuel tax for shipping within the IMO.” ([LPDD](#), p. 456)
- “The federal government should conduct a careful study of the Jones Act’s net impact on emissions from shipping; depending on the results, the Act should then be repealed or amended to include emissions reductions measures as indicated in the study.” ([LPDD](#), p. 457)
- “Ports can differentiate port charges or fees based on GHG emissions of particular ships.” ([LPDD](#), p. 458)
- “The United States could ask the Conference of Parties to the UNFCCC to set a global cap on shipping emissions.” ([LPDD](#), p. 459)
- “All U.S. ports should consider becoming members of the World Ports Climate Initiative.” ([LPDD](#), p. 459)

### LPDD Resources

- LPDD.org, “Shipping”: <https://lpdd.org/pathway/shipping/>

### Previous/Current Implementation

- In 2018, The International Maritime Organization (IMO) of the United Nations released a plan to reduce carbon intensity in shipping by at least 40% by 2030, and 70% by 2050. “The United States and Canada have ... been approved by the IMO for an emissions control area up to 200 miles off their coasts... This requires ships passing through these waters to comply with Tier III emissions limits for NOx, which reduce NOx emissions approximately 80%.” (“North American Emissions Control Area.” [LPDD Resources](#)).<sup>140</sup>
- In addition, the state of California has implemented [fuel requirements](#)<sup>141</sup> for vessels. A number of cities have also imposed voluntary speed reductions programs for vessels entering ports ([San Diego](#),<sup>142</sup> [Los Angeles](#)<sup>143</sup>).

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<sup>139</sup> The Climate Smart Ports Act. H.R. 7024, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/7024?s=1&r=2>

<sup>140</sup> “North American Emissions Control Area.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/resources/north-american-emissions-control-area/>

<sup>141</sup> Specifications for M-85 Fuel Methanol. Barclays California Official Code of Regulations. 2019. [https://perma.cc/G557-8TK2#co\\_anchor\\_I8DAA8B042F814126A25CF55648C4FA55](https://perma.cc/G557-8TK2#co_anchor_I8DAA8B042F814126A25CF55648C4FA55)

<sup>142</sup> “Reducing emissions from the Port of San Diego’s maritime operations.” *Port of San Diego*. <https://perma.cc/9S26-MDQ6>

<sup>143</sup> Port of Los Angeles Vessel Speed Reduction Incentive Program Guidelines. *The Port of Los Angeles*. <https://perma.cc/6AN9-4MQ4>

- The [DOT's Maritime Environmental and Technical Assistance \(META\)](#)<sup>144</sup> Program, administered by the Maritime Administration (MARAD), “promotes the research, demonstration, and development of emerging technologies, practices, and processes that improve maritime industrial environmental sustainability.”

### Impact on GHGs

- Because U.S. domestic shipping is responsible for only 0.08% ([LPDD Resources](#), ch. 17) of U.S. domestic emissions, mandating the electrification of domestic ships would only reduce emissions by .5% ([U.S. Policy Solutions Simulator v 2.1.1](#)).
- However, mandating emissions reductions on ships entering U.S. ports would achieve greater global emissions reductions. Furthermore, while international shipping is responsible for only 3% of global GHG emissions, shipping emissions could reach 18% of global emissions by 2050 unless further action is taken ([LPDD Resources](#), ch. 17).

### Obstacles/Shortfalls

- “The large loads and long distances traveled by ocean-going vessels (with no opportunity to charge while underway) limit the suitability of electricity for these vessel types” ([U.S. Policy Solutions Simulator v 2.1.1](#)).
- “The legal issues that arise when considering the decarbonization of shipping are mainly jurisdictional” ([LPDD Resources](#), ch. 17).

### Additional Resources

- A report on the 2018 International Maritime Organization strategy to reduce shipping emissions:
  - “Reducing CO2 Emissions to Zero: The ‘Paris Agreement for Shipping’-- Implementing the Initial Strategy on Reduction of GHG Emissions from Ships (adopted by the UN International Maritime Organization).” International Chamber of Shipping. Marisec Publications. 2018. <https://perma.cc/EB6Y-GS4Y>
- This study quantifies the necessary shipping and aviation emissions reductions in the context of a 2°C emission pathway:
  - Lee, David S., Lim, Ling and Owen, Bethan. “Shipping and Aviation Emissions in the Context of a 2°C Emission Pathway.” <https://perma.cc/9PA8-QZP3>
- IMO report of greenhouse gas emissions from ships in 2014:
  - “Third IMO GHG Study 2014.” International Maritime Organization. 2015. <https://lpdd.org/wp-content/uploads/2019/12/IMO-GHG-3-report.pdf>
- A UK Parliament report on shipping emissions and climate change goals:
  - “Environmental Audit Committee - Fourth Report: Reducing CO2 and other emissions from shipping.” UK Parliament House of Commons. 2009. <https://publications.parliament.uk/pa/cm200809/cmselect/cmenvaud/528/52802.htm>

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<sup>144</sup> Maritime Environmental and Technical Assistance (META) Program. *U.S. Department of Transportation Maritime Administration*. <https://maritime.dot.gov/innovation/meta/maritime-environmental-and-technical-assistance-meta-program>



- “Designation of North American Emission Control Area to Reduce Emissions from Ships.” Environmental Protection Agency. March 2010. <https://perma.cc/AZX6-YL3D>
- “2017 Guidelines for Administration Verification of Ship Fuel Oil Consumption Data.” July 2017. <https://perma.cc/9TZS-PRXX>
- “Prevention Of Air Pollution From Ships -- An International Fund for Greenhouse Gas Emissions from Ships Submitted by Denmark.” International Maritime Organization. April 2009. <https://perma.cc/3KXS-YHAT>
- This report describes the possibility of a carbon tax as a key element of GHG mitigation policy for international maritime transport:
  - Parry, Ian, Heine, Dirk, Kizzier, Kelley, and Smith, Tristan. “Carbon Taxation for International Maritime Fuels: Assessing the Options.” International Monetary Fund. September 2018. <https://lpdd.org/wp-content/uploads/2019/12/wp18203-1.pdf>

## ENERGY PRODUCTION

### Renewable Energy: Mandates

#### Description

Requires retail electricity suppliers to provide an increasing percentage of renewable electricity, reaching 100% clean energy by a date between 2030 and 2050 (the goal depends upon the proposal).

#### Additional considerations/methods of implementation:

- “Congress should direct DOE and the Environmental Protection Agency (EPA) to enter into an agreement with the National Academies of Science, Engineering, and Medicine to evaluate methodologies to quantify lifecycle greenhouse gas emissions associated with generating electricity and to determine the appropriate credit value for the clean energy standard” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 39).
- “Congress should direct DOE and EPA to enter into an agreement with the National Academies of Science, Engineering, and Medicine to assess the distributional impacts of the clean energy standard during implementation, including any impacts on environmental justice communities, and to develop recommendations to mitigate any unintended distributional impacts. The National Academies should conduct this assessment every five years” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 39).
- “Congress should direct the Federal Energy Regulatory Commission (FERC) to develop a comprehensive, long-range electric infrastructure strategy and implement such other rules and regulations as are necessary to achieve 100% net-zero electricity generation by no later than 2040 and support any state policies that establish more stringent standards” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 39)

Proposed by: CLEAN Future Act 2020 ([summary](#) p. 2); [Evergreen Action](#) (p. 12); [Energy Innovation](#) (p. 2); [Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 38); [Clean Energy Standard Act of 2019 \(H.R. 2597/S. 1359\)](#);

<sup>145</sup>Cory Booker 2020 Presidential Campaign; Julian Castro 2020 Presidential Campaign; Beto O’Rourke 2020 Presidential Campaign; Elizabeth Warren 2020 Presidential Campaign; [Clean Energy Innovation and Deployment Act](#);<sup>146</sup>

#### LPDD Recommendations

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<sup>145</sup> Clean Energy Standard Act of 2019. H.R. 2597/S. 1359, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/senate-bill/1359>

<sup>146</sup> Clean Energy Innovation and Deployment Act. 2020.  
[https://degette.house.gov/sites/degette.house.gov/files/CEIDA%20Section%20by%20Section%20Summary\\_7.9.20\\_o.pdf](https://degette.house.gov/sites/degette.house.gov/files/CEIDA%20Section%20by%20Section%20Summary_7.9.20_o.pdf)

- “Congress should adopt a national clean energy standard, including energy efficiency and a national clean energy credit program that would coordinate a national market for tradable credits.” (LPDD, p. 613)
- Include distributed, consumer-produced solar in utility renewable energy procurement mandates (LPDD Resources).

#### LPDD Resources

- LPDD.org, “National Clean Energy Standard”: <https://lpdd.org/pathway/a-national-clean-energy-standard/>

#### Past Implementation

100% clean electricity laws have been adopted in 8 states, Washington, D.C., Puerto Rico, and more than 160 American cities and counties (Sierra Club).<sup>147</sup>

#### Impact on GHG emissions

- In 2013, state renewable portfolio standards reduced greenhouse gas emissions by 59 million MT of CO<sub>2</sub>e (Multi-Year Analysis Examines Costs, Benefits, and Impacts of Renewable Portfolio Standards, p. 17).<sup>148</sup>
- A national standard of 100% renewable electricity by 2050 could reduce national emissions by 24% compared to a 2020 baseline (U.S. Policy Solutions Simulator v 2.1.1).

#### Co-Benefits

- Renewable energy mandates create jobs in the renewable energy sector, lower household electricity bills, decrease water usage, and decrease emissions of harmful pollutants such as greenhouse gases, sulfur dioxide, nitrogen oxides, and particulate matter 2.5 (Multi-Year Analysis Examines Costs, Benefits, and Impacts of Renewable Portfolio Standards, p. 2).<sup>149</sup>
- Enacting a Clean Energy Standard would create roughly 530,000 jobs annually in infrastructure build-out (Plummeting Solar, Wind, and Battery Costs Can Accelerate Our Clean Electricity Future).<sup>150</sup>

#### Obstacles/shortcomings

Legal complications could arise from a federal renewable energy standard that differs from state standards. In addition, a federal standard would require greater state-to-state transmission, as states differ in their capacity to generate renewable energy (A U.S. Federal Renewable Portfolio Standard: Potentials and Pitfalls).

#### Studies of Efficacy

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<sup>147</sup> “Committed.” Sierra Club. Accessed July 2020. <https://www.sierraclub.org/ready-for-100/commitments>

<sup>148</sup> Lawrence Berkeley National Laboratory. Multi-Year Analysis Examines Costs, Benefits, and Impacts of Renewable Portfolio Standards. National Renewable Energy Laboratory. January 2016. <https://www.nrel.gov/docs/fy16osti/65409.pdf>

<sup>149</sup> Ibid.

<sup>150</sup> Goldman School of Public Policy at the University of California, Berkeley. Plummeting Solar, Wind, and Battery Costs Can Accelerate Our Clean Electricity Future. June 2020. <https://www.2035report.com/>

Wiser, et al. “A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards.” National Renewable Energy Laboratory. 2016.

<https://www.nrel.gov/docs/fy16osti/65005.pdf>

#### Additional Resources

- Subramanian, Narayan S. “Powering the Future: An Inclusive National Clean Energy Standard with Negative Emissions Technologies.” *Columbia Journal of Environmental Law*, vol. 45, no. 2. 2020.

<https://journals.library.columbia.edu/index.php/cjel/article/view/6158>

## Renewable Energy: Permitting

### Description

Before constructing or operating a renewable energy facility, jurisdictions demand that developers and operators have construction and operational permits.

- “The Department of Interior (DOI) and USDA should prioritize permitting low- impact renewable energy and transmission development on public lands and offshore waters” ([Evergreen Action Plan](#), p. 9).
- “Congress and the next President should work together to ... streamline permitting to develop America’s incredible offshore wind energy potential” ([Evergreen Action Plan](#), p. 70).

Proposed By: [Evergreen Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [American Energy Opportunity Act of 2019 \(H.R. 5335\)](#); [Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### LPDD Recommendations

- “DOI should carefully review and consider acting on the U.S. General Accountability Office’s 2015 recommenda-tions for improving the process for approving renewable energy projects on tribal lands.” ([LPDD](#), p. 470)
- “The federal government should vigorously implement FAST Act provisions to achieve the expedited review of renewable energy projects.” ([LPDD](#), p. 478)
- “Federal agencies could require fewer project-specific EIS for renewable energy projects by, for example, the more strategic use of programmatic EIS. BLM and CEQ could amend their NEPA regulations to provide that a mitigated FONSI is the preferred method for reviewing certain kinds of renewable projects if specified types of mitigation measures are undertaken and if the particular site does not pose special problems.” ([LPDD](#), p. 478)
- “Federal agencies should consider the positive impacts of renewable energy in making decisions under NEPA.” ([LPDD](#), p. 479)
- “Congress should consider creating an easier path under ESA §§7 and 10 for renewable projects that have met certain tightly defined conditions. The president should issue an Executive Order imposing time limitations (subject to limited extensions for good cause) for the ESA §10 incidental take permit process and consider other ways to make the process more efficient.” ([LPDD](#), p. 487)
- “Congress should instruct reviewing agencies that unavoidable visual and aesthetic impacts do not provide a basis for denying wind energy permits.” ([LPDD](#), p. 475)
- “FWS should enhance species impact databases and standardized metrics for take assessment under the ESA. FWS should expand types of compensatory mitigation allowed for renewable energy project impacts on wildlife.” ([LPDD](#), p. 486)

### LPDD Resources

- LPDD.org, “Overcoming Local Permitting Opposition”:  
<https://lpdd.org/pathway/overcoming-local-permitting-opposition/>

### Previous/Current Implementation

On April 3, 2020, New York passed the [Accelerated Renewable Energy Growth and Community Benefit Act](#) to streamline and accelerate the permitting of renewable energy projects. The law creates the Office of Renewable Energy Siting to introduce a single forum for the permitting review process ([NY's Governor Cuomo Signs Law Introducing One-Stop Shop for Renewable Energy Project Permitting](#)).<sup>151</sup>

#### Co-Benefits

Streamlining the permitting process would reduce costs of renewable energy production and consumption ([Solar Energy Industries Association](#)).<sup>152</sup>

#### Additional Resources

- Past efforts to streamline the federal permitting process:
  - U.S. Government Accountability Office. “Agencies Have Taken Steps Aimed at Improving the Permitting Process for Development on Federal Lands.” January 2013. <https://www.gao.gov/products/GAO-13-189>
- Report on the ways the Trump Administration has hindered renewable energy siting on public lands and waters:
  - Gentile, Nicole and Kelly, Kate. “The Trump Administration Is Stifling Renewable Energy on Public Lands and Waters.” Center for American Progress. June 25, 2020. [https://www.americanprogress.org/issues/green/reports/2020/06/25/486852/trump-administration-stifling-renewable-energy-public-lands-waters/?utm\\_medium=email&utm\\_source=amprog\\_elq&utm\\_campaign=27&utm\\_content=42409](https://www.americanprogress.org/issues/green/reports/2020/06/25/486852/trump-administration-stifling-renewable-energy-public-lands-waters/?utm_medium=email&utm_source=amprog_elq&utm_campaign=27&utm_content=42409)

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<sup>151</sup> Coghlan, Jennifer and Holden, Margaret. “NY’s Governor Cuomo Signs Law Introducing One-Stop Shop for Renewable Energy Project Permitting.” *Save, Paget & Riesel*. April 6, 2020. <https://sprlaw.com/nys-governor-cuomo-signs-law-introducing-one-stop-shop-for-renewable-energy-project-permitting/>

<sup>152</sup> “Federal Legislation Will Streamline Solar Permitting, Grow Clean Energy Economy.” *Solar Energy Industries Association*. September 9, 2019. <https://www.seia.org/news/federal-legislation-will-streamline-solar-permitting-grow-clean-energy-economy>

## **Renewable Energy: Siting**

(See also Environmental Justice -- Facility Siting Issues)

### Description:

- “Establishes a DOE program to provide information and technical assistance to support the siting of clean energy resources at sites formerly home to fossil fuel-powered generating units. Authorizes \$10 million per year from FY 2021-2030” ([CLEAN Future Act](#), p. 5)
- “Reducing ... siting conflicts by pre-screening federal and state lands for suitability is crucial to enable this rapid buildout of new renewable resources and associated transmission” ([Energy Innovation](#), p. 12)
- “Congress should create a new program at DOE to provide federal funding and technical assistance for state, local, and tribal authorities to conduct transmission planning and review applications to site proposed interstate transmission projects” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 52)

Proposed by: [CLEAN Future Act](#) (p. 5); [Energy Innovation](#) (p. 12); [Evergreen Action](#) (p. 15)

### LPDD Recommendations

- “Congress should enact the proposed Public Lands Renewable Energy Development Act, or something like it, to encourage and expedite new renewable projects on public lands.” ([LPDD](#), p. 470)
- “BOEM should continue its designation of wind energy areas, and prepare programmatic EIS to expedite approval of projects in those areas.” ([LPDD](#), p. 474)
- “Congress could provide a liability exemption under CERCLA for the developers of renewable energy facilities on contaminated land, assuming they have followed specified standards and procedures.” ([LPDD](#), p. 475)
- “Congress should enact a statute to prohibit state and local governments from banning renewable energy facilities and require state and local governments to make decisions in facility siting within a reasonable period of time.” ([LPDD](#), p. 482)
- “Congress should enact the proposed Public Lands Renewable Energy Development Act, or something like it, to encourage and expedite new renewable projects on public lands. BLM and the Forest Service should identify more large solar energy areas where an environmental review that includes a detailed examination of species presence and habitat can be utilized.” ([LPDD](#), p. 470)

### LPDD Resources

- LPDD.org, “Promoting Best Practices in Local Site Approval Processes”: <https://lpdd.org/pathway/promoting-best-practices-in-local-siting-approval-processes/>
- LPDD.org, “Utilizing Federal Land for Solar Development”: <https://lpdd.org/pathway/utilizing-federal-land-for-solar-development/>

### Previous/Current Implementation

- The federal [West-wide Energy Corridors](#)<sup>153</sup> planning process identifies “continuous strips of federal land across jurisdictional boundaries suitable for transmission development. Federal agencies have also prescreened areas of ideal development for solar energy in six Western states (Solar Energy Zones) and offshore wind energy off the Atlantic Coast (Wind Energy Zones)” ([Energy Innovation](#), p. 12).
- North Carolina has developed [model ordinances for wind siting](#)<sup>154</sup> that make commercial wind facilities subject to special use permitting in all zones.
- New York became the first state to establish a renewable energy siting office ([Utility Dive](#)).<sup>155</sup>
- More examples can be found [here](#).<sup>156</sup>

### Co-Benefits

Improved siting will increase the speed of renewable energy deployment.

### Obstacles

States have faced resistance from local governments who oppose wind development. “Without addressing local opposition, state or federal siting preemption often unnecessarily overlooks solutions that can achieve the same needed infrastructure without burdening local communities. These communities often lack ordinances for renewable infrastructure, so when a project is proposed there is a scramble to respond, leaving local action open to the most vocal opponents” ([Siting Renewable Generation: The Northeast Perspective](#), Energy Innovation, p. 5).<sup>157</sup>

### Additional Resources

- Gerrard, Michael B. “Legal Pathways for a Massive Increase in Utility-Scale Renewable Generation Capacity.” *Environmental Law Institute*. 2017.  
<https://climate.law.columbia.edu/sites/default/files/content/pics/homePage/Legal-Pathways-for-a-Massive-Increase-in-Utility-Scale-Renewable-Generation-Capacity.pdf>
- This report examines siting solutions tailored to meeting renewable energy demand in a land constrained region:
  - Stein, Eleanor and O’Boyle, Mike. “Siting Renewable Generation: The Northeast Perspective.” Energy Innovation. March 2017. <https://perma.cc/GZA6-HCDL>
- This report summarizes the wind energy siting and zoning practices in all 50 states and the District of Columbia:
  - “Wind Energy & Wind Park Siting and Zoning Best Practices and Guidance for States.” The National Association of Regulatory Utility Commissioners. January 2012. <https://perma.cc/K3GV-TJAS>

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<sup>153</sup> West Wide Energy Corridor Information Center. Corridoreis.anl.gov. <http://corridoreis.anl.gov>

<sup>154</sup> North Carolina Wind Working Group. Model Wind Ordinance For Wind Energy Facilities In North Carolina. July 2008. <https://perma.cc/55YA-HKBO>

<sup>155</sup> Walton, Robert. “New York Becomes First State to Establish Renewables Siting Office in an Effort to Speed Up Deployment.” *Utility Dive*. April 7, 2020. <https://www.utilitydive.com/news/new-york-becomes-1st-state-to-establish-renewables-siting-office-in-an-effo/575591/>

<sup>156</sup> “Promoting Best Practices in Renewable Energy Siting.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/promoting-best-practices-in-local-siting-approval-processes/>

<sup>157</sup> <https://perma.cc/GZA6-HCDL>



- This paper highlights siting issues in New York State and provides several preliminary policy recommendations for addressing them:
  - Howe, Cullen. “Breaking Down the Barriers to Siting Renewable Energy in New York State.” New York League of Conservation Voters Education Fund. 2019.  
<https://nylcvef.org/wp-content/uploads/2019/02/renewable-siting-whitepaper.pdf>
- Report on the ways the Trump Administration has hindered renewable energy siting on public lands and waters:
  - Gentile, Nicole and Kelly, Kate. “The Trump Administration Is Stifling Renewable Energy on Public Lands and Waters.” Center for American Progress. June 25, 2020.  
[https://www.americanprogress.org/issues/green/reports/2020/06/25/486852/trump-administration-stifling-renewable-energy-public-lands-waters/?utm\\_medium=email&utm\\_source=amprog\\_elq&utm\\_campaign=27&utm\\_content=42409](https://www.americanprogress.org/issues/green/reports/2020/06/25/486852/trump-administration-stifling-renewable-energy-public-lands-waters/?utm_medium=email&utm_source=amprog_elq&utm_campaign=27&utm_content=42409)

## Electricity Transmission And Smart Grid

### Description

Policies to invest in a modern transmission system and “smart grid” that enable clean energy resources deployment.

- “Requires the Federal Energy Regulatory Commission (FERC) to initiate a rulemaking to increase the effectiveness of the interregional transmission planning process” ([CLEAN Future Act](#), Summary, p. 3).
- “Congress should provide states with matching funds to pay for interstate transmission lines with demonstrable reliability, cost, and renewable integration benefits” ([Energy Innovation](#) p. 15)
- “Increase funding for the Department of Energy’s (DOE) Office of Electricity to support efforts to add smart grid functions to transmission and distribution systems. Reinstate DOE’s Smart Grid Investment Grant program” ([Center for Climate and Energy Solutions](#), p. 1).
- “Congress should amend the Federal Power Act so that the goals of the National Interest Electric Transmission Corridors program are to help achieve national climate goals, including enhancing the development, supply, or delivery of onshore and offshore renewable energy” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 52).
- “Congress should create a new program at DOE to provide federal funding and technical assistance for state, local, and tribal authorities to conduct transmission planning and review applications to site proposed interstate transmission projects. Congress should also authorize DOE to provide incentives for economic development to these state, local, and tribal jurisdictions” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 52).
- “Congress should establish a National Transmission Policy to provide guidance to state and local officials and reviewing courts to clarify that it is in the public interest to expand transmission to facilitate a decarbonized electricity supply and enable greenhouse gas emissions” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 53).
- “Congress should direct FERC to provide performance-based incentives for investments that improve the capacity and efficiency of the bulk electric transmission system” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 54).
- “Requires the Secretary of Energy to establish a program to promote the development of [microgrids](#) for isolated communities and improve the resilience of critical infrastructure” ([CLEAN Future Act](#), summary p. 5).
- “We will spend \$526 billion on a modern, high-volt, underground, renewable, direct current, smart, electric transmission and distribution grid will ensure our transition to 100 percent sustainable energy is safe and smooth” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [CLEAN Future Act](#); [Joe Biden 2020 Presidential Campaign](#); [Energy Innovation](#); [Center for Climate and Energy Solutions](#); [Grid Modernization Research and Development Act of](#)

[2019 \(H.R. 5428\)](#);<sup>158</sup> [Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Bernie Sanders 2020 Presidential Campaign](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Julian Castro 2020 Presidential Campaign](#); [Kamala Harris 2020 Presidential Campaign](#); [Pete Buttigieg 2020 Presidential Campaign](#); [DNC Draft 2020 Policy Platform](#)

### LPDD Recommendations

- “Congress could enact new legislation to transfer siting approval and eminent domain authority for interstate electric transmission lines from the states to FERC, DOE, or another federal agency. Alternatively, Congress could leave siting authority for interstate transmission lines with the states but require that states consider regional and national electricity needs, including decarbonization goals, in making siting decisions and allowing a federal remedy in court for failure to comply.” (LPDD, p. 540)
- “Congress could create multistate regional siting authorities to approve interstate transmission lines within a region. Congress could direct DOE to create more national interest electric transmission corridors (NIETCs). Congress could expand DOE’s authority under EPAct 2005 to partner with private transmission line companies in areas beyond the Western Area Power Administration and the Southwestern Power Administration, and to clarify that FERC has authority to grant siting permits for transmission lines within NIETCs if a state has denied a siting permit for the line.” (LPDD, p. 541)

### LPDD Resources

- “Transmission, Distribution, and Storage: Grid Integration.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/transmission-distribution-and-storage-grid-integration/>

### Previous/Current Implementation

- “The [Midcontinent Independent System Operator \(MISO\) Multi-Value Project](#) (MVP) transmission expansion plan (submitted to FERC for approval in 2011) provides an example of regional cost allocation that benefits all electricity customers. The MVP portfolio proactively identified regional transmission solutions, or MVPs that meet one or more of three goals. These lines: Reliably and economically enable regional public policy needs, provide multiple types of regional economic value, and/or provide a combination of regional reliability and economic value.” (Energy Innovation, p. 14)
- The [American Recovery and Reinvestment Act of 2009](#)<sup>159</sup> funded 16 energy storage demonstrations as part of the Smart Grid Demonstration program at DOE.
- “[Maryland SB 573](#) (2019) creates an energy storage pilot program in Maryland. The program requires the state’s four investor owned utilities to issue two solicitations for energy storage projects in 2020” (LPDD Resources).

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<sup>158</sup> Grid Modernization Research and Development Act. H.R. 5428, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/5428/text>

<sup>159</sup> The American Recovery and Reinvestment Act. H.R. 1, 111th Congress. 2009. <https://www.congress.gov/bill/111th-congress/house-bill/1/text>

- “House Bill 715 requires New Hampshire’s Public Utilities Commission to look into ways to fairly compensate energy storage projects based on the savings those projects can bring to utility companies. The bill requires the PUC to find better payment models for companies that build energy storage, including compensation for helping utilities avoid transmission and distribution costs” ([LPDD Resources](#)).
- More examples can be found [here](#).<sup>160</sup>

### Impact on GHGs

A 113% increase in transmission capacity by 2050 would reduce 2050 U.S. emissions by .87% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

“A June 2020 [report](#)<sup>161</sup> by the Goldman School of Public Policy at the University of California Berkeley concluded that strong clean energy and transmission policies can dependably deliver 90% carbon-free electricity nationwide by 2035, without increasing consumer electricity bills at all from today’s levels” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 38).

### Obstacles

- “Siting new transmission lines is often a prolonged, expensive, and contentious undertaking.... In recent decades, ... the evolution of interstate and regional electricity markets has increasingly necessitated long-line, interstate transmission projects. Further, the extent of [variable energy resource] integration that will be required by existing state renewable portfolio requirements, and the reality that many renewable resources are located at a distance from load, will likely create a greater need for new longline transmission in some regions. ... Under the current siting regime, the developer of a multistate transmission line must obtain requisite approvals from state and local authorities along the full length of the line.... For their part, individual state authorities may be bound by state statutes to accept or reject the project on the basis of their in-state transmission needs, or the in-state benefits that the project offers. In these cases, states may not be empowered to consider the regional benefits of a proposed project. Thus, a project that transmits power generated in one state, passes through a second state, and serves load in a third state could have difficulty winning approval from regulators in the second state. In some states, regulators might even be required by law to reject a project that does not serve load within the state’s boundaries, even in cases where the project delivers broader benefits to the region at large that the state would share in over time” ([Expanding the U.S. Electric Transmission and Distribution Grid to Meet Deep Decarbonization Goals](#), p. 10756).
- In some states, “utilities can only obtain cost recovery from ratepayers for transmission and distribution services and may not participate in electricity generation markets. If energy storage is seen as part of the generation side of the grid, a utility may not obtain cost recovery (and thus may be less likely to invest) in energy storage technology” ([Expanding the](#)

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<sup>160</sup> “Energy Storage.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/energy-storage/>

<sup>161</sup> Goldman School of Public Policy at the University of California, Berkeley. Plummetering Solar, Wind, and Battery Costs Can Accelerate Our Clean Electricity Future. June 2020. <https://www.2035report.com/>

[U.S. Electric Transmission and Distribution Grid to Meet Deep Decarbonization Goals](#), p. 10760) .

- “Landowner opposition can be a significant barrier to new transmission development. Many landowners perceive they are bearing all of the costs of transmission expansion without realizing any of the benefits” ([Expanding the U.S. Electric Transmission and Distribution Grid to Meet Deep Decarbonization Goals](#), p. 10764).

#### Additional Resources

- U.S. Department of Energy. “Benefits Of Demand Response In Electricity Markets And Recommendations For Achieving Them.” 2006.  
[https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/DOE\\_Benefits\\_of\\_Demand\\_Response\\_in\\_Electricity\\_Markets\\_and\\_Recommendations\\_for\\_Achieving\\_The\\_m\\_Report\\_to\\_Congress.pdf](https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/DOE_Benefits_of_Demand_Response_in_Electricity_Markets_and_Recommendations_for_Achieving_The_m_Report_to_Congress.pdf)
- “The Future of the Electric Grid - An Interdisciplinary MIT Study. Massachusetts Institute of Technology.” 2011. <http://energy.mit.edu/wp-content/uploads/2011/12/MITEI-The-Future-of-the-Electric-Grid.pdf>
- Klass, Alexandra B. “Expanding the U.S. Electric Transmission and Distribution Grid to Meet Deep Decarbonization Goals.” *Environmental Law Institute*. 2017.  
<https://lpdd.org/wp-content/uploads/2019/05/20-LPDD-Transmission-Distribution-and-Storage-Grid-Integration.pdf>

## Demand Response

### Description

Utilities offer demand response or demand management programs to incentivize consumers to reduce their energy during peak periods of demand and under-supply.

- “Require utilities to prioritize ... demand-side management solutions to reduce overall power demand before considering building new power generation” ([Vision for Equitable Climate Action](#), p. 15).
- “Federal lawmakers should build partnerships with states, utilities and local communities, by providing federal matching dollars for smart grid local power distribution networks, including demand-response” ([Evergreen Action Plan](#), p. 16).
- “Congress should direct FERC to use its existing authorities to conduct a rulemaking that would review energy, reliability, and capacity market reforms that would better integrate renewable energy, battery storage, storage-as-transmission, hybrid resources, distributed energy resources, and demand response in wholesale power markets” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 61).
- “Congress should amend [PURPA](#)<sup>162</sup> to require state regulatory commissions to consider adopting rate designs that would require utilities to demonstrate that they have considered investing in energy storage and to require electric utilities to implement, where possible, cost effective non-wires solutions such as distributed ... demand response ... to promote grid resilience” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 72).

Proposed by: [Vision for Equitable Climate Action](#); [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Center for Climate and Energy Solutions](#); [Energy Innovation](#); [LIFT America Act \(H.R. 2741\)](#); <sup>163</sup> [CLEAN Future Act](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### LPDD Recommendations

- “FERC should continue to work toward nondiscriminatory “market participation models” that take account of the specific characteristics and capabilities of grid-edge resources.” (LPDD, p. 161)

### Previous/Current Implementation

- Initiatives such as the [New England Demand Response Initiative](#) (NEDRI), the Mid-Atlantic Distributed Resources Initiative (MADRI), and the Pacific Northwest Demand Response Project were created to develop a set of demand response programs for their respective regional power markets.

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<sup>162</sup> Public Utility Regulatory Policies Act of 1978 (PURPA). *Office of Electricity*. Energy.Gov. <https://www.energy.gov/oe/services/electricity-policy-coordination-and-implementation/other-regulatory-efforts/public>

<sup>163</sup> Leading Infrastructure for Tomorrow’s (LIFT) America Act. H.R. 2741, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/2741>

- In addition, in 2005, the DOE issued a [report](#)<sup>164</sup> recommending actions for achieving successful demand response programs ([Energy.Gov](#)).<sup>165</sup>
- Commercial, industrial, and residential customers enrolled in ConEdison's [Brooklyn-Queens Demand Management Demand Response project](#)<sup>166</sup> are encouraged to cut back on their energy use during certain hours.

### Impact on GHGs

Adding an additional 350 GW of demand response capacity in 2050 would reduce 2050 U.S. emissions by .35% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

“Demand-side management programs aim to lower electricity demand, which in turn avoids the cost of building new generators and transmission lines, saves customers money, and lowers pollution from electric generators” ([EIA](#)).<sup>167</sup>

### Obstacles/Shortfalls

“Policymakers should exercise caution in attributing environmental gains to demand response, because they are dependent on the emissions profiles and marginal operating costs of the generation plants in specific regions” ([Benefits Of Demand Response In Electricity Markets And Recommendations For Achieving Them](#), p. 29)

### Additional Resources

- Gold, Rachel, Myers, Amanda, and O’Boyle, Michael. “Performance Incentive Mechanisms for Strategic Demand Reduction.” February 2020. <https://energyinnovation.org/wp-content/uploads/2020/02/Performance-Incentive-Mechanisms-for-Strategic-Demand-Reduction.pdf>
- “The Role of Demand Management in the Utility of the Future.” Institute for Building Efficiency. April 2014. [https://www.21stcenturypower.org/assets/pdfs/demand\\_management\\_utility\\_future.pdf](https://www.21stcenturypower.org/assets/pdfs/demand_management_utility_future.pdf)

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<sup>164</sup> U.S. Department of Energy. Benefits Of Demand Response In Electricity Markets And Recommendations For Achieving Them. 2006.

[https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/DOE\\_Benefits\\_of\\_Demand\\_Response\\_in\\_Electricity\\_Markets\\_and\\_Recommendations\\_for\\_Achieving\\_Them\\_Report\\_to\\_Congress.pdf](https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/DOE_Benefits_of_Demand_Response_in_Electricity_Markets_and_Recommendations_for_Achieving_Them_Report_to_Congress.pdf)

<sup>165</sup> Demand Response - Policy: More Information. Office of Electricity, Energy.Gov. <https://www.energy.gov/oe/demand-response-policy-more-information>

<sup>166</sup> “Brooklyn-Queens Demand Management Demand Response Program.” ConEdison. <https://www.coned.com/en/business-partners/business-opportunities/brooklyn-queens-demand-management-demand-response-program>

<sup>167</sup> “Demand-Side Management Programs Save Energy and Reduce Peak Demand.” U.S. Energy Information Administration. <https://www.eia.gov/todayinenergy/detail.php?id=38872>



## Electricity Storage

### Description

Policies to improve electricity storage capacity through tax credits, research, and investment.

- “Storage deployment would need to grow 25 percent each year, from 523 megawatts (MW) in 2019 to 20,000 MW in 2035” ([Energy Innovation](#) p. 1).
- “Expand available loan capital for the Rural Energy Savings Program and expedite the application process to encourage energy upgrades in rural areas—such as more ... expanded energy storage” ([Center for Climate and Energy Solutions](#), p. 5)
- “Congress should make energy storage independently eligible for an Investment Tax Credit for energy storage. Congress should provide an option for direct pay for the tax credit” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 58).
- “Congress should direct DOE to create a national program focused on energy storage. DOE offices within the Grid Modernization Initiative should coordinate on energy storage research” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 58).
- “Congress should amend PURPA to require that each state consider mandating that, as part of a supply-side resource planning process, electric utilities demonstrate that they have considered an investment in energy storage systems” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 59).
- “We will spend ... \$852 billion to build energy storage capacity” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; [CLEAN Future Act](#) (pp. 4-5); [Vision for Equitable Climate Action](#) (p. 7); [Evergreen Action](#) (p. 16); [DNC Environment and Climate Crisis Council](#) (p. 4); [Energy Innovation](#); [Center for Climate and Energy Solutions](#) (p. 5); [Legal Authority for Presidential Executive Action on Climate](#) (p. 3); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [GREEN Act of 2020 \(H.R. 7330\)](#), Section 102;<sup>168</sup> [Promoting Grid Storage Act of 2019 \(H.R. 2909/S. 1593\)](#);<sup>169</sup> [Better Energy Storage Technology \(BEST\) Act \(H.R. 2986\)](#);<sup>170</sup> [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations

- “Congress should define new, fast-track licensing parameters that apply only to pumped storage projects, or even just closed-loop systems.” ([LPDD](#), p. 590)
  - “DOE or FERC can fund additional research, technology, and development on a range of distribution network and smart grid developments, including energy storage. ([LPDD](#), p. 542)

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<sup>168</sup> GREEN Act of 2020. H.R. 7330, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/7330?s=1&r=1>

<sup>169</sup> Promoting Grid Storage Act of 2019. H.R. 2909/S. 1593, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/2909/related-bills?r=6&s=1>

<sup>170</sup> Better Energy Storage Technology (BEST) Act. H.R. 2986, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/2986/text>



## LPDD Resources

- LPDD.org, “Energy Storage”: <https://lpdd.org/pathway/energy-storage/>

## Previous/Current Implementation

- In 2017, the United States generated 4 billion megawatt-hours (MWh) of electricity, but only had 431 MWh of electricity storage available. By December 2017, there were approximately 708 MW of large-scale battery storage operational in the U.S. energy grid. “In February 2018, the Federal Energy Regulatory Commission (FERC) unanimously approved Order No. 841, which required Independent System Operators and Regional Transmission Organizations to remove barriers to entry for energy storage technologies, by having these groups reevaluate their tariffs. ... In May 2018, the Department of Energy's Advanced Research Projects Agency (ARPA-E) committed up to \$30 million in funding for long-term energy storage innovation.” A number of states have also passed policies promoting storage improvements ([Environmental and Energy Study Institute](#)).<sup>171</sup>
- On July 14, 2020, the U.S. Department of Energy (DOE) released the Energy Storage Grand Challenge (ESGC) Draft Roadmap and a Request for Information seeking stakeholder input. The Draft Roadmap outlines a Department-wide strategy to accelerate innovation across a range of storage technologies (“[Energy Storage Grand Challenge Draft Roadmap](#),” *Energy.Gov*).<sup>172</sup>

## Impact on GHGs

On its own, a 16% annual growth in grid-scale storage capacity beginning in 2020 would reduce U.S. emissions only by .4% in 2050 compared to a BAU baseline. However, improved storage would reduce emissions more significantly when implemented in addition to increased renewable energy production. For example, “without energy storage, adding 60 GW of renewables to California achieves 72% CO<sub>2</sub> reductions (relative to a zero-renewables case) ... Some energy storage technologies, on the other hand, allow 90% CO<sub>2</sub> reductions from the same renewable penetrations” ([The Role Of Energy Storage In Deep Decarbonization Of Electricity Production](#)).<sup>173</sup>

## Co-Benefits

Improved storage would create a more efficient electricity grid that is resistant to disruptions, it would increase the economic value of wind and solar power, and it would create more jobs in supporting sectors such as manufacturing, engineering, construction, transportation and finance ([Energy.Gov](#)).<sup>174</sup>

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<sup>171</sup> Fact Sheet: Energy Storage (2019). Environmental and Energy Study Institute. <https://www.eesi.org/papers/view/energy-storage-2019>

<sup>172</sup> “Energy Storage Grand Challenge Draft Roadmap,” *Energy.Gov*. <https://www.energy.gov/energy-storage-grand-challenge/downloads/energy-storage-grand-challenge-draft-roadmap>

<sup>173</sup> Arbabzadeh, Maryam, et al. The Role Of Energy Storage In Deep Decarbonization Of Electricity Production. *Nature Communications*, Vol. 10. July 30, 2019. <https://www.nature.com/articles/s41467-019-11161-5>

<sup>174</sup> “Energy Storage: the Key to a Reliable, Clean Electricity Supply.” *Energy.Gov*. February 22, 2012. <https://www.energy.gov/articles/energy-storage-key-reliable-clean-electricity-supply>

### Obstacles/Shortfalls

Improved storage capacity will require significant capital investments.

### Additional Resources

- U.S. Department of Energy. “Solving Challenges in Energy Storage.” July 2019. <https://www.energy.gov/sites/prod/files/2019/07/f64/2018-OTT-Energy-Storage-Spotlight.pdf>
- National Renewable Energy Laboratory. [Energy Storage: Possibilities for Expanding Electric Grid Flexibility](https://www.nrel.gov/docs/fy16osti/64764.pdf). <https://www.nrel.gov/docs/fy16osti/64764.pdf>
- International Renewable Energy Agency. “Electricity Storage and Renewables: Costs and Markets to 2030.” 2017. [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Oct/IRENA Electricity Storage Costs 2017 Summary.pdf?la=en&hash=2FDC44939920F8D2BA29CB762C607BC9E882D4E9](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Oct/IRENA_Electricity_Storage_Costs_2017_Summary.pdf?la=en&hash=2FDC44939920F8D2BA29CB762C607BC9E882D4E9)
- “The Future of the Electric Grid - An Interdisciplinary MIT Study. Massachusetts Institute of Technology.” 2011. <http://energy.mit.edu/wp-content/uploads/2011/12/MITEI-The-Future-of-the-Electric-Grid.pdf>

## Electricity Rates and Charges

### Description

Setting electricity rates and charges to promote/incentivize clean energy usage and energy efficiency.

- “Where regulatory requirements and subsidies are not financed through public taxes, state utility commissions should presumptively favor per kWh customer charges rather than fixed fees or cost adders in setting customer energy charges” ([LPDD Resources](#), ch. 23).
- “Congress should amend the Federal Power Act to direct FERC to find rates unjust, unreasonable, unduly discriminatory, or preferential if they do not incorporate the cost of externalized greenhouse gas emissions” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 60).

Proposed by: [Energy Prices Require Including Climate Externalities \(Energy PRICE\) Act \(H.R. 5742\)](#); <sup>175</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### LPDD Recommendations

- “FERC should adopt a regulation that encourages RTOs to adopt a grid system reliability adder reflecting the carbon attributes of different energy resources in setting transmission rates for the sale of energy in interstate wholesale power markets.” ([LPDD](#), p. 615)
- “FERC can require that wholesale rates include a carbon adder set at a level intended to reflect the social cost of carbon.” ([LPDD](#), p. 630)

### LPDD Resources

- LPDD.org, “Reducing Fixed Electricity Charges”: <https://lpdd.org/pathway/reducing-fixed-electricity-charges/>
- LPDD.org, “Pricing Carbon Into Energy Costs”: <https://lpdd.org/pathway/pricing-carbon-into-energy-costs/>

### Previous/Current Implementation

- “In 2018, the Colorado Public Utilities Commission rejected the Black Hills Energy request for a fixed charge increase from \$16.50/month to \$20.13/month and [recommended lowering it to \\$8.77/month](#)”<sup>176</sup> ([LPDD Resources](#)).
- “In 2015, Connecticut [passed a law](#)<sup>177</sup> defining acceptable components of a utility fixed charge as the fixed costs, operations and maintenance expenses that are directly related to metering, billing, service connections and customer service. In 2017, the method prescribed by the new law was challenged and [upheld by the commission](#). The commission also ruled calculations could include ‘policy considerations, economic conditions, or other facts and

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<sup>175</sup> Energy Prices Require Including Climate Externalities (Energy PRICE) Act. H.R. 5742, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5742/text?r=7&s=1>

<sup>176</sup> Decision No. C18-0445. Before the Public Utilities Commission of the State of Colorado. 2017. <https://perma.cc/BA68-YM2Z>

<sup>177</sup> Committee Bill No. 570. State of Connecticut General Assembly. January Session, 2015. <https://perma.cc/H6NJ-EW7X>

circumstances,’ which recognized stakeholder concerns with fixed charge impacts on low-and-moderate income customers as well as EE and DER adoption” ([LPDD Resources](#)).

- “In [a 2018 settlement](#) of Central Hudson’s 2017 rate case, the utility’s fixed charge will drop from \$24/month in 2019 to \$19.50/month in 2021. ‘Numerous commenters, including [various town, city and county officials](#),<sup>178</sup> stated that fixed customer charges are too high and need to be reduced,’ the settlement agreement reported” ([LPDD Resources](#)).
- The [Federal Power Act](#)<sup>179</sup> requires FERC to review rates for the transmission or sale of wholesale electricity to ensure that they are “just and reasonable and not unduly discriminatory or preferential.”

### Co-Benefits

Allowing customers to pay for electricity on a per kWh basis, as opposed to a fixed rate, incentivizes energy efficiency and reduced electricity usage. Furthermore, fixed rates harm consumers who use less electricity than average, and it particularly impacts low-income consumers. Favoring per kWh rates can alleviate these harms ([Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives](#)).<sup>180</sup>

### Obstacles/Shortfalls

“Economically efficient pricing, while very important, will not by itself remove all barriers to investment in cost effective end-use energy efficiency. Consumers will still lack important information and tools to respond. Programmatic responses to these barriers are still needed” ([Pricing Do’s and Don’ts: Designing Retail Rates as if Efficiency Counts](#), p. 5).<sup>181</sup>

### Additional Resources

- Lazar, Jim, Chernik, Paul and Marcus, William. “Electric Cost Allocation for a New Era.” Regulatory Assistance Project. January 2020. <https://lpdd.org/wp-content/uploads/2020/04/rap-lazar-chernick-marcus-lebel-electric-cost-allocation-new-era-2020-january.pdf>
- “Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives.” Future Electric Utility Regulation. 2016. <https://perma.cc/5476-TP6C>
- “Findings of a 2016-2017 Analysis of Investor-Owned Utility Proposals to Increase Mandatory Fixed Fees on Residents.” <https://perma.cc/7RLC-9AP7>
- “Pricing Do’s and Don’ts: Designing Retail Rates as if Efficiency Counts.” Regulatory Assistance Project. April 2011. <https://perma.cc/U972-E8CC>

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<sup>178</sup> “CLP Announces Major Victory in the Central Hudson Rate Case!” *Citizens for Local Power*. 2018. <https://citizensforlocalpower.org/nochratehike>

<sup>179</sup> “The Federal Power Act (FPA) and Electricity Markets.” Congressional Research Service. March 10, 2017. [https://www.everycrsreport.com/files/20170310\\_R44783\\_dd3f5c7c0c852b78f3ea62166ac5ebdbd1586e12.pdf](https://www.everycrsreport.com/files/20170310_R44783_dd3f5c7c0c852b78f3ea62166ac5ebdbd1586e12.pdf)

<sup>180</sup> Wood, Lisa, et al. Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives. Future Electric Utility Regulation. 2016. <https://perma.cc/5476-TP6C>

<sup>181</sup> Lazar, Jim, Chernik, Paul and Marcus, William. Electric Cost Allocation for a New Era. Regulatory Assistance Project. January 2020. <https://lpdd.org/wp-content/uploads/2020/04/rap-lazar-chernick-marcus-lebel-electric-cost-allocation-new-era-2020-january.pdf>

## Phasing Out Fossil Fuel Electricity Generation

### Description

- “A phase-out of fossil fuels should include a halt to all new permits for fossil-fuel exploration, production, and infrastructure, a phase-out of all subsidies to fossil fuels, and divestment of all public and private financial investments from the exploration, production, and distribution of fossil fuels” ([Vision for Equitable Climate Action](#), p. 18)
- “The next President should use executive action to ban all new fossil fuel leasing on federal lands and offshore waters, including coal, oil, gas, oil shale, and tar sands, on day one.” ([Evergreen Action Plan](#), p. 54)
- “The next administration will require Congressional action to enact any outright ban on fracking” ([Evergreen Action Plan](#), p. 55)
- “Congress should impose a moratorium on all new fossil fuel leases on public lands while ensuring robust economic development and worker transition assistance for communities dependent on fossil fuel extraction; prohibit new offshore oil and gas leasing in all areas of the Outer Continental Shelf” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 14).
- “In order to make the carbon pollution reductions required by the [IPCC report](#),<sup>182</sup> we must eliminate all new fossil fuel production in the United States immediately. This will require reorganizing the Department of Energy, Department of the Interior, Bureau of Land Management, Bureau of Safety and Environmental Enforcement, Bureau of Ocean Energy Management, Energy Information Administration, Federal Energy Regulatory Commission, and Federal Emergency Management Agency to prepare for the clean energy economy and climate impacts to eliminate or transition resources and offices historically used to facilitate fossil fuel extraction, transportation, refining, and use. Instead, these agencies will lead a centralized taskforce to phase out fossil fuels by expediting research, development, deployment, and technical support for polluting industries to ensure a smooth transition for the workers and communities who have historically relied on fossil fuel production. This taskforce will be responsible not only for phasing out fossil fuel production on public lands and waters, but will support the end of fossil fuel production on private property as well” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Vision for Equitable Climate Action](#) (p. 18); [Evergreen Action](#) (p. 54); [DNC Environment and Climate Crisis Council](#) (p. 4); [Legal Authority For Presidential Executive Action On Climate](#) (p. 8); [Keep It in the Ground Act \(2017\)](#);<sup>183</sup> [Off Fossil Fuels for a Better Future Act \(2017\)](#);<sup>184</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy,](#)

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<sup>182</sup> Intergovernmental Panel on Climate Change. “Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emissions Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty.” 2018.  
[https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15\\_SPM\\_version\\_stand\\_alone\\_LR.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf)

<sup>183</sup> Keep it in the Ground Act. S. 750, 115th Congress. 2017. <https://www.congress.gov/bill/115th-congress/senate-bill/750/text>

<sup>184</sup> Off Fossil Fuels for a Better Future Act. H.R. 3671, 115th Congress. 2017. <https://www.congress.gov/bill/115th-congress/house-bill/3671>

[Resilient and Just America](#); All 2020 Presidential candidates supported phasing out fossil fuel production but through varying timelines

### LPDD Recommendations

- “Congress could enact a direct prohibition or phaseout on the use of fossil fuels. EPA could impose a ban on the use of fossil fuels in power plants.” ([LPDD](#), p. 626)
- “The federal government could pay utilities the remaining ‘book value’ for investor utility-owned plants, and negotiate prices with private plant owners to pay them to close GHG-emitting facilities.” ([LPDD](#), p. 635)
- “The federal government could require companies to consider the possibility that their fossil fuel-related assets would be stranded before making investment decisions.” ([LPDD](#), p. 644)
- “CEQ should consider requiring EISs prepared under NEPA for fossil fuel actions to discuss the consistency of such actions with decarbonization goals.” ([LPDD](#), p. 644)
- “TVA could produce a definite, accelerated schedule for the retirement of the 35 remaining coal-fired generating units.” ([LPDD](#), p. 634)
- “The federal government should provide subsidies for clean energy technologies and remove current subsidies for fossil fuels and other non-sustainable activities and products.” ([LPDD](#), p. 119)

### LPDD Resources

- LPDD.org, “Phasing Out the Use of Fossil Fuels for the Generation of Electricity”: <https://lpdd.org/pathway/phasing-out-the-use-of-fossil-fuels-for-the-generation-of-electricity/>

### Previous/Current Implementation

- A number of states have implemented restrictions of fossil fuel-powered electric plants, phasing out the use of coal ([examples here](#)).<sup>185</sup> Several states have also banned oil and gas extraction ([examples here](#)).<sup>186</sup>
- The Obama Administration’s [Secretary’s Order 3338](#)<sup>187</sup> prohibited new coal exploration on public lands for a period. This type of EO could be seen as a model for a future president to apply to all fossil fuels. While the Trump Administration has attempted to repeal SO 3338, [these efforts have been slowed by the courts](#)<sup>188</sup> for not following NEPA requirements ([LPDD Resources](#)).<sup>189</sup>

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<sup>185</sup> “Restricting Fossil-Fuel Powered Electric Plants.” *Model Laws for Deep Decarbonization*. 2020. <https://lpdd.org/pathway/restricting-new-fossil-fuel-powered-plants/>

<sup>186</sup> “Prohibiting Oil and Gas Extraction.” *Model Laws for Deep Decarbonization*. 2020. <https://lpdd.org/pathway/prohibiting-oil-and-gas-extraction/>

<sup>187</sup> Order No. 3338. Discretionary Programmatic Environmental Impact Statement to Modernize the Federal Coal Program. The Secretary of the Interior of Washington. 2016. <https://perma.cc/2XDH-42EV>

<sup>188</sup> King, Pamela. “Judge: Trump Can’t OK Mining Without Environmental Reviews.” *E&E News*. April 22, 2019. <https://perma.cc/3FHB-ED88>

<sup>189</sup> “Secretary’s Order 3338.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/resources/secretarys-order-3338/>

- In 2020, Germany passed bills that would require the nation's coal plants to close by 2048.<sup>190</sup>

### Impact on GHGs

- Banning new coal and natural gas power plants beginning in 2020 would reduce U.S. emissions by 3% in 2050 compared to a BAU baseline (equivalent to a reduction of 177 million metric tons of CO<sub>2</sub>e). ([U.S. Policy Solutions Simulator v 2.1.1](#)).
- Removing fossil fuel subsidies would reduce global emissions by 1-5% compared to a business as usual scenario ([Carbon Brief](#)).<sup>191</sup>

### Obstacles/Shortfalls

In order to meet energy demands, there would need to be a rapid deployment of renewable energy to compensate for the loss of fossil fuel electricity generation. In addition, restrictions to fossil fuel production will receive substantial opposition from lobbyist groups and special interests.

### Additional Resources

- Hein, Jayni, Kim, Joy and Smith Sam. "Look Before You Lease - Reducing Fossil Fuel Dominance on Public Lands by Accounting for Option Value." Institute for Policy Integrity. January 2020. <https://perma.cc/22ND-CNMN>

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<sup>190</sup> Wettengel, Julian. "Spelling out the coal exit – Germany's phase-out plan." *Clean Energy Wire*. July 3, 2020. <https://www.cleanenergywire.org/factsheets/spelling-out-coal-phase-out-germanys-exit-law-draft>

<sup>191</sup> Timperley, Jocelyn. New Study Questions Impact of Ending Fossil Fuel Subsidies. *Carbon Brief*. 2018. <https://www.carbonbrief.org/new-study-questions-impact-ending-fossil-fuel-subsidies#:~:text=The%20study%20found%20the%20removal,substantially%20even%20with%20this%20reduction>  
)



## Air Pollution Standards for Fossil Fuel Power Plants

### Description

- “Direct the EPA to issue strict Clean Air Act rules to rapidly reduce greenhouse emissions from power plants” ([Legal Authority for Presidential Executive Action on Climate](#), p. 3).
- The president should use “a diverse suite of approaches to regulating greenhouse gas pollution from existing stationary sources, including: using Section 111 to set sector-based standards; setting National Ambient Air Quality Standards (NAAQS) to require each state to reduce its greenhouse gas pollution in a manner similar to other air pollutants considered harmful to public health and the environment; and Section 115 of the Act, which concerns U.S. responsibility to reduce harmful air pollution affecting the international community” ([Evergreen Action Plan](#), p. 13).
- “Congress should direct EPA to evaluate the sufficiency of current regulations to reduce black carbon pollution and to develop new regulations if it finds the current ones inadequate. Congress should direct the State Department, USAID, and EPA to identify and support additional opportunities for international black carbon reduction assistance” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 515).

Proposed by: [Evergreen Action](#); [Legal Authority for Presidential Executive Action on Climate](#); [Energy Innovation](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Joe Biden 2020 Presidential Campaign](#)

### LPDD Recommendations

- “EPA should remove the four-hour exemption after generation during which the Mercury and Air Toxics Standards Rule numerical emission standards do not apply.” ([LPDD](#), p. 632)
- “EPA could choose to tighten its rules to require closed cycles in more instances, or to apply the rules to a broader set of power plants.” ([LPDD](#), p. 631)
- “EPA could put a limit on GHG emissions related to power generation under §§111(d) or 115 of the CAA.” ([LPDD](#), p. 626)
- “EPA regulations under CAA §111(b) and (d) should combine a federal floor (state-specific, mass-based allowance budget to meet best system of emissions reduction-derived targets) with compliance encouraged through state, regional, or national carbon trading.” ([LPDD](#), p. 311)
- “EPA should establish standards of performance under CAA §111(d) for designated pollutants (i.e., not criteria pollutants and not hazardous air pollutants), the control of which would also reduce black carbon emissions.” ([LPDD](#), p. 874)
- “EPA could strengthen the NSPS for new NGCCs to require at least partial CO<sub>2</sub> capture beginning in the mid--2020s. EPA should in the near term tighten the NSPS under the CAA for new coal-fired and NGCC units to levels only achievable with CCS or partial CCS. If EPA does not tighten NSPS in the near term, EPA should adopt regulations that encourage CCS retrofits in addition to CCS deployment at new builds.” ([LPDD](#), p. 730)
- “EPA could modify the NSPS for new coal-fired units by requiring full CO<sub>2</sub> capture (i.e., 90%) beginning in the early 2020s.” ([LPDD](#), p. 736)



- “EPA should revise its climate pollution BACT guidance to reflect NSPS requirements for partial CCS on coal-fired generators.” (LPDD, p. 737)
- “EPA should use its authority under CAA §§115, 615, or 111 to establish emission caps or performance standards for stationary sources of nitrous oxide emissions, particularly power plants and nitric acid facilities.” (LPDD, p. 933)
- “EPA should use the definition of BACT to push sources that propose to use dirty fuels, such as coal and diesel, to replace them with cleaner fuels, such as renewable energy, biogas, and biodiesel.” (LPDD, p. 860)
- “EPA should require states to address the transition from new natural gas plants to deep decarbonization in SIPs related to compliance with any carbon emissions reduction goals. EPA should encourage states to execute agreements with natural gas plant operators that, if gas emissions are not declining after 10 years, some mitigation measures will be taken, including plant curtailment or (at the extreme) shutdown, or investment in renewable power plants by gas plant operators to offset adverse pollution impacts.” (LPDD, p. 615)

#### LPDD Resources

- LPDD.org, “Restricting Fossil-Fuel Powered Electric Plants”: <https://lpdd.org/pathway/restricting-new-fossil-fuel-powered-plants/>
- LPDD.org, “Impacting Power Plant Economics Through Cooling Water Restrictions”: <https://lpdd.org/pathway/impacting-power-plant-economics-through-cooling-water-restrictions/>

#### Previous/Current Implementation

- The [Clean Power Plan](#),<sup>192</sup> announced by President Obama in August 2015, set the first-ever limits on carbon pollution from U.S. power plants. It aimed to cut emissions from the electricity sector by an estimated 32 percent below 2005 levels by 2030. It was stayed by the Supreme Court. The Trump Administration repealed it and replaced it with the weaker Affordable Clean Energy Rule. These actions are now in litigation.
- “In June 2019, EPA issued GHG emission regulations for existing fossil fuel-fired power plants in the [Affordable Clean Energy \(ACE\) Rule](#).<sup>193</sup> The rule would direct states to require coal-fired power plants to use prescribed technologies to improve their heat rate (i.e., increase efficiency), as a best system of emission reduction for carbon dioxide. The ACE Rule is not expected to reduce power sector emissions from a business-as-usual scenario” ([Center for Climate and Energy Solutions](#)).

#### Impact on GHGs

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<sup>192</sup> Fact Sheet: Overview of the Clean Power Plan. U.S. Environmental Protection Agency. <http://www2.epa.gov/cleanpowerplan>

<sup>193</sup> “Affordable Clean Energy Rule.” U.S. Environmental Protection Agency. <https://www.epa.gov/stationary-sources-air-pollution/affordable-clean-energy-rule>

In 2019, U.S. power plants emitted nearly 1.8 billion tons of CO<sub>2</sub>e ([EPA](#)),<sup>194</sup> or over 30% of the [total](#) CO<sub>2</sub>e emitted by the U.S. in 2019. Reducing emissions from power plants could significantly reduce overall greenhouse gas emissions.

### Co-Benefits

Reduced pollution provides air quality and human health benefits ([The Many Benefits of Reducing Carbon Pollution from Existing Power Plants](#)).<sup>195</sup>

### Additional Resources

- Legal Petition Seeks New Air Pollution Standards for Petrochemical Plants. Center for Biological Diversity. December 3, 2019. <https://biologicaldiversity.org/w/news/press-releases/legal-petition-seeks-new-air-pollution-standards-petrochemical-plants-2019-12-03/>
- “Some Methods of Reducing Sulfur Dioxide from Power Plants.” *Air Quality and Stationary Source Emission Control*. National Research Council (U.S.). Commission on Natural Resources. 1975. <https://www.nap.edu/read/10840/chapter/13>
- Linn, Joshua, Mastrangelo, Erin and Burtraw, Dallas. Regulating Greenhouse Gas Emissions from Coal Power Plants under the Clean Air Act. Resources for the Future. February 2013. <https://media.rff.org/archive/files/sharepoint/WorkImages/Download/RFF-DP-13-05.pdf>
- Lashof, Dan and Yeh, Staria. Cleaner and Cheaper: Using the Clean Air Act to Sharply Reduce Carbon Pollution from Existing Power Plants, Delivering Health, Environmental, and Economic Benefits. NRDC. March 2014. <https://www.nrdc.org/sites/default/files/pollution-standards-IB-update.pdf>

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<sup>194</sup> “Power Plant Emission Trends.” *U.S. Environmental Protection Agency*. Accessed July 2020. <https://www.epa.gov/airmarkets/power-plant-emission-trends>

<sup>195</sup> Ceronsky, Megan. “The Many Benefits of Reducing Carbon Pollution from Existing Power Plants.” *Environmental Defense Fund*. May 15, 2014. <http://blogs.edf.org/climate411/2014/05/15/the-many-benefits-of-reducing-carbon-pollution-from-existing-power-plants/>

## Leasing Federal Lands For Fossil Fuel Production

### Description

- “The next President should use executive action to ban all new fossil fuel leasing on federal lands and offshore waters, including coal, oil, gas, oil shale, and tar sands, on day one” ([Evergreen Action Plan](#), p. 55).
- “To ensure that communities are not left behind, the moratorium should be accompanied by meaningful economic transition assistance and initiatives for states, localities, and workers that have been dependent on fossil fuel extraction on public lands for jobs and revenues” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 483).

Proposed by: [Evergreen Action](#); [Legal Authority for Presidential Executive Action on Climate](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Bernie Sanders 2020 Presidential Campaign](#); [Cory Booker 2020 Presidential Campaign](#); [Pete Buttigieg 2020 Presidential Campaign](#); [Jay Inslee 2020 Presidential Campaign](#); [Keep it in the Ground Act \(2017\) - S.750](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); H.R. 5435, [the American Public Lands and Waters Climate Solution Act of 2019](#); <sup>196</sup> All candidates support a moratorium on fossil fuel production on public lands and offshore waters;

### LPDD Recommendations

- “The federal government should halt federal leasing of federal lands and waters for fossil fuel extraction.” ([LPDD](#), p. 644)
- “BLM could retain its rule for reducing gas waste and take further action to address methane emissions from oil and gas production on public land.” ([LPDD](#), p. 832)

### LPDD Resources

- LPDD.org, “Federal Fossil Fuel Phaseouts”: <https://lpdd.org/pathway/federal-fossil-fuel-phaseouts/>
- LPDD.org, “Prohibiting Oil and Gas Extraction”: <https://lpdd.org/pathway/prohibiting-oil-and-gas-extraction/>

### Previous/Current Implementation

The Obama Administration enacted a [coal leasing moratorium](#) <sup>197</sup> in 2016.

### Impact on GHGs

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<sup>196</sup> The American Public Lands and Waters Climate Solution Act of 2019. H.R. 5435, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/5435?s=1&r=3>

<sup>197</sup> Warrick, Joby and Eilperin, Juliet. “Obama Announces Moratorium on New Federal Coal Leases.” *Washington Post*. January 15, 2016. <https://www.washingtonpost.com/news/energy-environment/wp/2016/01/14/obama-administration-set-to-announce-moratorium-on-some-new-federal-coal-leases/>

- Fossil fuels from federal lands produced the equivalent of nearly a quarter of the United States' total carbon dioxide emissions over a 10-year period, according to a recent [scientific analysis](#)<sup>198</sup> by the U.S. Geological Survey (USGS).
- Ending new leasing [could](#)<sup>199</sup> reduce global carbon dioxide emissions by an estimated 280 million tons annually by 2030 ([NRDC](#)).<sup>200</sup>

### Co-Benefits

Ending the leasing of federal land for fossil fuel production would not only reduce emissions, but also protect the land and its ecosystems. It would also allow land to be converted for recreation, reforestation, or renewable energy production ([Look Before You Lease](#)).<sup>201</sup>

### Obstacles/Shortfalls

Attempts to end the leasing of federal land for fossil fuel production would receive strong legal and political opposition, as it has in the past ([Leaving it in the Ground: Examining Recent Proposals to Ban Fossil Fuel Extraction on America's Public Lands](#)).

### Additional Resources

- Elliott, Dustin Charles. "Leaving it in the Ground: Examining Recent Proposals to Ban Fossil Fuel Extraction on America's Public Lands." March 2020. [https://www.americanbar.org/groups/environment\\_energy\\_resources/publications/trends/2019-2020/march-april-2020/leaving-it-in-the-ground/](https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2019-2020/march-april-2020/leaving-it-in-the-ground/)
- Hein, Jayni, Kim, Joy and Smith Sam. "Look Before You Lease - Reducing Fossil Fuel Dominance on Public Lands by Accounting for Option Value." Institute for Policy Integrity. January 2020. <https://perma.cc/22ND-CNMN>

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<sup>198</sup> Merrill, Matthew D., et al. "Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005–14." *Scientific Investigations Report 2018-5131*. 2018. <https://pubs.er.usgs.gov/publication/sir20185131>

<sup>199</sup> Erickson, P. and Lazarus, M. "Would constraining US fossil fuel production affect global CO2 emissions? A case study of US leasing policy." *Stockholm Environment Institute*. February 22, 2018. <https://www.sei.org/publications/case-study-us-leasing-policy/>

<sup>200</sup> Eisenberg, Jacob. "Public Lands' Fossil Fuels & Climate Change." *NRDC*. February 12, 2019. <https://www.nrdc.org/experts/jacob-eisenberg/public-lands-fossil-fuels-climate-change>

<sup>201</sup> Hein, Jayni, Kim, Joy and Smith Sam. *Look Before You Lease - Reducing Fossil Fuel Dominance on Public Lands by Accounting for Option Value*. Institute for Policy Integrity. January 2020. <https://perma.cc/22ND-CNMN>

## Natural Gas Production

### Description

Policies to reduce emissions from natural gas production, including through national goals, technological improvements, federal methane rules, and air quality monitoring.

- “Establishes national goals for reducing methane emissions from the oil and natural gas sector to achieve a 65 percent reduction below 2012 levels by 2025, and a 90 percent reduction below 2012 levels by 2030. ... Directs the Secretary of Energy to establish a technology commercialization program to reduce GHG emissions from the oil and natural gas sector through improvements to existing technologies and practices that reduce such emissions” (CLEAN Future Act, [summary](#) pp. 18-19).
- “Defines the public interest under Sections 3 and 7 of the Natural Gas Act (NGA). Clarifies that FERC must consider climate change in its decision-making, resolving any ambiguity and arguments surrounding the District of Columbia Circuit Court’s holding in Sabal Trail (CLEAN Future Act, p. 3).
- “Congress should reinstate the EPA’s [new source performance standards] NSPS rule, as finalized in 2016, and the BLM methane waste rules” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 198).
- “Congress should direct EPA to require states to conduct air quality monitoring for criteria and hazardous air pollutants in areas with significant oil and gas development and should ensure that this information is made available to the affected communities” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 199).

Proposed by: [CLEAN Future Act](#); [Evergreen Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); All 2020 Presidential candidates except Castro, Klobuchar and Biden supported ending fracking

### LPDD Recommendations

- “EPA could consider adoption of new methane regulations for existing oil and gas facilities.” ([LPDD](#), p. 890)
- “BLM could retain its rule for reducing gas waste and take further action to address methane emissions from oil and gas production on public land.” ([LPDD](#), p. 844)
- “EPA could, under §115 of the CAA, integrate the program with existing NSPS and other carbon regulations such as methane emissions from the oil and gas sector; further, it could allow states to meet a declining cap with reductions in other regions and sectors.” ([LPDD](#), p. 317)

### LPDD Resources

- LPDD.org, “Regulation of Oil and Gas Sector Methane Emissions”:  
<https://lpdd.org/pathway/regulation-of-oil-and-gas-sector-methane-emissions/>

### Previous/Current Implementation

- A number of states (including California, Colorado, and Pennsylvania) regulate emissions from natural gas production. Policies include requiring natural gas compressor stations to

habitually replace rod packing, or requiring operators to monitor components of natural gas production facilities and compressor stations for leaks and repair them.

- EPA oversees the Natural Gas STAR (NG STAR) program, which started in 1993 and encourages oil and natural gas companies to voluntarily adopt technologies that reduce methane emissions ([Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector](#)).
- The Obama administration's EPA finalized new source performance standards (NSPS) for the oil and gas sector in June 2016, expanding and strengthening standards set in 2012.
- In 2016, the Obama administration's Bureau of Land Management (BLM) issued rules to reduce waste of natural gas from venting, flaring, and leaks during oil and gas production on onshore federal and tribal lands. The Trump Administration reversed the BLM rules in 2018.

### Impact on GHGs

The CLEAN Future act aims to reduce methane emissions from the oil and natural gas sector to achieve a 65 percent reduction below 2012 levels by 2025, and a 90 percent reduction below 2012 levels by 2030

In 2011, natural gas systems contributed approximately one-quarter of all U.S. methane emissions, of which over 37 percent are associated with production. ([Leveraging Natural Gas to Reduce Greenhouse Gas Emissions. Center for Climate and Energy Solutions](#)).

### Co-Benefits

Reduces pollutants emitted from natural gas production that have negative human health impacts ([Union of Concerned Scientists](#)).<sup>202</sup>

### Obstacles/Shortfalls

"There are clear institutional barriers to methane capture. ... Contracting is common in many aspects of the production subsectors, for example, and contractors may not be fully incentivized to reduce methane emissions if their contracts do not explicitly reward such behavior." ([Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector](#)).

Use of natural gas reduces emissions compared to coal combustion, so some environmentalist groups advocate for increased natural gas use in order to lower U.S. GHG emissions ([Leveraging Natural Gas to Reduce Greenhouse Gas Emissions. Center for Climate and Energy Solutions](#)).

### Additional Resources

- Munnings, Clayton and Krupnick, Alan. Comparing Policies to Resources to Reduce Methane Emissions in the Natural Gas Sector. Resources for the Future. July 2017. <https://media.rff.org/documents/RFF-Rpt-Methane.pdf>
- Center for Climate and Energy Solutions. Leveraging Natural Gas to Reduce Greenhouse Gas Emissions. June 2013.

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<sup>202</sup> "Environmental Impacts of Natural Gas." *Union of Concerned Scientists*. June 19, 2014. <https://www.ucsusa.org/resources/environmental-impacts-natural-gas#:~:text=Air%20pollution,sulfur%2C%20mercury%2C%20and%20particulates.&text=Exposure%20to%20elevated%20levels%20of,%2C%20and%20cancer%20%5B1%5D>

<https://www.c2es.org/site/assets/uploads/2013/06/leveraging-natural-gas-reduce-ghg-emissions.pdf>

## Natural Gas Pipelines

### Description

Policies to either reject new natural gas pipelines or reduce emissions from natural gas pipelines.

- “Issue an Executive Order directing all federal agencies to deny permits for new fossil fuel infrastructure projects, including but not limited to pipelines” ([Legal Authority for Presidential Executive Action on Climate](#), p. 2).
- The next administration should “work with Congress to end FERC’s authority to pre-empt states’ abilities to reject natural gas pipelines” ([Evergreen Action Plan](#), p. 58).
- “Work to set ... restrictions on exports of ... liquid natural gas (LNG)” (Evergreen Action Plan, p. 58).
- “Further directs EPA to include [methane emissions] standards for new and existing natural gas transmission and distribution pipelines” (CLEAN Future Act, [Summary](#) p. 18).
- “Amends the [Natural Gas Act] to prevent pipeline companies from using eminent domain until they have obtained all federal and state permits necessary for the construction and operation of a pipeline project. Prohibits use of eminent domain for pipelines attached to liquefied natural gas facilities” (CLEAN Future Act, [Summary](#) p. 3).
- “Congress should pass legislation to require natural gas pipeline operators to install and use advanced leak detection technology on all gas pipelines. ... Congress should require natural gas pipeline operators to use the best available technology to capture gas released during routine operations and maintenance. ... Congress should establish deadlines for pipeline operators to install automatic or remote-controlled shutoff valves in all areas and implement a leak detection and repair program. ... Congress should require natural gas pipeline operators to report and immediately repair any large loss event, such as a gas leak of or exceeding 50,000 cubic feet” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 201).
- “Congress should amend the Natural Gas Act to require FERC to consider all factors relevant to the public convenience and necessity, including upstream and downstream greenhouse gas emissions, community and landowner impacts, and market necessity on a long-term and regional basis” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 204)

Proposed by: [Legal Authority for Presidential Executive Action on Climate](#); [Evergreen Action](#); [CLEAN Future Act](#); [Safe, Accountable, Fair, and Environmentally Responsible \(SAFER\) Pipelines Act of 2019 \(H.R. 3432/H.R. 5120\)](#); <sup>203</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Methane Emissions from Transmission Harm American Neighborhoods and the Environment \(METHANE\) Act \(S. 2469\)](#) <sup>204</sup>

### LPDD Recommendations

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<sup>203</sup> Safer Pipelines act of 2019. H.R. 3432, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/3432>

<sup>204</sup> Methane Emissions from Transmission Harm American Neighborhoods and the Environment (METHANE) Act. S. 2469, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/2469>



- “Congress could direct DOE to analyze whether existing oil and natural gas pipelines could be repurposed to transport captured CO<sub>2</sub>.” (LPDD, p. 738)
- “FERC should require pipeline operators seeking to apply stricter quality standards to renewable gas than natural gas to provide a valid justification for that choice .... PHMSA should adopt more stringent repair requirements for renewable gas pipelines to minimize pipeline leaks and associated costs.” (LPDD, p. 689)
- “PHMSA could update their existing regulations to require the prompt detection and repair of all leaks.” (LPDD, p. 888)

#### LPDD Resources

- LPDD.org, “Minimizing Pipeline Leaks”: <https://lpdd.org/pathway/minimizing-pipeline-leaks/>
- LPDD.org, “Pipeline Leaks”: <https://lpdd.org/pathway/pipeline-leaks/>

#### Previous/Current Implementation

- FERC must conduct an environmental review under NEPA before issuing a Certificate authorizing a pipeline project. This involves assessing air quality impacts.
- States have adopted mechanisms to encourage local distribution companies to invest in accelerated pipeline replacement programs ([Natural Gas Infrastructure Modernization Programs at Local Distribution Companies](#), p. 37).<sup>205</sup>

#### Impact on GHGs

- The CLEAN Future act aims to reduce methane emissions from the oil and natural gas sector to achieve a 65 percent reduction below 2012 levels by 2025, and a 90 percent reduction below 2012 levels by 2030.
- Net emissions from natural gas transmission, storage and distribution totaled 30 million metric tons of CO<sub>2</sub>e in 2012 ([Natural Gas Infrastructure and Methane Emissions. Bipartisan Policy Center](#)).<sup>206</sup>

#### Co-Benefits

Limiting natural gas pipelines would reduce the risk of explosions or fires (“[Pipeline Risks](#).” Watershed Council).<sup>207</sup>

#### Obstacles/Barriers

“There are clear institutional barriers to methane capture. For example, in most states, public utility commissions do not allow local distribution companies to fully recover costs associated

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<sup>205</sup> Office of Energy Policy and Systems Analysis. “Natural Gas Infrastructure Modernization Programs at Local Distribution Companies: Key Issues and Considerations.” U.S. Department of Energy. January 2017. <https://www.energy.gov/sites/prod/files/2017/01/f34/Natural%20Gas%20Infrastructure%20Modernization%20Programs%20at%20Local%20Distribution%20Companies--Key%20Issues%20and%20Considerations.pdf>

<sup>206</sup> Munnings, Clayton and Krupnick, Alan. Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector. Resources for the Future. March 2020. <https://media.rff.org/documents/RFF-Rpt-Methane.pdf>

<sup>207</sup> “Pipeline Risks.” *Watershed Council*. <https://www.watershedcouncil.org/pipeline-risks.html#:~:text=For%20natural%20gas%20pipelines%2C%20the,gas%2C%20contributes%20to%20climate%20change>

with repairing pipeline leaks ... because the costs of discovering and fixing small leaks are considered maintenance expenses” ([Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector](#)).<sup>208</sup>

#### Additional Resources

- Center for Climate and Energy Solutions. “Leveraging Natural Gas to Reduce Greenhouse Gas Emissions.” June 2013.  
<https://www.c2es.org/site/assets/uploads/2013/06/leveraging-natural-gas-reduce-ghg-emissions.pdf>
- “Controlling Methane Emissions in the Natural Gas Sector: A Review of Federal & State Regulatory Frameworks Governing Production, Gathering, Processing, Transmission, and Distribution. Joint Institute for Strategic Energy Analysis.” U.S. Department of Energy’s National Renewable Energy Laboratory. April 2015.  
<https://www.nrel.gov/docs/fy15osti/63416.pdf>

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<sup>208</sup> Munnings, Clayton and Krupnick, Alan. Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector. Resources for the Future. March 2020. <https://media.rff.org/documents/RFF-Rpt-Methane.pdf>

## Natural Gas Power Plants

### Description

“States could impose an outright ban on new coal-fired generation and/or a formal limit on new natural gas generation additions” ([LPDD Resources](#)).<sup>209</sup>

### Previous/Current Implementation

- A number of states (including California, Colorado, and Pennsylvania) regulate emissions from natural gas production. Policies include requiring natural gas compressor stations to habitually replace rod packing, or requiring operators to monitor components of natural gas production facilities and compressor stations for leaks and repair them ([Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector](#)).<sup>210</sup>
- EPA oversees the Natural Gas STAR (NG STAR) program, which started in 1993 and encourages oil and natural gas companies to voluntarily adopt technologies that reduce methane emissions ([Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector](#)).<sup>211</sup>

### Impact on GHGs

Banning new natural gas power plants beginning in 2020 would reduce U.S. emissions by 3% in 2050 compared to a BAU baseline (equivalent to a reduction of 177 million metric tons of CO<sub>2</sub>e) ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Obstacles/Shortfalls

The use of natural gas reduces emissions compared to coal combustion, so some environmentalist groups advocate for increased natural gas use in order to lower U.S. GHG emissions. ([Leveraging Natural Gas to Reduce Greenhouse Gas Emissions. Center for Climate and Energy Solutions](#)).

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<sup>209</sup> “Restricting Fossil-Fuel Powered Electric Plants.” *Model Pathways for Deep Decarbonization*. <https://lpdd.org/pathway/restricting-new-fossil-fuel-powered-plants/>

<sup>210</sup> Munnings, Clayton and Krupnick, Alan. Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector. Resources for the Future. March 2020. <https://media.rff.org/documents/RFF-Rpt-Methane.pdf>

<sup>211</sup> Munnings, Clayton and Krupnick, Alan. Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector. Resources for the Future. March 2020. <https://media.rff.org/documents/RFF-Rpt-Methane.pdf>

## Hydropower

### Description

Policies to advance hydropower, which generates electricity through falling water.

- “Reauthorizes sections 242 and 243 of the Energy Policy Act of 2005 (EPACT05) to provide incentives for owners and operators of hydroelectric projects to make production and efficiency improvements to hydropower facilities from FY 2021-2036, and to expand eligibility for the program to hydropower facilities at existing dams or conduits with generating capacities of 10 megawatts or less. Adds a new section to the FPA to improve the hydropower licensing process” (CLEAN Future Act, [Summary](#), p. 6)
- “Congress should extend the [Production Tax Credit (PTC)] for qualified hydropower and landfill gas” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 42).
- “Congress ... should expand eligibility for federal funding to include small hydropower-generating dams” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 182).
- Other policies include: upgrading existing fleet of hydropower assets, installing new hydropower facilities at existing non-powered dams, and implementing low-head conduit, MHK, and pumped storage projects (Sensiba, et al., [Deep Decarbonization and Hydropower](#), pp. 10314-10317).<sup>212</sup>

Proposed by: [Vision for Equitable Climate Action](#); [CLEAN Future Act](#); [GREEN Act of 2020](#) (H.R. 7330); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Reliable Investment in Vital Energy Reauthorization \(RIVER\) Act](#) (H.R. 3361)

### LPDD Recommendations

- “Congress could direct FERC, when approving a project upgrade or efficiency improvement, to extend license terms beyond 50 years to allow hydropower project owners sufficient time to recoup the cost of investment.” ([LPDD](#), p. 589)
- “Congress should adopt a national RPS that includes all forms of duly licensed and exempted nonfederal hydro-power, or Congress should adopt a carbon tax. Congress should amend EPAct 2005 to clarify that all forms of duly licensed and exempted nonfederal hydro-power satisfy renewable energy requirements for federal procurement.” ([LPDD](#), p. 583)
- “Congress should require FERC, together with federal and state resource agencies exercising authority in the licensing or relicensing of nonfederal hydropower, to give “equal consideration” to the climate benefits afforded by hydropower. Through the use of federal research grants and other federal funding provided to the states, Congress should encourage the states to change their restrictive RPS requirements by allowing all duly licensed and exempted nonfederal hydropower to qualify. The federal administration should direct all federal departments, agencies, and bureaus with responsibilities for the approval of any aspect of hydropower to review, update, and supplement agency

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<sup>212</sup> Sensiba, Charles R., Swiger, Michael A., and White, Sharon L. Deep Decarbonization and Hydropower. *Environmental Law Institute*, 2018. <https://lpdd.org/wp-content/uploads/2019/05/22-LPDD-Hydropower.pdf>

guidance documents, hand-books, and resource plans to reflect hydropower as a priority for combating carbon emissions.” (LPDD, p. 584)

- “Congress should reform the hydropower licensing and permitting program by statutorily designating FERC as the lead agency, for purposes of NEPA review, for all licenses and other authorizations required under federal law. To help ensure that agencies have needed resources to fulfill their responsibilities under federal law, Congress should provide optional mechanisms for agencies to receive direct funding from hydropower license applicants. To help promote timely participation by the hydropower applicant and participating resource agencies, Congress should empower FERC to establish a centralized schedule for the completion of all licenses and authorizations required for a nonfederal hydropower project.” (LPDD, p. 587)
- “Congress should reform FERC’s license amendment process by implementing a fast-track procedure for efficiency upgrades, modernization activities, and upgrades that are not anticipated to produce significant environmental effects.” (LPDD, p. 589)
- “Congress should define new, fast-track licensing parameters that apply only to pumped storage projects, or even just closed-loop systems.” (LPDD, p. 590)
- “Congress should reduce the uncertainty of pumped storage developments at Bureau of Reclamation facilities by clarifying jurisdictional limits and reducing overlapping responsibilities between FERC and the Bureau of Reclamation at these sites.” (LPDD, p. 591)
- “Congress should create a new licensing or “exemption” program for the purpose of authorizing new hydropower development at non-powered dams.” (LPDD, p. 592)
- “Congress should modify the hydropower licensing process, and adopt an expeditious permitting scheme, for marine and hydrokinetic technologies.” (LPDD, p. 593)

#### LPDD Resources

- LPDD.org, “Hydropower”: <https://lpdd.org/pathway/hydropower/>

#### Previous/Current Implementation

- “As of the end of 2015, there were 2,198 active conventional hydropower plants in the United States ... resulting in a total of 101 GW of installed hydropower capacity” (Deep Decarbonization and Hydropower, p. 10311).<sup>213</sup>
- The [Hydropower Regulatory Efficiency Act of 2013](#)<sup>214</sup> (HREA) included provisions to encourage the addition of hydropower facilities at existing dams (Deep Decarbonization and Hydropower).<sup>215</sup>

#### Impact on GHGs

“DOE estimates that hydropower in the United States could feasibly grow from 101 gigawatts (GW) of emissions-free generating and storage capacity to nearly 150 GW by 2050, avoiding 5.6

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<sup>213</sup> Ibid.

<sup>214</sup> Hydropower Regulatory Efficiency Act of 2013. H.R. 267, 113th Congress. 2013. <https://www.congress.gov/bill/113th-congress/house-bill/267>

<sup>215</sup> Sensiba, Charles R., Swiger, Michael A., and White, Sharon L. Deep Decarbonization and Hydropower. Environmental Law Institute, 2018. <https://lpdd.org/wp-content/uploads/2019/05/22-LPDD-Hydropower.pdf>

billion metric tons of carbon dioxide (CO<sub>2</sub>) emissions” ([Deep Decarbonization and Hydropower](#), p.10310).<sup>216</sup>

### Co-Benefits

Hydropower projects could create 195,000 new jobs by 2050 ([Deep Decarbonization and Hydropower](#), p.10310).<sup>217</sup>

### Obstacles

- Impediments include lengthy and complex regulatory requirements, failure of the organized electricity markets to adequately compensate hydropower generators for the grid benefits they provide, environmental opposition to new hydropower, and interest in dam removal. ([Deep Decarbonization and Hydropower](#)).<sup>218</sup>
- Potential environmental harms: “Flooding land for a hydroelectric reservoir has an extreme environmental impact: it destroys forest, wildlife habitat, agricultural land, and scenic lands. ... Fish and other organisms can be injured and killed by turbine blades” ([Union of Concerned Scientists](#)).<sup>219</sup>

### Additional Resources

- “Advantages and Disadvantages of Hydropower.” Envirothon PA. 2005. <https://www.envirothonpa.org/documents/19bHydropowerAdvantagesandDisadvantages.pdf>
- Askari, Mohammad, et al. “Hydroelectric Advantages and Disadvantages.” April 2015. [https://www.researchgate.net/publication/275094706\\_Hydroelectric\\_Energy\\_Advantages\\_and\\_Disadvantages](https://www.researchgate.net/publication/275094706_Hydroelectric_Energy_Advantages_and_Disadvantages)
- Demooei, Sheyda, et al. “Hydropower Policy Report.” Carnegie Mellon University. May 5 2015. <https://www.cmu.edu/epp/people/faculty/course-reports/NTC%20Hydropower-Final-Report%20Spring%202015.pdf>
- “Hydropower Vision - A New Chapter for America’s 1st Renewable Electricity Source.” U.S. Department of Energy. <https://www.energy.gov/sites/prod/files/2018/02/f49/Hydropower-Vision-021518.pdf>

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<sup>216</sup> Sensiba, Charles R., Swiger, Michael A., and White, Sharon L. Deep Decarbonization and Hydropower. *Environmental Law Institute*, 2018. <https://lpdd.org/wp-content/uploads/2019/05/22-LPDD-Hydropower.pdf>

<sup>217</sup> Ibid.

<sup>218</sup> Ibid.

<sup>219</sup> “Environmental Impacts of Hydroelectric Power.” *Union of Concerned Scientists*. March 5, 2013. <https://www.ucsusa.org/resources/environmental-impacts-hydroelectric-power#:~:text=Flooding%20land%20for%20a%20hydroelectric,agricultural%20land%2C%20and%20scenic%20lands.>

## Nuclear

### Description

- “Establishes a pilot program requiring DOE to enter into at least one long-term power purchase agreement to purchase electricity generated from advanced nuclear power technologies” (CLEAN Future Act of 2020, [Summary](#), p. 6).
- “The High Nuclear Scenario involves more than 400 gigawatts of nuclear, four times current capacity. The Mixed Scenario involves approximately 200 gigawatts of nuclear, or two times current capacity” ([Deep Decarbonization and Nuclear Energy](#), p. 10244).<sup>220</sup>
- “Congress should direct the [Nuclear Regulatory Commission] NRC to increase inspections at aging [nuclear] plants and maintain a strong Reactor Oversight Process[, and] ... to use its existing authority under the National Environmental Policy Act (NEPA) to conduct a rigorous climate assessment of any nuclear reactors seeking license renewals, including thorough review of vulnerabilities to potential climate impacts” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 47)
- “Congress should direct DOE to provide support for first-of-a-kind or early deployment nuclear power technologies, such as small modular reactors, through R&D, federal financing, loan guarantees, other types of federal credit, or a pilot program for a long-term power purchase agreement for federal agencies, provided the technology meets high standards of safety, including cybersecurity, and minimizes proliferation risks” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 48).
- “Congress should continue to pursue a legislative solution to America’s nuclear waste problem, which should include consent-based siting for any permanent repository for nuclear waste” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 49).
- “Congress should direct the Nuclear Regulatory Commission to perform a fleet-wide assessment of extreme weather and climate vulnerabilities of U.S. nuclear plants and spent fuel based on projected climate impacts” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 50).

Proposed by: [CLEAN Future Act](#); [Joe Biden 2020 Presidential Campaign](#); [Evergreen Action](#); [Nuclear Energy Research and Development Act \(H.R. 6097\)](#);<sup>221</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Cory Booker 2020 Presidential Campaign; Andrew Yang 2020 Presidential Campaign

### LPDD Recommendations

- “Congress could permit advanced depreciation to encourage licensees to invest in long-term operations at existing nuclear plants.” ([LPDD](#), p. 559)
- “Congress should consider investment tax credits to provide an incentive for current nuclear operators to invest in both power uprates and second license renewal. Congress should

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<sup>220</sup> Repka, David and Smith, Tyson R. Deep Decarbonization and Nuclear Energy. 2018. <https://lpdd.org/wp-content/uploads/2019/05/21-LPDD-Nuclear-Energy.pdf>

<sup>221</sup> Nuclear Energy Research and Development Act. H.R. 6097, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/6097/text>



consider production tax credits for nuclear generation to prevent early retirements by “topping off” economic returns for nuclear generators. Congress should continue and increase funding to DOE and NRC to support research and licensing and regulatory process improvements to reduce the technical, economic, and regulatory uncertainty associated with operation beyond 60 years.” ([LPDD](#), p. 559)

- “The federal government should consider subsidies for nuclear generation comparable to direct subsidies for renewables that improve, if not reverse, the cost comparison relative to renewables.” ([LPDD](#), p. 560)
- “Congress should amend the Atomic Energy Act to eliminate or modify restrictions on foreign ownership, control, and domination for new nuclear projects .... Congress or DOE should expand the federal loan guarantee program to be far more extensive in scope, more financially aggressive, and less costly for the project developers than the 2005 program.” ([LPDD](#), p. 562)
- “Congress could amend the Atomic Energy Act to reduce or eliminate the fee recovery for government review of new designs, which could be considered as a public investment in the technology. Congress could increase DOE funding (supplementing private venture capital) to support development and testing of new reactor technologies, as well as detailed design engineering and NRC licensing. Congress should consider direct public funding or public-private partnerships to develop, license, and deploy small modular reactors and advanced non-light water reactor technologies. If advanced non-light water reactor technology will be ready, NRC may need to accelerate development of a regulatory framework for that technology to support substantial new deployment by 2050.” ([LPDD](#), p. 563)
- “The federal government must encourage—or even require—standardization of nuclear power plant designs to the maximum extent feasible. Congress could provide incentives for ‘first-to-market’ designs, and provide that once a new nuclear power plant design is licensed and deployed successfully, subsequent developers would be eligible for tax incentives or access to low-cost financing for using the same design. ” ([LPDD](#), p. 564)
- “Congress could impose strict timelines for NRC reviews of combined license (COL) applications referencing a standard design certification (DC) to reflect the reduced scope of issues for review. NRC should—consistent with the Atomic Energy Act and NEPA—eliminate contested hearings on NEPA issues (or at least move them forward in the process).” ([LPDD](#), p. 565)
- “The federal government should support transmission systems to connect nuclear power sites to population centers. Congress should consider creating a federal role in designating available nuclear project sites, away from population centers and away from external threats such as severe weather and earthquakes, linked to a revitalized transmission system, and preempt state and local permitting.” ([LPDD](#), p. 567)
- “Congress, by law, could require that a specified percentage of electricity that the federal government procures be from nuclear power generation .... Congress could consider creating a new government administration or corporation to develop nuclear projects, based on the TVA model.” ([LPDD](#), p. 567)
- “Congress could amend the Nuclear Waste Policy Act to provide for consent-based siting and licensing of alternative or additional sites. Congress could assign the tasks of completing a repository and addressing the need for additional repository capacity to a new ‘Nuclear Waste Administration’ as an alternative to DOE with a clear mission and consistent funding



from the existing Nuclear Waste Fund. Congress could authorize private waste storage facilities (e.g., current proposed facilities in Texas and New Mexico) to store nuclear waste. Congress should appropriate funds for reactivating and licensing the Yucca Mountain project for disposal of spent nuclear fuel.” (LPDD, p. 568)

#### LPDD Resources

- LPDD.org, “Nuclear Energy”: <https://lpdd.org/pathway/nuclear-energy/>

#### Previous/Current Implementation

- In 2019, the U.S. generated 809,409 thousand MWh of nuclear energy (EIA).<sup>222</sup>
- “In 2016, 99 U.S. nuclear power reactors operated at a capacity factor of 92.5% and generated 805 billion kilowatt hours (kWh) of electricity, representing about 20% of electricity in the United States” (Deep Carbonization and Nuclear Energy, p. 10244).
- France implemented up to six new nuclear plants per year from 1973 to 1988, transforming its electricity generation from almost entirely fossil fuels to 80% nuclear, revealing precedent for rapid expansion of nuclear power (Deep Carbonization and Nuclear Energy, p. 10245).

#### Impact on GHG Emissions

- Currently, U.S. nuclear energy production avoids 476 million metric tons of CO<sub>2</sub> emissions per year (NEI, p. 6).<sup>223</sup>
- Subsidizing nuclear energy production at \$54/MWh would reduce U.S. GHG emissions by 4.5% in 2050 compared to a BAU baseline (U.S. Policy Solutions Simulator v 2.1.1).

#### Obstacles/Shortcomings

Nuclear power poses safety and security risks, radioactive waste disposal challenges, and water requirements. Risks can be mitigated through power plant technologies. Many U.S. nuclear power plants also require financial and/or political support in order to remain profitable (The Nuclear Power Dilemma, p. 2).<sup>224</sup> Because of its associated risks, nuclear power production faces opposition from some political and environmental groups.

#### Co-Benefits

Nuclear power production creates jobs associated with equipment manufacture, construction, and operation (Deep Carbonization and Nuclear Energy, p. 10246).

#### Resources

- Union of Concerned Scientists. “The Nuclear Power Dilemma: Declining Profits, Plant Closures, and the Threat of Rising Carbon Emissions.” 2018.

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<sup>222</sup> “Nuclear Explained.” Energy Information Administration. Accessed July 2020. <https://www.eia.gov/energyexplained/nuclear/us-nuclear-industry.php>

<sup>223</sup> Nuclear Energy Institute. Nuclear by the Numbers. 2020. <https://www.nei.org/CorporateSite/media/filefolder/resources/fact-sheets/nuclear-by-the-numbers.pdf>

<sup>224</sup> Union of Concerned Scientists. The Nuclear Power Dilemma: Declining Profits, Plant Closures, and the Threat of Rising Carbon Emissions. 2018. <https://www.ucsusa.org/sites/default/files/attach/2018/11/Nuclear-Power-Dilemma-full-report.pdf>

<https://www.ucsusa.org/sites/default/files/attach/2018/11/Nuclear-Power-Dilemma-full-report.pdf>

- Repka, David and Smith, Tyson R. “Deep Decarbonization and Nuclear Energy.” 2018. <https://lpdd.org/wp-content/uploads/2019/05/21-LPDD-Nuclear-Energy.pdf>
- Climate Change and Nuclear Power 2018. “International Atomic Energy Agency.” 2018. [https://www-pub.iaea.org/MTCD/Publications/PDF/CCNAP-2018\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/CCNAP-2018_web.pdf)
- Nuclear Energy Institute. “Nuclear by the Numbers.” 2020. <https://www.nei.org/CorporateSite/media/filefolder/resources/fact-sheets/nuclear-by-the-numbers.pdf>

## **Biomass**

### Description

- “Bioenergy feedstocks are cultivated crops, agricultural and forest residues, algae, sewage and livestock manures, and other organic materials. Feedstock selection and cultivation begins the bioenergy supply chain, followed by handling, processing and distribution, and, eventually, end use conversion, producing fuels to power motor vehicles and generate electricity” ([Bioenergy Feedstocks \(Ch. 25\)](#), LPDD Resources).
- “The next administration ... will have significant discretion over federal biofuels policy ... And it should use that authority to transform the post-2022 RFS into a Clean & Renewable Fuel Standard (CRFS) that promotes low-carbon biofuels” ([Evergreen Action Plan](#), p. 20).
- “Congress should invest in research to better understand the lifecycle carbon implications of wood use and wood products, including accurately accounting for the climate impacts of biomass” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 460).
- “Congress should establish safeguards to ensure woody biomass does not contribute to the biodiversity crisis, including restricting harvesting from sensitive habitat and ecosystems, preventing the conversion of natural forest habitat, and prohibiting the cultivation of invasive species for bioenergy feedstock” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 460).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Rural; [Vision for Equitable Climate Action](#) (p. 7); [Energy Innovation](#) (p. 5); [Evergreen Action](#) (p. 20); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### LPDD Recommendations

- “The General Services Administration should adjust the Federal Acquisition Regulation to specifically contemplate energy procurement, requiring that any contracts related to procurements of electricity or transportation fuel from bioenergy utilize feedstocks that meet decarbonization criteria.” ([LPDD](#), p. 658)
- “Congress could condition the receipt of federal subsidy funds in the agricultural sector on the implementation of sustainable bioenergy feedstock practices.” ([LPDD](#), p. 658)
- “Congress could modify the Healthy Forests Restoration Act to include explicit contemplation of extracted for-est floor fuels for bioenergy end uses, the conditioning of biomass commercial utilization grants on sustainable bioenergy feedstock cultivation, and/or the expansion of bioenergy feedstocks when doing so would increase the carbon sink capacity of the land base.” ([LPDD](#), p. 659)
- “Congress should eliminate the Biomass Crop Assistance Program (BCAP) requirement that eligible materials be limited to byproducts of preventative treatment removed to reduce risk of fire or insect infestation. Congress should expand the BCAP to more explicitly account for a wider array of bioenergy end uses, and should condition financial assistance on sustainable biomass feedstock cultivation criteria.” ([LPDD](#), p. 662)
- “USFS could make adjustments to the Community Forest and Open Space Conservation Program to make clear that valid forest uses include the cultivation of bioenergy feedstocks. USFS could potentially use its discretion under the federal Forest Legacy

Program to allow for bioenergy feedstock production, while at the same time requiring decarbonization-driven standards for such lands. USFS could utilize its discretion under the Healthy Forests Reserve Program to enhance carbon sequestration on forestlands to allow the production of bioenergy feedstocks—so long as production occurs according to decarbonization criteria related to sustainability (particularly related to biodiversity protection), enhanced carbon sequestration management methods, and related measures. USFS should implement the Healthy Forests Reserve Program nationwide.” (LPDD, p. 663)

- “To the extent that bioenergy feedstock lands can be made to sequester more carbon through improved management techniques, Congress should amend the Cooperative Forestry Assistance Act to condition receipt of forest stewardship management funds on the incorporation of such techniques.” (LPDD, p. 663)
- “Congress could convert the RFS volume requirements to “percentage of final demand,” thus allowing for adjustments over time that align with declining demand for gasoline as vehicle efficiency and mobility electrification increases. Congress could modify the RFS to phase out credits for grandfathered facilities.” (LPDD, p. 665)
- “Congress could adopt a federal RPS that preempts state RPS provisions to the extent they fail to limit biomass for electricity to feedstocks that demonstrate substantial life-cycle GHG reduction without limiting state ambition.” (LPDD, p. 667)
- “Congress could require that any bioenergy feedstock used in the United States be certified by an independent certification organization (or allow agencies to adopt private certification standards for their own certification programs).” (LPDD, p. 668)
- “The federal government could require that any bioenergy companies participating in the market demonstrate certification of sustainable operations before receiving federal permits or other approvals. Congress could authorize the General Services Administration to require certification for any feedstocks procured by the federal government or energy derived from bioenergy and purchased by the federal government.” (LPDD, p. 669)
- “Congress could add hydrogen and synthetic natural gas to the RFS mandate.” (LPDD, p. 669)
- “Congress should reform the 2010 RFS to move from an absolute volume of mandated production to a percentage of final demand, which will be necessary as overall gasoline demand declines due to the improvements in the transportation sector. Congress should reform the RFS approach to include a multiplier for per-unit emissions reductions. Congress should require use of a life-cycle analysis, whether as part of the RFS or a low-carbon fuel standard, to provide an incentive to achieve decarbonization in the production and delivery of liquid fuels.” (LPDD, p. 702)
- “DOE should redeploy funding for biofuels research to development of fuels that have high-value uses, such as biomass-based diesel.” (LPDD, p. 703)
- “Congress could provide funding assistance to Gulf Coast states that are well-positioned to further develop the biomass industry, given the widespread availability of biomass resources in that region of the country.” (LPDD, p. 704)
- “Congress could provide tax credits or grant funding to stimulate investment in R&D leading to improved equipment to harvest, store, and deliver feedstock for biofuels.” (LPDD, p. 705)

## LPDD Resources

- LPDD.org, “Production and Delivery of Bioenergy Fuels”: <https://lpdd.org/pathway/production-and-delivery-of-bioenergy-fuels/>
- LPDD.org, “Bioenergy Feedstocks”: <https://lpdd.org/pathway/bioenergy-feedstocks/>

## Previous/Current Implementation

- The Department of Energy invests in biomass R&D projects. In 2015, the U.S. produced 16 billion gallons of biofuels ([Energy.Gov](#)).<sup>225</sup>
- There are also a number of federal biomass incentives programs. For example, the IRS’s Volumetric Ethanol Excise Tax Credit gives gasoline suppliers who blend ethanol with gasoline a tax credit of 45 cents per gallon of ethanol ([Biofuels Incentives: A Summary of Federal Programs](#)).<sup>226</sup>
- The 2007 Energy Independence and Security Act (EISA) expanded the Renewable Fuel Standard to include any form of renewable fuel produced from renewable biomass.<sup>227</sup>

## Impact on GHGs

The potential for biomass to reduce greenhouse gas emissions depends on the energy resource being replaced, the type of biomass, the combustion technology, and re-growing efforts. Generally, if biomass electricity production were subsidized at \$60/MWh (high end of potential subsidy), U.S. 2050 emissions would reduce by .02% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

## Co-Benefits

- Study on the value of U.S. biofuel power:
  - Morris, G. The Value of the Benefits of U.S. Biofuel Power. Green Power Institute. National Renewable Energy Laboratory. November 1999. <https://www.nrel.gov/docs/fy00osti/27541.pdf>

## Obstacles/Shortfalls

Some biofuel technologies, including wood-burning power plants and garbage incinerators, can produce greater carbon emissions than the fossil fuels they are intended to replace ([Vision for Equitable Climate Action](#), p. 7). Other drawbacks include potential deforestation, high costs of production, high water requirements, and large space needs ([Renewable Resources](#)

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<sup>225</sup> “Bioenergy Frequently Asked Questions.” *Office of Energy Efficiency & Renewable Energy*. Energy.Gov. <https://www.energy.gov/eere/bioenergy/bioenergy-frequently-asked-questions#:~:text=The%2016%20billion%20gallons%20of,1.3%20billion%20gallons%20was%20biodiesel.>

<sup>226</sup> Yacobucci, Brent D. Biofuels Incentives: A Summary of Federal Programs. Congressional Research Service. January 11, 2012. <https://fas.org/sgp/crs/misc/R40110.pdf>

<sup>227</sup> “Summary of the Energy Independence and Security Act.” *U.S. Environmental Protection Agency*. <https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act>

[Coalition](#)).<sup>228</sup> As a result, several environmental groups have called biomass a “false solution” ([Legal Authority For Presidential Executive Action On Climate](#), p. 32)

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<sup>228</sup> “The Advantages and Disadvantages of Biomass Energy.” *Renewable Resources Coalition*. December 9, 2016. <https://www.renewableresourcescoalition.org/biomass-energy-advantages-disadvantages/>

## Geothermal

### Description

Policies to advance the production of geothermal energy, which is heat derived within the sub-surface of the earth carried to the surface by water or steam.

- “Geothermal energy, currently eligible for a lower investment tax credit, should be made eligible for the full credit.” Policies could include tax credits, a clean energy standard for the electricity sector, and research and development for enhanced geothermal production ([Center for Climate and Energy Solutions](#), p. 3).
- “Congress should reauthorize and expand DOE research, development, and demonstration of geothermal energy technologies” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 43).
- Establish a program to transfer and adapt key oil and gas technologies for geothermal development ([The American Energy Innovation Act](#)).

Proposed by: [Evergreen Action](#) (p.14); [Vision for Equitable Climate Action](#); [DNC Environment and Climate Crisis Council](#) (p. 3,7); [Energy Innovation](#) (p. 5); [Center for Climate and Energy Solutions](#) (p. 3); [Advanced Geothermal Research and Development Act of 2019](#) (H.R. 5374);<sup>229</sup> [Geothermal Energy Opportunity \(GEO\) Act of 2019](#) (H.R. 5154);<sup>230</sup> Section 101 of [the GREEN Act](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### Previous/Current Implementation

- Currently 0.4% of total U.S. utility-scale electricity generation comes from geothermal ([Geothermal Explained](#), U.S. Energy Information Administration).<sup>231</sup>
- The U.S. has tapped less than 0.6% of geothermal electricity resources; the majority can become available with Enhanced Geothermal System technology ([University of Michigan](#)).<sup>232</sup>
- The Geothermal Tax Credit was in place from 2005 to 2016 and then reinstated in 2018. The federal tax credit allowed homeowners to deduct 30% of the amount they spent on purchasing and installing a geothermal heat pump system from their federal income taxes. The tax credit decreases to 26% in 2020 and 22% in 2021 ([The 2020 Federal Geothermal Tax Credit: Your Questions Answered](#)).<sup>233</sup>

### Impact on GHGs

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<sup>229</sup> Advanced Geothermal Research and Development Act of 2019. H.R. 5374. 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/5374>

<sup>230</sup> GEO Act of 2020. H.R. 5154, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5154/text?r=32&s=1>

<sup>231</sup> “Geothermal Explained.” U.S. Energy Information Administration. <https://www.eia.gov/energyexplained/geothermal/use-of-geothermal-energy.php>

<sup>232</sup> “Geothermal Energy Factsheet.” *Center for Sustainable Systems*. University of Michigan. <http://css.umich.edu/factsheets/geothermal-energy-factsheet#:~:text=In%202016%2C%20there%20were%203%2C567,MW%20of%20projects%20in%20development.&text=Electricity%20generated%20from%20geothermal%20power,65.6%20billion%20kWh%20in%202050.>

<sup>233</sup> The 2020 Federal Geothermal Tax Credit: Your Questions Answered. Dandelion Energy. December 3, 2019. <https://dandelionenergy.com/blog/federal-geothermal-tax-credit#:~:text=The%20federal%20tax%20credit%20initially,2020%20and%2022%25%20in%202021>



Geothermal produces 0.2 lbs of CO<sub>2</sub>/kW-hr, while coal produces over ten times that, at 2.095 lbs of CO<sub>2</sub>/kW-hr ([Geothermal Energy Reduces Greenhouse Gases](#), *Climate Change Research*).<sup>234</sup>

#### Obstacles/Shortfalls

- Geothermal energy is location specific. Geothermal plants need to be built in places where the energy is accessible, which means that some areas are not able to exploit this resource ([TWI](#)).<sup>235</sup>
- Geothermal energy also runs the risk of triggering earthquakes.<sup>236</sup>
- Geothermal energy is an expensive resource, generally more expensive than conventional heating and cooling systems.<sup>237</sup>
- Geothermal energy can create negative environmental effects if installed or operated improperly ([Geothermal 101: The Basics And Applications Of Geothermal Energy](#)).<sup>238</sup>
- It can also lead to groundwater/environmental contamination in the event of a pipe leak ([Geothermal 101: The Basics And Applications Of Geothermal Energy](#)).<sup>239</sup>

#### Additional Resources

Zarrouk, Sadiq J., Moon, Hyungsul. "Efficiency of Geothermal Power Plants: A Worldwide Review." *Geothermics*, Vol 51. July 2014.

<https://www.sciencedirect.com/science/article/pii/S0375650513001120>

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<sup>234</sup> Bloomfield, K. Kit, Moore, Joseph N. and Nielson, Robert M., Jr. Geothermal Energy Reduces Greenhouse Gases. *Climate Change Research*. April 2003. <https://geothermal.org/PDFs/Articles/greenhousegases.pdf>

<sup>235</sup> "What are the Advantages and Disadvantages of Geothermal Energy?" *TWI*. <https://www.twi-global.com/technical-knowledge/faqs/geothermal-energy/pros-and-cons>

<sup>236</sup> Ibid.

<sup>237</sup> Ibid.

<sup>238</sup> Zoet, Adam. Geothermal 101: The Basics And Applications Of Geothermal Energy. Dovetail Partners Inc. September 12, 2011. <https://www.ourenergypolicy.org/wp-content/uploads/2013/09/DovetailGeothermal0911.pdf>

<sup>239</sup> Zoet, Adam. Geothermal 101: The Basics And Applications Of Geothermal Energy. Dovetail Partners Inc. September 12, 2011. <https://www.ourenergypolicy.org/wp-content/uploads/2013/09/DovetailGeothermal0911.pdf>



## Oil Production

### Description

Policies to regulate emissions from oil production as well as ban new oil production projects.

- “Banning new oil and gas permitting on public lands and waters” ([Joe Biden 2020 Presidential Campaign](#) - Climate).
- “Requir[es] aggressive methane pollution limits for new and existing oil and gas operations” ([Joe Biden 2020 Presidential Campaign](#) - Climate).
- “The next President can issue an Executive Order on approval of new fossil fuel infrastructure projects, instructing federal agencies to deny all permits and approvals for fossil fuel infrastructure unless denial would be unlawful under the applicable statute(s)” ([Legal Authority for Presidential Executive Action on Climate](#), p. 16).
- “Pass legislation permanently banning fracking and enhanced oil recovery and initiate a managed phaseout of existing operations” ([DNC Environment and Climate Crisis Council](#), p. 5).
- “Eliminates an exemption under the [Clean Air Act (CAA)] for emissions from oil and gas exploration and production and establishes hydrogen sulfide as a hazardous air pollutant under the CAA” ([CLEAN Future Act](#), summary p. 17).
- “Congress should pass legislation establishing a national methane pollution reduction goal for the oil and gas sector of 65% to 70% by 2025 and 90% by 2030, relative to 2012 levels, and directing EPA and BLM to conduct rulemakings to achieve those reductions from new and existing oil and gas operations” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 198).
- “Congress should direct the EPA and BLM to require operators to use, sell, or reinject an increasing percentage of routinely flared gas at oil wells, achieving 100% by the earliest date practicable but no later than 2030” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 199).
- “Congress should direct EPA to require states to conduct air quality monitoring for criteria and hazardous air pollutants in areas with significant oil and gas development and should ensure that this information is made available to the affected communities” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 199).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; [Legal Authority for Presidential Executive Action on Climate](#); [DNC Environment and Climate Crisis Council](#); [Evergreen Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [Methane Waste Prevention Act](#) (H.R. 2711);<sup>240</sup> [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations

- “Congress could enact a direct prohibition or phaseout on the use of fossil fuels. Alternatively, EPA could impose a ban on the use of fossil fuels in power plants.” ([LPDD](#), p. 626)

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<sup>240</sup> Methane Waste Prevention Act of 2019. H.R. 2711, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/2711/text>

- “The federal government should halt federal leasing of federal lands and waters for fossil fuel extraction.” (LPDD, p. 644)
- “BLM could retain its rule for reducing gas waste and take further action to address methane emissions from oil and gas production on public land.” (LPDD, p. 884)
- “EPA could consider adoption of new methane regulations for existing oil and gas facilities.” (LPDD, p. 890)

#### LPDD Resources

- LPDD.org, “Restricting New Fossil Fuel Powered Plants”: <https://lpdd.org/pathway/restricting-new-fossil-fuel-powered-plants/>
- LPDD.org, “Prohibiting Oil and Gas Extraction”: <https://lpdd.org/pathway/prohibiting-oil-and-gas-extraction/>
- LPDD.org, “Federal Fossil Fuel Phaseouts”: <https://lpdd.org/pathway/federal-fossil-fuel-phaseouts/>

#### Previous/Current Implementation

- States such as Virginia, New Jersey, Maine, Oregon, New Hampshire, New York, Vermont, Washington, and Maryland have banned either off-shore oil drilling or fracking. (“[Prohibiting Oil and Gas Extraction](#),” LPDD Resources).<sup>241</sup>
- The EPA’s Clean Air Act regulates methane emissions from oil and gas production. However, the EPA under the Trump Administration has proposed to repeal these regulations.

#### Impact on GHGs

Ending the Bureau of Ocean Energy Management’s off-shore oil drilling projects in Beaufort Sea, Chukchi Sea, Cook Inlet, and the Gulf of Mexico and replacing them with oil substitutes would reduce CO<sub>2</sub>e emissions by 846 Mt ([The Climate Change Costs of Offshore Oil Drilling](#), p. 6).<sup>242</sup>

#### Co-Benefits

Ending oil and gas production would provide air and water quality benefits. Ending off-shore drilling also reduces the risk of oil spills or explosions, and thus reduces harm to workers, wildlife and ecosystems ([Why We Must Stop New Offshore Drilling](#)).<sup>243</sup>

#### Additional Resources

- Suh, Rhea. “Why We Must Stop New Offshore Drilling.” NRDC. June 15, 2016. <https://www.nrdc.org/experts/rhea-suh/why-we-must-stop-new-offshore-drilling>
- Joy, Michael P. and Dimitroff, Sashe D. “Oil and Gas Regulation in the United States: Overview.” June 2016. <https://content.next.westlaw.com/Document/I466099551c9011e38578f7ccc38dcbee/Vi>

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<sup>241</sup> “Prohibiting Oil and Gas Extraction.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/prohibiting-oil-and-gas-extraction/>

<sup>242</sup> Donaghy, Jim. The Climate Change Costs of Offshore Oil Drilling. Greenpeace. June 2016. <https://www.greenpeace.org/usa/wp-content/uploads/2016/06/Climate-Costs-Offshore-Oil-June2016-FINAL.pdf>

<sup>243</sup> Suh, Rhea. “Why We Must Stop New Offshore Drilling.” NRDC. June 15, 2016. <https://www.nrdc.org/experts/rhea-suh/why-we-must-stop-new-offshore-drilling>

[ew/FullText.html?transitionType=Default&contextData=\(sc.Default\)&firstPage=true&b  
hcp=1](#)

## Oil Transportation

### Description

“Congress should ensure that siting, design, repair, and maintenance standards for hazardous liquid and natural gas pipelines take climate risks into account and meet any federal flood and wildfire resilience standards” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 212).

Proposed by: [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Pipeline Seismic Safety Study Act](#) (H.R. 4375).<sup>244</sup>

### Previous/Current Implementation

- The EPA regulates air emissions from refineries and fuel distribution systems, including pipelines.
- The Federal Energy Regulatory Commission (FERC) regulates the transportation of oil through interstate oil pipelines but does not oversee pipeline operations.
- The Federal Railroad Administration (part of the DOT) is responsible for railroad safety, including rail transport of crude oil and refined products.
- Oil pipeline siting regulations in the Great Lakes-St. Lawrence River region:  
<http://gls crudeoiltransport.org/wp-content/uploads/2019/02/Pipeline-Siting-FINAL.pdf>

### Oil Transportation Emissions

One study found that in the U.S. gulf region, oil pipelines emit .14 million tons of CO<sub>2</sub>e per year. ([Emissions in the Stream: Estimating the Greenhouse Gas Impacts of an Oil and Gas Boom](#)).<sup>245</sup>

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<sup>244</sup> Pipeline Seismic Safety Study Act. H.R. 4375, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4375?s=1&r=2>

<sup>245</sup> Waxman, Andrew R., Khomaini, Achmad, Leibowicz, Benjamin D., and Olmstead, Sheila M. Emissions in the Stream: Estimating the Greenhouse Gas Impacts of an Oil and Gas Boom. January 14, 2020. <https://iopscience.iop.org/article/10.1088/1748-9326/ab5e6f>

## Coal Mining

### Description

- A “100% clean energy agenda should include retiring the entirety of the U.S. coal fleet by 2030, to eliminate dangerous pollution that is poisoning our communities and planet” ([Evergreen Action Plan](#), p. 12).
- Joe Biden plans to create jobs reclaiming abandoned coal, hardrock, and uranium mines ([Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy).
- Ban mountaintop removal coal mining ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Evergreen Action](#); [Legal Authority for Presidential Executive Action on Climate](#); [Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy; [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations

- Congress should eliminate subsidies for coal producers as part of broader decarbonization policy. ([LPDD](#), p. 208)
- TVA could produce a definite, accelerated schedule for the retirement of the 35 remaining coal-fired generating units. ([LPDD](#), p. 634)
- EPA should in the near term tighten the NSPS under the CAA for new coal-fired and NGCC units to levels only achievable with CCS or partial CCS. ([LPDD](#), p. 730)
- EPA could modify the NSPS for new coal-fired units by requiring full CO<sub>2</sub> capture (i.e., 90%) beginning in the early 2020s. ([LPDD](#), p. 736)
- EPA should revise its climate pollution BACT guidance to reflect NSPS requirements for partial CCS on coal-fired generators. ([LPDD](#), p. 737)

### LPDD Resources

- LPDD.org, “Coal Storage Bans”: <https://lpdd.org/pathway/coal-storage-bans/>
- LPDD.org, “Coal Ash Restrictions”: <https://lpdd.org/pathway/coal-ash-restrictions/>
- LPDD.org, “Divesting from Fossil Fuels”: <https://lpdd.org/pathway/divesting-from-coal/>

### Previous/Current Implementation

- The Obama administration enacted through executive order a [coal leasing moratorium](#) in 2016.<sup>246</sup>
- “In 2019, Washington passed [SB 5116](#),<sup>247</sup> which will require utilities in Washington to stop buying electricity generated from coal by the end of 2025 or face penalties” ([LPDD Resources](#)).
- “[Senate Bill 2629](#) (2020) bans end coal burning in Hawaii by 2022, which coincides with the date AES Hawaii is expected to shutter Hawaii’s last coal-burning plant” ([LPDD Resources](#)).

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<sup>246</sup> Warrick, Joby and Eilperin, Juliet. “Obama Announces Moratorium on New Federal Coal Leases.” *Washington Post*. January 15, 2016. <https://www.washingtonpost.com/news/energy-environment/wp/2016/01/14/obama-administration-set-to-announce-moratorium-on-some-new-federal-coal-leases/>

<sup>247</sup> Washington State SB 5116. 66th Legislature, 2019. <https://perma.cc/X38G-V8HE>

- “In May 2019 [New York’s] Department of Environmental Conservation [adopted new CO<sub>2</sub> limits](#) that will effectively ban coal plants in 2020” ([LPDD Resources](#)).
- Due in large part to local organizing in opposition, over the past two decades energy companies have shut down 551 coal generators at 227 plants throughout the U.S.
- [Powering Past Coal Alliance](#) (PPCA) — a global coalition of national and sub-national governments, businesses and organizations committed to phasing out coal power plant pollution by 2030.
- Michigan [plans](#)<sup>248</sup> to phase out its coal-fired power plants by 2040 and replace them with renewable energy and energy efficiency resources.

### Impact on GHGs

Retiring the U.S. coal fleet by 2030, which equates to 4,500 MW of retired coal per year, would reduce U.S. 2050 emissions by 13% compared to a BAU baseline, or by 15% compared to a 2005 baseline. This equates to an avoided 745 million metric tons of CO<sub>2</sub>e ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

- The Rocky Mountain Institute recently published an analysis estimating the cost of domestic coal plant retirement to be just \$35- \$40 billion.<sup>249</sup>
- Replacing fossil fuels with renewable energy production creates a net addition of jobs ([Energy Innovation](#), p. 16).
- Retiring coal production would improve air quality.

### Obstacles/Shortfalls

- Additional investments will be necessary to support workers and communities in the economic transition away from coal production.
- A moratorium on coal mining will face political and legal opposition.
- “Retiring power plants can cause financial disruption for utilities. ... Under conventional state regulation, monopoly utilities have the right to charge customers the full cost of paying off the remaining power plant balance, including risk-adjusted returns for shareholders and creditors” ([Energy Innovation](#), p. 9).

### Additional Resources

Froese, Michelle. “The Benefits of Retiring Coal-Burning Plants.” Windpower Engineering and Development. July 5, 2019. <https://www.windpowerengineering.com/the-benefits-of-retiring-coal-burning-plants/>

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<sup>248</sup> Eggert, David. “Michigan Utility OK’d to Close Coal Plants, Boost Renewables.” *AP News*. June 7, 2019. <https://apnews.com/13d39fdf8d5f4c12b0044d7f1113788e>

<sup>249</sup> “Rocky Mountain Institute: Financing Freedom from Renewables.” *Energy Central*. October 17, 2019. <https://energycentral.com/news/rocky-mountain-institute-financing-freedom-fossil-fuels#:~:text=The%20next%20US%20administration%20has,climate%20bargain%20of%20all%20time.&text=In%20the%20United%20States%2C%20coal, clean%20power%20that's%20actually%20cheaper>





## Unacceptable Energy Sources

### Description

Policies to end the use of certain energy sources, including:

- Nuclear energy ([Vision for Equitable Climate Action](#), p. 6; [Legal Authority for Presidential Executive Action on Climate](#), p. 5; [Elizabeth Warren 2020 Presidential Campaign](#); [Bernie Sanders 2020 Presidential Campaign](#)).
- Biomass ([Vision for Equitable Climate Action](#), p. 6; [Legal Authority for Presidential Executive Action on Climate](#), p. 5).
- Potentially fossil fuels.

Proposed by: [Vision for Equitable Climate Action](#); [Legal Authority for Presidential Executive Action on Climate](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Elizabeth Warren 2020 Presidential Campaign](#)

### Previous/Current Implementation

- Finland has passed a [ban](#)<sup>250</sup> on the use of coal, which will go into effect on May 1st, 2029.
- [Fourteen states](#)<sup>251</sup> have currently placed restrictions on the construction of new nuclear power facilities: California, Connecticut, Hawaii, Illinois, Maine, Massachusetts, Minnesota, Montana, New Jersey, New York, Oregon, Rhode Island, Vermont and West Virginia.
- In 2020, Germany passed bills that would require the nation's coal plants to close by 2048.<sup>252</sup>

### Impact on GHGs

Banning new coal and nuclear power plants would have little impact on future U.S. greenhouse gas emissions. However, retiring 4500 MW of coal per year would reduce U.S. greenhouse gas emissions by 12.7% in 2050 compared to a BAU baseline ([U.S. Energy Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

- Reducing biomass combustion would reduce associated pollution of PM 2.5, ammonia, nitrogen oxides, and sulphur dioxides in urban areas ([Restricting Urban Biomass: A Chance to Improve City Air Quality](#)).<sup>253</sup>

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<sup>250</sup> Ministry of Economic Affairs and Employment. "A law banning the use of coal in 2029 will enter into force in early April." *Valtioneuvosto Statsrådet*. March 28, 2019. [https://valtioneuvosto.fi/-/1410877/kivihiilen-energiakayton-vuonna-2029-kieltava-laki-voimaan-huhtikuun-alussa?\\_101\\_INSTANCE\\_YZfcyWxQB2Me\\_languageId=en\\_US#:~:text=f%C3%B6r%20huvudinne%C3%A5llet%20EN-The%20act%20banning%20the%20use%20of%20coal%20for%20energy%20generation,into%20force%20in%20early%20April&text=Coal%20Dfired%20power%20and%20heating,as%20of%201%20May%202029.&text=Coal%20will%20be%20the%20first,be%20banned%20in%20energy%20production](https://valtioneuvosto.fi/-/1410877/kivihiilen-energiakayton-vuonna-2029-kieltava-laki-voimaan-huhtikuun-alussa?_101_INSTANCE_YZfcyWxQB2Me_languageId=en_US#:~:text=f%C3%B6r%20huvudinne%C3%A5llet%20EN-The%20act%20banning%20the%20use%20of%20coal%20for%20energy%20generation,into%20force%20in%20early%20April&text=Coal%20Dfired%20power%20and%20heating,as%20of%201%20May%202029.&text=Coal%20will%20be%20the%20first,be%20banned%20in%20energy%20production).

<sup>251</sup> State Restrictions on New Nuclear Power Facility Construction. *National Conference of State Legislatures*. May 2017. <https://www.ncsl.org/research/environment-and-natural-resources/states-restrictions-on-new-nuclear-power-facility.aspx>

<sup>252</sup> Wettengel, Julian. "Spelling out the coal exit – Germany's phase-out plan." *Clean Energy Wire*. July 3, 2020. <https://www.cleanenergywire.org/factsheets/spelling-out-coal-phase-out-germanys-exit-law-draft>

<sup>253</sup> Leaver, Stuart. *Restricting Urban Biomass: A Chance to Improve City Air Quality*. Evora. October 29, 2019. <https://evoraglobal.com/news/energy/restricting-urban-biomass-improve-air-quality/>

- Similarly, retiring coal production would improve air quality.
- Ending nuclear power production would eliminate its associated safety and security risks, radioactive waste disposal challenges, and water requirements.

#### Obstacles/Shortfalls

Reducing nuclear and biomass energy and replacing them with high-carbon energy sources could increase greenhouse gas emissions. For example, retiring 1250 MW of nuclear energy per year by 2050 could increase U.S. emissions by .5% compared to a BAU baseline ([U.S. Energy Policy Solutions Simulator v 2.1.1](#)). In addition, a ban on certain energy sources would face industry opposition.

## Energy Democracy And Community-led Energy Transformation

### Description

- “Federal lawmakers should prioritize bottom-up, community-driven economic development strategies that give individuals and communities the opportunity to fully own and control their clean energy assets as part of the path to 100% clean energy. ... This includes the creation of a new Clean Community Energy Grant Program to offer direct grants for clean energy projects developed by community-based non-profit organizations, which lack tax liability and therefore often lack access to tax financing for their renewable energy and efficiency projects. This agenda should also include the creation of a new DOE Solar Communities Initiative that sets by 2040 a national goal to meet 10% of total electricity demand through distributed solar energy generation. ... The next administration should also relaunch the DOE’s Better Communities Alliance, to promote packaged clean energy solutions while also giving local governments better access to DOE funding and support” ([Evergreen Action Plan](#), p. 15).
- Enact binding laws to ensure the fundamental right to renewable energy for all, based on democratic and community control ([A Green New Deal to Save People and the Planet](#)).<sup>254</sup>
- “The renewable energy generated by the Green New Deal will be publicly owned, managed by the Federal Power Marketing Administrations, the Bureau of Reclamation and the Tennessee Valley Authority and sold to distribution utilities with a preference for public power districts, municipally- and cooperatively-owned utilities with democratic, public ownership, and other existing utilities that demonstrate a commitment to the public interest. The Department of Energy will provide technical assistance to states and municipalities that would like to establish publicly owned distribution utilities or community choice aggregation programs in their communities. Electricity will be sold at current rates to keep the cost of electricity stable during this transition” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: Evergreen Action; [Legal Authority for Presidential Executive Action on Climate](#) (p. 28); [Community Solar Consumer Choice Act of 2020](#) (H.R. 5968);<sup>255</sup> [CLEAN Future Act; The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [A Green New Deal to Save People and the Planet](#); [Bernie Sanders 2020 Presidential Campaign](#)

### Previous/Current Implementation

- [The Better Communities Alliance](#)<sup>256</sup> was a collaborative effort among 60 local governments, philanthropies, nonprofit organizations, and leading private companies to accelerate local clean energy progress across the country. Through the BCA, city and county leaders committed to reduce building energy waste, expand renewable energy and sustainable

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<sup>254</sup> Ghio, Nicole. A Green New Deal to Save People and the Planet. *Friends of the Earth*. <https://foe.org/green-new-deal-save-people-planet/>

<sup>255</sup> Community Solar Consumer Choice Act of 2020. H.R. 5968, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5968/text?r=3&s=1>

<sup>256</sup> Energy Department Launches Better Communities Alliance to Ignite Clean Energy Action in Cities and Counties Nationwide. *Office of Energy and Renewable Energy*. Energy.Gov. September 26, 2016. <https://www.energy.gov/eere/articles/energy-department-launches-better-communities-alliance-ignite-clean-energy-action>

transportation options, harness new energy-saving technologies, and invest in resilient power systems and community infrastructure.

- “Several state governments are encouraging small-scale, distributed storage adoption through deployment targets, incentive programs, and regulatory adjustments ([NREL.gov](https://www.nrel.gov)).<sup>257</sup>
- The state of Vermont has taken several steps to operationalizing energy democracy, including by developing community solar projects and achieving 100% renewable energy in the city of Burlington. Town Energy Committees throughout the state also play a part in energy democratization ([Operationalizing Energy Democracy: Challenges and Opportunities in Vermont's Renewable Energy Transformation](#)).<sup>258</sup>
- East Bay Community Energy's (EBCE) vision for Alameda County is “a framework developed with community input for accelerating clean energy investments that enhance workforce development, promote stronger local economic activity, and increase community resilience. The [Alameda Local Development Business Plan] outlines various financial and non-financial resources for non-profit and community organizations to help accomplish these goals” (“[Community Innovation Grants](#).” *East Bay Community Energy*).<sup>259</sup>

#### Co-Benefits

- The proposed DOE Solar Communities Initiative “would drive approximately \$150 billion in additional investment over the next ten years and it would help achieve 100% clean power” ([Evergreen Action Plan](#), p. 15).
- Energy democracy projects often choose locally-based businesses as energy infrastructure installers, which provides local economic benefits and supports employment opportunities ([Operationalizing Energy Democracy: Challenges and Opportunities in Vermont's Renewable Energy Transformation](#)).<sup>260</sup>

#### Obstacles/Shortfalls

“Among the many challenges of operationalizing energy democracy goals that emerge is the prominent role of the private sector. ... The influence of the private sector is at odds with some of the community-oriented goals of the energy democracy agenda, and the sector generally lacks a strong union presence.” Challenges can also include: opposition to renewable energy siting, and limited attention to the most vulnerable individuals within the energy system ([Operationalizing Energy Democracy: Challenges and Opportunities in Vermont's Renewable Energy Transformation](#)).<sup>261</sup>

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<sup>257</sup> National Renewable Energy Laboratory. “Distributed Solar PV for Electric System Resiliency: Policy and Regulatory Considerations.” November 2014. <https://www.nrel.gov/docs/fy15osti/62631.pdf>

<sup>258</sup> Stephens, Jennie C., et al. “Operationalizing Energy Democracy: Challenges and Opportunities in Vermont's Renewable Energy Transformation.” *Frontiers in Communication*. October 3, 2018. <https://www.frontiersin.org/articles/10.3389/fcomm.2018.00043/full>

<sup>259</sup> “Community Innovation Grants.” *East Bay Community Energy*. <https://ebce.org/communitygrants/>

<sup>260</sup> Stephens, Jennie C., et al. “Operationalizing Energy Democracy: Challenges and Opportunities in Vermont's Renewable Energy Transformation.” *Frontiers in Communication*. October 3, 2018. <https://www.frontiersin.org/articles/10.3389/fcomm.2018.00043/full>

<sup>261</sup> Stephens, Jennie C., Burke, Matthew J., Gibian, Brock, Jordie, Elie, and Watts, Richard. “Operationalizing Energy Democracy: Challenges and Opportunities in Vermont's Renewable Energy Transformation.” *Frontiers in Communication*. October 3, 2018. <https://www.frontiersin.org/articles/10.3389/fcomm.2018.00043/full>

### Additional Resources

Stephens, Jennie C., Burke, Matthew J., Gibian, Brock, Jordie, Elie, and Watts, Richard.  
“Operationalizing Energy Democracy: Challenges and Opportunities in Vermont's Renewable  
Energy Transformation. *Frontiers in Communication*.” October 3, 2018.  
<https://www.frontiersin.org/articles/10.3389/fcomm.2018.00043/full>

## BUILDINGS

### Energy Efficiency Standards

#### Description

- Sets mandatory minimum energy-efficiency standards for building technologies and design elements, including appliances, lighting, cooling, and heating. ([“The Role of Energy in Deep Carbonization,”](#) p. 10031).<sup>262</sup>
- “Establish national energy savings targets for model building energy codes, enabling adoption of codes that would require zero energy” (CLEAN Future Act, [Summary](#), p. 7).
- “Congress should reauthorize and increase funding for the Energy Efficiency and Conservation Block Grant Program” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 35).
- “Congress should incentivize states, local governments, tribes, and territories to adopt the most updated residential and commercial building energy codes, with the goal of all jurisdictions adopting a net-zero-emission code by 2030” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 152).
- Mandate high levels of insulation on all solid walls of building facades (Urban Green Council, [90 by 50](#)).<sup>263</sup>
- Create incentives to upgrade to LED lighting, including subsidies for low-income residents ([“Buildings,”](#) *Rocky Mountain Institute*).<sup>264</sup>
- Mandate green roofs and/or rooftop solar photovoltaic electricity systems ([A People's Climate Plan for New York City?](#)<sup>265</sup>; [Climate Mobilization Act](#)<sup>266</sup>).

Proposed by: [CLEAN Future Act](#); [Vision For Equitable Climate Action](#); [DNC Environment and Climate Crisis Council](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); H.R. 2088 ([“To amend the Energy Independence and Security Act of 2007 to reauthorize the Energy Efficiency and Conservation Block Grant Program”](#));<sup>267</sup> [Energy Savings and Industrial Competitiveness Act of 2019](#) (H.R. 3962/S. 2137);<sup>268</sup> Urban Green Council, [‘90 by 50’](#); Rocky Mountain Institute, [‘Buildings’](#); [A People's Climate Plan for New York City?](#)<sup>269</sup> [Climate Mobilization Act](#); [Joe Biden 2020 Presidential](#)

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<sup>262</sup> Kennedy, Kit. The Role of Energy in Deep Carbonization. *Environmental Law Institute*. 2018.

<https://lpdd.org/wp-content/uploads/2019/05/09-LPDD-Lighting-Appliances-and-Other-Equipment.pdf>

<sup>263</sup> Urban Green Council. 90 by 50: New York City Can Reduce its Carbon Footprint by 90% by 2050. 2013.

[https://www.urbangreencouncil.org/sites/default/files/90\\_by\\_50\\_report.pdf](https://www.urbangreencouncil.org/sites/default/files/90_by_50_report.pdf)

<sup>264</sup> “Buildings.” *Rocky Mountain Institute*. <https://rmi.org/our-work/buildings/>

<sup>265</sup> Center for the Humanities. A People's Climate Plan for New York City? 2020.

<https://www.centerforthehumanities.org/programming/a-peoples-climate-action-plan-for-new-york-1>

<sup>266</sup> “Climate Mobilization Act.” New York City Council. <https://council.nyc.gov/data/green/#green-bills>

<sup>267</sup> To amend the Energy Independence and Security Act of 2007 to reauthorize the Energy Efficiency and Conservation Block Grant Program. H.R. 2088, 116th Congress, 2019. <https://www.congress.gov/bill/116th-congress/house-bill/2088/text>

<sup>268</sup> Energy Savings and Industrial Competitiveness Act of 2019. H.R. 3962/S. 2137. 116th Congress, 2019.

<https://www.congress.gov/bill/116th-congress/senate-bill/2137>

<sup>269</sup> Climate Action Lab. “A People’s Climate Plan for New York City?” The Center for the Humanities. August 2020. <https://www.centerforthehumanities.org/programming/a-peoples-climate-action-plan-for-new-york-1>

[Campaign](#) - Climate; [Elizabeth Warren 2020 Presidential Campaign](#); Beto O'Rourke 2020 Presidential Campaign; Kamala Harris 2020 Presidential Campaign.

### LPDD Recommendations

- Congress should enact legislation to create an ambitious federal energy-efficiency resource standard, which would be a national energy-efficiency goal for electric and natural gas utilities. ([LPDD](#), p. 231)
- Congress should amend the state preemption provision of the EPCA to provide states with greater autonomy in setting energy-efficiency standards. Congress should amend the EPCA to explicitly authorize DOE to adopt energy-efficiency standards with multiple efficiency metrics. Congress should amend the EPCA to give DOE discretion to establish shorter compliance lead times for energy-efficiency standards when needed and appropriate. DOE should update existing standards promptly, as required by EPCA's statutory schedule of deadlines for amended energy-efficiency standards. ([LPDD](#), p. 234)
- Congress or the executive branch should develop an integrated suite of energy-efficiency policies that combine, coordinate, and synthesize a full suite of complementary energy-efficiency policies, including mandatory minimum energy-efficiency standards, voluntary labeling and incentive programs that further increase produce energy-efficiency levels over time, tax incentives, and other complementary energy-efficiency policies that are part of a larger set of decarbonization policies. ([LPDD](#), pp. 219, 232, 247)
- DOE should continue and enhance coordination with the DOE energy-efficiency standards program and the Energy Star. As part of this coordination, Energy Star product ratings should be updated frequently so that voluntary Energy Star ratings can increase market penetration for efficient products, helping to give rise to stronger mandatory DOE energy-efficiency standards over time. ([LPDD](#), p. 238)
- DOE should continue setting leading-edge energy-efficiency standards for heating, cooling, lighting, and other energy-consuming equipment used in new buildings. ([LPDD](#), p. 272)
- DOE should produce a model Zero Energy Buildings-focused energy code. ([LPDD](#), p. 273)
- FHA could require energy audit certifications for FHA-insured home mortgage loans that the homes meet minimum energy-efficiency standards. ([LPDD](#), p. 289)

### LPDD Resources

- LPDD.org, "Federal EERS": <https://lpdd.org/pathway/federal-eers/>
- LPDD.org, "State Energy Efficiency Resource Standards": <https://lpdd.org/pathway/state-energy-efficiency-resource-standards/>
- LPDD.org, "State Efficiency Standards for Products that Are Not Federally Regulated": <https://lpdd.org/pathway/state-efficiency-standards-for-products-that-are-not-federally-regulated/>
- LPDD.org, "Improving State and Local Building Energy Codes": <https://lpdd.org/pathway/improving-state-and-local-building-energy-codes/>
- LPDD.org, "Building Energy Performance Standards": <https://lpdd.org/pathway/building-energy-performance-standards/>



### Current/Past Implementation

- The current Department of Energy appliance standards program requires that specific products achieve a minimum level of energy or water efficiency (“[The Role of Energy in Deep Carbonization](#),” p. 10031).<sup>270</sup> Several states and cities have adopted zero energy building codes, requiring buildings to use net zero energy or carbon ([NBI](#)).<sup>271</sup>
- As established by the Energy Independence and Security Act of 2007 and funded through the Recovery Act, the [Energy Efficiency and Conservation Block Grant Program](#)<sup>272</sup> (EECBG) enabled states, local governments, and tribes to develop innovative energy efficiency and renewable energy initiatives.
- In 2019, New York City enacted [Local Law 97](#),<sup>273</sup> which creates carbon emission caps for energy use in buildings over 25,000 square feet. Beginning in 2024, the emissions limits will affect the 20% most carbon-intensive buildings, and in 2030, the limits will become more stringent, affecting the 75% most carbon-intensive buildings

### Impact on GHG Emissions

In 2012, 36 million metric tons of CO<sub>2</sub> emissions were avoided due to building energy codes. From 2013 to 2040, emissions reductions are expected to total 3,178 MMT CO<sub>2</sub> ([Achieving Energy Savings and Emission Reductions from Building Energy Codes: A Primer for State Planning](#)).<sup>274</sup>

### Studies of Efficacy

- Building energy codes implemented in 2003 and 2006 effectively saved energy and reduced carbon dioxide:
  - Koirala, Bishwa S., Bohara, Alok K., and Li, Hui. “Effects of Energy-Efficiency Building Codes in the Energy Savings and Emissions of Carbon Dioxide.” *Environmental Economics and Policy Studies*, Vol. 15. 2013. <https://link.springer.com/article/10.1007/s10018-013-0054-x>
- Building simulations and analysis by Pacific Northwest National Laboratory show that the energy use of the average U.S. home or building that met at least the 2012 residential or 2013 commercial model energy code decreased by more than 30% compared to a

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<sup>270</sup> Kennedy, Kit. The Role of Energy in Deep Carbonization. *Environmental Law Institute*. 2018.

<https://lpdd.org/wp-content/uploads/2019/05/09-LPDD-Lighting-Appliances-and-Other-Equipment.pdf>

<sup>271</sup> “2019 is the Year of Energy Codes.” *New Buildings Institute*. January 14, 2019. <https://newbuildings.org/2019-is-the-year-of-energy-codes/>

<sup>272</sup> “Energy Efficiency and Conservation Block Grant Program.” *Office of Energy Efficiency and Renewable Energy*. Energy.Gov. <https://www.energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program>

<sup>273</sup> CodeGreen. “NYC Carbon Emissions Bill Passed into Law – “Local Law 97” – What it means for commercial building owners.” May 20, 2019. <https://codegreensolutions.com/nyc-carbon-emissions-bill-passed-into-law-local-law-97-what-it-means-for-commercial-building-owners/#:~:text=The%20piece%20of%20the%20%E2%80%9Cdeal,Local%20Law%2097%20of%202019.>

<sup>274</sup> U.S. Department of Energy. *Achieving Energy Savings and Emission Reductions from Building Energy Codes: A Primer for State Planning*. 2015. [https://www.energycodes.gov/sites/default/files/documents/Codes\\_Energy\\_Savings\\_State\\_Primer.pdf](https://www.energycodes.gov/sites/default/files/documents/Codes_Energy_Savings_State_Primer.pdf)

similar home from 2008 or commercial building from 2003 ([Take a Ride on the Energy Slide with Building Codes](#)).<sup>275</sup>

### Co-Benefits

- In 2015, energy savings reduced consumer energy bills by \$63 billion, and they are expected to result in \$2 trillion in cumulative energy bill savings through 2030 ([ACEEE](#)).<sup>276</sup>
- The Energy Efficiency and Conservation Block Grant program generated lifetime cost savings of \$5.2 billion and created 63,000 jobs ([Energy Efficiency and Conservation Block Grant Program](#)).<sup>277</sup>

### Additional Resources

- The Value and Benefit of Building Codes. “Environmental Energy and Study Institute.” September 30, 2013. <https://www.eesi.org/papers/view/the-value-and-impact-of-building-codes#6>
- Cox, Sadie. “Building Energy Codes: Policy Overview and Good Practices.” National Renewable Energy Laboratory. February 2016. <https://www.nrel.gov/docs/fy16osti/65542.pdf>

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<sup>275</sup> Ungar, Lowell. Take a Ride on the Energy Slide with Building Codes, ACEEE, Feb. 12, 2016. <https://www.aceee.org/blog/2016/02/take-ride-energy-slide-building-codes>

<sup>276</sup> “ASAP/ACEEE Report on Energy-Saving Standards: Next President Could Set In Motion ‘Enormous’ Energy and Carbon Pollution Cuts Benefitting Consumers \$65 Billion a Year.” ACEEE. August 4, 2016. <https://www.aceee.org/press/2016/08/asapaceee-report-energy-saving>

<sup>277</sup> Energy Efficiency and Conservation Block Grant Program. *Office of Energy Efficiency & Renewable Energy*. Energy.Gov. <https://www.energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program>

## Retirement Of Old Appliances And Equipment

### Description

- The next administration “should include establishing targeted, refundable tax credits for energy upgrades and installing HVAC systems, water heaters (including solar water heaters), envelope improvements, and systems solutions ... These incentives should extend to commercial equipment, as well, including advanced boilers and chiller replacements” ([Evergreen Action Plan](#), p. 24).
- “Congress should create point-of-sale rebates for the replacement of fossil fuel based space heating, water heating, and cooking appliances with electric air-source heat pumps, heat pump electric water heaters, and induction ranges and cooktops, respectively” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 159).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [CLEAN Future Act](#) (p. 10); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#)

### LPDD Recommendations

- Until a federal program is developed, states should develop their own “cash for clunkers” programs to accelerate the turnover of less efficient appliances and market penetration of more efficient appliances. ([LPDD](#), p. 239)

### LPDD Resources

- LPDD.org, Adopting Policies to Accelerate Turnover and Penetration of Efficient Appliances: <https://lpdd.org/pathway/adopting-policies-to-accelerate-turnover-and-penetration-of-efficient-appliances/>

### Previous/Current Implementation

- States and utilities offer incentives to residents who recycle their appliances, such as refrigerators and freezers: [Massachusetts](#),<sup>278</sup> [Wisconsin](#),<sup>279</sup> [New York State Electric and Gas Corporation](#).<sup>280</sup>
- The EPA’s [Responsible Appliance Disposal](#)<sup>281</sup> program is a partnership launched in October 2006 [that] recognizes partners that commit to collecting and disposing of old refrigerated appliances using the best environmental practices available and going beyond what is required by federal law.

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<sup>278</sup> “Refrigerator and Freezer Recycling.” *Mass Save*. <https://www.masssave.com/en/shop/recycling/refrigerator-and-freezer-recycling>

<sup>279</sup> “State Program Offers Refrigerator Recycling and Free Pick-Up.” *Focus on Energy - Partnering with Wisconsin Utilities*. August 2, 2017. <https://focusonenergy.com/newsroom/state-program-offers-refrigerator-recycling-and-free-pick>

<sup>280</sup> “Appliance Recycling Program.” *NYSEG*. <https://www.nyseg.com/wps/portal/nyseg/saveenergy/rebatesandprograms/appliancerecyclingprogram/>

<sup>281</sup> “Responsible Appliance Disposal.” *U.S. Environmental Protection Agency*. <https://www.epa.gov/rad/environmental-benefits#:~:text=Climate%20Benefits,-The%20recovery%20of&text=In%20addition%2C%20the%20recycling%20of,needed%20to%20produce%20virgin%20materials.>

- DOE created the State Energy-Efficient Appliance Rebate Program ([SEEARP](#))<sup>282</sup> to help consumers replace inefficient appliances with new, efficient models. From 2009 to 2012, SEEARP provided nearly \$300 million for appliance rebates, saving consumers more than \$73 million in annual energy and water costs and avoiding more than 240,000 metric tons of annual greenhouse gas emissions.

#### Impact on GHGs

In 2014, the early retirement of nearly 400,000 appliances in the EPA's [Responsible Appliance Disposal](#) program avoided 1.7 million metric tons of CO<sub>2e</sub> emissions.<sup>283</sup>

#### Co-Benefits

In 2014, the early retirement of nearly 400,000 appliances in the EPA's [Responsible Appliance Disposal](#) program saved consumers \$335 million and avoided 207 weighted tons of ozone depleting potential.<sup>284</sup>

#### Obstacles/Shortfalls

There can be high costs associated with pickup and recycling of old appliances from customers. It may be a challenge to “find creative new ways of funding such partnerships between solid waste organizations, air quality regulators, and utilities” ([Out With the Old, In With the New: Why Refrigerator and Room Air Conditioner Programs Should Target Replacement to Maximize Energy Savings](#), p. 33).<sup>285</sup>

#### Additional Resources

“Out With the Old, In With the New: Why Refrigerator and Room Air Conditioner Programs Should Target Replacement to Maximize Energy Savings.” NRDC. November 2001.  
<https://www.nrdc.org/sites/default/files/app1.pdf>

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<sup>282</sup> “State Energy Efficient Appliance Rebate Program (SEEARP) American Recovery and Reinvestment Act (ARRA) Funding Opportunity Number: DE-FOA-0000119.” *Energy.Gov*. <https://www.energy.gov/downloads/state-energy-efficient-appliance-rebate-program-seearp-american-recovery-and-reinvestment>

<sup>283</sup> “Responsible Appliance Disposal.” *U.S. Environmental Protection Agency*.  
<https://www.epa.gov/rad/environmental-benefits#:~:text=Climate%20Benefits,-The%20recovery%20of&text=In%20addition%2C%20the%20recycling%20of,needed%20to%20produce%20virgin%20materials.>

<sup>284</sup> “Responsible Appliance Disposal.” *U.S. Environmental Protection Agency*.  
<https://www.epa.gov/rad/environmental-benefits#:~:text=Climate%20Benefits,-The%20recovery%20of&text=In%20addition%2C%20the%20recycling%20of,needed%20to%20produce%20virgin%20materials.>

<sup>285</sup> Out With the Old, In With the New: Why Refrigerator and Room Air Conditioner Programs Should Target Replacement to Maximize Energy Savings. NRDC. November 2001.  
<https://www.nrdc.org/sites/default/files/app1.pdf>



## Electrify Buildings

### Description

“In buildings, electrification involves substituting electric technologies for combustion-fueled technologies for end uses where other fuels are being used — most notably, space heating and water heating” ([Electrification of buildings and industry in the United States](#), p. v)

- “Biden will set a target of reducing the carbon footprint of the U.S. building stock 50% by 2035, creating incentives for deep retrofits that combine appliance electrification” ([Joe Biden 2020 Presidential Campaign - Climate](#))
- “Congress should expand investments in public housing for weatherization, electrification, and onsite renewable energy generation. As part of these investments, Congress should establish a fund to electrify stoves, heating, and hot water in public housing nationwide to eliminate the respiratory triggers produced by fossil fuel use in public housing” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 171).
- “Congress should create point-of-sale rebates for the replacement of fossil fuel based space heating, water heating, and cooking appliances with electric air-source heat pumps, heat pump electric water heaters, and induction ranges and cooktops, respectively” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 159).
- “Congress should draft legislation to create tax incentives for whole home retrofits and new home construction, which would apply to the total cost of the electric unit, parts, and labor” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 159).
- Encourage heat pump installations by reducing the energy savings requirement for buildings that convert to high-efficiency electric heat or hot water systems (Urban Green Council. [Blueprint for Efficiency: An 80 x 50 Buildings Partnership Report](#). August 2018).
- Create programs for "district energy projects" to unite buildings in microgrids for shared electric, water and steam systems ([Taking District Energy To Urban Neighborhoods](#)<sup>286</sup>; [The American Energy Innovation Act \(Draft\)](#)).
- “Low and moderate-income families and small businesses will be able to fully electrify heating and other current uses of fossil fuels in buildings through federal funding. We must fully end all fossil fuel use in buildings by 2030” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Joe Biden 2020 Presidential Campaign](#); [Evergreen Action](#) (p. 24); [DNC Environment and Climate Crisis Council](#) (p. 5); [CLEAN Future Act](#) (Summary p. 21); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); Urban Green Council, [Blueprint for Efficiency: An 80 x 50 Buildings Partnership](#)

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<sup>286</sup> Grace, Christina. “From MUSH to the City of Tomorrow: Taking District Energy To Urban Neighborhoods.” *The Sallan Foundation*. February 2, 2012.  
[https://www.sallan.org/Snapshot/2012/02/from\\_mush\\_to\\_the\\_city\\_of\\_tomorrow\\_taking\\_district\\_energy\\_to\\_urban\\_neighborhoods\\_1.php](https://www.sallan.org/Snapshot/2012/02/from_mush_to_the_city_of_tomorrow_taking_district_energy_to_urban_neighborhoods_1.php)

[Report](#);<sup>287</sup> [Taking District Energy To Urban Neighborhoods](#);<sup>288</sup> [The American Energy Innovation Act](#); [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations

- “Congress should establish a national ZEBs or NZEBs goal for a specific date such as 2030.” (LPDD, p. 273)
- “Congress should consider enacting laws requiring that building owners who presently use fossil fuel for space and water heating must retrofit their buildings by electrification.” (LPDD, p. 296)
- “Congress should consider adopting mandatory retrofit laws for energy conservation and decarbonization in exist-ing commercial and residential buildings.” (LPDD, p. 289)

### LPDD Resources

- LPDD.org, “Zero Net Energy Buildings”: <https://lpdd.org/pathway/zero-energy-buildings/>
- LPDD.org, “Natural Gas Bans in New Buildings”: <https://lpdd.org/pathway/natural-gas-bans-in-new-buildings/>
- LPDD.org, “Fuel Switching”: <https://lpdd.org/pathway/fuel-switching/>
- LPDD.org, “Building Energy Performance Standards”: <https://lpdd.org/pathway/building-energy-performance-standards/>

### Previous/Current Implementation

- “Electricity’s share of total energy usage in residential and commercial buildings has generally been increasing since at least 1960 as usage of electrically-powered devices (such as appliances and air conditioners) has grown. However, this increase has been fairly gradual, and the U.S. Energy Information Administration’s (EIA’s) Annual Energy Outlook forecasts that it will be even more gradual in the future” ([Electrification of buildings and industry in the United States](#), p. 9).<sup>289</sup>
- DOE created the State Energy-Efficient Appliance Rebate Program (SEEARP)<sup>290</sup> to help consumers replace inefficient appliances with new, efficient models. From 2009 to 2012, SEEARP provided nearly \$300 million for appliance rebates, saving consumers more than \$73 million in annual energy and water costs and avoiding more than 240,000 metric tons of annual greenhouse gas emissions.

### Impact on GHGs

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<sup>287</sup> Urban Green Council. Blueprint for Efficiency: An 80 x 50 Buildings Partnership Report. August 2018.

<https://www.urbangreencouncil.org/content/projects/blueprint-efficiency-80x50-buildings-partnership-report>

<sup>288</sup> Grace, Christina. “From MUSH To The City of Tomorrow: Taking District Energy To Urban Neighborhoods.” *The Sallan Foundation*. February 2, 2012.

[https://www.sallan.org/Snapshot/2012/02/from\\_mush\\_to\\_the\\_city\\_of\\_tomorrow\\_taking\\_district\\_energy\\_to\\_urban\\_neighborhoods\\_1.php#.XyRQNPhKi8U](https://www.sallan.org/Snapshot/2012/02/from_mush_to_the_city_of_tomorrow_taking_district_energy_to_urban_neighborhoods_1.php#.XyRQNPhKi8U)

<sup>289</sup> Lawrence Berkeley National Laboratory. Electrification of Buildings and Industry in the United States: Drivers, Barriers, Prospects, and Policy Approaches. March 2018. [https://eta-publications.lbl.gov/sites/default/files/electrification\\_of\\_buildings\\_and\\_industry\\_final\\_o.pdf](https://eta-publications.lbl.gov/sites/default/files/electrification_of_buildings_and_industry_final_o.pdf)

<sup>290</sup> State Energy Efficient Appliance Rebate Program (SEEARP) American Recovery and Reinvestment Act (ARRA) Funding Opportunity Number: DE-FOA-0000119.



If 100% of all new building components and appliances are electrified by 2050, U.S. emissions in 2050 would reduce by 7% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

- “Energy system benefits of electrification include greater flexibility for managing electric loads, opportunities to provide additional ancillary services to the grid, and valuable synergies with electric vehicles, demand response, and distributed generation and energy storage. In addition, electrification may foster economic development, boost balance of trade, improve air quality, reduce fuel price risks, reduce consumers’ costs in some applications, and improve product quality in some industrial processes and quality of some energy services in buildings” ([Electrification of buildings and industry in the United States](#), p. v).<sup>291</sup>
- Electrifying stoves can reduce harmful indoor air pollution ([Gas Stoves: Health and Air Quality Impacts and Solutions. Rocky Mountain Institute](#)).<sup>292</sup>

### Obstacles/Shortfalls

- The price of natural gas versus cost of electricity can make the relative cost of energy more unfavorable for electricity, which thus deters electrification. There are also a number of capital costs that arise from electrification ([Electrification of buildings and industry in the United States](#), p. 6).<sup>293</sup>
- “Electric equipment and appliances do not provide identical amenities to their direct-fuel counterparts, which may cause consumers to avoid them even if the economics are favorable” ([Electrification of buildings and industry in the United States](#), p. 7).<sup>294</sup>
- “Regulation affects the relative attractiveness of electric vs. direct-fuel options. The most notable cases are building energy codes and appliance and equipment standards. Codes can encourage one fuel or another in a variety of direct or indirect ways” ([Electrification of buildings and industry in the United States](#), p. 8).<sup>295</sup>
- “Electrification increases the load on electricity delivery infrastructure. While incremental changes in specific buildings are unlikely to have impacts, extensive electricity changes in large industrial facilities, or an accretion of smaller changes in the same area, could require

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<sup>291</sup> Deason, Jeff, et al. “Electrification of Buildings and Industry in the United States.” Lawrence Berkeley National Laboratory. March 2018. <http://ipu.msu.edu/wp-content/uploads/2018/04/LBNL-Electrification-of-Buildings-2018.pdf>

<sup>292</sup> Seals, Brady and Kasner, Andee. Gas Stoves: Health and Air Quality Impacts and Solutions. Rocky Mountain Institute. 2020. <https://rmi.org/insight/gas-stoves-pollution-health>

<sup>293</sup> Deason, Jeff, et al. “Electrification of Buildings and Industry in the United States.” Lawrence Berkeley National Laboratory. March 2018. <http://ipu.msu.edu/wp-content/uploads/2018/04/LBNL-Electrification-of-Buildings-2018.pdf>

<sup>294</sup> Deason, Jeff, et al. “Electrification of Buildings and Industry in the United States.” Lawrence Berkeley National Laboratory. March 2018. <http://ipu.msu.edu/wp-content/uploads/2018/04/LBNL-Electrification-of-Buildings-2018.pdf>

<sup>295</sup> Deason, Jeff, et al. “Electrification of Buildings and Industry in the United States.” Lawrence Berkeley National Laboratory. March 2018. <http://ipu.msu.edu/wp-content/uploads/2018/04/LBNL-Electrification-of-Buildings-2018.pdf>

distribution system upgrades” ([Electrification of buildings and industry in the United States](#), p. 8).<sup>296</sup>

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<sup>296</sup> Deason, Jeff, et al. “Electrification of Buildings and Industry in the United States.” Lawrence Berkeley National Laboratory. March 2018. <http://ipu.msu.edu/wp-content/uploads/2018/04/LBNL-Electrification-of-Buildings-2018.pdf>

## Building Retrofits

### Description

- “The next President and Congress should use strong consumer incentives, utility requirements, and direct public investments in an ambitious Rebuild America energy retrofit program” ([Evergreen Action Plan](#), p. 24).
- “Conduct high-quality, deep energy efficiency retrofits of 75% of all existing public and private buildings by 2040 and 100% by 2050 while meeting applicable building safety Standards” ([Vision for Equitable Climate Action](#), p. 14).
- “Target of retrofitting 4% of existing houses and buildings every year until the job is done” ([Elizabeth Warren 2020 Presidential Campaign](#)).
- “Before it expires at the end of 2020, Congress should pass a longer-term extension and update of the Section 25C tax credit for homeowner investments in energy efficiency improvements” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 145).
- “Upgrade 4 million buildings and weatherize 2 million homes over 4 years” ([Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy).
- “We will provide \$2.18 trillion for sliding-scale grants for low- and moderate-income families and small businesses to invest in weatherizing and retrofitting their homes and businesses” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy; [Elizabeth Warren 2020 Presidential Campaign](#); Governor Jay Inslee; [Moving Forward Act](#) (H.R. 2); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); Kamala Harris 2020 Presidential Campaign; Amy Klobuchar 2020 Presidential Campaign; Cory Booker 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#); [DNC Draft 2020 Policy Platform](#)

### LPDD Recommendations:

- “Congress should consider adopting mandatory retrofit laws for energy conservation and decarbonization in exist-ing commercial and residential buildings.” ([LPDD](#), p. 289)
- “Congress should consider enacting laws requiring that building owners who presently use fossil fuel for space and water heating must retrofit their buildings by electrification.” ([LPDD](#), p. 296)

### LPDD Resources:

- LPDD.org, “Requiring Building Retrofits”: <https://lpdd.org/pathway/retrofitting-existing-buildings/>
- LPDD.org, “Incentivizing Voluntary Retrofitting”: <https://lpdd.org/pathway/incentivizing-voluntary-retrofitting/>
- LPDD.org, “Financing Deep Retrofits”: <https://lpdd.org/pathway/financing-deep-retrofits/>

### Previous/Current Implementation

Congress enacted the [Section 25C tax credit](#) for homeowner investments in energy-efficient heating, cooling, and water heating and energy-efficient doors and windows in existing and renovated homes.

### Impact on GHGs

Elizabeth's Warren plan to retrofit 4% of existing houses and buildings every year would reduce 2050 U.S. emissions by 3.2% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

- “A federal commitment to project-scaled building retrofits will put millions of Americans to work cutting pollution and energy bills for households and businesses through energy efficiency and electrification upgrades in millions of existing residential and commercial buildings throughout the country” ([Evergreen Action Plan](#), p. 24).
- Joe Biden's goal of upgrading or weatherizing 6 million homes over 4 years would create at least 1 million jobs ([Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy).
- “Deep weatherization retrofits will reduce residential energy consumption by 30 percent” ([Bernie Sanders 2020 Presidential Campaign](#)).

### Obstacles/Shortfalls

Retrofitting is “expensive and inconvenient; Internal spaces may reduce upon installation of internal wall-insulation; Might cause negative impact to heritage and archaeological assets caused by usage of unproven methods, technologies or instruments; Further research is needed especially on insulation mechanism on walls and the effect on retrofit on buildings fabrics; More education, training and activities on maintaining and preserving the buildings need to be taught to address issues and to create awareness” ([The Application, Benefits and Challenges of Retrofitting the Existing Buildings](#), p. 4).<sup>297</sup>

### Resources

- Hendricks, Bracken, Goldstein, Benjamin, Detchon, Reid and Shickman, Kurt. “Rebuilding America: A National Policy Framework for Investment in Energy Efficient Retrofits.” Center for American Progress. August 2009. [https://cdn.americanprogress.org/wp-content/uploads/issues/2009/08/pdf/rebuilding\\_america.pdf](https://cdn.americanprogress.org/wp-content/uploads/issues/2009/08/pdf/rebuilding_america.pdf)
- Khairi, Muhammad, Jaapar, Aini, and Yahya, Zaharah. “The Application, Benefits and Challenges of Retrofitting the Existing Buildings.” *Materials Science and Engineering*. 2017. <https://iopscience.iop.org/article/10.1088/1757-899X/271/1/012030/pdf>

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<sup>297</sup> Khairi, Muhammad, Jaapar, Aini, and Yahya, Zaharah. The Application, Benefits and Challenges of Retrofitting the Existing Buildings. *Materials Science and Engineering*. 2017. <https://iopscience.iop.org/article/10.1088/1757-899X/271/1/012030/pdf>



## Plumbing Standards

### Description

Policies to impose water-efficiency standards for plumbing fixtures.

- “Generally, the standards impose a maximum on the amount of water used per flush by toilets and urinals and per minute by faucets and showerheads. In the United States, these amounts or flow rates are described as gallon per flush (gpf) or gallon per minute (gpm)” ([NCSL](#)).<sup>298</sup>

### Previous/Current Implementation

“Connecticut enacted the first state water efficiency standards in 1989. This legislation set maximum flow rates for fixtures manufactured, sold, and installed in the state after 1990. A handful of other states followed suit, and the federal government enacted national standards in the U.S. Energy Policy Act of 1992 ([EPAct 1992](#)).<sup>299</sup> This comprehensive legislation set minimum efficiency standards for all toilets, showers, urinals and faucets manufactured in the United States after 1994. ... In 2006, the U.S. Environmental Protection Agency (EPA) created the [WaterSense Program](#).<sup>300</sup> This voluntary national program certifies products that use 20 percent less water than the federal minimum without sacrificing performance. ... Since then, California, Georgia, Texas, and most recently Colorado have matched the EPA WaterSense flow rate criteria in creating their state efficiency standards” ([NCSL](#)).<sup>301</sup>

### Impact on GHGs

“If every household in the United States installed efficient fixtures and appliances, residential hot water use could be reduced by approximately 4.4 billion gallons per year. Resultant direct energy savings are estimated to be 41 million MWh electricity and 240 billion cubic feet of natural gas, with associated CO<sub>2</sub> reductions of about 38.3 million metric tons” ([The Carbon Footprint of Water](#), p. 2).<sup>302</sup>

### Co-Benefits

Over 20 years, the EPAct’s standards saved more than [18 trillion gallons](#)<sup>303</sup> of water through more efficient toilets alone. The total cost savings from federal water efficiency standards – including savings from reducing the amount of energy to heat water – is [more than \\$100 per](#)

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<sup>298</sup> Water-Efficient Plumbing Fixtures. *National Conference of State Legislatures*.

<https://www.ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx>

<sup>299</sup> Energy Policy Act of 1992. H.R. 775, 102nd Congress. 1991. <https://www.congress.gov/bill/102nd-congress/house-bill/776/text>

<sup>300</sup> “WaterSense.” *U.S. Environmental Protection Agency*. <https://www.epa.gov/watersense>

<sup>301</sup> Water-Efficient Plumbing Fixtures. *National Conference of State Legislatures*. <https://www.ncsl.org/research/environment-and-natural-resources/water-efficient-plumbing-fixtures635433474.aspx>

<sup>302</sup> Griffiths-Sattenspiel, Bevan and Wilson, Wendy. *The Carbon Footprint of Water*. River Network. 2009. <https://www.csu.edu/cerc/researchreports/documents/CarbonFootprintofWater-RiverNetwork-2009.pdf>

<sup>303</sup> “20 Year of the Energy Policy Act: 18 Trillion Gallons Saved Through More Efficient Toilets.” *Alliance for Water Efficiency*. March 21, 2014. <https://www.allianceforwaterefficiency.org/news/20-year-energy-policy-act-18-trillion-gallons-saved-through-more-efficient-toilets>

[household](#)<sup>304</sup> every year. A study by the American Water Works Association estimated that for 16 utilities it analyzed in the year 2000, “the standards [would] cause water consumption to be reduced enough to save local water utilities from \$165.7 million to \$231.2 million by 2020 because planned investments to expand drinking water treatment or storage capacity can be deferred or avoided” ([GAO](#), p. 20).<sup>305</sup>

#### Additional Resources

United States Government Accountability Office. “Water Infrastructure: Water-Efficient Plumbing Fixtures Reduce Water Consumption and Wastewater Flows.” August 2000.

<https://www.gao.gov/new.items/rc00232.pdf>

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<sup>304</sup> Osann, Ed. “25 Years of Water Efficiency Across the US.” October 25, 2017. NRDC.  
<https://www.nrdc.org/experts/ed-osann/celebrating-25-years-water-efficiency>

<sup>305</sup> U.S. Government Accountability Office. Water Infrastructure: Water-Efficient Plumbing Fixtures Reduce Water Consumption and Wastewater Flows. August 2000. <https://www.gao.gov/new.items/rc00232.pdf>



## Federal Buildings

### Description

- “The next administration should ... accelerate implementation of the federal [Fossil Fuel-Generated Energy Consumption Reduction rule](#),<sup>306</sup> through the Department of Energy (DOE), to eliminate by 2023 fossil-fuel use – including coal, fuel oil and natural gas – in all new and renovated federal buildings” ([Evergreen Action Plan](#), pp. 23-24).
  - “In order to help federal agencies meet these net-zero emissions requirements for new buildings and encourage deep retrofits that can meet these standards, Congress should consider appropriating incremental funds to enable these projects. Agencies could then apply for this additional funding when needed” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 177).
  - “Congress should codify FEMP and establish ambitious energy use intensity and emissions reduction targets for federal buildings, including its leased buildings. ... Congress should require and fund GSA and FEMP to undertake at least 100 deep energy retrofits of federal buildings by 2025” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 178).
- ❖ Federally-assisted state buildings: “Amends section 125 of EPACT05 by ... adding benchmarking programs to enable monitoring and use of energy performance data in buildings as an eligible use of grant funds” (CLEAN Future Act, [summary](#), p. 9).

Proposed by: [Evergreen Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [Green Energy for Federal Buildings Act](#) (H.R. 5142)<sup>307</sup>; [Energy Efficient Government Technology Act](#) (H.R. 1420);<sup>308</sup> Andrew Yang 2020 Presidential Campaign;

### LPDD Recommendations:

- “Congress should consider legislation requiring that all federal buildings, regardless of age, have no fossil fuel-generated energy consumption on or before 2050. In the alternative, the next President could issue an Executive Order to the same effect.” ([LPDD](#), p. 292)
- “Federal agencies should fully implement the requirement in EISA that federal buildings reduce fossil fuel use measured against a 2003 benchmark by 100% by 2030, and meet the goal that all new commercial buildings achieve zero net energy by 2030. Federal agencies should continue implementing the “Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings” adopted pursuant to Executive Order No. 13423 that requires advanced energy monitoring that provides at least daily data on

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<sup>306</sup> 75 FR 63404. 2010. <https://www.federalregister.gov/documents/2010/10/15/2010-25852/fossil-fuel-generated-energy-consumption-reduction-for-new-federal-buildings-and-major-renovations>

<sup>307</sup> Green Energy for Federal Buildings Act. H.R. 5142, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/5142/text?r=67&s=1>

<sup>308</sup> Energy Efficient Government Technology Act. H.R. 1420, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/1420?q=%7B%22search%22%3A%5B%22H+res+148%22%5D%7D>

energy use. The General Services Administration should retain its 2016 Facilities Standards that require all new federal build-ings to attain LEED Gold (Version 4) certification, as a minimum.” ([LPDD](#), p. 272)

#### Previous/Current Implementation

- [Energy Conservation and Production Act \(ECPA\)](#)<sup>309</sup> requires DOE to establish building energy efficiency standards for all new federal buildings. Energy efficiency standards were [updated](#) in 2017 to the International Code Council (ICC) 2015 International Energy Conservation Code (IECC). Buildings must be designed to achieve energy consumption levels that are at least 30 percent below the levels established in the referenced codes, if [life-cycle cost-effective](#).
- The [Energy Independence and Security Act of 2007](#)<sup>310</sup> established a building energy intensity reduction requirement of 30% below 2003 levels by 2015. As of 2018, the federal government had not achieved this requirement, only reaching 25.5% reductions in 2018.
- The [Federal Energy Management Program](#)<sup>311</sup> (FEMP) provides guidance and resources to help federal agencies manage their energy use and comply with energy efficiency and other requirements. FEMP also supports tracking and sharing of agency performance. However, FEMP does not have authorizing legislation.

#### Obstacles/Shortfalls

Energy efficiency standards only apply to new or renovated federal buildings. In 2014 the Pacific Northwest National Laboratory (PNNL) [reported](#)<sup>312</sup> that existing federal buildings could realize an energy use intensity (EUI) reduction of nearly 20 percent by 2025 (from a 2015 baseline), compared to just a 2.7 percent reduction likely to be realized by the next generation of replacement buildings ([ASE.Org](#)).<sup>313</sup>

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<sup>309</sup> VanGeem, Martha G. “Energy Codes and Standards.” *Whole Building Design guide*. 2016. [https://www.wbdg.org/resources/energy-codes-and-standards#:~:text=Section%20305%20of%20ECPA%2C%20as,for%20all%20new%20Federal%20buildings.&text=B](https://www.wbdg.org/resources/energy-codes-and-standards#:~:text=Section%20305%20of%20ECPA%2C%20as,for%20all%20new%20Federal%20buildings.&text=Buildings%20must%20be%20designed%20to,life%2Dcycle%20cost%2Deffective)

<sup>310</sup> Summary of Energy Independence and Security Act of 2007. U.S. Environmental Protection Agency. <https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act>

<sup>311</sup> Federal Energy Management Program. Office of Energy Efficiency & Renewable Energy. Energy.Gov. <https://www.energy.gov/eere/femp/federal-energy-management-program>

<sup>312</sup> Judd, KS, et al. “Analysis of Federal Agency Facility Energy Reduction Potential and Goal-Setting Approaches for 2025.” U.S. Department of Energy. May 2014. [https://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-23063.pdf](https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23063.pdf)

<sup>313</sup> Reott, Jason. “Federal Buildings Use Far More Energy Than They Should. This Bipartisan Bill Would Help Cut The Waste.” *Alliance to Save Energy*. <https://www.ase.org/blog/federal-buildings-use-far-more-energy-they-should-bipartisan-bill-would-help-cut-waste#:~:text=New%20Federal%20Buildings%20Are%20Generally,Ones%20are%20Ripe%20for%20Improvement&text=Nearly%2094%20percent%20of%20federal,2007%20have%20met%20this%20requirement>



## Smart Growth

### Description

“The American Planning Association identifies Smart Growth as that which supports choice and opportunity by promoting efficient and sustainable land development, incorporates redevelopment patterns that optimize prior infrastructure investments, and consumes less land that is otherwise available for agriculture, open space, natural systems, and rural lifestyles” ([APA Policy Guide on Smart Growth](#)).<sup>314</sup>

Proposals include ([Evergreen Action Plan](#), p. 19):

- Preserving existing affordable housing and constructing new affordable units.
- Increasing financial incentives for private investment in publicly beneficial green affordable housing and transit-oriented development projects.
- Pairing clean and efficient transportation infrastructure with policies that promote walkable neighborhoods.
- Relaunching and expanding the HUD-EPA-USDOT Sustainable Communities Initiative to promote climate pollution reductions, smart transportation, affordable and accessible housing, and job creation.
- Transportation plans that promote biking, walking and shared micro-mobility options such as electric scooters and e-bikes.

Proposed by: [Evergreen Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#) (p. 86); [Build More Housing Near Transit Act](#) (H.R. 4307)<sup>315</sup>

### LPDD Recommendations:

- “Congress should require transportation plans to establish targets for reducing GHG pollution and VMT consistent with specific goals and require tracking of progress to meet these targets.” ([LPDD](#), p. 335)
- “Congress should adopt a “fix it first” approach and place a greater emphasis on the maintenance, repair, and replacement of existing infrastructure.” ([LPDD](#), p. 336)
- “The federal government should adopt legal and policy reforms to reorient transportation planning and investment decisions to minimize impacts on tree cover, wetlands, and other carbon sinks. The federal government should pursue reforms that better link transportation and land use, including targeting transportation funding and planning resources to encourage transit-oriented development.” ([LPDD](#), p. 347)
- “The federal government should devote a larger share of transportation funding to providing meaningful alternatives to driving, and increase funding for projects that better connect various modes in order to expand transportation choices.” ([LPDD](#), p. 344)
- “FHWA should modify street design standards to make them more flexible and context-sensitive in order to promote non-motorized transportation.” ([LPDD](#), p. 345)

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<sup>314</sup> APA Policy Guide on Smart Growth. American Planning Association. 2012. <http://www.planning.org/policy/guides/adopted/smartgrowth.htm>

<sup>315</sup> Build More Housing Near Transit Act. H.R. 4307, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4307?s=1&r=7>

- “The federal government should maximize the efficiency of existing infrastructure by emphasizing systems management and intelligent transportation systems.” (LPDD, p. 336)
- “The federal government should offer more generous financial incentives and technical assistance to promote infill, renovation, and redevelopment.” (LPDD, p. 347)

#### LPDD Resources

- LPDD.org, “Reorienting Transportation Planning to Minimize GHGs”: <https://lpdd.org/pathway/reorienting-transportation-planning-to-minimize-ghgs/>
- LPDD.org, “Using Land Use Policy to Reduce Vehicle Miles Travelled”: <https://lpdd.org/pathway/using-land-use-policy-to-diminish-vehicle-miles-traveled/>
- LPDD.org, “Walkable Development”: <https://lpdd.org/pathway/walkable-development/>

#### Previous/Current Implementation

- “Portland was the first U.S. government to adopt a climate action plan in 1993 in which active transportation was given a central role. Portland has built more than 100 miles of trails and bike lanes just since 2001. This and earlier investments in infrastructure and programming have resulted in a quintupling of bike miles traveled over the last 15 years” ([Walking, Biking and Climate Change](#)).<sup>316</sup>
- Cities around the country have implemented various Smart Growth principles, including mixed land uses, compact building design, creating walkable neighborhoods, and preserving open space. Case studies can be found [here](#).<sup>317</sup>

#### Co-Benefits

Smart growth provides efficient utilization of land resources, more compact urban areas, and more efficient delivery of quality public services. It also creates safer streets for pedestrians and bicyclists, improved air and water quality, reduced costs of housing and travel and, as a result, increased local consumer spending. Finally, smart growth reduces the costs of disaster cleanup and long-term environmental mitigation due to the provision of interconnected networks of natural lands, natural areas and wildlife habitat, and waterways ([APA Policy Guide on Smart Growth](#)).<sup>318</sup>

#### Obstacles/Shortfalls

- Successful smart growth policies require collaboration between policymakers and community members.
- Adding environmental amenities to a residential area can lead to displacement and gentrification (cross reference: [Homelessness, Displacement, Gentrification](#)).
- “Special consideration should be given to the location and timing of infrastructure extensions in rural areas so as not to encourage growth that will promote inefficient and

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<sup>316</sup> The Short Trip with Big Impacts: Walking, Biking and Climate Change. Rails to Trails Conservancy. 2007. <https://www.railstotrails.org/resourcehandler.ashx?id=3766>

<sup>317</sup> “Smart Growth Illustrated.” U.S. Environmental Protection Agency. <https://www.epa.gov/smartgrowth/smart-growth-illustrated>

<sup>318</sup> APA Policy Guide on Smart Growth. American Planning Association. 2012. <http://www.planning.org/policy/guides/adopted/smartgrowth.htm>

unsustainable development patterns; create the need for additional inefficient and costly infrastructure; result in the loss of viable agriculture, forest land, and important natural habitat; create conflicts between agricultural and urban land uses; or ultimately harm the character of the rural community” ([APA Policy Guide on Smart Growth](#)).<sup>319</sup>

#### Additional Resources

Baron, Madeline, et al. “Housing Underproduction in the U.S.: Economic, Fiscal and Environmental Impacts of Enabling Transit-Oriented Smart Growth to Address America’s Housing Affordability Challenge.” Up for Growth, Holland Government Affairs, and ECONorthwest. 2018. [https://www.upforgrowth.org/sites/default/files/2018-09/housing\\_underproduction.pdf](https://www.upforgrowth.org/sites/default/files/2018-09/housing_underproduction.pdf)

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<sup>319</sup> APA Policy Guide on Smart Growth. American Planning Association. 2012. <http://www.planning.org/policy/guides/adopted/smartgrowth.htm>

## Affordable Housing

### Description

- Promote the construction, preservation and rehabilitation of affordable housing by:
  - Increasing investments for the National Housing Trust Fund (HTF) and the Community Development Financial Institutions (CDFI) Fund, to at least \$42 billion annually ([Evergreen Action Plan](#), pp. 25-26).
  - Working through HUD and with Congress to fully fund Section 8 Housing Choice Vouchers to support all renters making below 50% of average median income ([Evergreen Action Plan](#), pp. 25-26).
  - Establishing a Refundable Tax Credit for rent-burdened families to reimburse the portion of rent payments that exceed 30% of household income for families making less than the average median income ([Evergreen Action Plan](#), pp. 25-26).
- “Congress should create a HUD program to fund energy efficiency improvements in assisted and unsubsidized affordable multifamily housing. The program should also provide technical assistance to affordable housing providers to make energy and water efficiency improvements, install renewable energy, and incorporate healthy building materials” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 174).
- “Repair and modernize public housing including making all public housing accessible, conducting deep energy retrofits of all public housing, and providing access to high-speed broadband. We will also ensure that public housing has quality, shared community spaces to ensure every public housing complex has the capacity to serve as a community resiliency center” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; [Evergreen Action](#); [Vision for Equitable Climate Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Bernie Sanders 2020 Presidential Campaign](#); Cory Booker 2020 Presidential Campaign; Julian Castro 2020 Presidential Campaign; Beto O'Rourke 2020 Presidential campaign; Elizabeth Warren 2020 Presidential Campaign; [DNC Draft 2020 Policy Platform](#)

### LPDD Recommendations:

- Congress should act to allow subsidy funds to be combined with private finance to create low-income housing rehabilitation programs that require energy-efficiency standards be met in the rehabilitation process. ([LPDD](#), p. 181)

### Previous/Current Implementation

- There are four programs that represent almost all federal spending for affordable housing assistance for people with the lowest incomes: [Tenant-Based Rental Assistance](#), [Project-Based Rental Assistance](#), [Public Housing Operating Funds](#), and [Public Housing Capital Grants](#) (“[Policy](#),” *National Alliance to End Homelessness*).<sup>320</sup>

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<sup>320</sup> “Policy.” *National Alliance to End Homelessness*. <https://endhomelessness.org/ending-homelessness/policy/>



- The [National Housing Trust Fund](#)<sup>321</sup> (HTF) is a housing resource targeted to the building, rehabilitating, preserving, and operating rental housing for extremely low-income people. HTF allocates funding to states for these purposes. In 2016, \$174 million in HTF dollars were allocated. In 2017, \$219 million was available, and in 2018, \$267 million was available.
- The [Community Development Financial Institutions Fund](#),<sup>322</sup> created in 1994, provides financial assistance to community development financial institutions in order to promote economic revitalization.
- Examples of city initiatives to promote affordable housing:
  - Sisson, Patrick. “Solving Affordable Housing: Creative Solutions Around the U.S.” *Curbed*. July 25, 2017. <https://www.curbed.com/2017/7/25/16020648/affordable-housing-apartment-urban-development>

### Co-Benefits

Affordable housing improves local economies by boosting purchasing power and increasing job opportunities. In addition, updating and retrofitting affordable housing units can promote energy efficiency and healthier living spaces ([Impact of Affordable Housing on Families and Communities: A Review of the Evidence Base](#)).<sup>323</sup>

### Obstacles

“Land use policies and zoning regulations constrain the supply of affordable housing. Density limits, height restrictions, parking requirements, lengthy permitting and approval processes, and community opposition all contribute to increased housing prices” ([HUDUser.gov](#)).<sup>324</sup>

### Additional Resources

- “Impact of Affordable Housing on Families and Communities: A Review of the Evidence Base.” Enterprise Community Partners. 2014. <https://homeforallsmc.org/wp-content/uploads/2017/05/Impact-of-Affordable-Housing-on-Families-and-Communities.pdf>
- Sisson, Patrick. “Solving Affordable Housing: Creative Solutions Around the U.S.” *Curbed*. July 25, 2017. <https://www.curbed.com/2017/7/25/16020648/affordable-housing-apartment-urban-development>
- Baron, Madeline, et al. “Housing Underproduction in the U.S.: Economic, Fiscal and Environmental Impacts of Enabling Transit-Oriented Smart Growth to Address

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<sup>321</sup> “National Housing Trust Fund,” *National Low Income Housing Coalition*. <https://nlihc.org/explore-issues/projects-campaigns/national-housing-trust-fund>

<sup>322</sup> “About Us.” *Community Development Financial Institutions Fund*. U.S. Department of Treasury. <https://www.cdfifund.gov/about/Pages/default.aspx>

<sup>323</sup> Impact of Affordable Housing on Families and Communities: A Review of the Evidence Base. Enterprise Community Partners. 2014. <https://homeforallsmc.org/wp-content/uploads/2017/05/Impact-of-Affordable-Housing-on-Families-and-Communities.pdf>

<sup>324</sup> “Regulatory Barriers and Affordable Housing Quarterly Update.” *PD&R Edge*. HUDUser.gov. <https://www.huduser.gov/portal/pdredge/pdr-edge-featd-article-072318.html#:~:text=The%20Problem%20With%20Regulatory%20Barriers,contribute%20to%20increased%20housing%20prices>



America's Housing Affordability Challenge.” Up for Growth, Holland Government Affairs, and ECONorthwest. 2018.

[https://www.upforgrowth.org/sites/default/files/2018-09/housing\\_underproduction.pdf](https://www.upforgrowth.org/sites/default/files/2018-09/housing_underproduction.pdf)

## Homelessness, Displacement, Gentrification

### Description

- “The next President and Congress should champion the creation of a National Housing Stabilization Fund that can offer temporary rental support and financial assistance to families facing economic dislocation or short-term financial challenges due to lost wages, bills for medical care, transportation, and child care. ... Federal lawmakers should also improve enforcement of existing fair housing laws, and put in place new stronger protections for tenants, including from housing discrimination based on income source ... Finally, federal lawmakers should direct federal support directly to the community level, and such aid to cities and states should be pursued for expansion in the context of climate driven reinvestment in the built environment.” ([Evergreen Action Plan](#), p. 27).
- “Congress should direct HUD to conduct research to determine whether there are distributional impacts from policies to promote renewable energy, energy efficiency, and electrification. In many cases, policies to promote economic development have led to gentrification, so lessons from these experiences should be incorporated into future climate policy. Based on the results of this research, HUD should develop recommendations to improve equitable access to energy efficiency, renewable energy, and electrification in the building sector” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 174).

Proposed by: [Evergreen Action](#); [Vision for Equitable Climate Action](#) (p. 14); [Joe Biden 2020 Presidential Campaign](#) - Climate; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### Previous/Current Implementation

- HUD’s McKinney-Vento Homeless Assistance Grants program is at the core of federal efforts to end homelessness. Each year, HUD awards Homeless Assistance Grants to communities that administer housing and services at the local level. There are four programs that represent almost all federal spending for affordable housing assistance for people with the lowest incomes: [Tenant-Based Rental Assistance](#), [Project-Based Rental Assistance](#), [Public Housing Operating Funds](#), and [Public Housing Capital Grants](#) (“[Policy](#),” *National Alliance to End Homelessness*).<sup>325</sup>
- A number of cities have successfully implemented anti-gentrification policies, including in San Francisco's Chinatown, East Palo Alto, and Diridon Station, San Jose. For example, zoning laws prohibit demolition or conversion of residential buildings for other uses. As a result, these laws preserve low-income housing and avoid an increase in hotels. Other policies include rent stabilization, foreclosure assistance, and mobile home rent control ([Policy Case Studies](#), Urban Displacement Project).<sup>326</sup>

### Obstacles/Shortfalls

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<sup>325</sup> “Policy.” *National Alliance to End Homelessness*. <https://endhomelessness.org/ending-homelessness/policy/>

<sup>326</sup> “Policy Case Studies.” Urban Displacement Project. <https://www.urbandisplacement.org/policy-case-studies>

Cities struggle to introduce environmental amenities to low-income neighborhoods while simultaneously ensuring that property values will not rise and residents will not be displaced.

#### Additional Resources

- This case study looks at successful policies to combat displacement and gentrification in San Francisco's Chinatown:
  - Urban Displacement Project. "San Francisco's Chinatown." University of California Berkeley. March 2016.  
[https://www.urbandisplacement.org/sites/default/files/images/urbandisplacementproject\\_policycasesstudy\\_chinatown\\_april2016.pdf](https://www.urbandisplacement.org/sites/default/files/images/urbandisplacementproject_policycasesstudy_chinatown_april2016.pdf)
- Broad, Juliana. "Fighting Gentrification and Displacement: Emerging Best Practices." The Next System Project. February 19, 2020. <https://thenextsystem.org/fighting-gentrification-best-practices>
- Gould, Kenneth and Lewis, Tammy. "Green Gentrification: Urban Sustainability and the Struggle for Environmental Justice." Routledge. January 2016.  
[https://www.researchgate.net/publication/303693059\\_Green\\_Gentrification\\_Urban\\_Sustainability\\_and\\_the\\_Struggle\\_for\\_Environmental\\_Justice](https://www.researchgate.net/publication/303693059_Green_Gentrification_Urban_Sustainability_and_the_Struggle_for_Environmental_Justice)
- Pearsall, Hamil and Anguelovski, Isabelle. "Contesting and Resisting Environmental Gentrification: Responses to New Paradoxes and Challenges for Urban Environmental Justice." *Sociological Research Online*. August 2016.  
[https://www.researchgate.net/publication/307554948\\_Contesting\\_and\\_Resisting\\_Environmental\\_Gentrification\\_Responses\\_to\\_New\\_Paradoxes\\_and\\_Challenges\\_for\\_Urban\\_Environmental\\_Justice/link/5c418673a6fdccd6b5b59676/download](https://www.researchgate.net/publication/307554948_Contesting_and_Resisting_Environmental_Gentrification_Responses_to_New_Paradoxes_and_Challenges_for_Urban_Environmental_Justice/link/5c418673a6fdccd6b5b59676/download)
- "How to Prevent City Climate Action from Becoming 'Green Gentrification.'" World Resources Institute. Accessed June 2020. <https://www.wri.org/blog/2019/12/how-prevent-city-climate-action-becoming-green-gentrification>

## INDUSTRY

### Advanced Manufacturing Investments And Industrial Policy

#### Description

- Establish a new, uncapped Advanced Energy Manufacturing Tax Credit, much like that passed in the 2009 Recovery Act, but much larger, to incentivize investment and growth in domestic manufacturing capacity for clean energy industries, such as wind turbines, electric vehicles, and advanced batteries ([Evergreen Action Plan](#), p. 29).
- Expand federal support for technical assistance and skills-training programs for businesses, states, and local governments, including the Department of Commerce’s Manufacturing Extension Service, and Advanced Manufacturing Partnerships, and related efforts ([Evergreen Action Plan](#), p. 29).
- Establish a Quadrennial Industrial Review (QIR), to be conducted by the U.S. Department of Commerce, working with the DOE and the Department of Defense (DOD), to map strategic industries and identify sound industrial policies — including critical materials and rare-earth elements, global demands, and domestic production capacities — and support sustained American competitiveness and industrial growth that enable a livable climate ([Evergreen Action Plan](#), p. 29).
- “To better direct federal efforts to reduce emissions from industry, Congress should lift [Advanced Manufacturing Office] out of [the Office for Energy Efficiency and Renewable Energy] and create and fund a new Assistant Secretary for Manufacturing and Industry within DOE. ... Congress should include emissions reductions as part of the mission of the new Office of Manufacturing and Industry and increase its resources to expand beyond AMO’s activities in energy efficiency” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 240).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) (supports building on efforts of Recovery Act); [CLEAN Future Act](#) supports implementing an Assistant Secretary of Energy for Manufacturing and Industrial Decarbonization; [Energy Innovation](#) (supports clean manufacturing); Kamala Harris 2020 Presidential Campaign; [Elizabeth Warren 2020 Presidential Campaign](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

#### LPDD Recommendations:

- “Congress should consider adopting a carbon tax in the form of an upstream price on fossil fuels for energy pro-duction plus industrial non-energy carbon emissions (e.g., clinker production), with the tax corrected for carbon that is captured and stored and carbon in feedstocks permanently embodied in products and in compliance with source-specific or cross-sector standards.” ([LPDD](#), p. 309)
- “Congress should consider an emissions trading scheme that operates within strict, multisector emis-sions limits, with allowances exchanged cross-sector with the potential to expand to other jurisdictions through linked programs, all within a fixed, declining cap that affords minimal or no offsets.” ([LPDD](#), p. 311)

- “EPA regulations under CAA §111(b) and (d) should set emissions limits for the refining, chemicals, steel and other primary metals, pulp and paper, food processing, cement and nonmetallic minerals, transportation equipment, and several dozen other sectors through CAA §111(b) (best demonstrated technology informed by design, equipment, work practice, and operational standards where necessary for new and modified facilities in source categories that are not already identified under the NSPS program) and §111(d) (existing sources for categories already enacted under the NSPS program, including refineries and cement plants).” ([LPDD](#), p. 311)
- “Congress should focus on key processes that take place within energy-intensive industries, such as fractional distillation in refineries; steam cracking in petrochemical plants; pulp making, drying, and finishing in paper production; preservation, process heating, and machine-driven end uses in food processing; upstream production approaches in the iron and steel sector; conversion of bauxite to alumina and its electrolysis; clinker production in cement manufacture; and motor and steam systems across a number of sectors.” ([LPDD](#), pp. 306-08, 315)
- “EPA could adopt regulations under CAA §115 to fix an aggregate limit for industrial carbon emissions that declines to meet deep decarbonization objectives and allows for a variety of compliance options, including emissions trading.” ([LPDD](#), p. 317)
- “Congress should approve appropriations for an innovation fund that would establish criteria for access to resources (e.g., co-benefits such as cost savings or environmental management systems innovation), to supplement emissions trading encouraged by new EPA rulemaking under CAA §111 and/or §115, and to assist states as they draft SIP revisions to comply with rulemaking under the CAA. Congress should speed up the timetable for facility-specific adoption of new technology encouraged by rulemaking under CAA §111 and/or §115 with subsidies and regulatory floors (e.g., DOE’s Appliance and Equipment Standards Program) as well as increased support for less proven emissions reduction methods such as CCS and co-firing biomass.” ([LPDD](#), p. 318)
- “Congress should pursue subsidy of deep decarbonization of the industrial sector through a mix of federal RD&D, tax exemption, and equipment standards (cross-sector); energy audits and voluntary agreements (sector-specific); and information-based programs (sector- and economywide). DOE could partner with EPA to administer an innovation fund, which would blend elements of the EU ETS New Entrants Reserve (where allowances finance low-carbon demonstration projects) and sector-specific support programs such as the United Kingdom’s Renewable Heat Incentive (which use allowance proceeds to pay for technology adoption on a unit basis).” ([LPDD](#), p. 318)
- “Congress should invest in methods to calculate embodied carbon emissions by material and manufacturing process. Congress should designate the National Institute of Standards and Technology (or a new organization) to publish data and aggregation methods for life-cycle assessment comparisons by product in order to encourage firms to pursue material substitution. Congress should require that firms publicly report emissions data by material.” ([LPDD](#), p. 322)
- “Congress should provide financial support for demonstration projects for materials efficiency that reduce CO<sub>2</sub> emissions, such as reusable nanoscale materials in high-volume manufacturing.” ([LPDD](#), p. 322)

- “DOE should modify its Superior Energy Performance initiative to include carbon emissions target setting, material efficiency standards, and reuse and material substitution optimization requirements.” (LPDD, p. 322)
- “EPA could inventory material flows; subsidize effective recycling, industrial linkage, and co-processing technologies; and facilitate industrial symbiosis agreements among firms and state and local governments that pursue resource synergies.” (LPDD, p. 323)
- “Congress should pursue material efficiency strategies such as lightweighting, reduced yield loss, diverted scrap, reuse, increased product life-span, and greater product use intensity.” (LPDD, p. 324)
- “Congress could encourage increased material efficiency through an amended Federal Energy Management Program under EISA. Congress could support the adaptation of model building codes to encourage substitution of primary materials as well as material replacement and life-span.” (LPDD, p. 325)
- “Congress should employ a mix of policies to drive material efficiency across the life cycle. Congress could inventory and amend its scattered MEPS statutes to provide DOE with explicit authority to set material efficiency goals, remove materially inefficient manufacturing incentives, and adjust social cost of carbon figures to reflect new data. Congress could pass comprehensive product standard legislation modeled after the EU’s Ecodesign Directive.” (LPDD, p. 324)

#### LPDD Resources:

- LPDD.org, Subsidy Support for Industrial Process Improvements: <https://lpdd.org/pathway/subsidy-support-for-industrial-process-improvements/>
- LPDD.org, Material Efficiency: <https://lpdd.org/pathway/material-efficiency/>
- LPDD.org, Policies Supporting Low Carbon Industrial Materials: <https://lpdd.org/pathway/policies-supporting-low-carbon-industrial-materials/>

#### Previous/Current Implementation

[The American Recovery and Reinvestment Act](#)<sup>327</sup> of 2009 created [the Advanced Energy Manufacturing Tax Credit](#),<sup>328</sup> which authorized the Treasury to provide developers with an investment tax credit of 30 percent for the manufacture of particular types of energy equipment. Funded at \$2.3 billion, the tax credit was made available to 183 domestic clean energy manufacturing facilities during Phase I of the program.

#### Impact on GHGs

Advanced manufacturing has the potential to reduce greenhouse gas emissions from the manufacturing sector. In addition, manufacturing of clean energy infrastructure can contribute to a reduction in emissions. “Advanced manufacturing uses new materials and emerging technologies (e.g., additive manufacturing and digital manufacturing) and is expected to be

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<sup>327</sup> The American Recovery and Reinvestment Act. H.R. 1, 111th Congress. 2009. <https://www.congress.gov/bill/111th-congress/house-bill/1/text>

<sup>328</sup> 48C Phase II Advanced Energy Manufacturing Tax Credit Program Selections. Energy.Gov. <https://www.energy.gov/downloads/48c-phase-ii-advanced-energy-manufacturing-tax-credit-program-selections#:~:text=The%20Advanced%20Energy%20Manufacturing%20Tax,particular%20types%20of%20energy%20equipment.>

essential, not only for the economic competitiveness of individual manufacturers at a global scope, but also for the sustainability of the overall industrial sector” ([Impact of advanced manufacturing on sustainability: An overview of the special volume on advanced manufacturing for sustainability and low fossil carbon emissions](#), p. 69).<sup>329</sup>

### Co-Benefits

Advanced manufacturing creates jobs<sup>330</sup> and increases the availability of clean energy infrastructure.

### Additional Resources

Mingzhou Jin, et al. “Impact of advanced manufacturing on sustainability: An overview of the special volume on advanced manufacturing for sustainability and low fossil carbon emissions.” *Journal of Cleaner Production*, Vol. 161. 2017.  
<https://www.sciencedirect.com/science/article/abs/pii/S0959652617310417>

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<sup>329</sup> Jin, Mingzhou, Tang, Renzhong, Ji, Yangjian, Lui, Fei, Gao, Liang, and Huisingh, Donald. Impact of advanced manufacturing on sustainability: An overview of the special volume on advanced manufacturing for sustainability and low fossil carbon emissions. *Journal of Cleaner Production*, Vol. 161. 2017.  
<https://www.sciencedirect.com/science/article/abs/pii/S0959652617310417>

<sup>330</sup> McGrew, Will. “Building a competitive, talent-driven future for U.S. manufacturing requires investing in our nation’s high-tech advantage.” *Washington Center for Equitable Growth*. 2019.  
<https://equitablegrowth.org/building-a-competitive-talent-driven-future-for-u-s-manufacturing-requires-investing-in-our-nations-high-tech-advantage/>



## Manufacturing of Equipment for Clean Economy

### Description

Policies to promote manufacturing of equipment to reduce emissions and promote renewable energy sources.

- “Amends EPACT05 title VII (subtitle B) to include plug-in electric vehicles and directs the Secretary of Energy to accelerate domestic manufacturing of batteries, power electronics, and other technologies for use in plug-in vehicles” ([CLEAN Future Act](#), Summary, p. 14).
- “The next administration should work with Congress to establish a new, uncapped Advanced Energy Manufacturing Tax Credit, much like that passed in the 2009 Recovery Act, but much larger, to incentivize investment and growth in domestic manufacturing capacity for clean energy industries, such as wind turbines, electric vehicles, and advanced batteries” ([Evergreen Action Plan](#), p. 29).
- “Congress should authorize new funding for the 48C advanced energy tax credit to re-equip, expand, or establish domestic clean energy, transportation, grid, and industrial decarbonization technology manufacturing facilities. ... Congress should reauthorize and expand the Section 45M production tax credit for the manufacture of clean energy, energy efficiency, and decarbonization technologies” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#) p. 267)
- “Congress should reauthorize and expand the Section 45M production tax credit for the manufacture of clean energy, energy efficiency, and decarbonization technologies” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#) p. 268)

Proposed by: [CLEAN Future Act](#); [Evergreen Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Bernie Sanders 2020 Presidential Campaign](#); Pete Buttigieg 2020 Presidential Campaign; [Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy; [Green New Deal](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### Previous/Current Implementation

- [The American Recovery and Reinvestment Act](#)<sup>331</sup> of 2009 created [the Advanced Energy Manufacturing Tax Credit](#)<sup>332</sup>, which authorized the Treasury to provide developers with an investment tax credit of 30 percent for the manufacture of particular types of energy equipment. Funded at \$2.3 billion, the tax credit was made available to 183 domestic clean energy manufacturing facilities during Phase I of the program.

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<sup>331</sup> American Recovery and Reinvestment Act of 2009. National Telecommunications and Information Administration. <https://www.ntia.doc.gov/page/2011/american-recovery-and-reinvestment-act-2009>

<sup>332</sup> 48C Phase II Advanced Energy Manufacturing Tax Credit Program Selections. Energy.Gov. <https://www.energy.gov/downloads/48c-phase-ii-advanced-energy-manufacturing-tax-credit-program-selections#:~:text=The%20Advanced%20Energy%20Manufacturing%20Tax,particular%20types%20of%20energy%20equipment>.



### Co-Benefits

- Job creation: The Recovery Act investments of up to \$2.3 billion for advanced energy manufacturing facilities was estimated to generate more than 17,000 jobs.<sup>333</sup> This job creation would help ease the economic burden placed on communities most impacted by the transition away from fossil fuel generation.

### Additional Resources

- “Manufacturing Workforce for a Clean Energy Economy.” U.S. Department of Energy. 2010. [https://www1.eere.energy.gov/library/pdfs/industry\\_green\\_jobs\\_fact\\_sheet\\_6-1.pdf](https://www1.eere.energy.gov/library/pdfs/industry_green_jobs_fact_sheet_6-1.pdf)
- Chan, Isaac. “Advanced Technologies for Clean Energy Manufacturing.” U.S. Department of Energy. 2010. <https://www.nist.gov/system/files/documents/el/Chandoe.pdf>

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<sup>333</sup> Fact Sheet: \$2.3 Billion in New Clean Energy Manufacturing Tax Credits. *Department of Energy*. Energy.Gov. January 8, 2020. <https://www.energy.gov/articles/fact-sheet-23-billion-new-clean-energy-manufacturing-tax-credits>

## Buy Clean Program

### Description

- “Directs the EPA Administrator to establish a Buy Clean Program to steadily reduce the quantity of embodied carbon emissions of construction materials and products and promote the use of clean construction materials and products in projects supported by federal funds” ([CLEAN Future Act, Summary](#), p. 15).
- “Congress should consider the state of the art in available technologies while balancing feasibility and cost considerations when determining the maximum emissions intensity benchmarks. In order to protect [energy-intensive and trade-exposed (EITE)] industries, Congress should also set these benchmarks at levels that most domestic manufacturers can meet with available technologies but cut out dirtier goods. The benchmarks should also increase in stringency to push industries to improve and to continue driving down costs in increasingly lower-emission technologies. EPA should build on existing data and programs, such as Energy Star for Industry and the national EPD database recommended above, to determine appropriate benchmarks and product categories and engage relevant stakeholders (at minimum, unions, environmental organizations, affected businesses, environmental justice groups, and academics) as part of an inclusive and transparent decision-making process. To have the greatest possible impact, the Buy Clean Program should apply to all federal agencies involved in procuring and funding projects that procure steel and other emissions-intensive industrial goods” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 260).
- “To create incentives for breakthrough innovations in very low-emission materials, Congress should direct EPA to create an additional requirement for procuring low-emission goods. This requirement should apply to all federal agencies and all projects above a certain size (such as \$1 million in total project cost) that utilize more than a minimal amount of federal funds. The requirement should start as a small percentage of all procurement of a material by each agency and each covered project, and it should increase over time. The emissions intensity benchmark for this higher tier of products should push the state of the art in low-emissions technology and should also continue to ratchet as technologies improve” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 260).

Cross Reference: [Purchasing Policies](#)

Proposed by: [CLEAN Future Act](#) (2020); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#) (p. 259); [Joe Biden 2020 Presidential Campaign](#) - Climate; All 2020 Presidential Candidates support using the federal government procurement system to drive clean manufacturing; [DNC Draft 2020 Policy Platform](#).

### LPDD Recommendations:

- Congress should support material efficiency with certification, labeling, and standard-setting as well as preferential purchasing and targeted RD&D support (e.g., R&D integration through DOE’s Energy Materials Network consortia led by one or more national laboratories). (LPDD, p. 321)

- Congress could pass legislation that establishes procurement requirements for the federal government consistent with circular economy and deep decarbonization goals. (LPDD, p. 193)

#### LPDD Resources:

- LPDD.org, Using Government Procurement to Support Innovation: <https://lpdd.org/pathway/using-government-procurement-to-support-innovation/>

#### Previous/Current Implementation

- The state of California enacted a Buy Clean Program in 2017 known as AB 262, which requires Environmental Product Declarations (EPDs) for certain materials used for state building projects. Thus, when an agency contracts to buy steel, flat glass, and mineral wool insulation for infrastructure projects, they must take into account their suppliers' emissions performances ([U.S. Green Building Council Los Angeles](#)).<sup>334</sup>
- [LEED](#)<sup>335</sup> is a green building rating program that provides multi-level, point-based certifications. "In the US, national certification systems such as LEED are strengthening focus on embodied carbon, establishing disclosure and performance pathways specific to building products" ([Buy Clean Washington Study](#), 2019, p. 3).
- More examples: [Buy Clean Washington Study](#), pp. 2-8 to 2-29.

#### Impact on GHGs

Emissions from construction materials account for 11% of annual global carbon emissions and 28% of building sector emissions ([Buy Clean Washington Study](#), p. 1). Therefore, a Buy Clean program would significantly reduce these emissions.

#### Co-Benefits

"Creating a market specifically for low-emission materials and products would help scale their production and bring down their costs. Because the federal government is a major purchaser of these commodities, particularly for infrastructure and buildings, federal procurement of low-emission options would create a significant market, increasing their deployment and sending a clear signal to the private sector that investments in low-emission technologies would be profitable" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 259).

#### Obstacles/Shortfalls

- 1. Establishing a method to shape performance-based targets for each product category would require rigorous data collection and verification, a defined calculation methodology, and government access to vetted software and tools. 2. Additional costs of environmental reporting could burden small businesses (or firms with tight operating budgets) with limited flexibility to absorb the added financial burden of environmental reporting. 3. 'Harsh' penalizations (e.g. disqualifying noncompliant materials) could result in delays to project

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<sup>334</sup> "Buy Clean California." U.S. Green Building Council Los Angeles. <https://usgbc-la.org/programs/buy-clean-california/>

<sup>335</sup> "LEED Rating System." U.S. Green Building Council. <https://www.usgbc.org/leed>

schedules or incur additional costs to project teams. 4. Policymakers would need to avoid developing exemption guidelines that are too broad or too easy to meet ([Buy Clean Washington Study](#), p. 5-16).

#### Additional Resources

- World Green Building Council. “Bringing Embodied Carbon Upfront: Coordinated Action for the Building and Construction Sector to Tackle Embodied Carbon.” Accessed July 2020.  
[https://www.worldgbc.org/sites/default/files/WorldGBC\\_Bringing\\_Embodied\\_Carbon\\_Upfront.pdf](https://www.worldgbc.org/sites/default/files/WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf)

## Industrial Energy Efficiency and Carbon Intensity Standards

### Description

The next administration should work to implement new standards for carbon intensity of domestic manufacturing processes and equipment that encourage the production and sale of super-efficient equipment, appliances, and electronics ([Evergreen Action Plan](#), p. 31).

- Provide incentives to move toward low-carbon cement and concrete production ([Project Drawdown](#); [Deep Decarbonization Roadmap for the Cement and Concrete Industries in California](#)<sup>336</sup>).
- Create targeted plastic bans to support growth of biopolymers (bioplastics) ([Project Drawdown](#)).

Proposed by: [Evergreen Action](#) (p. 31); [Project Drawdown](#)

### LPDD Recommendations:

- Congress should adopt a federal subsidy for mid-range energy efficiency and fuel switching in the industrial sector through a sectoral crediting mechanism. ([LPDD](#), p. 319)
- Congress should invest in methods to calculate embodied carbon emissions by material and manufacturing process. ([LPDD](#), p. 322)

### Previous/Current Implementation

The U.S. Department of Energy has specified mandatory energy efficiency standards for electric motors, pumps, commercial boilers, and various other types of equipment used in industrial facilities ([EESI](#)).<sup>337</sup>

### Impact on GHGs

Doubling the annual rate of equipment efficiency improvement rate through 2050 (equating to a 26% reduction in energy use) for all industries would reduce U.S. emissions by 6% in 2050 compared to a BAU baseline (equivalent to a reduction of 338 million metric tons) ([U.S. Policy Solutions Simulator v 2.1.1](#))

### Co-Benefits

Efficiency standards reduce energy costs. They also create research, manufacturing, and installation jobs ([EESI](#)).<sup>338</sup>

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<sup>336</sup> Hasanbeigi, Ali and Springer, Cecelia. Deep Decarbonization Roadmap for the Cement and Concrete Industries in California. Global Efficiency Intelligence. September 2019. <https://buyclean.org/media/2019/09/Decarbonization-Roadmap-CA-Cement-Final.pdf>

<sup>337</sup> “Fact Sheet - Energy Efficiency Standards for Appliances, Lighting and Equipment (2017).” *Environmental and Energy Study Institute*. August 11, 2017. <https://www.eesi.org/papers/view/fact-sheet-energy-efficiency-standards-for-appliances-lighting-and-equipmen#4>

<sup>338</sup> Ibid.

### Additional Resources

- Energy Innovation. “Industrial Energy Efficiency, Policy Solutions.” Accessed July 2020. <https://www.energypolicy.solutions/policies/industrial-energy-efficiency/>
- U.S. Department of Energy. “Barriers to Industrial Energy Efficiency.” Report to Congress. June 2015. [https://www.energy.gov/sites/prod/files/2015/06/f23/EXEC-2014-005846\\_6%20Report\\_signed\\_o.pdf](https://www.energy.gov/sites/prod/files/2015/06/f23/EXEC-2014-005846_6%20Report_signed_o.pdf)
- U.S. Department of Energy. “U.S. Department of Energy, 2016, Industrial Energy Efficiency Potential Analysis.” 2017. <https://www.energy.gov/sites/prod/files/2017/04/f34/energy-savings-by-state-industrial-methodology.pdf>

## Industrial Electrification

### Description

Policies to support the electrification of industrial processes and equipment. Policies include increased investment in Research and Development, incentives for technology deployment, target-setting, and codes/standards (Lawrence Berkeley National Laboratory. [Electrification of Buildings and Industry in the United States: Drivers, Barriers, Prospects, and Policy Approaches](#). March 2018).<sup>339</sup>

- “Congress should pass legislation to bolster and guide federal RDD&D funding and to create a cross-agency program, led by DOE and the new Assistant Secretary for Manufacturing and Industry, that focuses on technologies that enable emissions reductions in the industrial sector” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 241).

Proposed by: [Evergreen Action Plan](#) (p. 32); [Vision for Equitable Climate Action](#) (p. 7); [Electricity Markets and Policy Group](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#).

### LPDD Recommendations:

- Congress should pursue policies that promote efficient end use in the industrial sector, energy supply strategies such as electricity supply decarbonization, fuel switching, material efficiency, and carbon management. ([LPDD](#), p. 302)
- Congress should adopt a federal subsidy for mid-range energy efficiency and fuel switching in the industrial sector through a sectoral crediting mechanism. ([LPDD](#), p. 319)

### Previous/Current Implementation

“Incentive programs for heat pumps are potentially important drivers of electrification. These programs are widespread, generally offered through loans, rebates or tax incentives. For example, the Massachusetts Clean Energy Center offers a program funded by the Massachusetts Renewable Energy Trust offering rebates of between \$2,500 and \$30,000 for the purchase of qualifying air-source heat for rated efficiencies of heat pumps” ([Electrification of Buildings and Industry in the United States: Drivers, Barriers, Prospects, and Policy Approaches](#), p. 46).<sup>340</sup>

### Impact on GHGs

Doubling the annual rate of equipment efficiency improvement through 2050 (equating to a 26% reduction in energy use) for all industries would reduce U.S. emissions by 6% in 2050 compared to a BAU baseline (equivalent to a reduction of 338 million metric tons).

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<sup>339</sup> Deason, Jeff, Wei, Max, Leventis, Greg, Smith, Sarah, and Schwartz, Lisa. Electrification of Buildings and Industry in the United States: Drivers, Barriers, Prospects, and Policy Approaches. Lawrence Berkeley National Laboratory. March 2018. [https://eta-publications.lbl.gov/sites/default/files/electrification\\_of\\_buildings\\_and\\_industry\\_final\\_o.pdf](https://eta-publications.lbl.gov/sites/default/files/electrification_of_buildings_and_industry_final_o.pdf)

<sup>340</sup> Ibid.

Switching the fuel used by facilities from hard coal to a mixture of electricity (based on the industry's electrification potential) and hydrogen (for the remainder) could reduce U.S. emissions in 2050 by 1.5% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

“Increased electrification offers greater flexibility for managing electric loads and opportunities for customers to provide services that support grid operations. In addition, electrification may foster economic development, boost balance of trade, improve air quality, reduce fuel price risks, reduce consumers' costs in some applications, improve product quality in some industrial processes” (Berkeley Lab, [New Study Explores Prospects and Approaches for Increased Electrification of Buildings and Industry](#)).<sup>341</sup>

### Obstacles/Shortfalls

- Capital costs arise from industrial electrification ([Electrification of Buildings and Industry in the United States](#), p. 6).<sup>342</sup>
- “Most industrial processes are not currently designed to use electricity and electrified alternatives are not currently available for many applications, e.g., high temperature processes such as cement manufacturing”([Electrification of Buildings and Industry in the United States](#), p. 7).<sup>343</sup>
- “The industrial sector has a diversity of sub-sectors and products and a variety of process heating modules and applications. This diversity presents a barrier for widespread electrification in terms of process design, development, and conversion costs. Each industry sub-sector and product can have its own process heating requirements and product specifications that require application-specific designs and performance requirements for electrified processing. This design and engineering challenge is an especially difficult barrier for electrifying processes that have a high degree of process integration” ([Electrification of Buildings and Industry in the United States](#), p. 7).<sup>344</sup>

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<sup>341</sup> Lawrence Berkeley National Laboratory. New Study Explores Prospects and Approaches for Increased Electrification of Buildings and Industry. April 9, 2018. <https://emp.lbl.gov/news/new-study-explores-prospects-and-approaches>

<sup>342</sup> Deason, Jeff, Wei, Max, Leventis, Greg, Smith, Sarah, and Schwartz, Lisa. Electrification of Buildings and Industry in the United States: Drivers, Barriers, Prospects, and Policy Approaches. Lawrence Berkeley National Laboratory. March 2018. [https://eta-publications.lbl.gov/sites/default/files/electrification\\_of\\_buildings\\_and\\_industry\\_final\\_o.pdf](https://eta-publications.lbl.gov/sites/default/files/electrification_of_buildings_and_industry_final_o.pdf)

<sup>343</sup> Deason, Jeff, Wei, Max, Leventis, Greg, Smith, Sarah, and Schwartz, Lisa. Electrification of Buildings and Industry in the United States: Drivers, Barriers, Prospects, and Policy Approaches. Lawrence Berkeley National Laboratory. March 2018. [https://eta-publications.lbl.gov/sites/default/files/electrification\\_of\\_buildings\\_and\\_industry\\_final\\_o.pdf](https://eta-publications.lbl.gov/sites/default/files/electrification_of_buildings_and_industry_final_o.pdf)

<sup>344</sup> Deason, Jeff, Wei, Max, Leventis, Greg, Smith, Sarah, and Schwartz, Lisa. Electrification of Buildings and Industry in the United States: Drivers, Barriers, Prospects, and Policy Approaches. Lawrence Berkeley National Laboratory. March 2018. [https://eta-publications.lbl.gov/sites/default/files/electrification\\_of\\_buildings\\_and\\_industry\\_final\\_o.pdf](https://eta-publications.lbl.gov/sites/default/files/electrification_of_buildings_and_industry_final_o.pdf)





## Clean Energy Exports

### Description

- “The next administration should focus the attention of federal international trade and finance agencies, such as the Export-Import Bank (Ex-Im), the Overseas Private Investment Corporation (OPIC), the Millennium Challenge Corporation (MCC), and the Foreign Agricultural Service, to accelerate American clean energy and sustainable products exports” ([Evergreen Action Plan](#), p. 32).
- “Create a Clean Energy Export and Climate Investment Initiative. ... Biden will establish a new government-wide effort to promote American clean energy exports and investments around the world to advance climate mitigation, adaptation, and resilience. The initiative will offer incentives for U.S. firms that supply low-carbon solutions to the international market in order to spur U.S. industry, jobs, and competitiveness, and make America the world leader in clean energy technologies. It will prioritize partnerships with countries that make high climate ambition commitments under Paris and provide low-cost financing to these countries for American clean energy exports” ([Joe Biden 2020 Presidential Campaign](#) - Climate).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; [Elizabeth Warren 2020 Presidential Campaign](#); [Evergreen Action](#); [Asia Society Policy Institute](#)

### Previous/Current Implementation

- President Obama announced the National Export Initiative (NEI), seeking to double exports in five years to support several million new jobs. ([Renewable Energy and Energy Efficiency Export Initiative](#)).<sup>345</sup>
- “Wind resources exist near the borders of each of [the U.S., Mexico, and Canada], and large solar resources are shared across the U.S./Mexico border. To date, state-level renewable portfolio standards partially motivate construction of wind and solar electricity projects in the United States. As a result, the electricity generated is consumed in the domestic market. In June 2016 it was reported that the three countries agreed to a 50% clean power ... target by 2025. ... It is possible that renewable electricity trade opportunities might develop through ... Mexican imports from the United States” ([Congressional Research Service](#)).<sup>346</sup>

### Obstacles

- Obstacles for U.S. clean energy exporters: “Reaching ‘grid parity’ – long the dream of the clean energy industry – will be harder to achieve given lower coal and natural gas prices. ... [Still,] the fall in clean energy costs over the past few years should help the industry remain

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<sup>345</sup> TPCC Working Group on Renewable Energy and Energy Efficiency. Renewable Energy and Energy Efficiency Export Initiative. National Export Initiative. 2017. <http://www.biomassthermal.org/wp-content/uploads/2017/12/Renewable-Energy-and-Energy-Efficiency-Export-Initiative.pdf>

<sup>346</sup> Parfomak, Paul W., et al. Cross-Border Energy Trade in North America: Present and Potential. Congressional Research Service. <https://fas.org/sgp/crs/misc/R44747.pdf>

competitive” ([2016 Top Markets Report Renewable Energy: A Market Assessment Tool for U.S. Exporters](#), p. 4).<sup>347</sup>

- “Critics assert that only large developers have the know-how and financial resources to participate in auctions. U.S. suppliers must choose their partners wisely if the proposed project depends on the auction system. These auctions are sometimes designed to pit different renewable energy subsectors against each other” ([2016 Top Markets Report Renewable Energy: A Market Assessment Tool for U.S. Exporters](#), p. 9).<sup>348</sup>
- “U.S.-based suppliers can also expect to encounter markets that are more inclined towards protectionism. For example, the financing terms or the auction requirements sometimes build in an obligation for a certain percentage of local content” ([2016 Top Markets Report Renewable Energy: A Market Assessment Tool for U.S. Exporters](#), p. 9).<sup>349</sup>

#### Additional Resources

- International Trade Administration. “2016 Top Markets Report Renewable Energy: A Market Assessment Tool for U.S. Exporters.” April 2016.  
[https://legacy.trade.gov/topmarkets/pdf/Renewable\\_Energy\\_Top\\_Markets\\_Report.pdf](https://legacy.trade.gov/topmarkets/pdf/Renewable_Energy_Top_Markets_Report.pdf)
- “Renewable Energy and Energy Efficiency Exporter Portal.” *Export.Gov*.  
[https://legacy.trade.gov/topmarkets/pdf/Renewable\\_Energy\\_Top\\_Markets\\_Report.pdf](https://legacy.trade.gov/topmarkets/pdf/Renewable_Energy_Top_Markets_Report.pdf)

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<sup>347</sup> International Trade Administration. 2016 Top Markets Report Renewable Energy: A Market Assessment Tool for U.S. Exporters. April 2016. [https://legacy.trade.gov/topmarkets/pdf/Renewable\\_Energy\\_Top\\_Markets\\_Report.pdf](https://legacy.trade.gov/topmarkets/pdf/Renewable_Energy_Top_Markets_Report.pdf)

<sup>348</sup> International Trade Administration. 2016 Top Markets Report Renewable Energy: A Market Assessment Tool for U.S. Exporters. April 2016. [https://legacy.trade.gov/topmarkets/pdf/Renewable\\_Energy\\_Top\\_Markets\\_Report.pdf](https://legacy.trade.gov/topmarkets/pdf/Renewable_Energy_Top_Markets_Report.pdf)

<sup>349</sup> International Trade Administration. 2016 Top Markets Report Renewable Energy: A Market Assessment Tool for U.S. Exporters. April 2016. [https://legacy.trade.gov/topmarkets/pdf/Renewable\\_Energy\\_Top\\_Markets\\_Report.pdf](https://legacy.trade.gov/topmarkets/pdf/Renewable_Energy_Top_Markets_Report.pdf)

## Refrigerants and HFCs

### Description

Policies to reduce HFC emissions from refrigerants:

- Ratify Kigali Agreement on HFCs either through an Executive Order based on existing authority to regulate HFCs under Title VI of the CAA or formal advice and consent by the U.S. Senate.
- Enact a price on carbon that covers emissions from all non-greenhouse gas sources, including refrigerants ([Vision for Equitable Climate Action](#), p. 27).
- States or the federal government should restrict use of HFCs in building efficiency programs ([LPDD Resources](#), ch. 34).
- State and local governments should update and amend their green purchasing program requirements to eliminate purchases of HFC-containing equipment where other low-global warming potential and more energy-efficient alternatives are available on the market ([LPDD Resources](#), ch. 34)
- “Congress should (1) direct the EPA to phase down the production and consumption of HFCs, curb HFC leakage, and speed the transition to available alternatives; (2) increase resources for agency enforcement of and education about regulations pertaining to HFCs, including prohibitions against venting; and (3) create a grant program to provide resources to states and localities to facilitate the replacement of equipment using HFCs to reduce consumer costs” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 284).

Proposed by: [Vision for Equitable Climate Action](#) (p. 11); [Evergreen Action](#) (pp. 30, 76); [DNC Environment and Climate Crisis Council](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 284); [Joe Biden 2020 Presidential Campaign](#) - Climate; Kamala Harris 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; [Asia Society Policy Institute](#)

### LPDD Recommendations:

- EPA should initiate a new rulemaking to support its partially vacated 2015 Significant New Alternatives Policy (SNAP) Rule. ([LPDD](#), p. 908)
- Congress should levy an excise tax on HFCs. ([LPDD](#), p. 910)
- EPA could reduce national HFC emissions from do-it-yourself mobile air conditioning by amending its existing rules to adopt California’s deposit and recycling program. ([LPDD](#), p. 910)
- The federal government should restrict use of HFCs in building efficiency programs. ([LPDD](#), p. 913)
- The federal government should quickly ratify the Kigali Amendment either through an Executive Order based on existing authority to regulate HFCs under Title VI of the CAA or formal advice and consent by the U.S. Senate. ([LPDD](#), p. 934)

### LPDD Resources:

- LPDD.org, Fluorinated Gases: <https://lpdd.org/pathway/fluorinated-gases/>

### Previous/Current Implementation

- The Montreal Protocol (1988) legally mandates the phaseout of the production and use of controlled ozone-depleting substances. In October 2016, the Parties to the Montreal Protocol adopted the Kigali Amendment agreeing to phase down HFCs ([Montreal Protocol](#)).<sup>350</sup>
- Title VI of the Clean Air Act represents the primary regulatory authority to control HFCs, which includes the commitments in the Montreal Protocol. Title VI requires EPA to develop programs that protect the stratospheric ozone layer. Section 608 at 42 USC §§ 7671 – 7671q. 42 USC §7671g establishes the NRER program, under which EPA has established several regulations related to HFCs ([Clean Air Act Title VI](#)).<sup>351</sup>
- The U.S. Climate Alliance, composed of 24 states representing 55% of the U.S. population and 60% of U.S. GDP, has committed to reducing short-lived climate pollutants, including HFCs ([U.S. Climate Alliance](#)).<sup>352</sup>
- California has implemented a number of policies regulating HFC emissions from refrigerants. ([Subarticle 5.1. Management of High Global Warming Potential Refrigerants for Stationary Sources](#), California Code of Regulations<sup>353</sup>; [Barclays Official California Code of Regulations](#)<sup>354</sup>).
- As part of its Climate Action Plan, George Washington University pledged that, as refrigeration and air-conditioning systems in all of its facilities are replaced over time, all new systems must use refrigerants with lower global warming potential than the systems they replace ([Climate Action Plan](#)).<sup>355</sup>

### Impact on Warming

The global HFC phasedown plan set under the Kigali Amendment is expected to avoid up to 90 percent of the warming HFCs otherwise would have caused by 2100—up to 0.5°C ([Climate Action Plan](#)).<sup>356</sup>

### Co-Benefits

The Kigali Amendment would give American companies an advantage in technology, manufacturing, and investment, which would lead to job creation. It would both strengthen America's exports and weaken the market for imported products. If adopted, the Kigali Amendment is projected to increase U.S. manufacturing jobs by 33,000 by 2027, increase

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<sup>350</sup> Montreal Protocol on Substances that Deplete the Ozone Layer. Montreal, 16 September 1987. Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer. United Nations. Kigali, October 15, 2016. <https://perma.cc/J44V-7XNM>

<sup>351</sup> Clean Air Act Title VI - Stratospheric Ozone Protection. Environmental Protection Agency. <https://www.epa.gov/clean-air-act-overview/clean-air-act-title-vi-stratospheric-ozone-protection>

<sup>352</sup> “Short Lived Climate Pollutant Challenge.” *United States Climate Alliance*. <http://www.usclimatealliance.org/slcpcchallenge>

<sup>353</sup> Subarticle 5.1. Management of High Global Warming Potential Refrigerants for Stationary Sources. California Code of Regulations. <https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=IE2Bo2C8o9EE911EoA0o7F9o20o4D9A59&bhcp=1&transitionType=Default&contextData=%28sc.Default%29>

<sup>354</sup> Climate Action Plan. George Washington University. May 15, 2010. <https://perma.cc/LB38-WLNK>

<sup>355</sup> Climate Action Plan. George Washington University. May 15, 2010. <https://perma.cc/LB38-WLNK>

<sup>356</sup> Zaelke, Durwood. Historic Kigali Amendment Eliminates Warming From One of Six Main Greenhouse Gases. American Bar Association. January 1, 2017. <https://perma.cc/T2M6-JEDX>

exports by \$5 billion and reduce imports by nearly \$7 billion. The amendment may increase the U.S. share of the global market from 7.2% to 9.0% ([Alliance for Responsible Atmospheric Policy](#)).<sup>357</sup>

- Obstacles/Shortfalls

Barriers to HFC phase-out include: lack of availability of low global warming potential (GWP) fluids and technologies, lack of technician skills/training, and inadequate safety codes/standards. In addition, some low GWP alternatives are flammable (and are replacing high GWP HFCs that are non-flammable). This creates several technical and regulatory issues ([Introduction to the Kigali Agreement](#)).<sup>358</sup>

- “Although converting to HFC alternatives may offer net cost savings over time, some have high upfront costs, may require equipment replacement, or may need facility and vehicle redesigns. Additionally, customers who purchase refrigeration or air conditioning equipment may not know about the climate impacts of high-GWP HFCs or the availability of alternatives. Because of these barriers, the U.S. market may not rapidly adopt zero- or low-GWP HFC alternatives without new rules or financial incentives” ([World Resources Institute](#)).<sup>359</sup>

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<sup>357</sup> “Tell Washington Lawmakers: Ratify the Kigali Amendment.” *The Alliance for Responsible Atmospheric Policy*. <http://www.alliancepolicy.org/campaigns/kigali>

<sup>358</sup> “Introduction to the Kigali Amendment.” *OzonAction, UN Environment*. [http://www.unep.fr/ozonaction/information/mmcfiles/7876-e-Kigali\\_FSO1\\_Introduction.pdf](http://www.unep.fr/ozonaction/information/mmcfiles/7876-e-Kigali_FSO1_Introduction.pdf)

<sup>359</sup> Igusky, Kristin. “Reducing HFCs in the US Would Benefit Consumers and the Climate.” *World Resources Institute*. March 3, 2015. <https://www.wri.org/blog/2015/03/reducing-hfcs-us-would-benefit-consumers-and-climate>

## Black Carbon

### Description

Sources for black carbon emissions include: diesel combustion from the transportation sector, diesel combustion from stationary sources, coal combustion, and biomass combustion.

- “Directs EPA, in consultation with appropriate federal agencies, to submit to Congress a report regarding abatement of black carbon emissions in the United States. Within two years, the EPA Administrator must determine if existing regulations under the CAA will adequately reduce black carbon emissions or finalize new regulations to reduce black carbon emissions by 70 percent relative to 2013 levels by 2025. Directs the Administrator, in coordination with appropriate federal officials, to report on international black carbon mitigation assistance” (CLEAN Future Act, [Summary](#), p. 19).
- “Congress should direct EPA to evaluate the sufficiency of current regulations to reduce black carbon pollution and to develop new regulations if it finds the current ones inadequate. Congress should direct the State Department, USAID, and EPA to identify and support additional opportunities for international black carbon reduction assistance” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 515).

Proposed by: [CLEAN Future Act](#); [Vision for Equitable Climate Action](#) (p. 28); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Evergreen Action Plan](#) (p. 73); [Legal Authority for Presidential Executive Action on Climate](#) (p. 25); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [H.R. 4143, the Super Pollutants Act of 2019](#); <sup>360</sup> Pete Buttigieg 2020 Presidential Campaign

### LPDD Recommendations:

- EPA should strengthen federal standards for fine PM as a strategy to reduce black carbon emissions. ([LPDD](#), p. 857)
- For any categories of nonroad sources that emit fine PM but are not yet regulated, EPA should promulgate standards to ensure that new equipment is designed with filters and other pollution controls. For those categories of nonroad sources already subject to regulation, EPA should conduct a technology review to assess whether fine PM emissions controls could be strengthened and, if so, EPA should enact new regulations with even more stringent emissions controls. EPA should investigate whether it is feasible to produce diesel with lower black carbon content and whether a systems-based approach could achieve deeper black carbon reductions. ([LPDD](#), p. 858)
- EPA should use the definition of BACT to push sources that propose to use dirty fuels, such as coal and diesel, to replace them with cleaner fuels, such as renewable energy, biogas, and biodiesel. ([LPDD](#), p. 860)
- EPA should require stationary sources to install the most effective PM filters and other emissions controls. EPA should prioritize the development and/or revision of NESHAPs for source categories that emit black carbon that would be controlled indirectly by MACT-based emission standards for toxic air pollutants. EPA should establish standards

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<sup>360</sup> Super Pollutants Act of 2019. H.R. 4143, 116th Congress 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4143/text>



of performance under CAA §111(d) for designated pollutants (i.e., not criteria pollutants and not hazardous air pollutants), the control of which would also reduce black carbon emissions. (LPDD, p. 874)

- Federal land managers and EPA should conduct regional research to understand how black carbon emissions contribute to warming. (LPDD, p. 877)

#### LPDD Resources:

- LPDD.org, Black Carbon: <https://lpdd.org/pathway/black-carbon/>

#### Previous/Current Implementation

- The EPA has the authority to regulate black carbon from a number of sources through the Clean Air Act and new source performance standards.
- California has implemented a number of regulations that reduce black carbon emissions. For example, it has promulgated regulations for a variety of [nonroad sources](#).<sup>361</sup> The state also [requires](#)<sup>362</sup> trucks to comply with a random roadside in-use emissions testing program to verify that diesel engines do not smoke excessively and are tamper free. The [California Truck and Bus Regulation](#)<sup>363</sup> includes emission standards for new engines and vehicles, as well as an engine retrofit requirement aimed to ensure that, by 2023, most trucks and buses in the state will have engines no older than model year 2010. It's [ZEV program](#),<sup>364</sup> which a number of other states have adopted, requires automobile companies to produce a certain percentage of ZEVs for sale in California.<sup>365</sup>
- The United Nations Environment Program, the United States, and 5 other countries initiated the [Climate and Clean Air Coalition](#)<sup>366</sup> (CCAC) in 2012. It now has 130 partners from governments, intergovernmental organizations, businesses, scientific institutions, and civil society working together to reduce short-lived climate pollutants, including black carbon. The United States works with the CCAC through programs supported by the Environmental Protection Agency (EPA) and USAID.

#### Co-Benefits

Regulating black carbon emissions provides health benefits by reducing concentrations of harmful particulates.<sup>367</sup> It also reduces the warming-effects of black carbon, which when deposited on snow or ice reduces surface reflectivity and increases the rate of melting ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 515).

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<sup>361</sup> "Off-Road MOBILE Sources." *California Air Resources Board*.

<https://ww3.arb.ca.gov/msprog/offroad/offroad.htm>

<sup>362</sup> "Multi-Regulation Summary (MRS)." *California Air Resources Board*. 2013. <https://perma.cc/BZT6-LSFL>

<sup>363</sup> "Truck and Bus Regulation." *California Air Resources Board*. <https://perma.cc/D77Y-HFSN>

<sup>364</sup> "The Zero Emission Vehicle Regulation." *California Air Resources Board*. <https://perma.cc/949M-3UZR>

<sup>365</sup> "State Mobile Source Standards Under the Clean Air Act." *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/state-mobile-source-standards-under-the-clean-air-act/>

<sup>366</sup> *Climate and Clean Air Coalition*. <https://ccacoalition.org/en>

<sup>367</sup> EarthJustice. Reducing Black Carbon Emissions. Accessed July 2020. [https://earthjustice.org/sites/default/files/library/factsheets/ej\\_blackcarbon\\_factsheet.pdf](https://earthjustice.org/sites/default/files/library/factsheets/ej_blackcarbon_factsheet.pdf)



### Additional Resources

- Center for Biological Diversity et al., “Petition for Rulemaking Under the Clean Air Act to Reduce Greenhouse Gas and Black Carbon Emissions from Locomotives.” 2010.  
[https://www.biologicaldiversity.org/programs/climate\\_law\\_institute/transportation\\_and\\_global\\_warming/pdfs/Locomotives\\_Petition\\_09\\_21\\_2010.pdf](https://www.biologicaldiversity.org/programs/climate_law_institute/transportation_and_global_warming/pdfs/Locomotives_Petition_09_21_2010.pdf)
- EarthJustice. “Reducing Black Carbon Emissions.” Accessed July 2020.  
[https://earthjustice.org/sites/default/files/library/factsheets/ej\\_blackcarbon\\_factsheet.pdf](https://earthjustice.org/sites/default/files/library/factsheets/ej_blackcarbon_factsheet.pdf)
- Chang, Hannah. “Domestic Black Carbon Mitigation Under the Clean Air Act.”  
*Columbia Law School Center for Climate Change Law*. August 13, 2010.  
<http://wordpress.ei.columbia.edu/climate-change-law/files/2016/06/Chang-2010-08-Domestic-Black-Carbon-Mitigation-CAA.pdf>

## Low-Carbon Building Materials

### Description

Policies that promote the use of low-carbon or carbon-neutral construction and manufacturing materials:

- “The next President should launch a federal [Buy Clean](#) program to direct federal procurement of low-carbon materials in a manner that reduces climate pollution and closes this “carbon loophole” — making reducing climate pollution a business advantage for American manufacturing enterprises” ([Evergreen Action Plan](#) p. 30)
- “Congress should re-expand and increase the Section 47 rehabilitation tax credit to incentivize the reuse of existing building structures when developing new buildings that minimizes the need for new construction materials and reduces emissions. In addition to providing a credit for rehabilitating certified historic structures, the expanded tax credit should include credits for non historic buildings of a certain age” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 161).
- “Congress should require federal agencies to use [Environmental Product Declarations] when they procure building materials” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 162).
- “Congress should direct EPA to establish a voluntary certification and label program for green building materials and products. EPA should base the program on EPDs” (([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 163).

Proposed by: [Evergreen Action](#); [CLEAN Future Act](#) (summary p. 15); [Vision for Equitable Climate Action](#) (p. 11); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [INVEST Act](#); [DNC Draft 2020 Policy Platform](#)

### LPDD Recommendations:

- Congress should require federal agencies to use a life-cycle assessment to track the environmental carbon impact of construction materials. ([LPDD](#), p. 273)
- Congress should invest in methods to calculate embodied carbon emissions by material and manufacturing process. Congress should designate the National Institute of Standards and Technology (or a new organization) to publish data and aggregation methods for life-cycle assessment comparisons by product in order to encourage firms to pursue material substitution. ([LPDD](#), p. 322)
- Congress should provide financial support for demonstration projects for materials efficiency that reduce CO<sub>2</sub> emissions, such as reusable nanoscale materials in high-volume manufacturing. ([LPDD](#), p. 322)
- DOE should modify its Superior Energy Performance initiative to include carbon emissions target setting, material efficiency standards, and reuse and material substitution optimization requirements. ([LPDD](#), p. 322)

- Congress could inventory and amend its scattered MEPS statutes to provide DOE with explicit authority to set material efficiency goals, remove materially inefficient manufacturing incentives, and adjust social cost of carbon figures to reflect new data. (LPDD, p. 324)
- Congress should pursue material efficiency strategies such as lightweighting, reduced yield loss, diverted scrap, reuse, increased product life-span, and greater product use intensity. (LPDD, p. 324)
- Congress could encourage increased material efficiency through an amended Federal Energy Management Pro-gram under EISA. (LPDD, p. 325)

#### LPDD Resources:

- LPDD.org, Material Efficiency: <https://lpdd.org/pathway/material-efficiency/>

#### Previous/Current Implementation

- The state of California enacted a Buy Clean Program in 2017 known as AB 262, which requires Environmental Product Declarations (EPDs) for certain materials used for state building projects. Thus, when an agency contracts to buy steel, flat glass, and mineral wool insulation for infrastructure projects, they must take into account their suppliers' emissions performances.<sup>368</sup>
- [The Netherlands Circularity Goals](#):<sup>369</sup> To meet the country's commitment to economic circularity by 2050, the goals set the intention of being 50 percent circular by 2030 and requiring that the building sector reduce its raw materials use by 50 percent by 2030. Since 2013, all new buildings are also required to conduct a whole-building life-cycle analysis.
- The voluntary EPA and DOE [Energy Star program](#)<sup>370</sup> for appliances allows consumers to easily identify energy-efficient product options through the Energy Star label.

#### Impact on GHGs

Emissions from construction materials account for 11% of annual global carbon emissions and 28% of building sector emissions ([Buy Clean Washington Study](#)). Promoting low-carbon building materials could thus significantly reduce building sector emissions.

#### Co-Benefits

- "The widespread use of low-carbon building materials and products... promotes local environmental and socio-economic development. The use of locally available materials and products not only reduces the use of carbon intensive materials, but also reduces the embodied-carbon from long distance transportation. This also supports the development of

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<sup>368</sup> "Buy Clean California." *U.S. Green Building Council Los Angeles*. <https://usgbc-la.org/programs/buy-clean-california/>

<sup>369</sup> "A circular economy in the Netherlands by 2050 (summary)." *Government of the Netherlands*. <https://www.government.nl/documents/leaflets/2016/09/22/a-circular-economy-in-the-netherlands-by-2050>

<sup>370</sup> *Energy Star*. <https://www.energystar.gov/>

local industries, which in turn provide jobs for local residents” ([Carbon Sink and Low-Carbon Building Materials](#)).<sup>371</sup>

- “True carbon-sink and low-carbon materials and products should not incur an additional investment requirement. Their cost can potentially be even lower than carbon-intensive products, due to local availability that saves on transportation costs, and lower ingredient costs due to recycled or by-product materials that are substituted for virgin raw materials” ([Carbon Sink and Low-Carbon Building Materials](#)).<sup>372</sup>

#### Obstacles/Shortfalls

- Materials are often wasted during construction in order to achieve desired aesthetic effects. This lessens the positive impact of using low-carbon materials. Therefore, low carbon building design must minimize waste by taking into account the standard sizes of building materials ([Carbon Sink and Low-Carbon Building Materials](#)).<sup>373</sup>
- “Despite the dramatic economic and environmental impact of buildings, the engineering of sustainable buildings is missing from most schools of engineering in the United States. ... There is an acute lack of spending on research and development (R&D) for sustainable buildings” ([Challenges and Opportunities for Low-Carbon Building Materials](#), p. 85).<sup>374</sup>
- “Further supply-side supportive policy measures are still needed for manufacturers to drive the necessary investment in technologies and processes. ... Barriers to wider inclusion of embodied carbon in demand- side policy include lack of awareness and demand but also aspects of the political framework such as policy cycles and changing political priorities.” ([Bringing Embodied Carbon Upfront](#), p. 36).<sup>375</sup>

#### Additional Resources

- Ochsendorf, John. “Challenges and Opportunities for Low-Carbon Building Materials.” Massachusetts Institute of Technology. 2011.  
<https://www.nap.edu/read/13274/chapter/16#8>
- World Green Building Council. “Bringing Embodied Carbon Upfront.”  
[https://www.worldgbc.org/sites/default/files/WorldGBC\\_Bringing\\_Embodied\\_Carbon\\_Upfront.pdf](https://www.worldgbc.org/sites/default/files/WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf)

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<sup>371</sup> “Carbon Sink and Low-Carbon Building Materials.” *Climate Technology Centre & Network*. <https://www.ctc-n.org/technologies/carbon-sink-and-low-carbon-building-materials>

<sup>372</sup> “Carbon Sink and Low-Carbon Building Materials.” *Climate Technology Centre & Network*. <https://www.ctc-n.org/technologies/carbon-sink-and-low-carbon-building-materials>

<sup>373</sup> Ibid.

<sup>374</sup> Ochsendorf, John. *Challenges and Opportunities for Low-Carbon Building Materials*. Massachusetts Institute of Technology. 2011. <https://www.nap.edu/read/13274/chapter/16#8>

<sup>375</sup> World Green Building Council. *Bringing Embodied Carbon Upfront*.  
[https://www.worldgbc.org/sites/default/files/WorldGBC\\_Bringing\\_Embodied\\_Carbon\\_Upfront.pdf](https://www.worldgbc.org/sites/default/files/WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf)



## Circular Economy and Material Efficiency

### Description

- “Reduce manufacturing-related waste and extraction by expanding remanufacturing and reuse to encourage sustainable life cycle management as part of a “circular economy.” ([Vision for Equitable Climate Action](#), p. 10)
- Congress and the administration should provide financial support for demonstration projects for materials efficiency that reduce CO<sub>2</sub> emissions, such as reusable nanoscale materials in high-volume manufacturing. Pursue material efficiency strategies such as lightweighting, reduced yield loss, diverted scrap, reuse, increased product life-span, and greater product use intensity. Support material efficiency with certification, labeling, and standard-setting as well as preferential purchasing and targeted RD&D support (“Material Efficiency,” [LPDD Resources](#)).<sup>376</sup>
- “Congress should draft legislation to task relevant agencies, including DOE, the Environmental Protection Agency (EPA), and the National Institute of Standards and Technology (NIST), with developing a U.S. circular economy roadmap that can be used to guide efforts to transition to a circular economy. ... The roadmap should include a vision for how key industrial subsectors would fit into a circular economy, key milestones and targets for these subsectors, and recommendations on specific federal policies needed to drive this transition, including options for financing a circular economy model. Policies that should be considered and refined include R&D support for specific technologies and materials; targets or requirements for recycled content of certain goods; standards and/or incentives to encourage better product design, longer product lifetimes, extended producer responsibility, refillable packaging and products, and new service-based and sharing business models; preferential procurement; and fees and/or bans on certain materials, products, waste streams, and waste processing methods” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 247).
- Mandate minimum state rates of recycling ([LPDD Resources](#)).
- Mandate a 75% reduction of single-use packaging and single-use plastic products by 2030, exempting medical and sterile devices ([California Circular Economy and Plastic Pollution Reduction Act](#)).<sup>377</sup>

Proposed by: [Vision for Equitable Climate Action](#) (p. 10); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Bernie Sanders 2020 Presidential Campaign](#); Andrew Yang 2020 Presidential Campaign; Julian Castro 2020 Presidential Campaign;

### LPDD Recommendations:

- Congress could pass legislation that establishes extended producer responsibility, life-cycle assessment, and disclosure requirements for a wide range of products. (LPDD, p. 193)

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<sup>376</sup> “Material Efficiency.” *Model Pathways for Deep Decarbonization*. <https://lpdd.org/pathway/material-efficiency/>

<sup>377</sup> California Circular Economy and Plastic Pollution Reduction Act. S.B.-54. 2018. [http://leginfo.ca.gov/faces/billTextClient.xhtml?bill\\_id=201920200SB54](http://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB54)

- The federal government could promulgate regulations for plastic recycling facilities to address the potential leak-age of nanomaterials, sealants, dyes, and other substances. The federal government should consider adopting best practice regulations for management of nanomaterials in the waste stream. (LPDD, p. 195)
- The federal government should consider design requirements on electronic products that facilitate repurposing and recycling. (LPDD, p. 195)
- Congress could pass legislation that establishes procurement requirements for the federal government consistent with circular economy and deep decarbonization goals. (LPDD, p. 193)
- Congress could pass legislation that bans the use of certain GHG-intensive materials and products. Congress could pass legislation that sets forth minimum recycled content requirements for a wide range of materials and products. Congress could pass legislation that funds R&D into alternative biomaterials that can substitute for plastics. (LPDD, p. 193)
- Congress should encourage methodologically consistent product category rules and other metrics that address recycling, reuse, and material substitution in production in addition to yield loss and end-of-life extension. DOE should collaborate with international organizations to harmonize standards on such matters as non-renewable material intensity, recycled/reused product content, and recyclability. (LPDD, p. 322)
- DOE could inventory material flows; subsidize effective recycling, industrial linkage, and co-processing technologies; and facilitate industrial symbiosis agreements among firms and state and local governments that pursue resource synergies. (LPDD, p. 323)

#### LPDD Resources:

- LPDD.org, “Circular Economy Policies”: <https://lpdd.org/pathway/circular-economy-policies/>
- LPDD.org, “Recycling and Extended Producers Liability Laws”: <https://lpdd.org/pathway/recycling-and-extended-producers-liability-laws/>
- LPDD.org, “End of Life Vehicles and Producer’s Responsibility Laws”: <https://lpdd.org/pathway/end-of-life-vehicles-and-producer-responsibility-laws/>
- LPDD.org, “Material Efficiency”: <https://lpdd.org/pathway/material-efficiency/>

#### Previous/Current Implementation

- The UK’s National Industrial Symbiosis Program:
  - Jensen, Paul D., Basson, Lauren, Hellawell, Emma E., Bailey, Malcolm R. and Leach, Matthew. Experience from the UK’s National Industrial Symbiosis Programme. *Resources, Conservation and Recycling*, Vol. 55 No.7. <https://perma.cc/AZN8-X4PB>
- [DOE’s Reducing Embodied-Energy And Decreasing Emissions \(REMADE\) Institute](https://www.manufacturingusa.com/institutes/remade#:~:text=COVID%2D19-.REMADE%20(Reducing%20EMBodied%2Denergy%20And%20Decreasing%20Emissions),fibers%2C%20polymers%20and%20electronic%20waste.)<sup>378</sup> focuses on driving down the cost of technologies essential to reuse, recycle and remanufacture materials such as metals, fibers, polymers and electronic waste.

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<sup>378</sup> “REMADE (Reducing Embodied-energy And Decreasing Emissions).” *Manufacturing USA*. [https://www.manufacturingusa.com/institutes/remade#:~:text=COVID%2D19-.REMADE%20\(Reducing%20EMBodied%2Denergy%20And%20Decreasing%20Emissions\),fibers%2C%20polymers%20and%20electronic%20waste.](https://www.manufacturingusa.com/institutes/remade#:~:text=COVID%2D19-.REMADE%20(Reducing%20EMBodied%2Denergy%20And%20Decreasing%20Emissions),fibers%2C%20polymers%20and%20electronic%20waste.)

### Impact on GHGs

- Reducing demand for materials by 30% to 70% by 2050 for Cement, Iron & Steel, Chemicals, Water & Waste, and other industries would reduce U.S. emissions by 729 million metric tons of CO<sub>2</sub> in 2050 (a 12% reduction compared to BAU baseline) ([U.S. Policy Solutions Simulator v 2.1.1](#))
- For heavy industry, implementing a circular economy framework in the cement, steel, aluminum, and plastics subsectors could reduce global carbon dioxide emissions by 40% in 2050, compared to business as usual ([Reaching Net-Zero Carbon Emissions: Mission Possible](#)).<sup>379</sup>

### Co-Benefits

Material efficiency projects can provide economic benefits by retaining the value of products and materials and creating local jobs ([MIT](#)).<sup>380</sup>

### Obstacles/Shortfalls

Recycling materials may have less significant environmental benefits if the energy required to recycle a material is greater than the energy needs to primary production. Additionally, some materials such as cement have limited recycling potential ([MIT](#)).<sup>381</sup>

### Additional Resources

- Industrial Energy Efficiency and Combined Heat and Power Working Group. “Industrial Energy Efficiency: Designing Effective State Programs for the Industrial Sector.” March 2014. <https://perma.cc/W952-GWAM>
- Ball, P.D., Evans, S., Levers, A. and Ellison, D. “Zero Carbon Manufacturing Facility – towards integrating material, energy and waste process flows.” *Journal of Engineering Manufacture*, vol. 223, no. 9. September 1, 2009. <https://perma.cc/ZT3D-JXHV>
- Allwood, Julian M. “Transitions to Material Efficiency in the UK Steel Economy.” *Philosophical Transactions of a Royal Society*. 2013. <https://lpdd.org/wp-content/uploads/2019/11/rsta.2011.0577.pdf>
- Worrell, Ernst, Allwood, Julian and Gutowski, Timothy. “The Role of Material Efficiency in Environmental Stewardship.” *Annu. Rev. Environ. Resour.* 2016. <http://web.mit.edu/ebm/www/Publications/Worrell-et-al-ARER-2016%20copy.pdf>

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<sup>379</sup> Reaching Net-Zero Carbon Emissions: Mission Possible. *Energy Transitions*. Accessed July 2020. <http://www.energy-transitions.org/mission-possible>

<sup>380</sup> Worrell, Ernst, Allwood, Julian and Gutowski, Timothy. The Role of Material Efficiency in Environmental Stewardship. *Annu. Rev. Environ. Resour.* 2016. <http://web.mit.edu/ebm/www/Publications/Worrell-et-al-ARER-2016%20copy.pdf>

<sup>381</sup> Ibid.



## Cryptocurrency Mining

### Description

- Ban or regulate the commercial mining of cryptocurrency.
- “Technical standards imposed on the energy efficiency of mining devices or verification processors that are manufactured or imported in a country could prove highly effective with a jurisdiction. Rather than banning them completely at the point of importation, it would facilitate the purpose of distinguishing between efficient and inefficient types of mining machinery” ([Decarbonizing Bitcoin](#), p. 405).<sup>382</sup>
- “Where the [mining] device is purchased domestically, a VAT (Value Added Tax) can be imposed upon less efficient machines to make them less attractive. ... A further option is to require registration of such devices and introduce an annual emissions tax, differentiating in rates charged based upon the emissions output of the device. ... Another option is to introduce a surcharge on the existing tax on profits declared by miners” ([Decarbonizing Bitcoin](#), p. 405-6).<sup>383</sup>

### Previous/Current Implementation

The City of Plattsburg, New York placed a moratorium on cryptocurrency mining for 18 months starting in 2018, issuing a penalty of \$1,000 per day of operation for any firm, person, corporation, or other entity that established or ran a commercial cryptocurrency mining operation ([Business Insider](#)).<sup>384</sup>

### Impact on GHGs

Depending on the energy source, researchers estimate that crypto-mining can produce 3-15 million tons of global carbon emissions ([The Political Geography and Environmental Impacts of Cryptocurrency Mining](#)).<sup>385</sup>

### Obstacles/Shortfalls

- It would be difficult to effectively ban a global software network without corporate headquarters or a CEO. There are also legal obstacles regarding free speech and writing code. (Torpey, Kyle. [The Overlooked Reason the United States Would Struggle to Ban](#)

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<sup>382</sup> Truby, Jon. “Decarbonizing Bitcoin: Law and Policy Choices for Reducing the Energy Consumption of Blockchain Technologies and Digital Currencies.” *Energy Research & Social Science*, vol. 44. 2018. <https://www.sciencedirect.com/revproxy.brown.edu/science/article/pii/S2214629618301750>

<sup>383</sup> Ibid.

<sup>384</sup> Villas-Boas, Antonio. “For The First Time, a US City Has Banned Cryptocurrency Mining After Large-Scale Operations Used Up All its Power.” *Business Insider*. March 16, 2018. <https://www.businessinsider.com/plattsburgh-new-york-cryptocurrency-mining-ban-2018-3#:~:text=The%20city%20of%20Plattsburgh%2C%20New%20York%20announced%20on%20Thursday%20that,%2C%20cultural%20and%20electrical%20resources.%22>

<sup>385</sup> Samford, Heidi and Domingo Lovely-Frances. The Political Geography and Environmental Impacts of Cryptocurrency Mining. The Henry M. Jackson School of International Studies at the University of Washington. July 10, 2019. <https://isis.washington.edu/news/the-political-geography-and-environmental-impacts-of-cryptocurrency-mining/>

[Bitcoin](#).<sup>386</sup> Forbes. July 2, 2019; Torpey, Kyle. [U.S. Lawmakers Are Realizing They Can't Ban Bitcoin](#).<sup>387</sup> Forbes. July 30, 2019).

- Recent figures indicate crypto-mining facilities may subsidize the development of renewable energy resources by seeking the cheapest resource, optimizing consumption value...large-scale mines in other popular locations are primarily located in the Pacific Northwest, Upstate New York, Northern Scandinavia, Iceland, and Georgia – regions that extensively use renewable energy ([The Political Geography and Environmental Impacts of Cryptocurrency Mining](#)).<sup>388</sup>

#### Additional Resources

- Holthaus, Eric. “Bitcoin Could Cost Us Our Clean-Energy Future.” *Grist*. December 5, 2017. <https://grist.org/article/bitcoin-could-cost-us-our-clean-energy-future/>
- Truby, Jon. “Decarbonizing Bitcoin: Law and Policy Choices for Reducing the Energy Consumption of Blockchain Technologies and Digital Currencies.” *Energy Research & Social Science*, vol. 44. 2018. [https://www.sciencedirect-com.revproxy.brown.edu/science/article/pii/S2214629618301750](https://www.sciencedirect.com/revproxy.brown.edu/science/article/pii/S2214629618301750)

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<sup>386</sup> Torpey, Kyle. The Overlooked Reason the United States Would Struggle to Ban Bitcoin. Forbes. July 2, 2019. <https://www.forbes.com/sites/ktorpey/2019/07/02/the-overlooked-reason-the-united-states-would-struggle-to-ban-bitcoin/#a8e58b6344a9>

<sup>387</sup> Torpey, Kyle. U.S. Lawmakers Are Realizing They Can't Ban Bitcoin. Forbes. July 30, 2019. <https://www.forbes.com/sites/ktorpey/2019/07/30/us-lawmakers-are-realizing-they-cant-ban-bitcoin/#d5d37ad3e31a>

<sup>388</sup> Samford, Heidi and Domingo Lovely-Frances. The Political Geography and Environmental Impacts of Cryptocurrency Mining. The Henry M. Jackson School of International Studies at the University of Washington. July 10, 2019. <https://isis.washington.edu/news/the-political-geography-and-environmental-impacts-of-cryptocurrency-mining/>

## AGRICULTURE AND FORESTRY

### Agricultural Innovation

#### Description

- “The next federal administration should create new revenue streams that compensate producers for building ecosystem services, especially in removing carbon from the atmosphere and storing it in soil and forests” ([Evergreen Action Plan](#), p. 33).
- Establish performance-based payments for on-farm carbon removal, building upon the Soil Health Demonstration Projects authorized in the 2018 Farm Bill ([Evergreen Action Plan](#), p. 33).
- Ensure climate-smart crop insurance ([Evergreen Action Plan](#), p. 33).
- Work with Congress to expand Environmental Quality Incentives Program, Conservation Reserve Program, Regional Conservation Partnership Program and Conservation Stewardship Program ([Evergreen Action Plan](#), p. 34).
- Invest in the deployment of anaerobic digesters ([Evergreen Action Plan](#), p. 34).
- “Congress should dramatically increase the annual budget for the Sustainable Agriculture Research and Education (SARE) program, while also specifically appropriating funds for SARE to use to support the development of carbon farming” ([LPDD Resources](#), ch. 30).
- “Congress should direct NRCS to establish region-specific climate change mitigation bundles within CSP. These bundles should include practices that reduce agricultural greenhouse gas emissions, such as improved nutrient management, and practices that increase carbon sequestration, such as using cover crops, reduced tillage, and diverse crop rotations” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 344).
- “Congress should establish regional agroforestry centers to conduct research, train extension agents, and provide assistance to agroforestry producers” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 344).
- “Congress should also establish a state soil health grant program to provide states and tribes with funding for soil carbon sequestration programs” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 349).
- Create market incentives for multistrata agroforestry that layers planting from tree canopies to undercrops ([Drawdown](#)).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Elizabeth Warren 2020 Presidential Campaign](#); [CLEAN Future Act](#); [Center for Climate and Energy Solutions](#); [DNC Environment and Climate Crisis Council](#); [Vision for Equitable Climate Action](#); [H.R. 4269/S. 2452, the Climate Stewardship Act of 2019](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Green New Deal](#); [Agricultural Resilience Act](#);<sup>389</sup> [Bernie Sanders 2020 Presidential Campaign](#)  
LPDD Recommendations:

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<sup>389</sup> Agriculture Resilience Act. H.R. 5861, 116th Congress. 2020. <https://www.congress.gov/bills/116th-congress/house-bill/5861?s=1&r=3>

- Congress should at a minimum restore the USDA's research funding to its prior share of the agency's budget. (LPDD, p. 796)
- Congress should consider adopting a fertilizer fee that could both encourage more judicious use of fertilizer and help fund training on how to ensure no yield losses with less fertilizer and other climate-friendly agricultural practices. (LPDD, p. 809)
- Congress should create lending institutions, or existing ones could create specialty divisions, aimed at financing farms using climate-friendly practices. (LPDD, p. 815)
- Congress should direct the National Institute of Food and Agriculture to steadily increase the portion of funding for climate mitigation and adaptation, shifting research funding to projects designed to reduce GHG emissions or increase carbon sequestration, while improving soil health and resilience. (LPDD, p. 795)
- Congress should dramatically increase the annual budget for the Sustainable Agriculture Research and Education (SARE), while also specifically appropriating funds for SARE to use to support the development of carbon farming. (LPDD, p. 796)
- Congress should expand funding for the CRP, while also reforming the CRP to provide sustained climate benefits by offering farmers 30-year agreements or permanent easements, targeting lands with the most significant climate-change mitigation and adaptation potential. (LPDD, p. 802)
- Congress should require the Farm Service Agency and the Farm Credit System lending institutions to offer programs providing favorable credit to farmers and ranchers using climate-friendly practices recognized by NRCS and to require minimum climate-friendly practices relating to all loans. (LPDD, p. 813)
- Congress should require USDA to support climate mitigation efforts while providing increased funding for the agency to quickly develop and disseminate climate-friendly practices and crop varieties. (LPDD, p. 794)
- Congress should significantly expand funding to support climate-friendly practices at all research and extension entities within USDA (including Agricultural Research Service, National Institute of Food and Agriculture, the Sustainable Agriculture Research and Education program, Climate Hubs, and the Cooperative State Research and Extension Service) in order to achieve carbon neutrality while maintaining crop and livestock productivity. (LPDD, p. 795)
- USDA should ensure that agricultural banks are familiar with the benefits of carbon farming, which makes farms more resilient to weather disturbances and therefore exposes the lending institution to less risk. (LPDD, p. 815)
- Agricultural Research Service should prioritize funding for research into agroecology. (LPDD, p. 795)
- NIFA should immediately begin offering resources for carbon farming within the extension system, as it does for other issues, such as weed control and youth education. (LPDD, p. 798)
- NRCS should revise the CSP to prioritize low-carbon practices and to create a funding pool for farmers transitioning to, or practicing, carbon farming. (LPDD, p. 805)

#### LPDD Resources

- LPDD.org, Supporting Climate-Friendly Agriculture R&D:  
<https://lpdd.org/pathway/supporting-climate-friendly-agriculture-rd/>

- LPDD.org, Healthy Soils: <https://lpdd.org/pathway/healthy-soils/>
- LPDD.org, Reducing Agricultural Emissions through Source Regulation: <https://lpdd.org/pathway/reducing-agricultural-emissions-through-source-regulation/>

### Previous/Current Implementation

- The [Sustainable Agriculture Research and Education \(SARE\)](#) program provides grant funding for farmer-driven research on sustainable agriculture.<sup>390</sup>
- The through [Conservation Stewardship Program](#),<sup>391</sup> [Conservation Reserve Program](#),<sup>392</sup> [Regional Conservation Partnership Program](#),<sup>393</sup> and [Environmental Quality Incentives Program](#),<sup>394</sup> the USDA provides financial assistance for farmers who implement conservation practices.
- The [Leopold Center for Sustainable Agriculture](#)<sup>395</sup> at Iowa State University was established in 1987 to conduct research designed to reduce the environmental harms of agriculture and to help promulgate sustainable practices.
- About 20% of the [Agricultural Research Service's FY 2017](#)<sup>396</sup> research budget was allocated to environmental research, which includes research on climate change.

### Impact on GHGs

Agricultural innovation has the potential to reduce sector emissions, which contributed to [10% of total U.S. emissions](#) in 2018. Existing cropland management practices can reduce agricultural process emissions by 2% in 2050, while livestock measures could reduce agricultural process emissions by 10% by 2050 ([U.S. Policy Solutions Simulator v 2.1.1](#)). One [study](#) estimates that by 2050, anaerobic digesters could mitigate 151 MMtCO<sub>2</sub>e, mostly from methane abatement, but also in part from reducing electricity emissions ([Decarbonizing U.S. Agriculture, Forestry, and Land Use](#)).<sup>397</sup>

### Co-Benefits

Agricultural innovation can improve air and water quality, improve agricultural yields, and protect wildlife.

### Obstacles/Shortfalls

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<sup>390</sup> Sustainable Agriculture Research and Education. SARE.Org. <https://www.sare.org/>

<sup>391</sup> "Conservation Stewardship Program." *USDA Natural Resources Conservation Service*. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/>

<sup>392</sup> "Conservation Reserve Program." *USDA Farm Service Agency*. <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/>

<sup>393</sup> "Regional Conservation Partnership Program." *USDA Natural Resources Conservation Service*. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/rcpp/>

<sup>394</sup> "Environmental Quality Incentives Program." *USDA Natural Resources Conservation Service*. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>

<sup>395</sup> Leopold Center for Sustainable Agriculture. Iowa State University of Science and Technology, §266.39. <https://perma.cc/T3BR-SNFX>

<sup>396</sup> Agricultural Research Service's FY 2017. Agricultural Research Service. <https://www.ars.usda.gov/trending-topics/?topic=Climate%20Change>

<sup>397</sup> Huber, Kristiane. *Decarbonizing U.S. Agriculture, Forestry, and Land Use*. Center for Climate and Energy Solutions. July 2018. <https://www.c2es.org/document/decarbonizing-u-s-agriculture-forestry-and-land-use/>

Farm size can limit the capacity of producers to adopt ecological practices. Cultural factors also deter some farmers from changing their practices ([Agriculture's Role in Cutting Greenhouse Gas Emissions](#)).<sup>398</sup>

#### Additional Resources

- This [2019 report](#) from the National Academies of Sciences, Engineering, and Medicine outlines a research agenda for carbon sequestration, including a chapter on changes in agricultural practices that enhance soil carbon storage:
  - National Academies of Sciences, Engineering, and Medicine 2019. “Negative Emissions Technologies and Reliable Sequestration: A Research Agenda.” The National Academies Press. 2019. <https://lpdd.org/wp-content/uploads/2020/03/25259.pdf>
- Horowitz, John and Gottlieb, Jessica. “The Role of Agriculture in Reducing Greenhouse Gas Emissions.” United States Department of Agriculture Economic Research Service. September 2010. [https://www.ers.usda.gov/webdocs/publications/42842/8494\\_eb15\\_1.pdf?v=1806.8#:~:text=U.S.%20agriculture%20can%20contribute%20to,and%20increased%20renewable%20energy%20production](https://www.ers.usda.gov/webdocs/publications/42842/8494_eb15_1.pdf?v=1806.8#:~:text=U.S.%20agriculture%20can%20contribute%20to,and%20increased%20renewable%20energy%20production)
- Huber, Kristiane. “Decarbonizing U.S. Agriculture, Forestry, and Land Use.” Center for Climate and Energy Solutions. July 2018. <https://www.c2es.org/document/decarbonizing-u-s-agriculture-forestry-and-land-use/>
- Beck, Christian. “Four Urgent Challenges Facing Tech Innovation in Agriculture.” Innovate Map. Accessed July 2020. <https://innovatemap.com/resource/four-urgent-challenges-facing-tech-innovation-in-agriculture/>
- “Agricultural Research and Productivity.” United States Department of Agriculture Economic Research Service. <https://www.ers.usda.gov/topics/farm-economy/agricultural-research-and-productivity/>

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<sup>398</sup> Swan, Amy L., Marx, Ernie, Del Grosso, Stephen J. and Parton, William J. Agriculture's Role in Cutting Greenhouse Gas Emissions. Issues in Science and Technology. Summer 2011. [https://issues.org/p\\_parton/](https://issues.org/p_parton/)



## **Agricultural Subsidies**

### Description

Subsidize agricultural workers, particularly for implementing practices that benefit the environment.

- “The next federal administration should create new revenue streams that compensate producers for building ecosystem services, especially in removing carbon from the atmosphere and storing it in soil and forests. These investments in rural communities and a healthy climate create both economic opportunity and environmental protection: crop productivity, drought and flood resilience, stormwater retention, water filtration, air quality, and preservation of pollinators and other biodiversity” ([Evergreen Action Plan](#), p. 33).
- “Congress should increase support for organic agriculture and incentivize climate stewardship practices by organic producers. This legislation should include ... increased cost-share payments and mandatory funding levels for FSA’s National Organic Certification Cost Share Program, which provides cost-share assistance to producers who are obtaining or renewing their certification under the National Organic Program” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 348).
- “Congress should continue to promote strong tribal-federal government-to-government policies and collaborate on ways USDA can apply traditional knowledge and provide financial and technical assistance to tribal nations to implement climate stewardship practices” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 368).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Rural; [Vision for Equitable Climate Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Center for Climate and Energy Solutions](#); [DNC Environment And Climate Crisis Council](#); [Evergreen Action](#); [Green New Deal](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Jay Inslee 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#); Julian Castro 2020 Presidential Campaign; Cory Booker 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; Kamala Harris 2020 Presidential Campaign;

### Previous/Current Implementation

- Through the [Conservation Stewardship Program](#), [Conservation Reserve Program](#), [Regional Conservation Partnership Program](#), and [Environmental Quality Incentives Program](#), the USDA provides financial assistance for farmers who implement conservation practices. [Cross-Reference: [Agricultural Innovation](#)].

### LPDD Recommendations:

- Congress should extend the conservation compliance requirement to farm programs that are not currently covered by the requirement, ensuring that all producers who receive federal subsidies are not causing significant environmental harm. ([LPDD](#), p. 806)
- Congress should increase funding for the Conservation Reserve Enhancement Program, which gives farmers higher payments for participating in targeted conservation efforts organized by state and local officials. ([LPDD](#), p. 802)

- The federal government should consider requiring farm owners to comply with basic climate-friendly practices, such as installing buffer strips next to streams, in order to receive tax benefits for agricultural activities or easements. (LPDD, p. 810)
- The federal government should explore supporting facilities that could produce fertilizer with very low GHG emissions. (LPDD, p. 817)
- The federal government should use tax policy to discourage agricultural practices that increase GHG emissions and to encourage practices that decrease emissions and sequester carbon. (LPDD, p. 794)
- Congress should adopt a farm safety net focused on payments for ecosystem services (i.e., payment for improved stewardship and environmental benefits such as climate stabilization or water quality or quantity) in place of much or all of the current programs. (LPDD, p. 794)
- Congress should at a minimum double the extension system's budget to \$900 million, designating the additional funds for climate change-related education, programming, and services. (LPDD, p. 798)
- Congress should ensure that government financial incentive and regulatory programs do not support large-scale operations without also requiring them to curb their most environmentally damaging practices. (LPDD, p. 812)
- Congress should expand funding for the CSP to prioritize climate-beneficial activities like cover crops and resource-conserving crop rotations and ensure that they receive a higher, supplemental payment. (LPDD, p. 805)
- USDA should use its rulemaking authority to require farmers receiving commodity payments to adopt cost-effective climate-friendly practices. (LPDD, p. 802)
- The Federal Crop Insurance Corporation should require publicly funded crop insurance policies to treat GHG-intensive practices as risk-enhancing and reduce or eliminate their premium subsidies accordingly. (LPDD, p. 801)

#### LPDD Resources

- LPDD.org, Using Crop Insurance REGimes to Incentivize Lower Agricultural Emissions: <https://lpdd.org/pathway/using-crop-insurance-regimes-to-incentivize-lower-agriculture-emissions/>
- LPDD.org, Tax Incentives for Agricultural Carbon Sequestration: <https://lpdd.org/pathway/tax-incentives-for-agricultural-carbon-sequestration/>

#### Impacts on GHGs

- Conservation practices can reduce greenhouse gas emissions from agriculture ([Greenhouse Gas Mitigation Options and Costs for Agricultural Land and Animal Production within the United States](#)).<sup>399</sup> “Many of these activities enhance soil C sequestration: reducing tillage, reducing fallow periods, increasing primary productivity through greater use of perennial crops, using short rotation woody crops, and converting cropland to pasture or setting it aside. Others reduce N<sub>2</sub>O emissions: using nitrification inhibitors, reducing N fertilizer application rates, and changing the timing, placement, and source of fertilizer. Still other

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<sup>399</sup> ICF International. Greenhouse Gas Mitigation Options and Costs for Agricultural Land and Animal Production within the United States. February 2013. [https://www.usda.gov/oce/climate\\_change/mitigation\\_technologies/GHG\\_Mitigation\\_Options.pdf](https://www.usda.gov/oce/climate_change/mitigation_technologies/GHG_Mitigation_Options.pdf)



activities are aimed at reducing CH<sub>4</sub> emissions: rice water management and variety development” ([Greenhouse Gas Mitigation Potential of Agricultural Land Management in the United States: A Synthesis of the Literature](#), p. 56).<sup>400</sup> Cropland management practices can reduce agricultural process emissions by 2% in 2050, while livestock measures could reduce agricultural process emissions by 10% by 2050 ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

Conservation stewardship practices improve soil, health, and air quality. They can also improve yields. One recent soil health project study by the National Association of Conservation Districts (NACD) showed that a no-till/cover crop system could increase yields by \$110 per acre ([Case Studies Show Big Economic Benefits Of Soil Health Practices](#)).<sup>401</sup> Subsidizing these practices also improves farmer livelihoods by increasing their income.

### Obstacles/Shortfalls

“The conservation compliance requirements, despite their accomplishments, have faced numerous implementation challenges. Several years ago, the U.S. Government Accountability Office (GAO) reported that the conservation compliance requirements were not being implemented consistently by NRCS, which increased the possibility that farmers were receiving federal farm payments even in cases in which soil erosion rates were higher than permitted” ([Subsidies With Responsibilities: Placing Stewardship and Disclosure Conditions on Government Payments to Large-Scale Commodity Crop Operations](#)).<sup>402</sup>

### Additional Resources

Environmental Law Institute. “Subsidies With Responsibilities: Placing Stewardship and Disclosure Conditions on Government Payments to Large-Scale Commodity Crop Operations.” June 2012. <https://www.eli.org/sites/default/files/eli-pubs/d22-02.pdf>

## **Livestock Management**

### Description

- “This policy reduces greenhouse gas emissions from agriculture through livestock-related measures, such as feed supplements or drugs to prevent enteric methane formation” (U.S. Policy Solutions Simulator, Agriculture, [Livestock Measures](#)).<sup>403</sup>

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<sup>400</sup> Eagle, Alison J., Olander, Lydia P., Henry, Lucy Ar., Haugen-Kozyra, Karen, Millar, Neville and Robertson, G. Phillip. Greenhouse Gas Mitigation Potential of Agricultural Land Management in the United States: A Synthesis of the Literature. Nicholas Institute for Environmental Solutions at Duke University, January 2012. [https://nicholasinstitute.duke.edu/sites/default/files/publications/ni\\_r\\_10-04\\_3rd\\_edition.pdf](https://nicholasinstitute.duke.edu/sites/default/files/publications/ni_r_10-04_3rd_edition.pdf)

<sup>401</sup> “Case Studies Show Big Economic Benefits Of Soil Health Practices.” *National Association of Conservation Districts*. 2017. <https://www.nacdnet.org/newsroom/case-studies-show-big-economic-benefits-soil-health-practices/>

<sup>402</sup> Environmental Law Institute. Subsidies With Responsibilities: Placing Stewardship and Disclosure Conditions on Government Payments to Large-Scale Commodity Crop Operations. June 2012. <https://www.eli.org/sites/default/files/eli-pubs/d22-02.pdf>

<sup>403</sup> U.S. Energy Policy Solutions Simulator. <https://us.energypolicy.solutions/scenarios/home#>

- “The next administration should invest directly... in the deployment of anaerobic digesters to capture methane from livestock operations, for use in on-site energy generation or in reuse as a biogas replacement for fracked gas, for energy and industry and in the production of co-products” ([Evergreen Action Plan](#), p. 34).
- “Congress should significantly increase financial incentives and technical assistance to farmers and ranchers to implement rotational and prescribed grazing and silvopasture. Congress also should ... create an alternative manure management program to provide additional funding and grants to farmers for non-digester manure and methane management strategies to reduce emissions, including conversion of non-pasture dairy and livestock operations to pasture-based management and alternative manure treatment and storage practices” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 356).
- “Congress should move AgSTAR from EPA to USDA to increase farmer access and engagement” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 357).

Proposed by: [Evergreen Action](#); [The Agricultural Resilience Act](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#);

#### LPDD Recommendations:

- Congress should clarify that the purchaser of a lease or permit can graze as few animals as desired in order to preserve ecological values such as soil carbon. ([LPDD](#), p. 814)
- Congress should lower the EQIP payment cap for all animal feeding operations, or at a minimum, create a lower cap for such operations. ([LPDD](#), p. 804)
- Congress should pass new legislation eliminating the livestock facility exemptions in CERCLA and retain the coverage for such facilities under the Emergency Planning and Community Right-to-Know Act of 1986. ([LPDD](#), p. 811)
- EPA and USDA should consider imposing regulatory methane emissions limits for concentrated animal facilities. ([LPDD](#), p. 804)
- BLM and USFS should revise its policies to allow ranchers to graze only at intensities they believe are optimal, as long as the intensities are at or below the allotted amount, allowing them to restore the range and increase soil carbon. ([LPDD](#), p. 814)

#### Previous/Current Implementation

- A variety of policies have been used to encourage better manure management. For example, the U.S. Rural Energy for America Program (REAP)<sup>404</sup> provides financial assistance to farmers implementing energy and efficiency projects, including anaerobic digesters.

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<sup>404</sup> “Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guarantee.” *USDA Rural Development*. <https://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency>

- The [AgSTAR](#)<sup>405</sup> program is an EPA initiative that promotes the use of biogas recovery systems to reduce methane emissions from livestock waste

### Impact on GHGs

If emissions from livestock reduce by 10% by 2050, which Energy Innovation states would be the outcome of full livestock management implementation, then U.S. emissions would reduce by 1.2% in 2050 compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

- Anaerobic digesters also reduce odors and pathogens that are common with manure storage and the digested manure can be used as a fertilizer. ADs have the potential to generate 5.5% of U.S. electricity ([Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy](#)).<sup>406</sup>
- In addition, one study finds that reducing the amount of livestock feed grown that competes with direct human food crop production can reduce greenhouse gas emissions by 18%, arable land occupation by 26%, N-surplus by 46%, P-surplus by 40%, non-renewable energy use by 36%, pesticide use intensity by 22%, freshwater use by 21%, and soil erosion potential by 12% ([Impacts of Feeding Less Food-Competing Feedstuffs to Livestock on Global Food System Sustainability](#)).<sup>407</sup>

### Obstacles/Shortfalls

Anaerobic digesters have high capital costs ([Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy](#)).<sup>408</sup>

### Additional Resources

- Food and Agricultural Organization. “Livestock and the Environment.” *Livestock in the Balance*. 2009. <http://www.fao.org/3/i0680e/i0680e04.pdf>
- Zaks, David P. M., et al. “Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy.” *Environ. Sci. Technol.* 2011. <https://pubs.acs.org/doi/abs/10.1021/es104227y>
- Schader, Christian, et al. “Impacts of Feeding Less Food-Competing Feedstuffs to Livestock on Global Food System Sustainability.” *Journal of the Royal Society Interface*, Vol. 12, No. 113. 2015. <https://royalsocietypublishing.org/doi/full/10.1098/rsif.2015.0891>

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<sup>405</sup> “AgSTAR: Biogas Recovery in the Livestock Sector.” *U.S. Environmental Protection Agency*. <https://www.epa.gov/agstar>

<sup>406</sup> Zaks, David P. M., Winchester, Niven, Kucharik, Christopher J., Barford, Carol C., Paltsev, Sergey and Reilly, John M. “Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy.” *Environ. Sci. Technol.* 2011. <https://pubs.acs.org/doi/abs/10.1021/es104227y>

<sup>407</sup> Schader, Christian, et al. “Impacts of Feeding Less Food-Competing Feedstuffs to Livestock on Global Food System Sustainability.” *Journal of the Royal Society Interface*, Vol. 12, No. 113. 2015. <https://royalsocietypublishing.org/doi/full/10.1098/rsif.2015.0891>

<sup>408</sup> Zaks, David P. M., Winchester, Niven, Kucharik, Christopher J., Barford, Carol C., Paltsev, Sergey and Reilly, John M. “Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy.” *Environ. Sci. Technol.* 2011. <https://pubs.acs.org/doi/abs/10.1021/es104227y>

## Next-Generation Rural Electrification

### Description

- “The next President should work with Congress to increase the accessibility of and double funding for the USDA Rural Utility Service (RUS), and Rural Housing and Rural Business Service, to provide low-cost financing for zero-carbon generation, transmission and distribution of electricity, including distributed renewable energy and efficiency upgrades, as well as broadband infrastructure, smart grid solutions, and other technologies” ([Evergreen Action Plan](#), p. 36).
- “Establishes a DOE grant program to provide funding and technical assistance to rural electric cooperatives – or nonprofit organizations working with at least six rural electric cooperatives – to identify, evaluate, design, and demonstrate energy storage and microgrid projects that use renewable energy” ([CLEAN Future Act](#)).

Proposed by: [Evergreen Action](#); [CLEAN Future Act](#); [DNC Environment and Climate Crisis Council](#); [Center for Climate and Energy Solutions](#); [H.R. 4269/S. 2452, the Climate Stewardship Act of 2019](#)<sup>409</sup>; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Bernie Sanders 2020 Presidential Campaign](#); Kamala Harris 2020 Presidential Campaign; Cory Booker 2020 Presidential Campaign; Amy Klobuchar 2020 Presidential Campaign; Andrew Yang 2020 Presidential Campaign; [DNC Draft 2020 Policy Platform](#)

### Previous/Current Implementation

- [USDA’s Rural Utilities Service](#)<sup>410</sup> (RUS) provides infrastructure or infrastructure improvements to rural communities. These include water and waste treatment, electric power and telecommunications services.
- USDA’s [REAP](#)<sup>411</sup> program provides two types of assistance: (1) grants and loans to farmers and rural businesses for energy efficiency improvements and renewable energy systems; and (2) grants to state and local governments, land-grant universities, rural electric cooperatives, and public utilities to assist farmers and rural businesses with energy audits to evaluate their energy usage and potential for incorporating efficiency improvements and renewable energy production systems.
- The American Recovery and Reinvestment Act of 2009 included \$7 billion in funding for broadband internet in rural areas. In 2019, The FCC launched the [Rural Digital Opportunity Fund](#),<sup>412</sup> which would direct up to \$20.4 billion to expand broadband in unserved rural areas.

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<sup>409</sup> The Climate Stewardship Act of 2019. H.R. 4269/S. 2452, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4269/related-bills?q=%7B%22search%22%3A%5B%22Climate+stewardship+act%22%5D%7D&r=1>

<sup>410</sup> “Rural Utilities Service.” *United States Department of Agriculture*. <https://www.rd.usda.gov/about-rd/agencies/rural-utilities-service>

<sup>411</sup> “Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guarantee.” *USDA Rural Development*. <https://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency>

<sup>412</sup> “Auction 904: Rural digital Opportunity Fund.” *Federal Communications Commission*. <https://www.fcc.gov/auction/904>

### Impact on GHGs

- Throughout the entire U.S., “electrification in isolation of future additional emission reduction strategies results in a reduction of emissions of over 41% below the baseline level by 2050. When electrification is coupled with deep decarbonization of the power sector, emissions reductions increase to almost 65% below the baseline level in 2050 (71% below the 2005 level of 30 fossil fuel combustion emissions) ([Electrification & Decarbonization: Exploring U.S. Energy Use and Greenhouse Gas Emissions in Scenarios with Widespread Electrification and Power Sector Decarbonization](#)).<sup>413</sup>
- Rural areas use more energy per capita ([Rural Climate Network](#)).<sup>414</sup>

### Co-Benefits

Rural electrification provides jobs to rural Americans. From 1930 - 1960, “rural counties that gained early access to electricity experienced increased economic growth that persisted for decades after the country was fully electrified” ([Short- and Long-Run Impacts of Rural Electrification: Evidence from the Historical Rollout of the U.S. Power Grid](#)).<sup>415</sup>

### Additional Resources

- Hatlestad, Erik, Rock, Katie, and Veazey, Liz. “Rural Electrification 2.0: The Transition to a Clean Energy Economy.” Center for Rural Affairs. June 2019.  
<https://www.cfra.org/sites/www.cfra.org/files/publications/Rural%20Electrification%202.0.pdf>
- Rural Climate Network. “Rural Climate Policy Priorities.” 2015.  
[https://www.ruralclimatenetwork.org/sites/default/files/2015\\_11\\_25\\_RuralPolicyPriorities.pdf](https://www.ruralclimatenetwork.org/sites/default/files/2015_11_25_RuralPolicyPriorities.pdf)

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<sup>413</sup> Steinberg, Daniel, Bielen, Dave, Eichman, Josh, Eureka, Kelly, Logan, Jeff, Mai, Trieu, McMillan, Collin, Parker, Andrew, Vimmerstedt, Laura, and Wilson, Eric. Electrification & Decarbonization: Exploring U.S. Energy Use and Greenhouse Gas Emissions in Scenarios with Widespread Electrification and Power Sector Decarbonization. National Renewable Energy Lab. <https://www.nrel.gov/docs/fy17osti/68214.pdf>

<sup>414</sup> Rural Climate Network. Rural Climate Policy Priorities: Solutions from the Ground. 2015.  
[https://www.ruralclimatenetwork.org/sites/default/files/2015\\_11\\_25\\_RuralPolicyPriorities.pdf](https://www.ruralclimatenetwork.org/sites/default/files/2015_11_25_RuralPolicyPriorities.pdf)

<sup>415</sup> Lewis, Joshua and Severini, Edson. Short- and Long-Run Impacts of Rural Electrification: Evidence from the Historical Rollout of the U.S. Power Grid. December 2017.  
[https://economics.yale.edu/sites/default/files/lewis\\_severini\\_rural\\_electrification\\_dec2017.pdf](https://economics.yale.edu/sites/default/files/lewis_severini_rural_electrification_dec2017.pdf)

## Plant-Centric Diets

### Description

Promote plant-centric diets that include healthy amounts of sustainably sourced animal products ([Vision for Equitable Climate Action](#), p. 13):

- Encourage procurement policies at all government and institutional levels that increase the availability of healthy, plant-based options and reduce the amount of meat and dairy purchased and served.
- Include sustainability considerations in national dietary guidelines.
- Support research and development to improve the availability and healthfulness of plant-based foods.
- Support programs that provide safe, affordable, and culturally appropriate food options in underserved communities.

Proposed by: [Visions for Equitable Climate Action](#)

### LPDD Recommendations:

- USDA, with the U.S. Department for Health and Human Services, should acknowledge their legal ability to include sustainability as a factor in dietary guidelines and work to encourage healthy, climate-friendly diets. ([LPDD](#), p. 820)
- USDA could provide emissions information in its dietary guidelines, and identify foods, the production of which emits significant methane. ([LPDD](#), p. 892)

### LPDD Resources:

- LPDD.org, Dietary Guidelines: <https://lpdd.org/pathway/dietary-guidelines/>
- LPDD.org, Low Carbon Dietary Guidelines: <https://lpdd.org/pathway/low-carbon-dietary-guidelines/>

### Previous/Current Implementation

- In 2016, the Chinese government introduced dietary [guidelines](#)<sup>416</sup> that recommend a daily meat intake half that of current consumption levels.
- In 2019, New York City implemented a policy to phase out the purchase of processed meat by 2030 and reduce the purchase of beef by 50 percent ([NYC.Gov](#)).<sup>417</sup>

### Impact on GHGs

“Replacing 50% of all animal-based foods in the U.S. with plant-based alternatives leads to 224 MMT less emissions per year in 2030. ... [Assuming] a linear transition from the 2016 diet to 2030 [BAU] projections, this target of 50% substitution results in an estimated cumulative reduction of 1634 MMT.” ([Implications Of Future Us Diet Scenarios On Greenhouse Gas](#)

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<sup>416</sup> Wang, Xiaodong. “Ministry Tweaks Eating Guidelines.” *China Daily*. May 24, 2016. [http://www.chinadaily.com.cn/china/2016-05/14/content\\_25269469.htm](http://www.chinadaily.com.cn/china/2016-05/14/content_25269469.htm)

<sup>417</sup> “Action on Global Warming: NYC’s Green New Deal.” *NYC.Gov*. April 22, 2019. <https://www1.nyc.gov/office-of-the-mayor/news/209-19/action-global-warming-nyc-s-green-new-deal#/o>



[Emissions](#)).<sup>418</sup> This equates to a reduction of U.S. emissions by 4% in 2030 compared to a BAU baseline.

### Co-Benefits

Plant centric-diets also improve health outcomes. A meta-analysis of vegan and vegetarian diets reveals that both diets reduce the risk of heart disease by 25% and mortality from cancer by 8% ([Vegetarian, Vegan Diets And Multiple Health Outcomes](#)).<sup>419</sup> In addition, reduced meat consumption could reduce freshwater and cropland use ([Health and Nutritional Aspects of Sustainable Diet Strategies and Their Association with Environmental Impacts](#)).<sup>420</sup>

### Obstacles

Because animal products are heavily subsidized in the U.S., healthy plant-centric diets tend to cost more than meat-centric diets. Furthermore, meat, dairy and egg industries would lobby strongly against policies to promote plant-centric diets.

### Additional Resources

- Mozaffarian, Dariush, Agnelli, Sonia Y., Lang, Tim and Rivera, Juan A. “Role of Government Policy in Nutrition—Barriers to and Opportunities for Healthier Eating.” *BMJ*. 2018. <https://www.bmj.com/content/361/bmj.k2426>
- Changing Markets Foundation. “Growing the Good: The Case for Low-Carbon Transition in the Food Sector.” 2019. [https://changingmarkets.org/wp-content/uploads/2019/02/Growing\\_the\\_Good-The\\_Case\\_for\\_Low-Carbon\\_Transition\\_in\\_the\\_Food\\_Sector.pdf](https://changingmarkets.org/wp-content/uploads/2019/02/Growing_the_Good-The_Case_for_Low-Carbon_Transition_in_the_Food_Sector.pdf)
- Simon, Michele. “Statutory Authority for Sustainability in the Dietary Guidelines for Americans: Legal Analysis.” *My Plate, My Planet: Food for a Sustainable Nation*. Accessed July 2020. [https://lpdd.org/wp-content/uploads/2020/03/DGA\\_Legal\\_Analysis\\_02.pdf](https://lpdd.org/wp-content/uploads/2020/03/DGA_Legal_Analysis_02.pdf)

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<sup>418</sup> Heller, Martin C, Keoelian, Gregory A., and Rose, Diego. Implications Of Future Us Diet Scenarios On Greenhouse Gas Emissions. CCS Report, University of Michigan. 2020. <http://css.umich.edu/publication/implications-future-us-diet-scenarios-greenhouse-gas-emissions>

<sup>419</sup> Dinu, Monica, et al. Vegetarian, Vegan Diets And Multiple Health Outcomes: A Systematic Review with Meta-Analysis of Observational Studies. *Critical Reviews in Food Science and Nutrition*, Vol. 57, No. 17. 2017. <https://www.tandfonline.com/doi/full/10.1080/10408398.2016.1138447>

<sup>420</sup> Springmann, Marco. Health and Nutritional Aspects of Sustainable Diet Strategies and Their Association with Environmental Impacts. *The Lancet Planetary Health*, Vol. 2, No. 10. October 2018. <https://www.sciencedirect.com/science/article/pii/S2542519618302067>



## Food Waste

### Description

- Standardize date labels to reduce consumer confusion and waste; Track and publicly report food waste throughout the supply chain, particularly at the farm and retail levels; Prioritize prevention of food loss and waste through initiatives such as improving inventory management, retailer commitments to whole-crop and seasonal/bumper-crop purchasing, extended produce specifications, and investments in packing, tracking, and storage innovation; Invest in universal composting programs to reduce the amount of compostable food going into landfills while expanding access to fertilizers that are not reliant on CAFO waste or destructive mining practices ([Vision for Equitable Climate Action](#), p. 13).
- “Congress should increase support and investments in initiatives to reduce food waste at the consumer level, on the farm, in grocery stores and restaurants, in schools, throughout the government, and in landfills. Any legislation should also support implementation and funding for the Winning on Reducing Food Waste initiative and ensure it receives the necessary resources to achieve the national goal of reducing food waste by 50% by 2030, including making staff and financial resources available for USDA to support a Food Loss and Waste Reduction Liaison, as was specified but not funded in the 2018 Farm Bill” ([DNC Environment and Climate Crisis Council](#), p. 8; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 373).

Proposed by: [Vision for Equitable Climate Action](#); [DNC Environment and Climate Crisis Council](#) (p. 8); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [H.R. 6023, the COMPOST Act](#); <sup>421</sup> [H.R. 3981/S. 2337, the Food Date Labeling Act of 2019](#); <sup>422</sup> [H.R. 5607, the School Food Recovery Act of 2020](#); <sup>423</sup> Andrew Yang 2020 Presidential Campaign; Kamala Harris 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations:

- Congress should adopt legislation banning food waste in landfills, using Vermont’s Universal Recycling Law as a model. ([LPDD](#), p. 819)
- EPA, with DOE, should develop and adopt energy-efficiency standards that would apply to the food processing sector. ([LPDD](#), p. 818)
- Congress could pass legislation that establishes minimum state recycling rates and food scrap diversion rates. ([LPDD](#), p. 193)

### LPDD Resources:

- LPDD.org, Food Waste: <https://lpdd.org/pathway/food-waste/>

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<sup>421</sup> The COMPOST Act. H.R. 6023, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/6023?s=1&r=3>

<sup>422</sup> The Food Date Labeling Act of 2019. H.R. 3981/S. 2337, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/2337/all-info>

<sup>423</sup> The School Food Recovery Act of 2020. H.R. 5607, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5607?s=1&r=5>

### Previous/Current Implementation

- There are a number of policies/programs that aim to reduce food waste across the nation ([EPA](#)).<sup>424</sup>
- As of December 2015, all businesses are eligible for an enhanced tax deduction for food donations ([ReFED](#)).<sup>425</sup>
- New York City introduced a curb-side pick-up composting program in 2015 ([Food Scraps and Yard Waste](#), NYC Department of Sanitation).<sup>426</sup> This program was suspended in May of 2020 due to COVID-19 budget cuts ([NYC Department of Sanitation](#)).<sup>427</sup>
- In addition, a number of states have policies requiring food distributors, manufacturers, processors, or markets to recycle their separated organic material ([EPA](#)).<sup>428</sup>
- In October 2018, USDA, EPA, and FDA launched the [Winning on Reducing Food Waste Initiative](#)<sup>429</sup> to achieve a previously set national goal of reducing food loss and waste by 50% by 2030. The agencies coordinate food loss and waste reduction through education and outreach, research, community investments, voluntary programs, public-private partnerships, tool development, technical assistance, event participation, and policy discussion on the impacts and importance of reducing food loss and waste.

### Impact on GHGs

U.S. food waste results in the emission of at least 113 million metric tonnes of CO<sub>2</sub>e annually, equivalent to 2% of national emissions ([The Climate Change and Economic Impacts of Food Waste in the United States](#)).<sup>430</sup>

### Co-Benefits

Better utilizing food already grown reduces the need to convert more ecosystems into food production or to harvest more wild food. It also reduces the need to convert more land, apply more fertilizers, raise more livestock, and use energy for producing, processing, transporting, and storing food. Diverting food loss and waste from landfills prevents methane emissions from

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<sup>424</sup> Wasted Food Programs and Resources Across the United States. *U.S. Environmental Protection Agency*. <https://www.epa.gov/sustainable-management-food/wasted-food-programs-and-resources-across-united-states#9>

<sup>425</sup> U.S. Food Waste Policy Finder. *ReFED*. <https://www.refed.com/tools/food-waste-policy-finder/federal-policy/federal-tax-incentives>

<sup>426</sup> “Food Scraps and Yard Waste.” *NYC Department of Sanitation*. <https://www1.nyc.gov/assets/dsny/site/services/food-scraps-and-yard-waste-page>

<sup>427</sup> “NYC Sanitation Announces Service Changes Related to COVID-19 Budget Cuts.” *New York City Department of Sanitation*. April 17th, 2020. <https://www1.nyc.gov/assets/dsny/site/resources/press-releases/nyc-sanitation-announces-service-changes-related-to-covid-19-budget-cuts>

<sup>428</sup> Wasted Food Programs and Resources Across the United States. *U.S. Environmental Protection Agency*. <https://www.epa.gov/sustainable-management-food/wasted-food-programs-and-resources-across-united-states#9>

<sup>429</sup> “Winning on Reducing Food Waste Federal Interagency Strategy.” *U.S. Environmental Protection Agency*. April 9, 2019. <https://www.epa.gov/sustainable-management-food/winning-reducing-food-waste-federal-interagency-strategy>

<sup>430</sup> Venkat, Kumar. “The Climate Change and Economic Impacts of Food Waste in the United States.” *International Journal of Food System Dynamics*. 2012. <http://centmapress.ilb.uni-bonn.de/ojs/index.php/fsd/article/view/247/182>

rotting food. Finally, better utilizing food already grown reduces the need to withdraw more water from aquifers or add more agricultural chemicals that may pollute water bodies ([WRI](#)).<sup>431</sup>

### Obstacles/Shortfalls

Policies requiring organic waste recycling require adequate recycling facilities and infrastructure. In addition, the costs of enforcing food waste regulations are still relatively high because of the relatively large number of food waste producers involved per pound of food waste they generate ([A Lot to Digest: Advancing Food Waste Policy in the United States](#)).<sup>432</sup>

### Additional Resources

- Broad Leib, Emily, Rice, Christina, Nielsen, Annika, Mordecai, Tyler and Hartmann, Victoria. “Food Recovery in the District of Columbia: A Legal Guide. Food Law and Policy Clinic at Harvard Law School.” 2013. [https://www.chlpi.org/wp-content/uploads/2013/12/Food-Recovery\\_D.C.\\_Final.pdf](https://www.chlpi.org/wp-content/uploads/2013/12/Food-Recovery_D.C._Final.pdf)
- Mourad, Marie. “Recycling, Recovering and Preventing ‘Food Waste’: Competing Solutions for Food Systems Sustainability in the United States and France.” *Journal of Cleaner Production*, vol. 126. 2016. [https://www.sciencedirect.com/science/article/pii/S0959652616301536?casa\\_token=cXJt9OwBYVEAAAAA:qrQodpSeicYJ-WWmERYdKeTs4kdx6CcHoIgg35JzURoFot-scVOVdebsfhhXcfG\\_rrPRPRbWUGo](https://www.sciencedirect.com/science/article/pii/S0959652616301536?casa_token=cXJt9OwBYVEAAAAA:qrQodpSeicYJ-WWmERYdKeTs4kdx6CcHoIgg35JzURoFot-scVOVdebsfhhXcfG_rrPRPRbWUGo)
- Evans, Alexandra and Negele, Robin. “A Lot to Digest: Advancing Food Waste Policy in the United States.” *Natural Resources Journal*, Vol. 58, No. 1. 2018. <https://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=3993&context=nri>

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<sup>431</sup> Lipinski, Brian, et al. “Reducing Food Loss and Waste: Creating a Sustainable Food Future, Installment Two.” *World Resources Institute*. June 2013. <https://www.wri.org/publication/reducing-food-loss-and-waste>

<sup>432</sup> Evans, Alexandra and Negele, Robin. “A Lot to Digest: Advancing Food Waste Policy in the United States.” *Natural Resources Journal*, Vol. 58, No. 1. 2018. <https://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=3993&context=nri>

## Forest Management

(See also Tree Planting)

### Description

- “Through tax deductions and tax credits, the federal government could provide significant incentives to corporations and private individuals who manage forestland to sequester carbon” ([LPDD Resources](#)).
- The next administration should pursue federal-state-local collaboratives to capture the full carbon storage and forest health potential for reforestation, and to address the million acres of forest not yet under best management practices” ([Evergreen Action](#), p. 71).
- “Congress should amend [the [Multiple-Use Sustained-Yield Act](#)<sup>433</sup> of 1960] and the [National Forest Management Act](#)<sup>434</sup> to more directly emphasize climate mitigation and resilience as part of the Forest Service’s multiple use mission and planning. Additionally, Congress should direct USFS to require that all forest plans, projects, and associated NEPA analysis consider the impacts of forest management actions on the long-term sequestration of carbon and climate mitigation” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 444).
- “Congress should dramatically increase dedicated Forest Service and BLM funding for restoration activities to restore functioning and healthy forest ecosystems, including prescribed burning, tree planting, and restoring streams and natural fire regimes, in order to increase the climate benefits of America’s forests. Specifically, Congress should increase funding for CFLRP; the [Joint Chiefs’ Landscape Restoration Partnership](#)<sup>435</sup>; the Vegetative and Watershed Management Program; the Wildlife and Fisheries Habitat Management program; the [Land Management Planning, Assessment, and Monitoring program](#)<sup>436</sup>; and the [Forest Health Management – Federal Lands program](#)<sup>437</sup>” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 448).

Proposed by: [Evergreen Action](#); [Section 82401 of H.R. 2, the Moving Forward Act](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act](#);<sup>438</sup> [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations:

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<sup>433</sup> Multiple-Use Sustained-Yield Act of 1960. [As Amended through December 31, 1996, P.L. 104-333]. Public Law 86-517; Approved June 12, 1960. <https://www.fs.fed.us/emc/nfma/includes/musya60.pdf>

<sup>434</sup> National Forest Management Act of 1976. <https://www.fs.fed.us/emc/nfma/includes/NFMA1976.pdf>

<sup>435</sup> Joint Chiefs’ Landscape Restoration Partnership. *USDA Natural Resources Conservation Service*. <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?cid=stelprdb1244394>

<sup>436</sup> “Land Management Planning and Monitoring.” *U.S. Forest Service*. [https://www.fs.fed.us/emc/rig/lmp\\_monitoring.shtml](https://www.fs.fed.us/emc/rig/lmp_monitoring.shtml)

<sup>437</sup> “Forest Health Monitoring.” *U.S. Forest Service*. <https://www.fs.fed.us/foresthealth/protecting-forest/forest-health-monitoring/>

<sup>438</sup> The 21st Century Conservation Corps for Our Health and Our Jobs Act. H.R. 7264, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/7264/text>

- Through tax deductions and tax credits, the federal government could provide significant incentives to corporations and private individuals who manage forestland to sequester carbon. (LPDD, p. 844)
- Congress could expand the national forests by acquiring and reforesting private lands, focusing on lands rendered economically unproductive by the effects of climate change. (LPDD, p. 833)
- Congress should consider a modest carbon tax or GHG cap-and-trade program that recognizes private forest carbon capture as an emission offset, exempts emissions from sustainably produced biomass, and also imposes a tax burden on those who deforest their land through conversion. (LPDD, p. 843)
- The president should use executive authority to create and expand national monuments and manage federal lands to promote afforestation of permafrost areas, as climate change supports the expansion of northern forests. (LPDD, p. 834)
- Consistent with former Agriculture Secretary Vilsack's 2011 policy, the USFS should continue to administer landowner assistance programs so that they maximize carbon sequestration, climate change adaptation, and the production of carbon-sequestering forest products. (LPDD, p. 843)

#### LPDD Resources

- LPDD.org, Federal and State Forest Management Programs: <https://lpdd.org/pathway/federal-and-state-forest-management-programs/>
- LPDD.org, Tracking and Certifying Sustainable Forests: <https://lpdd.org/pathway/tracking-and-certifying-sustainable-forests/>
- LPDD.org, Conservation Incentives: <https://lpdd.org/pathway/conservation-incentives/>
- LPDD.org, Protecting Forests through Conservation Easements: <https://lpdd.org/pathway/protecting-forests-through-conservation-easements/>

#### Current/Past Implementation

- U.S. forests currently sequester nearly 40 gigatons (Gt) of carbon and are growing at a rate that offsets about 700 million tons (0.7 Gt) of CO<sub>2</sub> emissions per year, roughly 10% of U.S. total emissions (LPDD Resources, ch. 31).
- A number of states have enacted forest conservation and management programs. For example, California has committed \$96 million in additional state funds in part to improving forest management and restoration.
- Other programs: “[Federal and State Forest Management Programs](#),”<sup>439</sup> *Model Laws for Deep Decarbonization*.
- The Forest Service manages numerous forest restoration programs. [The Forest Service Collaborative Forest Landscape Restoration Program](#)<sup>440</sup> (CFLRP) encourages collaborative, science-based ecological restoration of priority forest landscapes.

#### Impact on GHGs

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<sup>439</sup> “Federal and State Forest Management Programs.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/federal-and-state-forest-management-programs/>

<sup>440</sup> “Collaborative Forest Landscape Restoration Program.” *U.S. Forest Service*. <https://www.fs.fed.us/restoration/CFLRP/>

- Forest management in the coming decades could increase forest carbon capture by another 100 million tons per year ([LPDD Resources](#)).
- According to Energy Innovation’s U.S. Policy Solutions Simulator, forest management would reduce U.S. emissions by 2% in 2050 emissions compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

Forestry management benefits water quality, noise abatement, wildlife, and human health ([Forest Management Solutions for Mitigating Climate Change in the United States](#)).<sup>441</sup>

### Obstacles

Sequestering an additional 100 million tons per year will require the addition of 2.7 million newly forested acres per year for the next several decades, as the amount of additional land suitable for reforestation declines. Moreover, many existing forests will be stressed by the climate changes that are now inevitable, and those same changes will reduce the areas that can support forests ([LPDD Resources](#), ch. 31).

### Additional Resources

- U.S. Forest Service. “Greenhouse Gas Emissions and Removals from Forest Land, Woodlands, and Urban Trees in the United States, 1990-2018.” United States Department of Agriculture. 2020.  
<https://lpdd.org/wp-content/uploads/2020/05/Greenhouse-Gas-Emissions-and-Removals-from-Forest-Land-Woodlands-and-Urban-Trees-in-the-United-States-1990-2018.pdf>
- National Association of State Foresters. “Recommendations for Enhancing the Role of Forests In Climate Change Mitigation and Ecosystem Adaption to Climate Change.” 2015.  
<https://perma.cc/8RBD-RH6K>
- Forest Climate Working Group. “Forest Carbon Solutions for Mitigating Climate Change.” December 2015.  
<https://perma.cc/8NEX-2XX5>
- The Chancery Lane Project. “Green Papers of Model Laws.” February 2020.  
<https://lpdd.org/wp-content/uploads/2020/05/TCLP-Green-Papers-of-Model-Laws-1st-Edition-3.pdf>

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<sup>441</sup> Malmshiemer, Robert W., et al. “Forest Management Solutions for Mitigating Climate Change in the United States.” *Journal of Forestry*. 2008. <https://perma.cc/CH4J-42XN>





## Forest Management for Wildfire Control

### Description

- “To the extent necessary to remove fire hazards (dead trees, heavy fuel loads), states may consider streamlining environmental permitting requirements for activities such as tree removal and prescribed fires and encouraging use of the biomass for energy production” ([Model Laws for Deep Decarbonization](#)).
- “The next President must fight for increased investments in the U.S. Forest Service” ([Evergreen Action Plan](#), p. 71)
- “Increasing funding for Job Corps Civilian Conservation Centers to train and place at-risk youth ages 16-24 in forest-related trades. This program encompasses 25 centers around the country that train an estimated 5,000 at-risk youth each year in trades including wildland firefighting, [and] forestry” ([Center for Climate and Energy Solutions](#), p. 8).
- “Congress could change the way the U.S. government pays for wildfire control by financing wildfire suppression out of general funds instead of treating wildfire as an agency expense draining money away from forest management and land purchase” ([LPDD Resources](#)).<sup>442</sup>

Proposed by: [Evergreen Action](#) (p. 71); [Center for Climate and Energy Solutions](#) (p. 8); [H.R.167 - Wildfire Disaster Funding Act](#) (2015)<sup>443</sup>

### LPDD Recommendations:

- Congress could change the way the U.S. government pays for wildfire control by financing wildfire suppression out of general funds instead of treating wildfire as an agency expense draining money away from forest management and land purchase. ([LPDD](#), p. 834)

### LPDD Resources:

- LPDD.org, Federal and State Forest Management Programs: <https://lpdd.org/pathway/federal-and-state-forest-management-programs/>

### Previous/Current Implementation

The US Forest Service works with local partners to mitigate wildfire risks through its Community Mitigation Assistance Team.<sup>444</sup>

### Impact on GHGs

Wildfires release greenhouse gases -- for example, the 2018 wildfire season in California is estimated to have released emissions equivalent to roughly 68 million tons of carbon dioxide ([U.S. Department of Interior](#)).<sup>445</sup> Controlling wildfires would thus reduce emissions

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<sup>442</sup> “Federal and State Forest Management Programs.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/federal-and-state-forest-management-programs/>

<sup>443</sup> Wildfire Disaster Funding Act. H.R.167, 114th Congress. 2015. <https://perma.cc/D37Z-YWCY>

<sup>444</sup> “Community Mitigation Assistance Team.” *U.S. Forest Service*. <https://www.fs.usda.gov/managing-land/fire/cmat>

<sup>445</sup> “New Analysis Shows 2018 California Wildfires Emitted as Much Carbon Dioxide as an Entire Year's Worth of Electricity.” *U.S. Department of Interior*. November 30, 2018. <https://www.doi.gov/pressreleases/new-analysis->

[\(Impact of Wildfires on Some Greenhouse gases Over Continental USA: A Study Based on Satellite Data\)](#).<sup>446</sup>

### Co-Benefits

Forest management creates job opportunities and protects communities in areas vulnerable to forest fires. Wildfires are also known to cause emission of Carbon Monoxide and particulate matters like PM<sub>10</sub> and PM<sub>2.5</sub>. Therefore, reducing emission of these substances would have positive human health and ecological impacts.

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[shows-2018-california-wildfires-emitted-much-carbon-dioxide-entire-years#:~:text=WASHINGTON%20%2D%20U.S.%20Secretary%20of%20the,million%20tons%20of%20carbon%20dioxide.](#)

<sup>446</sup> Kim, Bokhwa and Sarka, Sudipta. Impact of Wildfires on Some Greenhouse gases Over Continental USA: A Study Based on Satellite Data. *Remote Sensing of Environment*, vol. 188. 2017.  
[https://www.sciencedirect.com/science/article/pii/S0034425716304266?casa\\_token=iPs6ZIP5YCAAAAAA:wSX6vqEhlzUbN4-kg4gl4Ok5Kk5HFF-bVMylAFKS\\_HkTvD4HxRvgN\\_lCe-c6PG7ceGV75EGBRms](https://www.sciencedirect.com/science/article/pii/S0034425716304266?casa_token=iPs6ZIP5YCAAAAAA:wSX6vqEhlzUbN4-kg4gl4Ok5Kk5HFF-bVMylAFKS_HkTvD4HxRvgN_lCe-c6PG7ceGV75EGBRms)

## Wetlands Protection

### Description

- Wetlands, particularly “seagrass meadows and mangrove forests[,] should be protected and restored for their carbon drawdown and sequestration potential. Science-based best practices should be developed and implemented for the control of invasive species that threaten the natural ecosystem functions of wetlands and peatlands, as well as for reducing the impacts of stormwater runoff resulting in contamination of wetlands” ([Vision for Equitable Climate Action 2020](#), p. 20)
- “Congress should establish a national goal of protecting at least 30% of U.S. ocean areas and coastal wetlands by 2030, including increasing [Marine Protected Areas] while working to balance the needs of fisheries management systems” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 466).
- “Congress should restore lost and degraded wetlands as one component of a comprehensive climate strategy. This should include (1) directing NOAA to identify national restoration priorities that would produce the highest rate of carbon sequestration and ecosystems benefits and providing funding for these efforts; (2) increasing funding for existing NOAA and EPA grant programs to provide financial and technical assistance to restore degraded non-federal wetlands for climate mitigation and resilience; and (3) increasing federal investments in coastal and riverine ecosystem restoration, including NOAA’s [Office of Habitat Conservation](#),<sup>447</sup> NOAA’s [National Estuarine Research Reserve Program](#),<sup>448</sup> EPA’s [National Estuary Program](#),<sup>449</sup> and FWS’s [Coastal Program](#)<sup>450</sup>” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 467).

Proposed by: [Visions for Equitable Climate Action](#); [Evergreen Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [H.R. 925/S. 261, the North American Wetlands Conservation Extension Act](#)<sup>451</sup>; [H.R. 1747, the National Fish Habitat Conservation Through Partnerships Act](#)<sup>452</sup>; [Coastal and Great Lakes Communities Enhancement Package, H.R. 729](#)<sup>453</sup>; [H.R. 4269/S. 2452, the Climate Stewardship Act of 2019](#);<sup>454</sup> [DNC Draft 2020 Policy Platform](#)

### Current/Past Implementation

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<sup>447</sup> “Office of Habitat Conservation.” NOAA Fisheries. <https://www.fisheries.noaa.gov/contact/office-habitat-conservation-1>

<sup>448</sup> “National Estuarine Research Reserve Program.” NOAA. <https://coast.noaa.gov/nerrs/>

<sup>449</sup> “Estuaries and the National Estuary Program.” US Environmental Protection Agency. <https://www.epa.gov/nep>

<sup>450</sup> “Coastal Program.” US Fish & Wildlife Service. <https://www.fws.gov/coastal/>

<sup>451</sup> The North American Wetlands Conservation Extension Act. H.R. 925/S. 261, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/925/all-info>

<sup>452</sup> The National Fish Habitat Conservation Through Partnerships Act. H.R. 1747, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/1747/text>

<sup>453</sup> Coastal and Great Lakes Communities Enhancement Package. H.R. 729, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/729>

<sup>454</sup> The Climate Stewardship Act of 2019. H.R. 4269/S. 2452, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4269/related-bills?q=%7B%22search%22%3A%5B%22Climate+stewardship+act%22%5D%7D&r=1>

- Most wetland protection is implemented through Section 404 of the Clean Water Act, which restricts the discharge of materials into oceans and wetlands. Several agencies oversee wetland regulations, while many states have enacted their own wetland protection programs. Most programs focus on water quality monitoring and regulation ([State Wetland Program Evaluation](#), p. 5).<sup>455</sup>
- Congress passed the [North American Wetlands Conservation Act](#) (NAWCA) to provide federal cost-share funding to projects that conserve North America's migratory birds, waterfowl, fish, and wildlife resources. NAWCA grants fund the protection, restoration, and enhancement of wetlands.

### Impact on GHGs

Wetlands sequester carbon dioxide and act as a sink for greenhouse gases. In addition, the destruction of wetlands releases stored carbon and increases GHG emissions. Protecting and restoring U.S. wetlands could lead to 34 Tg in avoided CO<sub>2</sub>e emissions per year ([Supplementary Materials for Natural Climate Solutions for the United States](#), p. 71).<sup>456</sup>

### Co-Benefits

Wetlands improve biodiversity, water quality, air quality, and soil quality. They also help prevent flooding and protect coastlines ([Supplementary Materials for Natural Climate Solutions for the United States](#), p. 72).<sup>457</sup>

### Obstacles/Shortfalls

Wetland restoration and protection are associated with high investment costs ([Supplementary Materials for Natural Climate Solutions for the United States](#), p. 71).<sup>458</sup>

The Trump Administration is amending the Waters of the United States rule in a way that restricts regulatory coverage of wetlands. These amendments are subject of extensive litigation challenges. This issue is not explicitly about climate change and is not otherwise covered in this compilation.

### Resources

- This paper provides information about the mitigation potential of natural climate solutions (including wetland protection):
  - Fargione, Joseph E., et al. "Natural Climate Solutions for the United States." *Science Advances*, vol. 4. 2018.  
[https://www.researchgate.net/publication/328948490\\_Natural\\_climate\\_solutions\\_for\\_the\\_United\\_States](https://www.researchgate.net/publication/328948490_Natural_climate_solutions_for_the_United_States)

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<sup>455</sup> Environmental Law Institute. [State Wetland Program Evaluation: Phase I](#). January 2005.

<sup>456</sup> Fargione, Joseph E., et al. Supplementary Materials for Natural Climate Solutions for the United States. *Science Advances*, vol. 4. 2018.  
[https://advances.sciencemag.org/content/advances/suppl/2018/11/09/4.11.eaat1869.DC1/aat1869\\_SM.pdf](https://advances.sciencemag.org/content/advances/suppl/2018/11/09/4.11.eaat1869.DC1/aat1869_SM.pdf)

<sup>457</sup> Ibid.

<sup>458</sup> Ibid.

- Fargione, Joseph E., et al. “Supplementary Materials for Natural Climate Solutions for the United States.” *Science Advances*, vol. 4. 2018).  
[https://advances.sciencemag.org/content/advances/suppl/2018/11/09/4.11.eaat1869.DC1/aat1869\\_SM.pdf](https://advances.sciencemag.org/content/advances/suppl/2018/11/09/4.11.eaat1869.DC1/aat1869_SM.pdf)
- Environmental Law Institute. “State Wetland Program Evaluation: Phase I.” January 2005. [https://www.eli.org/sites/default/files/eli-pubs/d15\\_06.pdf](https://www.eli.org/sites/default/files/eli-pubs/d15_06.pdf)
- Copeland, Claudia. “Wetlands: An Overview of Issues.” Congressional Research Service. December 5, 2013. <https://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL33483.pdf>
- Crooks, Stephens, Herr, Dorothée, Tamelander, Jerker, Laffoley, Dan, and Vandever, Justin. “Mitigating Climate Change through Restoration and Management of Coastal Wetlands and Near-shore Marine Ecosystems: Challenges and Opportunities.” The World Bank Environment Department. March 2011.  
[https://www.aswm.org/pdf/lib/challenges\\_and\\_solutions\\_in\\_coastal\\_wetlands\\_finding\\_gaps\\_and\\_priorities\\_stelk\\_christie\\_1016.pdf](https://www.aswm.org/pdf/lib/challenges_and_solutions_in_coastal_wetlands_finding_gaps_and_priorities_stelk_christie_1016.pdf)

## Tree Planting

(See also [Forest Management](#))

### Description

Reforestation of historically forested lands, and afforestation in ecologically appropriate areas.

- “Congress should: Provide reforestation and afforestation funding through the Environmental Quality Incentives Program, administered by the Natural Resources Conservation Service (NRCS) ... [and] expand the Conservation Reserve Program, which provides incentives to farmers to take active agricultural lands out of production and plant environmentally beneficial species” ([Center for Climate and Energy Solutions](#), pp. 6-7).
- “Congress should (1) increase authorized funding for the Reforestation Trust Fund and lift the funding cap; (2) establish national goals for reforesting 40 to 50 million acres of federal and nonfederal land and provide adequate funding to achieve those goals; (3) direct land management agencies to guide reforestation using the best available science and focus on climate and biodiversity benefits when replanting... (4) direct land management agencies [to implement practices that promote biological diversity and growth of native species] ... (5) provide funding to update the national assessment of forest resources that identifies the areas of greatest potential for reforestation and climate and biodiversity benefits; and (6) support the development of native plant and seed banks to support regionally appropriate reforestation ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 454).
- “Congress should provide additional financial and technical assistance to increase reforestation on state, local, tribal, and private lands” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 455).
- Congress should increase trees planted in urban areas by (1) renewing the National Urban and Community Forestry Advisory Council; (2) increasing funding for the Urban and Community Forestry Program; (3) increasing funding for the Vibrant Cities Lab and providing financial incentives for cities to adopt Urban Forestry Management Plans; (4) ... providing grants for tree planting and prioritizing underserved cities and neighborhood...; (5) investing in workforce development and training programs ... that link underserved populations with urban forestry careers; (6) creating a new DOE grant program for energy providers to offer homeowners free or reduced-cost tree-planting services; and (7) supporting long-term staff in communities to continue to maintain and enhance reforestation efforts” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 456).

Proposed by: [Center for Climate and Energy Solutions](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient](#)

and Just America; [H.R. 4269/S. 2452, the Climate Stewardship Act of 2019](#)<sup>459</sup>; [H.R. 5311, the Forestry Renewal Act](#);<sup>460</sup> [S. 3106, the Reforestation Act of 2019](#)<sup>461</sup>

### Past/Previous Implementation

- The USDA Forest Service has partnerships with several volunteer tree planting programs. The Plant-A-Tree Program was established in 1983 to allow individuals or groups to voluntarily contribute funds directly to the Forest Service for tree planting on National Forests. [National Forest Foundation](#)<sup>462</sup> plants one tree for every dollar you give. [National Wildlife and Fish Foundation](#)<sup>463</sup> works with the Forest Service to conserve forested lands through stewardship and watershed restoration programs ([U.S. forest Service](#)).<sup>464</sup>
- In 1980, Congress created the [Reforestation Trust Fund](#)<sup>465</sup> to eliminate the backlog of reforestation on National Forest System lands. The Forest Service may use up to \$30 million annually for a variety of activities related to reforestation such as seeding and tree planting.
- “The [Conservation Reserve Program](#) offers payments to landholders to remove land from agricultural production and instead plant environmentally beneficial plant species. These contracts last at least a decade, with some payments lasting 15 years” ([Energy Innovation](#)).

### Impact on GHGs

If the rate of tree planting reaches 2 million acres per year in 2050, U.S. emissions in 2050 will reduce by 1.4% compared to a BAU baseline or by 3.7% compared to 2005 emissions ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

- “An annual federal investment on the order of \$4 billion over 20 years would realize the full carbon sequestration potential of tree-planting efforts, while creating more than 150,000 jobs and generating up to \$12 billion in economic activity a year. ... Trees Enhance soil health and air and water quality, and increase community resilience to storms, floods, and droughts” ([Center for Climate and Energy Solutions](#), pp. 6).
- “Integrating trees into pasture and cropland alone could sequester 147 million metric tons of carbon dioxide annually in addition to providing numerous co-benefits, such as providing shade for livestock, increased soil health, improved water quality, and additional revenue

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<sup>459</sup> The Climate Stewardship Act of 2019. H.R. 4269/S. 2452, 116th Congress. 2019.

<https://www.congress.gov/bill/116th-congress/house-bill/4269/related-bills?q=%7B%22search%22%3A%5B%22Climate+stewardship+act%22%5D%7D&r=1>

<sup>460</sup> The Forestry Renewal Act. H.R. 5311, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/5311?s=1&r=6>

<sup>461</sup> The Reforestation Act of 2019. S. 3106, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/3106>

<sup>462</sup> National Forest Foundation. <https://www.nationalforests.org/>

<sup>463</sup> National Fish and Wildlife Foundation. <https://www.nfwf.org/>

<sup>464</sup> “Reforestation Partnerships.” *US Forest Service*. <https://www.fs.fed.us/forestmanagement/vegetation-management/reforestation/partnerships.shtml>

<sup>465</sup> 16 U.S. Code § 1606a. Reforestation Trust Fund. *Legal Information Institute*. <https://www.law.cornell.edu/uscode/text/16/1606a>



streams for farmers” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 455).

#### Obstacles/Shortfalls

- Planting trees in certain areas, particularly moist peatlands, can increase greenhouse gas emissions by drying soils (“[Planting Trees in Wrong Places ‘Could Increase Greenhouse Gas Emissions,’ Government Warned](#)”).<sup>466</sup>
- “Forests’ ability in temperate zones (especially afforestation projects) to effectively sequester CO<sub>2</sub> and mitigate the effects of climate change may be reduced and even eliminated due to location, land-use change and the effects these factors can have on surface albedo” ([The Albedo Effect And Its Effect On Afforestation Carbon Offset Projects](#)).<sup>467</sup>

#### Additional Resources

- Bastin, Jean-Francois, et al. “The Global Tree Restoration Potential.” *Science*, Vol. 5, No. 6448. July 2019.  
<https://science.sciencemag.org/content/365/6448/76>
- Nielsen, Anne Sofie Elberg, Plantinga, Andrew J. and Alig, Ralph J. “New Cost Estimates for Carbon Sequestration Through Afforestation in the United States.” United States Department of Agriculture. March 2014.  
[https://www.fs.fed.us/pnw/pubs/pnw\\_gtr888.pdf](https://www.fs.fed.us/pnw/pubs/pnw_gtr888.pdf)
- Bala, G., et al. “Combined Climate and Carbon-Cycle Effects of Large-Scale Deforestation.” *PNAS*, April 2007.  
<https://www.pnas.org/content/104/16/6550>

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<sup>466</sup> Cockburn, Harry. “Planting Trees in Wrong Places ‘Could Increase Greenhouse Gas Emissions,’ Government Warned. *The Independent*, April 8, 2020. <https://www.independent.co.uk/environment/plant-trees-climate-crisis-where-greenhouse-gas-emissions-a9455671.html>

<sup>467</sup> Jones, Martin B. The Albedo Effect And Its Effect On Afforestation Carbon Offset Projects. *Quarterly Journal of Forestry*. April 2010. <https://www.woodlandstewardship.com/Albedo%20Effect.pdf>

## Agricultural Working Conditions

### Description

- “Improve working conditions, pay, and protections for all food chain workers. Strengthen OSHA standards and enforcement practices, as well as Agricultural Worker Protection Standards” ([DNC Environment and Climate Crisis Council](#), p. 8).
- “Congress should direct the Secretary of Labor to establish a standard on prevention of occupational exposure to excessive heat and require employers to implement a workplace excessive heat prevention plan to protect employees from heat-related injuries and illnesses. Standards and requirements should consider (1) exposure limits that trigger action to protect employees from heat-related illness; (2) hydration; (3) scheduled and paid rest breaks in shaded or climate-controlled spaces; (4) employer and supervisor training; and (5) emergency medical response planning” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 299).

Proposed by: [DNC Environment and Climate Crisis Council](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Joe Biden 2020 Presidential Campaign](#) - Infrastructure and Clean Energy

### Previous/Current Implementation

- “The Occupational Safety and Health Act of 1970 (OSHAct) was passed to prevent workers from being killed or seriously harmed at work. The law requires that employers provide their employees with working conditions that are free of known dangers. The Act created the Occupational Safety and Health Administration (OSHA), which sets and enforces protective workplace safety and health standards. OSHA also provides information, training and assistance to workers and employers” ([OSHA](#)).<sup>468</sup>
- EPA's [Agricultural Worker Protection Standard](#)<sup>469</sup> (WPS) aims to reduce pesticide poisonings and injuries among agricultural workers and pesticide handlers.
- The [Fair Labor Standards Act](#),<sup>470</sup> originally enacted in 1938, guarantees most workers a minimum wage for each hour worked. FLSA also provides for overtime pay by requiring that most employees who work more than 40 hours in a workweek be paid one and one-half times the regular rate of pay for each hour over forty hours per week ([U.S. Labor Law for Farmworkers](#)).<sup>471</sup>

### Co-Benefits

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<sup>468</sup> OSHA, OSAP.Org.

<https://www.osap.org/page/GuideOSHA#:~:text=OSHA%2ostandards%2oare%2orules%20that,that%20applies%2oto%20most%20worksites>

<sup>469</sup> “Agricultural Worker Protection Standard (WPS).” *US Environmental Protection Agency*.

<https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps#:~:text=EPA's%20Agricultural%20Worker%20Protection%20Standard.at%20over%20600%2C000%20agricultural%20establishments.>

<sup>470</sup> “The Fair Labor Standards Act of 1938, As Amended.” U.S. Department of Labor Wage and Hour Division. Revised May 2011. <https://www.dol.gov/sites/dolgov/files/WHd/legacy/files/FairLaborStandAct.pdf>

<sup>471</sup> U.S. Labor Law for Farmworkers. *Farmworker Justice*.

[https://www.farmworkerjustice.org/advocacy\\_program/us-labor-law-for-farmworkers/](https://www.farmworkerjustice.org/advocacy_program/us-labor-law-for-farmworkers/)

Improved working conditions provide economic and health benefits to agricultural workers. A healthy farm labor force improves productivity and benefits the agriculture industry.

Additional Resources

Schenker, Marc B., McCurdy, Stephen A., Riden, Heather E, and Villarejo, Don. “Improving the Health of Agricultural Workers and Their Families in California: Current Status and Policy Recommendations. Global Health Institute at the University of California.” 2015.

<https://ucghi.universityofcalifornia.edu/sites/default/files/ucghi-ag-work-paper-2015.pdf>

## Methane

### Description

Policies to reduce the amount of methane produced in livestock/agricultural operations. Some proposals support the use of technology to reduce emissions, while others also call for regulation of emissions by environmental agencies.

- “Biden ... will create new opportunities to support deployment of methane digesters to capture potent climate emissions and generate electricity” ([Joe Biden 2020 Presidential Campaign](#) - Climate).
- Congress could authorize environmental agencies to regulate methane emissions from manure management” ([Model Laws for Deep Decarbonization](#) ch. 33).
- “Congress should ... create an alternative manure management program to provide additional funding and grants to farmers for non-digester manure and methane management strategies to reduce emissions, including conversion of non-pasture dairy and livestock operations to pasture-based management and alternative manure treatment and storage practices” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 355)
- “Congress should direct USDA to increase research and development to examine different feeds and feed additives and their impact on methane emissions from enteric fermentation” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 356)
- “Congress should move AgSTAR from EPA to USDA to increase farmer access and engagement” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 357)

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; [Evergreen Action](#); [Vision for Equitable Climate Action](#); Elizabeth Warren 2020 Presidential Campaign; [H.R. 5861, the Agriculture Resilience Act](#); <sup>472</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### LPDD Recommendations:

- EPA or USDA should consider imposing regulatory methane emissions limits for concentrated animal facilities. ([LPDD](#), p. 804)
- BLM could retain its rule for reducing gas waste and take further action to address methane emissions from oil and gas production on public land. ([LPDD](#), p. 884)
- The federal government should adopt a program to fund gas management systems at both municipal and private landfills, and prioritize awards to landfills investing in landfill gas-to-energy systems. ([LPDD](#), p. 896)
- Congress could authorize environmental agencies to regulate methane emissions from manure management. ([LPDD](#), p. 895)

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<sup>472</sup> Agricultural Resilience Act. H.R. 5861, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5861?s=1&r=3>

- EPA could consider adoption of new methane regulations for existing oil and gas facilities. EPA or BLM could adopt regulations to control methane emissions from active and abandoned coal mines. ([LPDD](#), p. 890)
- EPA could revise its RCRA regulations to prevent landfill operators from venting methane to the atmosphere. ([LPDD](#), p. 898)
- Congress should prioritize funding for gas capture at landfills and other facilities in lieu of wastewater treatment plants. ([LPDD](#), p. 899)
- EPA, with state environmental agencies, could establish a clearinghouse for the exchange of information about gas capture systems, including their costs and benefits. ([LPDD](#), p. 899)
- EPA could adopt a regulation for methane emissions from wastewater treatment facilities. ([LPDD](#), p. 900)
- USDA could provide funding for, and otherwise support, research into new methane emissions reduction techniques from enteric fermentation. ([LPDD](#), p. 891)

#### LPDD Resources:

- LPDD.org, “Methane”: <https://lpdd.org/pathway/methane/>

#### Previous/Current Implementation

- The state of California has passed legislation to reduce methane emissions, including a [program](#) that incentivizes the use of dairy digesters and a [policy](#)<sup>473</sup> that requires the state’s investor-owned utilities to procure at least 90 MW of electricity generated at agricultural biogas facilities.
- The EPA has coordinated a [voluntary program](#)<sup>474</sup> that supports farmers and industry in the development and adoption of anaerobic digester systems.
- [EQIP](#) and the Rural Energy for America Program ([REAP](#)) currently include financial assistance for installing anaerobic digesters through cost-share, grants, and loans.
- The [AgSTAR](#) program is an EPA initiative that promotes the use of biogas recovery systems to reduce methane emissions from livestock waste

#### Impact on GHGs

- In 2009, U.S. agricultural sources produced 215.9 million metric tons of methane ([EIA](#)).<sup>475</sup>
- If all emissions from livestock reduce by 10% by 2050, which Energy Innovation states would be the outcome of full livestock management implementation, then U.S. emissions would reduce by 1.2% in 2050 compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

#### Co-Benefits

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<sup>473</sup> An act to amend Section 399.20 of the Public Utilities Code, relating to energy. S.B. 1122. 2012. <https://perma.cc/PBG5-8W2M>

<sup>474</sup> “Got Manure? Want Energy? We Can Help!” *AgStar*. [https://lpdd.org/wp-content/uploads/2020/03/agstar\\_trifold\\_bochure.pdf](https://lpdd.org/wp-content/uploads/2020/03/agstar_trifold_bochure.pdf)

<sup>475</sup> “Emissions of Greenhouse Gases in the United States.” *U.S. Energy Information Administration*. March 31, 2011. [https://www.eia.gov/environment/emissions/ghg\\_report/ghg\\_methane.php](https://www.eia.gov/environment/emissions/ghg_report/ghg_methane.php)

- Anaerobic digesters “generate products for use on the farm, such as animal bedding and high quality fertilizer” (EPA).<sup>476</sup>
- Anaerobic digesters also reduce odors and pathogens that are common with manure storage and the digested manure can be used as a fertilizer. ADs have the potential to generate 5.5% of U.S. electricity ([Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy](#)).<sup>477</sup>

### Obstacles/Shortfalls

- Anaerobic digesters have high capital costs ([Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy](#)).<sup>478</sup>
- The EPA currently exempts<sup>479</sup> livestock operations from reporting their emissions. Several proposals, such as Elizabeth Warren’s,<sup>480</sup> aimed to reverse this ban.

### Additional Resources

- Buddle, Bryce M., et al. “Strategies to Reduce Methane Emissions from Farmed Ruminants Grazing on Pasture.” *The Veterinary Journal*, Vol. 188, No. 1. April 2011.  
[https://www.sciencedirect.com/science/article/pii/S1090023310000821?casa\\_token=Y8fDZrzPw4QAAAAA:WosTBqRCicOoOG5SjbcWdHZ-WPoBGlv8mTBxXEyHBMLibcMKtK7lS-L4PxBus7jN2o2YKZkOo](https://www.sciencedirect.com/science/article/pii/S1090023310000821?casa_token=Y8fDZrzPw4QAAAAA:WosTBqRCicOoOG5SjbcWdHZ-WPoBGlv8mTBxXEyHBMLibcMKtK7lS-L4PxBus7jN2o2YKZkOo)
- Romany M. Webb, Climate change, FERC, and Natural Gas Pipelines: The Legal Basis for Considering Greenhouse Gas Emissions Under Section 8 of the Natural Gas Act, 28 N.Y.U. Envtl. L.J. 174 (2020),  
[https://climate.law.columbia.edu/sites/default/files/content/Webb\\_Climate%20Change%2C%20FERC%20%26%20Natural%20Gas%20Pipelines.pdf](https://climate.law.columbia.edu/sites/default/files/content/Webb_Climate%20Change%2C%20FERC%20%26%20Natural%20Gas%20Pipelines.pdf)
- Romany M. Webb, PHMSA’s Covid-19 Policy Could Lead to a Spike in Methane Emissions, Columbia Climate Law Blog, April 8, 2020,  
<http://blogs.law.columbia.edu/climatechange/2020/04/08/phmsas-covid-19-policy-could-lead-to-a-spike-in-methane-emissions/>
- Romany M. Webb, The Status of Methane Regulation in the United States, Columbia Climate Law Blog, January 21, 2020, <http://blogs.law.columbia.edu/climatechange/page/4/>

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<sup>476</sup> “Environmental Benefits of Anaerobic Digestion.” *U.S. Environmental Protection Agency*.

<https://www.epa.gov/anaerobic-digestion/environmental-benefits-anaerobic-digestion-ad#ManureMngmt>

<sup>477</sup> Zaks, David P. M., Winchester, Niven, Kucharik, Christopher J., Barford, Carol C., Paltsev, Sergey and Reilly, John M. Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy. *Environ. Sci. Technol.* 2011. <https://pubs.acs.org/doi/abs/10.1021/es104227y>

<sup>478</sup> Zaks, David P. M., Winchester, Niven, Kucharik, Christopher J., Barford, Carol C., Paltsev, Sergey and Reilly, John M. Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy. *Environ. Sci. Technol.* 2011. <https://pubs.acs.org/doi/abs/10.1021/es104227y>

<sup>479</sup> Amendment to Emergency Release Notification Regulations on Reporting Exemption for Air Emissions from Animal Waste at Farms; Emergency Planning and Community Right-to-Know Act. *US Environmental Protection Agency*. [https://www.epa.gov/sites/production/files/2018-10/documents/proposed\\_epcra\\_amendment\\_signed\\_10-30-18.pdf](https://www.epa.gov/sites/production/files/2018-10/documents/proposed_epcra_amendment_signed_10-30-18.pdf)

<sup>480</sup> “Tackling the Climate Crisis Head On.” *ElizabethWarren.Com*. <https://elizabethwarren.com/plans/climate-change#sustainable-agriculture>

## Nitrous Oxide

### Description

Policies to reduce nitrous oxide emissions from agriculture, including from synthetic nitrogen fertilizer:

- “The preservation, restoration, and conservation of freshwater and marine wetlands and peatlands is necessary to provide efficient sinks for greenhouse gases such as ... nitrous oxide” ([Vision for Equitable Climate Action](#), p. 20).
- “Congress should also draft legislation to reduce nitrous oxide emissions from soil management activities by (1) increasing NRCS resources and partnerships to improve and expand implementation of the Conservation Practice Standard for Nutrient Management... (2) expanding research, development, and deployment of precision agriculture technologies to apply fertilizer more efficiently; (3) directing USDA to make and enhance crop- and region-specific recommendations for farmers to increase adoption of nutrient management strategies, and develop and distribute literature and educational materials on nutrient management to improve nutrient use efficiency, reduce emissions, and improve water quality; (4) directing USDA to prioritize nutrient management outreach, technical assistance, and financial incentives in areas with soil types that are prone to high nitrogen loss; and (5) providing technical and financial assistance for farmers to adopt climate-smart alternatives to synthetic fertilizer, such as crop rotation, cover cropping, and the use of non-synthetic fertilizers such as compost” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 354).

Proposed by: [Vision for Equitable Climate Action](#) (p. 20); [Evergreen Action Plan](#) (p. 34); [H.R. 4269/S. 2452, the Climate Stewardship Act of 2019](#); <sup>481</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### LPDD Recommendations

- EPA should continue to use its authority under CAA §202 to regulate mobile sources of nitrous oxide emissions, and should introduce more stringent nitrous oxide emission caps for new motor vehicle fleets. ([LPDD](#), p. 927)
- EPA should seek to regulate nitrous oxide emissions from agriculture and livestock through management standards, rather than direct emission caps, due to the complexities of monitoring, verifying, and enforcing compliance with emissions caps for these sectors. EPA should use its authority under CAA §§115, 615, or 111 to establish emission caps or performance standards for stationary sources of nitrous oxide emissions, particularly power plants and nitric acid facilities. ([LPDD](#), pp. 930, 936)
- EPA should use its authority under CAA §§115 or 615 to issue nationwide regulations respecting the control of nitrous oxide emissions from agricultural soil management and livestock. ([LPDD](#), p. 933)

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<sup>481</sup> The Climate Stewardship Act of 2019. H.R. 4269/S. 2452, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/house-bill/4269/related-bills?q=%7B%22search%22%3A%5B%22Climate+stewardship+act%22%5D%7D&r=1>



- When setting emissions caps for stationary sources such as power plants and industrial facilities, EPA should account for nitrous oxide emissions from the sources. (LPDD, p. 935)
- Federal agricultural and environmental agencies should invest in technical support programs aimed at educating farmers about “win-win” measures—specifically, management strategies that improve nitrogen use efficiency, reduce fertilizer requirements, and reduce nitrous oxide emissions. (LPDD, p. 938)
- Congress or USDA should offer subsidized federal crop insurance and voluntary certification programs to farmers who voluntarily implement best management practices for nitrogen use efficiency. (LPDD, p. 939)
- Federal agencies should work in cooperation with private entities on the development of protocols or standards for best management practices for controlling nitrous oxide emissions. (LPDD, p. 939)

#### LPDD Resources

- LPDD.org, “Nitrous Oxide”: <https://lpdd.org/pathway/nitrous-oxide/>

#### Previous/Current Implementation

- Most wetland protection is implemented through Section 404 of the Clean Water Act, which restricts the discharge of materials into oceans and wetlands. Several agencies oversee wetland regulations, while many states have enacted their own wetland protection programs. Most programs focus on water quality monitoring and regulation ([State Wetland Program Evaluation](#), p. 5).<sup>482</sup>
- New Jersey<sup>483</sup> and New Hampshire<sup>484</sup> have set nitrogen concentration limits for different types of fertilizer.
- [Several states’ watershed implementation plans](#)<sup>485</sup> encourage farmers to adopt best practices including cover crops, forest buffers, and nutrient management plans.
- Delaware,<sup>486</sup> Maryland,<sup>487</sup> and Maine<sup>488</sup> have passed nutrient management laws, regulating farmer use and application of manure.
- USDA programs such as EQIP and CSP provide technical and financial assistance to farmers who implement pro-environment practices.

#### Impact on GHGs

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<sup>482</sup> Environmental Law Institute. State Wetland Program Evaluation: Phase I. January 2005. [https://www.eli.org/sites/default/files/eli-pubs/d15\\_06.pdf](https://www.eli.org/sites/default/files/eli-pubs/d15_06.pdf)

<sup>483</sup> “Healthy Lawns Healthy Water.” *State of New Jersey Department of Environmental Protection*. <https://www.nj.gov/dep/healthylawnshealthywater/>

<sup>484</sup> New Hampshire Law RSA: 431. 2015. <http://www.gencourt.state.nh.us/rsa/html/XL/431/431-mrg.htm>

<sup>485</sup> “Chesapeake Bay Watershed Implementation Plans.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/resources/chesapeake-bay-watershed-implementation-plans/>

<sup>486</sup> “Nutrient Management.” *State of Delaware*. <https://delcode.delaware.gov/title3/c022/>

<sup>487</sup> “Nutrient Management Law and Regulations Overview.” *Maryland Department of Agriculture*. [https://mda.maryland.gov/resource\\_conservation/Pages/nutrient\\_management\\_overview.aspx](https://mda.maryland.gov/resource_conservation/Pages/nutrient_management_overview.aspx)

<sup>488</sup> “Agricultural Compliance and Nutrient PManagement.” *Maine Gov*. [https://www.maine.gov/dacf/php/nutrient\\_management/statutes\\_rules.shtml](https://www.maine.gov/dacf/php/nutrient_management/statutes_rules.shtml)

Protecting and restoring U.S. wetlands, which is one way to reduce nitrous oxide emissions, could lead to 34 Tg in avoided GHG emissions per year ([Supplementary Materials for Natural Climate Solutions for the United States](#), p. 71).<sup>489</sup>

### Co-Benefits

- Nutrient Management Plan benefits include: maintenance of optimum conditions for crop growth, protection of local and regional water resources, and enhancement of farm profitability ([UMD](#)).<sup>490</sup>

### Additional Resources

- Nutrient and Pest Management Program, University of Wisconsin-Extension and University of Wisconsin-Madison. “What Is A Farm Nutrient Management Plan?” [https://ipcm.wisc.edu/download/pubsNM/what\\_is\\_NMP.pdf](https://ipcm.wisc.edu/download/pubsNM/what_is_NMP.pdf)
- Woodbury, Peter and Wightman, Jenifer. “Nitrogen Fertilizer Management & Greenhouse Gas Mitigation Opportunities.” Cornell University. Accessed July 2020. <http://climatesmartfarming.org/wp-content/uploads/2019/02/Nitrogen-Fertilizer-Management.pdf>
- Climate Change Connection. “Farming in a Changing Climate in Manitoba: A Guide to Sustainable Cropping Systems.” 2013. [https://climatechangeconnection.org/wp-content/uploads/2014/08/CCC\\_Crop\\_Guide\\_2013.pdf](https://climatechangeconnection.org/wp-content/uploads/2014/08/CCC_Crop_Guide_2013.pdf)

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<sup>489</sup> Fargione, Joseph E., et al. Supplementary Materials for Natural Climate Solutions for the United States. *Science Advances*, vol. 4. 2018.

[https://advances.sciencemag.org/content/advances/suppl/2018/11/09/4.11.eaat1869.DC1/aat1869\\_SM.pdf](https://advances.sciencemag.org/content/advances/suppl/2018/11/09/4.11.eaat1869.DC1/aat1869_SM.pdf)

<sup>490</sup> “What is a Nutrient Management Plan?” *University of Maryland Extension*. <https://extension.umd.edu/charles-county/nutrient-management/what-nutrient-management-plan>

## ENVIRONMENTAL JUSTICE

### Energy Affordability

#### Description

- “The next President and Congress should establish a new Universal Clean Energy Service Fund (UCESF), overseen by DOE, to reduce energy bills for working families. Modeled on the Universal Service Fund that promotes universal access to telecommunications services, this new program will be integral to improving protection of ratepayers and restructuring how energy is used at the community level” ([Evergreen Action Plan](#), p. 28).
- “Directs the Secretary of Energy to establish a program to provide loans and grants to eligible entities to construct or install community solar facilities or solar generating facilities to serve multi-family affordable housing” (CLEAN Future Act, [Summary](#) p. 6).
- “We will expand the Low-Income Home Energy Assistance Program (LIHEAP) by \$25 billion to help low-income families pay their heating and cooling bills. Additionally, the program will be expanded to provide 10 percent of program costs for maintenance of new efficient heating and cooling systems and technical assistance for the installation and use of new furnaces, heat pumps, boilers, and other upgrades for the duration of the 10-year transition” ([Bernie Sanders 2020 Presidential Campaign](#)).
- “Congress should direct DOE to create financing programs to expand access for low-income Americans to residential and community solar energy projects, particularly in conjunction with affordable housing developments. In developing these policies, Congress should solicit early input from the communities they are designed to benefit” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 77).
- “Congress should provide technical assistance and funding through USDA to deploy resilient renewable energy and microgrid systems in U.S. territories, including American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, Puerto Rico and the U.S. Virgin Islands. Congress should authorize federal agencies to issue waivers to territories for matching fund requirements under these and other climate-related existing grant programs” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 79).

Proposed by: [Evergreen Action](#); [CLEAN Future Act](#) (summary p. 6); [Energy Innovation](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 76); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Bernie Sanders 2020 Presidential Campaign](#); [Low-Income Solar Energy Act \(H.R. 4291\)](#)<sup>491</sup>

#### Previous/Current Implementation

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<sup>491</sup> Low-Income Solar Energy Act. H.R. 4291, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4291/text>

- Many states have similar public benefits funds to prevent utility shut-offs and hardship for low-income, elderly or other vulnerable groups, including small businesses ([Approaches To Low-income Energy Assistance Funding In Selected States](#)).<sup>492</sup>
- Shared renewable energy programs allowing multiple customers to invest in a medium-sized renewable energy facility and directly benefit from the energy produced. Several states have legislatively earmarked a portion of shared renewable energy systems for LMI customers, including California, Colorado, Maryland, New York, Oregon and Rhode Island ([Energy Efficiency and Renewables in Low-Income Homes](#)).<sup>493</sup>
- The federal Low-Income Home Energy Assistance Program ([LIHEAP](#))<sup>494</sup> overseen by the Department of Health & Human Services (HHS), is the current primary federal vehicle for helping low-income families pay their energy bills for home heating. LIHEAP funding has been severely reduced and is only currently sufficient to fund one out of five eligible households.
- DOE Weatherization Assistance Program ([WAP](#))<sup>495</sup> supports energy-saving building retrofits for low-income renters and homeowners working through states and non-profit community service organizations.
- The U.S. Department of Energy Clean Energy for Low Income Communities Accelerator (CELICA) was a two-year partnership with over 30 local partners from the government, utility and nonprofit sectors, with support from 10 national partners. CELICA partners leveraged commitments of \$335 million to help 155,000 low-income households access energy efficiency and renewable energy benefits ([Energy.gov](#)).<sup>496</sup>

### Impact on GHGs

Energy affordability reduces greenhouse gas emissions by allowing more consumers to use renewable energy.

### Co-Benefits

Increased renewable energy usage improves air quality and reduces the harmful health impacts of fossil fuel combustion. In addition, reducing energy costs for low-income residents can provide economic benefits, including by increasing purchasing power.

### Obstacles/Shortfalls

“Many low-income homes face issues such as mold, leaky roofs, asbestos, and other deteriorated conditions that can prevent providers from delivering energy efficiency improvements. Studies

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<sup>492</sup> Landey, Alana and Yuliya, Rza. Approaches To Low-income Energy Assistance Funding In Selected States. ASPE. March 1, 2014. [https://aspe.hhs.gov/basic-report/approaches-low-income-energy-assistance-funding-selected-states#\\_edn12](https://aspe.hhs.gov/basic-report/approaches-low-income-energy-assistance-funding-selected-states#_edn12)

<sup>493</sup> Durkay, Jocelyn. Energy Efficiency and Renewables in Low-Income Homes. National Conference of State Legislatures. February 2017. <https://www.ncsl.org/research/energy/energy-efficiency-and-renewables-in-lower-income-homes.aspx>

<sup>494</sup> “Low Income Home Energy Assistance Program.” *U.S. Department of Health and Human Services*. <https://www.acf.hhs.gov/ocs/programs/liheap>

<sup>495</sup> “Weatherization and Assistance Program.” *Office of Energy Efficiency and Renewable Energy*. <https://www.energy.gov/eere/wap/weatherization-assistance-program>

<sup>496</sup> “Low Income Community Energy Solutions.” *Office of Energy Efficiency & Renewable Energy*. Energy.Gov. <https://www.energy.gov/eere/slsc/low-income-community-energy-solutions>

show that, nationwide, up to 15 percent of homes may be unable to access weatherization services due to these and other health and safety issues. ... A lack of comprehensive data on demographics, energy usage, and program statistics can make it difficult to design and deliver effective programs to households that need services most.” (Environmental Defense Fund. [Low-Income Energy Efficiency](#)).<sup>497</sup>

#### Additional Resources

- Bagley, Katherine. Why Low-Income Households Need to Be Part of the Clean Energy Revolution. *Yale Environment 360*. May 16, 2019.  
<https://e360.yale.edu/features/why-low-income-households-need-to-be-part-of-the-clean-energy-revolution>
- “3 New Tools for Advancing Energy Affordability in Low Income Communities.” Office of Energy Efficiency and Renewable Energy. January 10, 2018.  
<https://www.energy.gov/eere/articles/3-new-tools-advancing-energy-affordability-low-income-communities>
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<https://www.ncsl.org/research/energy/energy-efficiency-and-renewables-in-lower-income-homes.aspx>
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<https://info.ornl.gov/sites/publications/Files/Pub124723.pdf>
- Environmental Defense Fund. “Low-Income Energy Efficiency.” February 2018.  
[https://www.edf.org/sites/default/files/documents/liee\\_national\\_summary.pdf](https://www.edf.org/sites/default/files/documents/liee_national_summary.pdf)

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<sup>497</sup> Environmental Defense Fund. Low-Income Energy Efficiency. February 2018.  
[https://www.edf.org/sites/default/files/documents/liee\\_national\\_summary.pdf](https://www.edf.org/sites/default/files/documents/liee_national_summary.pdf)

## Facility Siting Issues

(See also Energy Production: Renewable Energy Siting)

### Description

- “Direct the EPA to require buffer zones between air pollution infrastructure such as industrial sites, oil and gas infrastructure, landfills, pesticide-dependent agricultural land, and power plants, and vulnerable sites such as homes, schools, and hospitals” ([DNC Environment and Climate Crisis Council](#), p. 9).
- Provide technical assistance grants to local communities to help them participate in federal regulatory decision-making processes regarding waste disposal and air permits ([CLEAN Future Act](#)).
- “Must focus on solar ownership for people in low-income communities. Energy from environmental justice areas is being sold to larger solar developers for profit. We need to focus on local ownership of renewable energy assets to reduce energy burden” (A State Approach to a Just Transition Webinar 2020).<sup>498</sup>

Proposed by: [Evergreen Action](#); [DNC Environment and Climate Crisis Council](#); [H.R. 2181/S. 1079, the Chaco Cultural Heritage Area Protection Act of 2019](#);<sup>499</sup> [CLEAN Future Act](#)

### Previous/Current Implementation

- New Jersey imposes an unstandardized mandatory buffer zone between a facility site and neighboring land use ([Facility Siting and Initial Preparation](#), *NJ.Gov*).<sup>500</sup>
- The City of Dublin, California requires a minimum buffer zone of at least 2,000 feet between the nearest residential designated property and the facility site ([Hazardous Waste Facilities Location Procedure](#), City of Dublin, California Municipal Codes).<sup>501</sup>

### Co-Benefits

Buffer zones reduce adverse health outcomes (including adverse pregnancy outcomes, childhood cancers and cardiovascular, respiratory, and other chronic diseases) associated with proximity to polluting facility sites ([Proximity to Environmental Hazards: Environmental Justice and Adverse Health Outcomes](#)).<sup>502</sup>

### Additional Resources

- Energy Facilities Siting. Sierra Club.  
<https://www.sierraclub.org/policy/energy/energy-facilities>

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<sup>498</sup> Baker, Shalanda, et al. A State Approach to a Just Transition Webinar. Environmental Law Institute. July 10, 2020.

<sup>499</sup> The Chaco Cultural Heritage Area Protection Act of 2019. H.R. 2181/S. 1079, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/house-bill/2181/all-info>

<sup>500</sup> “Facility Siting and Initial Preparation.” *NJ.Gov*. <https://www.nj.gov/dep/dshw/rrtp/compost/facprep.htm>

<sup>501</sup> Hazardous Waste Facilities Location Procedure. City of Dublin, California Municipal Codes.  
<https://www.codepublishing.com/CA/Dublin/html/Dublino8/Dublino86o.html>

<sup>502</sup> Maantay, Juliana, Chakraborty, Jayajit, and Brender, Jean. Proximity to Environmental Hazards: Environmental Justice and Adverse Health Outcomes. U.S. Environmental Protection Agency. May 2010.  
<https://archive.epa.gov/ncer/ej/web/pdf/brender.pdf>





## Site Cleanup

### Description

- “We will recommit America to the task of protecting our citizens from dangerous pollution and work to clean our air, our water, and eliminate toxins emitted from port facilities, which disproportionately harm low-income communities and communities of color” ([Biden-Sanders Unity Task Force Recommendations](#), p. 3).
- “Democrats will create an environmental justice fund to make historic investments across federal agencies aimed at eliminating legacy pollution, which disproportionately causes illness and premature death in communities of color, low-income communities, and indigenous communities, including protecting children’s health by replacing lead service lines and remediating lead paint in homes and schools; remediating Superfund and other contaminated sites; and ensuring housing and schools have adequate plumbing and safe wastewater disposal systems” ([Biden-Sanders Unity Task Force Recommendations](#), p. 4).
- “We must not only clean up existing blighted sites, but as we transition away from fossil fuels, we must ensure no infrastructure is abandoned in a way that would create health or safety dangers for the surrounding community. We will spend \$100 billion on fossil fuel well and mine cleanup” ([Bernie Sanders 2020 Presidential Campaign](#)).
- “We will clean up and repair thousands of contaminated sites. We will invest \$238 billion to clean up Superfund sites and \$150 billion to clean up and revitalize Brownfields, and other areas and communities that have been polluted by the fossil fuel, chemical and mining industries” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Biden-Sanders Unity Task Force](#); [Bernie Sanders 2020 Presidential Campaign](#); [Evergreen Action](#) (p. 43); [DNC Environment and Climate Crisis Council](#) (p. 11); [Vision for Equitable Climate Action](#) (p. 10); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) (p. 398)

### Previous/Current Implementation

- “Today, nearly 1,400 Superfund sites remain to be decontaminated, and as of 2015, approximately 53 million Americans lived within 3 miles of a final, deleted, or proposed Superfund site, including 40% and 27% overrepresentations of African-Americans, and Latinx-Americans, respectively” ([Evergreen Action Plan](#), p. 43).
- The ReGenesis Foundation<sup>503</sup> develops and implements programs focused on helping communities address environmental injustices through proper cleanup of polluted and hazarded areas, redevelopment and revitalization of local housing and business sectors, and providing proper healthcare access and options. “The [ReGenesis Project](#) project, in South Carolina, is a model for the country and a symbol that hard work and strategic investment by the federal government, driven by local priority-setting, can meet ambitious environmental goals today” ([Evergreen Action Plan](#), p. 43).
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<sup>503</sup> ReGenesis. <http://rcdc.us/>

## Air Conditioning For Public Housing And Low-income Households

### Description

Policies to provide air conditioning for residents of public housing or low-income households for free or at a reduced cost.

### Previous/Current Implementation

Many states provide eligible households with free air conditioners or fans. New York's [Cooling Assistance Home Energy Assistance Program](#)<sup>504</sup> (HEAP) provides one air conditioner or fan, not exceeding \$800 including installation, per applicant household. Other state cooling assistance programs: [State and Territory Cooling Programs](#).<sup>505</sup>

### Co-Benefits

One [study](#)<sup>506</sup> found income or poverty to be related to heat-associated mortality in the U.S. at the neighborhood level and the community level. Cooling assistance reduces the risk of heat-related illnesses for low income residents.

### Obstacles/Drawbacks

Increased air conditioning usage increases electricity usage, which can increase greenhouse gas emissions if sourced from fossil fuels.

### Other Resources

Michael B. Gerrard, "Heat Waves: Legal Tools to Address the Most Lethal Climate Problem (So Far)," 40 U. Ark. L. Rev. 515 (2018), [https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=3324&context=faculty\\_scholarship](https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=3324&context=faculty_scholarship)

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<sup>504</sup> "Home Energy Assistance Program (HEAP)." *New York State Office of Temporary and Disability Assistance*. <https://otda.ny.gov/programs/heap/>

<sup>505</sup> "State & Territory Cooling Programs." *U.S. Department of Health and Human Services*. <https://liheapch.acf.hhs.gov/tables/cooling.htm>

<sup>506</sup> Gronlund, Carina J. Racial and socioeconomic disparities in heat-related health effects and their mechanisms: a review. *Curr Epidemiol Rep*. 2014. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4264980/>

## Utility Disconnections

### Description

- “Place a moratorium on essential utility service disconnections” ([Vision for Equitable Climate Action](#), p. 7).
- Establish simple procedures for socially vulnerable groups to apply and be registered for protection from disconnection. Include seasonal protections with both temperature and date-based solutions ([NAACP](#), p. v).<sup>507</sup>

Proposed by: [Vision for Equitable Climate Action](#); [NAACP](#)

### Previous/Current Implementation

- During the COVID-19 pandemic, a [number of states](#)<sup>508</sup> placed moratoriums on utility disconnections for customers facing financial hardship.
- “All states require utility companies to provide a ... notice before a disconnection. Some states will not disconnect during certain hours of days of the week, while other states will not disconnect before or during a holiday. ... Date-based protections take place during the colder months, usually between the months of November and March or April. Temperature protections are based on various ranges of hot and cold temperatures that could place residents in danger. ... Nine states do not provide any state regulated seasonal protections for utility customers. These states include: Alaska, California, Colorado, Connecticut, Florida, North Dakota, Oregon, Tennessee, and Virginia” ([Lights Out in the Cold: Reforming Utility Shut-Off Policies as if Human Rights Matter](#). NAACP).<sup>509</sup>

### Co-Benefits

Protections against utility disconnections ensure access to essential electricity for low-income households. In the summer, assured access to air conditioning can prevent heat-related illness, particularly as climate change continues to increase temperatures ([Utility Disconnections Leave Thousands Around the Nation “Out in the Cold” or Left in the Dark](#). NAACP).<sup>510</sup>

### Additional Resources

Environmental Climate and Justice Program, NAACP. “Lights Out in the Cold: Reforming Utility Shut-Off Policies as if Human Rights Matter.” March 2017  
[https://www.naacp.org/wp-content/uploads/2017/12/Lights-Out-in-the-Cold\\_NAACP.pdf](https://www.naacp.org/wp-content/uploads/2017/12/Lights-Out-in-the-Cold_NAACP.pdf)

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<sup>507</sup> Environmental Climate and Justice Program, NAACP. “Lights Out in the Cold: Reforming Utility Shut-Off Policies as if Human Rights Matter.” March 2017. [https://www.naacp.org/wp-content/uploads/2017/12/Lights-Out-in-the-Cold\\_NAACP.pdf](https://www.naacp.org/wp-content/uploads/2017/12/Lights-Out-in-the-Cold_NAACP.pdf)

<sup>508</sup> “State Response Tracker.” *National Association of Regulatory Utility Commissioners*.  
<https://www.naruc.org/compilation-of-covid-19-news-resources/state-response-tracker/>

<sup>509</sup> NAACP. “Lights Out in the Cold.” [https://www.naacp.org/wp-content/uploads/2017/12/Lights-Out-in-the-Cold\\_NAACP.pdf](https://www.naacp.org/wp-content/uploads/2017/12/Lights-Out-in-the-Cold_NAACP.pdf)

<sup>510</sup> Utility Disconnections Leave Thousands Around the Nation “Out in the Cold” or Left in the Dark. NAACP. March 31, 2017. <https://www.naacp.org/latest/utility-disconnections-leave-thousands-around-nation-cold-left-dark/>

## Right to Food

### Description

- “Secure the right to food, ensuring that economically disadvantaged areas, communities of color, and climate-impacted communities have access to healthy food” ([Vision for Equitable Climate Action](#), p. 11).
- Provide targeted government programs to low-income populations and communities of color that will guarantee the right to healthy and affordable food; increase funding for nutrition assistance programs; create economic opportunities and incentives for locally owned businesses to carry affordable, fresh, and healthy foods within food deserts ([Haas Institute for a Fair and Inclusive Society](#), p. 7).<sup>511</sup>
- “Congress should establish a commission with representatives from USDA, EPA, tribal nations, environmental justice communities, and NGOs to develop a comprehensive framework to build an equitable and just climate-friendly food system. This framework should address federal policies and programs aimed at ... increasing access to healthy, fresh, and culturally appropriate foods” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 368).
- “Because the cost of energy and food are so intertwined, we will provide \$215.8 billion for free, universal school meals, including breakfast, lunch and snacks. We will expand the Supplemental Nutrition Assistance Program (SNAP) by \$311 billion to increase the benefits from the ‘thrifty’ plan which provides inadequate benefits to the more generous ‘low-cost’ food plan, include those with incomes up to 200 percent of the federal poverty line, remove punitive work requirements, remove barriers for college students to access SNAP, and ensure people are not denied benefits due to past interaction with the criminal justice system. We will also expand the SNAP program and benefits to the people of Puerto Rico, the Northern Mariana Islands, and American Samoa so they are on par with the benefits in the continental United States” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Vision for Equitable Climate Action](#); [Green New Deal](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Bernie Sanders 2020 Presidential Campaign](#); [Joe Biden 2020 Presidential Campaign](#) - COVID-19

### Previous/Current Implementation

- The right to food was first recognized as a human right in the Universal Declaration of Human Rights (Article 25) in 1948. “There are now 170 States Parties (as of January 2020) to the International Covenant on Economic, Social and Cultural Rights. This is a binding agreement, which provides a legal guarantee for the fundamental right to be free from hunger as well as the progressive realization of the right to adequate food (Article 11)” ([FAO.Org](#)).<sup>512</sup>

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<sup>511</sup> Elsheikh, Elsadig and Barhoum, Nadia. Structural Racialization and Food Insecurity in the United States: A Report to the U.N. Human Rights Committee on the International Covenant on Civil and Political Rights. Haas Institute for a Fair and Inclusive Society, University of California, Berkeley. December 2011. <https://haasinstitute.berkeley.edu/sites/default/files/Structural%20Racialization%20%20%26%20Food%20Insecurity%20in%20the%20US-%28Final%29.pdf>

<sup>512</sup> “Right to Food.” [FAO.Org](#). <http://www.fao.org/policy-support/policy-themes/right-to-food/en/>

- The Food and Nutrition Service (FNS) under the USDA is a federal agency that focuses on giving nutritional aid to people that are suffering from food insecurity. The FNS provides service to 1 in 5 Americans, and currently has 15 domestic nutrition assistance programs. For example, the [Supplemental Nutrition Assistance Program](#)<sup>513</sup> (SNAP) provides assistance for low- and no-income people in the United States. [The National School Lunch Program \(NSLP\)](#)<sup>514</sup> provides low-cost or free lunches to eligible students in public and nonprofit private schools and residential child care institutions ([ESRI](#)).<sup>515</sup>

### Co-Benefits

Food-security provides economic and health benefits. The Supplemental Nutrition Assistance Program (SNAP) has been found to improve current and long-term health among low-income families as well as reduce health care costs by about \$1,400, or nearly 25 percent, per year per low-income adult ([Center on Budget and Policy Priorities](#)).<sup>516</sup>

### Obstacles/Shortfalls

- Climate change will increase food insecurity unless mitigation measures are taken ([IPCC](#)).<sup>517</sup>
- A lack of food security stems from income inequality and structural racialization. Eliminating food insecurity will thus require substantial structural changes ([Structural Racialization and Food Insecurity in the United States: A Report to the U.N. Human Rights Committee on the International Covenant on Civil and Political Rights](#)).<sup>518</sup>

### Additional Resources

- “U.S. Policy in Food and Nutrition.” *Mitigating the Nutritional Impacts of the Global Food Price Crisis*. 2010.  
<https://www.nap.edu/read/12698/chapter/9#137>
- Food and Agriculture Organization of the United Nations. “Strengthening Sector Policies for Better Food Security and Nutrition Results.” 2017.  
<http://www.fao.org/3/a-i7214e.pdf>

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<sup>513</sup> “Supplemental Nutrition Assistance Program (SNAP).” *USDA*. <https://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program>

<sup>514</sup> “National School Lunch Program.” *USDA*. <https://www.fns.usda.gov/nslp>

<sup>515</sup> “Food Security Policies in the United States.” *ESRI*.  
<https://www.arcgis.com/apps/Cascade/index.html?appid=f2dcad744fa948699967661c45d21604>

<sup>516</sup> Carlson, Steven and Keith-Jennings, Brynne. “SNAP is Linked with Improved Nutritional Outcomes and Lower Health Care Costs.” *Center on Budget and Policy Priorities*. January 17, 2018.  
<https://www.cbpp.org/sites/default/files/atoms/files/1-17-18fa.pdf>

<sup>517</sup> Intergovernmental Panel on Climate Change. *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emissions Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. 2018. [https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15\\_SPM\\_version\\_stand\\_alone\\_LR.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf)

<sup>518</sup> Elsheikh, Elsadig and Barhoum, Nadia. *Structural Racialization and Food Insecurity in the United States: A Report to the U.N. Human Rights Committee on the International Covenant on Civil and Political Rights*. Haas Institute for a Fair and Inclusive Society, University of California, Berkeley. December 2011.  
<https://haasinstitute.berkeley.edu/sites/default/files/Structural%20Racialization%20%20%26%20Food%20Insecurity%20in%20the%20US-%28Final%29.pdf>

- Chilton, Mariana and Rose, Donald. “A Rights-Based Approach to Food Insecurity in the United States.” *Am J Public Health*. July 2009.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2696644/>
- Elsheikh, Elsadig and Barhoum, Nadia. “Structural Racialization and Food Insecurity in the United States: A Report to the U.N. Human Rights Committee on the International Covenant on Civil and Political Rights.” Haas Institute for a Fair and Inclusive Society, University of California, Berkeley. December 2011.  
<https://haasinstitute.berkeley.edu/sites/default/files/Structural%20Racialization%20%20%26%20Food%20Insecurity%20in%20the%20US-%28Final%29.pdf>
- Coleman-Jensen, Alisha, et al. “Household Food Insecurity in the United States in 2018.” *United States Department of Agriculture*. September 2019.  
<https://www.ers.usda.gov/webdocs/publications/94849/err-270.pdf?v=8869>

## JUST TRANSITION

### Economic Transition for Affected Communities

#### Description

- “To ensure that communities that bore the cost of resource extraction are first in line to receive the benefits from new investment in a clean energy economy, the next President should establish two stable long-term funds: a Re-Power Fund to invest in bottom-up, locally driven economic and workforce development, and a Restore Fund, focused on creating good jobs through site cleanup, environmental remediation and ecological restoration” ([Evergreen Action Plan](#), p. 38).
- “Provide transition benefits for workers displaced from extractive industries, including wage and benefit extensions, health care, pension protections, job training and education, and job opportunities with inclusive hiring practices and pay commensurate with skills and previous pay— beginning with passage of the Clean Energy Worker Just Transition Act” ([DNC Environment and Climate Crisis Council](#), p. 6)
- “Transition assistance should include: (1) establishing a transition fund, using revenues and fees from fossil fuel extraction on public lands, for economic development and transition initiatives for states, communities, and workers; (2) providing energy-producing states the option of a buyout, in which the federal government offers these states a one-time cash payout based on projected revenues from future oil and gas extraction on federal lands located within the state over a specified number of years and, in exchange, all future leasing and production revenue generated on public lands in that state would be directed to the federal government; (3) for states that do not opt for a buyout, developing a state fund matching program in which states have the option to deposit revenues from existing fossil fuel extraction activity into a “rainy day” fund, which the federal government would match, to aid in the transition away from fossil fuel development; (4) prioritizing renewable energy development, forest and natural space restoration, and carbon sequestration projects on federal lands in states that have the most fossil fuel extraction on public lands; and (5) directing the relevant federal agencies to provide technical assistance to communities in developing plans to transition local economies away from fossil fuel extraction on public lands and waters” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 501).
- “Congress should establish a National Economic Transition Office to coordinate, scale up, and target federal economic and workforce development assistance to communities and workers struggling as the result of changes in how America uses and consumes energy, starting with the coal economy” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 290).
- “Provide employers with tax credits to incentivize hiring transitioning employees. In order to ensure that workers who are displaced by this plan are able to find meaningful employment, we will provide the Work Opportunity Tax Credit to employers who hire them” ([Bernie Sanders 2020 Presidential Campaign](#)).
- “Counties with more than 35 qualifying workers will be eligible for targeted economic development funding to ensure job creation in the same communities that will feel the



impact of the transition most. Economic development funding will be distributed through an interagency effort spearheaded by the Department of Commerce Economic Development Administration. Funds will be allocated through the Appalachian Regional Commission, Economic Development Assistance Programs and the Abandoned Mine Lands fund” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [CLEAN Future Act](#) (p. 21 of summary); [Legal Authority for Presidential Executive Action on Climate](#) (p. 4); [Energy Innovation](#) (p. 16); [Vision for Equitable Climate Action](#) (p. 23); [Elizabeth Warren 2020 Presidential Campaign](#); [Green New Deal](#); [H.R. 5435, the American Public Lands and Waters Climate Solution Act of 2019](#)<sup>519</sup>; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Cory Booker 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#); Julian Castro 2020 Presidential Campaign

### LPDD Recommendations

- As the federal government considers new carbon taxes, they should consider using funds from those taxes as a logical source of revenue for social and transition supports. ([LPDD](#), p. 641)
- Congress should enact and fund the RECLAIM Act of 2017 (H.R. 1731) to provide \$1 billion dollars over five years to restore abandoned coal mines and use these and other funds to scale up economic diversification efforts in coal country, including through grants distributed by the Appalachian Regional Commission. ([LPDD](#), p. 638)

### LPDD Resources

- LPDD.org, Social Policies to Facilitate a Just Carbon Transition: <https://lpdd.org/pathway/social-policies-to-facilitate-a-just-carbon-transition/>

### Previous/Current Implementation

Examples of states’ just transition initiatives:

- Colorado passed [legislation](#)<sup>520</sup> in 2019 creating a “Just Transition Office,” which will create a plan to benefit coal transition communities, including by supplementing tax revenue and providing healthcare benefits.
- [Minnesota’s HF 1842 \(2020\)](#)<sup>521</sup> established the Community Energy Transition Grants program, a transition grant program for communities housing a coal, nuclear, or natural gas facility that is scheduled for decommissioning in order “to address the economic dislocation associated with the closing of a local electric generating plant.”

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<sup>519</sup> The American Public Lands and Waters Climate Solution Act of 2019. H.R. 5435, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/5435?s=1&r=3>

<sup>520</sup> Just Transition From Coal-based Electrical Energy Economy. Colorado General Assembly. 2019. <https://leg.colorado.gov/bills/hb19-1314>

<sup>521</sup> HF 1842, State of Minnesota House of Representatives. 2020. <https://lpdd.org/wp-content/uploads/2020/06/HF1842.2.pdf>

- New York's [Clean Climate Careers Initiative](#)<sup>522</sup> was launched in 2017 with the goal of creating 40,000 new clean energy jobs by 2020.
- More [examples](#).<sup>523</sup>
- “The EU ... supports job retraining programmes in member states through one of its structural funds and its social transition agenda, which is part of the Clean Planet for All package. The Modernisation Fund also has a special bracket for a just transition in carbon dependent regions, which could provide support and retraining for affected lower-income member states” (Guidehouse Inc. [Equality - Shaping an Inclusive Energy Transition](#). Eurelectric.).

### Co-Benefits

- An economic transition will not only help affected communities, but it will also support projects in renewable energy, site cleanup, restoration, and more.
- A significant federal program to plug orphan wells could create tens of thousands of jobs, potentially as many as 120,000 if 500,000 wells were plugged ([Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells](#)).<sup>524</sup>

### Obstacles

- “The inevitable interaction of the net zero transition with other technology-driven transitions such as automation and artificial intelligence (AI) may increase job impacts. ... As industries and economic sectors transform, affected by the net zero and other technology-driven transitions, there are likely to be changes in the numbers, types and locations of jobs, and there could be significant adjustment issues as workers need to move from declining to expanding sectors, firms and job types” ([Why a Just Transition is Crucial for Effective Climate Action](#), p. 3).<sup>525</sup>
- The cost of plugging the known inventory of 56,600 orphaned wells could range from \$1.4 billion to \$2.7 billion. Expanding the program to identify and plug 500,000 wells could plausibly cost between \$12 and \$24 billion. State regulatory offices would likely need to scale up administrative capacity to oversee such programs ([Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells](#)).<sup>526</sup>

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<sup>522</sup> “Governor Cuomo Announces Major Climate and Jobs Initiative in Partnership with the Worker Institute at Cornell University ILR's School and Climate Jobs NY to Help Create 40,000 Clean Energy Jobs by 2020.” *New York State*. June 2, 2017. <https://perma.cc/ZG7F-GSFM>

<sup>523</sup> “Social Policies to Facilitate a Just Carbon Transition.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/pathway/social-policies-to-facilitate-a-just-carbon-transition/>

<sup>524</sup> Rimi, Daniel, Nerurkar, Neelesh, and Bordoff, Jason. *Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells*. Columbia University Center on Global Energy Policy and Resources for the Future. July 2020. [https://energypolicy.columbia.edu/sites/default/files/file-uploads/OrphanWells\\_CGEP-Report\\_071620.pdf](https://energypolicy.columbia.edu/sites/default/files/file-uploads/OrphanWells_CGEP-Report_071620.pdf)

<sup>525</sup> Robins, Nick and Rydge, James. *Why a Just Transition is Crucial for Effective Climate Action*. Inevitable Policy Response. September 2019. <https://www.unpri.org/download?ac=7092>

<sup>526</sup> Rimi, Daniel, Nerurkar, Neelesh, and Bordoff, Jason. *Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells*. Columbia University Center on Global Energy Policy and Resources for the Future. July 2020. [https://energypolicy.columbia.edu/sites/default/files/file-uploads/OrphanWells\\_CGEP-Report\\_071620.pdf](https://energypolicy.columbia.edu/sites/default/files/file-uploads/OrphanWells_CGEP-Report_071620.pdf)

- “While states and the federal government require oil and gas companies to post bonds or other forms of financial assurance to pay for well plugging in case firms go bankrupt before plugging wells, these bonds often do not cover the full costs. Federal funding could exacerbate this problem if states and companies see it as alleviating their responsibility to plan for future remediation costs adequately. To avoid this, a federal program could prioritize plugging wells abandoned decades ago that were not subject to modern regulatory frameworks” ([Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells](#)).<sup>527</sup>

#### Additional Resources

- Robins, Nick and Rydge, James. “Why a Just Transition is Crucial for Effective Climate Action. Inevitable Policy Response.” September 2019.  
<https://www.unpri.org/download?ac=7092>
- Rimi, Daniel, Nerurkar, Neelesh, and Bordoff, Jason. “Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells.” Columbia University Center on Global Energy Policy and Resources for the Future. July 2020.  
[https://energypolicy.columbia.edu/sites/default/files/file-uploads/OrphanWells\\_CGEP-Report\\_071620.pdf](https://energypolicy.columbia.edu/sites/default/files/file-uploads/OrphanWells_CGEP-Report_071620.pdf)

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<sup>527</sup> Ibid.

## Workforce Development

### Description

- “Congress should ensure that jobs and skills relevant to the industrial sector and industrial firms are included in any upskilling workforce development programs, such as registered apprenticeships and incumbent worker or on-the-job training” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 258)
- “To ensure that communities that bore the cost of resource extraction are first in line to receive the benefits from new investment in a clean energy economy, the next President should establish ... a Re-Power Fund to invest in bottom-up, locally driven economic and workforce development” ([Evergreen Action Plan](#), p. 38).
- “Requires the Secretary [of Energy] to encourage underrepresented groups to enter science, technology, engineering, and mathematics (STEM) fields, increase national education and training for energy-related industries, and carry out DOE’s Minorities in Energy Initiative. Directs the Secretary to provide direct assistance and resources for energy-related job training programs, publish a report on job creation in energy-related industries, and conduct outreach to minority-serving institutions and displaced energy workers regarding emerging energy related jobs” ([CLEAN Future Act, summary](#), p. 21).
- “Congress should reauthorize the National Apprenticeship Act and expand industry partnerships with labor unions, community and technical colleges, and employers in the clean energy economy to increase the number of workers participating in Registered Apprenticeships” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 292).
- “Congress should reestablish the Civilian Conservation Corps and create a Climate Resilience Service Corps” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 296).

Cross Reference: [Climate Conservation Corps](#); [Economic Transition for Affected Communities](#)

Proposed by: [Evergreen Action Plan](#); [CLEAN Future Act \(2020\)](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [Green New Deal](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Legal Authority for Presidential Executive Action on Climate](#); [Governor Jay Inslee](#)<sup>528</sup>; [Promoting Apprenticeships through Regional Training Networks for Employers Required Skills \(PARTNERS\) Act \(H.R. 989\)](#)<sup>529</sup>; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [H.R. 4965, the Leveraging Effective Apprenticeships to Rebuild National Skills \(LEARNS\) Act](#)<sup>530</sup>; [Bernie Sanders 2020 Presidential Campaign](#); Cory

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<sup>528</sup> Inslee, Jay. “A Call to action for a Climate Conservation Corps.” *Data for Progress*. May 9, 2019. <https://www.dataforprogress.org/blog/a-call-to-action-for-a-climate-conservation-corps>

<sup>529</sup> PARTNERS Act. H.R. 989, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/989/text>

<sup>530</sup> LEARNS Act. H.R. 4965, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4965/text?r=2&s=1>

Booker 2020 Presidential Campaign; Julian Castro 2020 Presidential Campaign; Beto O'Rourke 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign;

### LPDD Recommendations

- Congress could adopt “carbon adjustment assistance” for dislocated carbon workers modeled on Trade Adjustment Assistance for workers dislocated by trade, and move toward an overall “active labor market system” through which society as a whole covers more of the costs to workers and their families of all economic transitions. Both to cushion workers in the carbon economy, and to serve as a model for internalizing the cost to workers and their families of displacement whatever the cause, Congress should implement an active labor market system for workers in the carbon economy. (LPDD, p. 639)
- Congress could use grants, technical assistance, and peer learning to induce more companies to reposition themselves from carbon to non-carbon energy markets, retraining and retaining more of their existing workers, and reducing job loss in communities currently dependent on carbon jobs. (LPDD, p. 640)
- Congress should also require the participation of workers and their representatives in sectoral reemployment initiatives. (LPDD, p. 640)

### LPDD Resources

- LPDD.org, Social Policies to Facilitate a Just Carbon Transition:  
<https://lpdd.org/pathway/social-policies-to-facilitate-a-just-carbon-transition/>

### Previous/Current Implementation

- President Franklin Delano Roosevelt created the Civilian Conservation Corps in 1933 to create jobs in forestry and conservation (USDA).<sup>531</sup>
- The Environmental Defense Fund runs a Climate Corps in which “fellows spend a summer designing and implementing new tools and practices to reduce energy consumption, procure renewable energy, set carbon reduction targets and engage customers, employees and suppliers in achieving sustainability goals” (EDF).<sup>532</sup>
- The federal Trade Adjustment Assistance<sup>533</sup> (TAA) initiative was first implemented in 1962. The TAA is designed to help workers displaced by shifts in U.S. global trade policies. The program supports wage subsidies, health insurance, counseling, retraining, relocation, and job search.
- In 2016, Scotland set up the Transition Training Fund<sup>534</sup> (TTF) to support unemployed workers in the oil and gas sector. The Scottish Government allocated £12million of its

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<sup>531</sup> U.S. Forest Service. The Civilian Conservation Corps and the National Forests. *FS Today*. March 21, 2008.  
[https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev3\\_004791.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_004791.pdf)

<sup>532</sup> “Climate Corps.” *Environmental Defense Fund*. <https://business.edf.org/categories/climate-corps/>

<sup>533</sup> “Trade Adjustment Assistance for Workers.” *U.S. Department of Labor*.  
<https://www.dol.gov/agencies/eta/tradeact>

<sup>534</sup> *Transition Training Fund*.  
<https://transitiontrainingfund.co.uk/#:~:text=About%20The%20Fund,managed%20by%20Skills%20Development%20Scotland.&text=The%20fund%20may%20also%20be,transition%20into%20STEM%20related%20teaching.>

general budget to the TTF, with the aim of redeploying 1,000 workers per year over the course of three years (Guidehouse Inc. [Equality - Shaping an Inclusive Energy Transition](#). Eurelectric).

### Obstacles

“The inevitable interaction of the net zero transition with other technology-driven transitions such as automation and artificial intelligence (AI) may increase job impacts. ... As industries and economic sectors transform, affected by the net zero and other technology-driven transitions, there are likely to be changes in the numbers, types and locations of jobs, and there could be significant adjustment issues as workers need to move from declining to expanding sectors, firms and job types” ([Why a Just Transition is Crucial for Effective Climate Action](#), p. 3).<sup>535</sup>

### Additional Resources

- Pollin, Robert and Callaci, Brian. “A Just Transition for U.S. Fossil Fuel Industry Workers.” The American Prospect Magazine. 2016.  
<https://prospect.org/environment/just-transition-u.s.-fossil-fuel-industry-workers/>
- Conway, Mark. “Developing and Implementing Just Transition Policies.” World Resources Institute.  
<https://www.wri.org/climate/expert-perspective/developing-and-implementing-just-transition-policies>
- Saul Griffith, Sam Calish. “Mobilizing for a zero carbon America: Jobs, jobs, jobs, and more jobs.” Rewiring America. July 2020. <https://www.rewiringamerica.org/jobs-report>

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<sup>535</sup> Robins, Nick and Rydge, James. Why a Just Transition is Crucial for Effective Climate Action. Inevitable Policy Response. September 2019. <https://www.unpri.org/download?ac=7092>

## Right To Organize And Collective Bargaining

### Description

Policies to protect laborers' organization and collective bargaining rights, including by:

- Repealing provisions of the federal Taft-Hartley Act that permit so-called “right-to-work” (RTW) laws in states; Working with Congress to amend the National Labor Relations Act to recognize establishment of a represented collective bargaining unit when a majority of workers vote to form a union or sign authorization cards to join a union; Working with municipalities to co-enforce labor laws and standards; Increasing fines on illegal corporate activity; Appointing members of the National Labor Relations Board (NLRB) who would enforce the 2015 Browning-Ferris ruling on Joint Enforcement Standards; Evaluating potential improvements to the National Labor Relations Act ([Evergreen Action Plan](#), p. 48).
- “Congress should pass legislation to secure workers’ right to organize a union to negotiate for higher wages, safer working conditions, and better benefits” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 288).

Proposed by: [Evergreen Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [DNC Environment and Climate Crisis Council](#); [Vision for Equitable Climate Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [DNC Draft 2020 Policy Platform](#); [Bernie Sanders 2020 Presidential Campaign](#)

### Previous/Current Implementation

Michigan, New York, New Jersey, Alaska, and Hawaii have the strongest pro-union laws in the United States, as they have both above 20% employed wage and salary workers in unions and have closed union shops. More details about each of these states' union laws can be found here: [Pro-Union Legislation in the States](#).<sup>536</sup>

### Co-Benefits

“The right to organize a union is essential to ensuring that public investments in a clean energy-powered economy create good jobs with family-supporting wages for everyone — regardless of race, gender or geographic location” ([Evergreen Action Plan](#), p. 47).

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<sup>536</sup> Pro-Union Legislation in the States. The University of Vermont.  
<http://www.uvm.edu/~vlrs/doc/prounionstates.htm#:~:text=Pro%2DUnion%20Legislation%20in%20the%20States&text=The%20National%20Labor%20Relations%20Act,National%20Labor%20Relations%20Board%202001>



## Climate Conservation Corps

### Description

“This Climate Corps should have three elements. The first, a National Climate Service Corps, will give young Americans the opportunity to serve in creating sustainability solutions in their own communities, learning how to retrofit buildings, install solar panels on rooftops, and build healthier pollution-free communities with clean water, food security, and green development. ... The second component is a Global Climate Service Corps, which would give Americans the opportunity to conduct a tour of service overseas while building expertise in climate mitigation and resilience, clean water, and sustainable economic development. ... The third component is a Green Careers Network, to build on national service to create permanent jobs in a clean energy economy” ([Evergreen Action Plan](#), p. 51-52).

Proposed by: [Evergreen Action](#); [Governor Jay Inslee](#); [Climate Stewardship Act of 2019](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Joe Biden 2020 Presidential Campaign](#) - Industry and Clean Energy (calls it Civilian Climate Corps)

### Previous/Current Implementation

- President Franklin Delano Roosevelt created the Civilian Conservation Corps in 1933 to create jobs in forestry and conservation ([USFS](#)).<sup>537</sup>
- The Environmental Defense Fund runs a Climate Corps in which “fellows spend a summer designing and implementing new tools and practices to reduce energy consumption, procure renewable energy, set carbon reduction targets and engage customers, employees and suppliers in achieving sustainability goals” ([EDF](#)).<sup>538</sup>

### Co-Benefits

A climate corps would help advance renewable energy projects, promote climate mitigation, restore ecosystems, and improve the economy through job creation. It would also provide job opportunities for those who previously worked in fossil fuel industries.

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<sup>537</sup> U.S. Forest Service. The Civilian Conservation Corps and the National Forests. *FS Today*. March 21, 2008. [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev3\\_004791.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_004791.pdf)

<sup>538</sup> “Climate Corps.” *Environmental Defense Fund*. <https://business.edf.org/categories/climate-corps/>

## Economic Transition for Rural Communities

### Description

- “The next President should establish two stable long-term funds: a Re-Power Fund to invest in bottom-up, locally driven economic and workforce development, and a Restore Fund, focused on creating good jobs through site cleanup, environmental remediation and ecological restoration” ([Evergreen Action Plan](#), p. 38).
- “Expanding rural broadband connectivity is fundamental to giving rural Americans the tools necessary to meet the challenges of the modern economy. Estimates range from \$130-150 billion in total funding necessary to support rural broadband demand. While much of that can come from the private sector, the next administration should pursue at least \$80 billion in public investment in rural broadband” ([Evergreen Action Plan](#), p. 37).
- “Requires the [National Climate] Bank prioritize investments in ‘climate-impacted communities,’ defined as those that are disproportionately affected by the impacts of climate change, including ... rural ... communities. The Bank must ensure that at least 20 percent of its investment activity is directed to serve these communities” (CLEAN Future Act, [Summary](#), p. 21).
- Bernie Sanders’ campaign pledged \$5.9 billion in funding to regional commissions that make targeted economic development investments in rural America ([Bernie Sanders 2020 Presidential Campaign](#)).

Cross Reference: [Economic Transition for Affected Communities](#)

Proposed by: [Evergreen Action](#); [Energy Innovation](#); [CLEAN Future Act \(2020\)](#); [Center for Climate and Energy Solutions](#); [Vision for Equitable Climate Action](#); [Joe Biden 2020 Presidential Campaign](#) - Industry and Clean Energy; [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations:

- Congress or federal agencies could adopt a lending program similar to the Energy Efficiency and Conservation Loan Program that is directed at rural renewable energy projects. ([LPDD](#), p. 138-9)
- Because many wood-heating systems are used in locations without adequate access to affordable and clean electricity and heat, governments should consider deployment of alternative energy supplies for rural communities in the northern parts of the country. ([LPDD](#), p. 876)

### Previous/Current Implementation

- In 2019, the Irish government launched a project to build local wealth for “agri-business, local government, residents of rural areas, and other stakeholders in stimulating rural regeneration and climate action” ([Local Wealth Building - Economic Development and Just Transition in Rural Areas](#)).<sup>539</sup>

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<sup>539</sup> “Local Wealth Building - Economic Development and Just Transition in Rural Areas.” *FEPS*. December 19, 2019. [https://www.feps-europe.eu/resources/news/296-com\\_news.news.html](https://www.feps-europe.eu/resources/news/296-com_news.news.html)

- The [Just Transition Fund](#)<sup>540</sup> is a philanthropic initiative focused on coal community transition.
- In 2011, the Obama Whitehouse published a [report](#) on the economic landscape facing rural America. It presented the administration's efforts to promote economic growth and job creation in rural communities.<sup>541</sup>

### Co-Benefits

An economic transition for rural communities would promote job creation, climate change mitigation, and the growth of clean energy industries.

### Obstacles/Shortfalls

"The inevitable interaction of the net zero transition with other technology-driven transitions such as automation and artificial intelligence (AI) may increase job impacts. ... As industries and economic sectors transform, affected by the net zero and other technology-driven transitions, there are likely to be changes in the numbers, types and locations of jobs, and there could be significant adjustment issues as workers need to move from declining to expanding sectors, firms and job types" ([Why a Just Transition is Crucial for Effective Climate Action](#), p. 3).<sup>542</sup>

### Additional Resources

"Investing in Rural America: Bringing Progress and Economic Opportunity to Rural Communities." Joint Economic Committee Democrats. June 2018.

[https://www.jec.senate.gov/public/\\_cache/files/ed5bf0b5-dd14-473f-acdc-fd86ba98a6e1/investing-in-rural-america.pdf](https://www.jec.senate.gov/public/_cache/files/ed5bf0b5-dd14-473f-acdc-fd86ba98a6e1/investing-in-rural-america.pdf)

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<sup>540</sup> "How We Work." *Just Transition Fund*. <https://www.justtransitionfund.org/how-we-work>

<sup>541</sup> White House Rural Council. "Jobs and Economic Security for Rural America." August 2011.

<sup>542</sup> Robins, Nick and Rydge, James. "Why a Just Transition is Crucial for Effective Climate Action." *Inevitable Policy Response*. September 2029. <https://www.unpri.org/download?ac=7092>

## Stranded Assets

### Description

Stranded assets refer to “an asset that must be shut down before it reaches the end of its expected investment horizon, or otherwise produces a poor return for the investor” ([Legal Authority for Presidential Executive Action on Climate](#), p. 15).

- “Government-backed or ratepayer-backed bonds can be important tools to reduce the cost of retiring uneconomic coal-fired plants. Selling the undepreciated balances to bond-holders is commonly referred to as ‘securitization.’” ([Energy Innovation](#), p. 11)
- U.S. Congress can “offer federal debt financing for utilities where compliance with clean energy standards leads to coal and gas closures, and regulated utilities have reasonable outstanding unpaid balances on those plants” ([Energy Innovation](#), p. 11)

Proposed by: [Energy Innovation](#)

### LPDD Recommendations:

- The federal government could require companies to consider the possibility that their fossil fuel-related assets would be stranded before making investment decisions. ([LPDD](#), p. 644)
- FERC should consider the possibility of stranded assets when assessing proposals for fossil fuel infrastructure that will be paid for by ratepayers. ([LPDD](#), p. 645)
- The Securities Exchange Commission should enforce compliance with its 2010 guidance on disclosure requirements related to climate change. The Securities Exchange Commission should enhance its 2010 guidance on climate change disclosure to require explicitly the possibility that climate regulation will lead to the stranding of corporate assets. ([LPDD](#), p. 645)

### LPDD Resources:

- LPDD.org, Stranded Assets and Climate Disclosures:  
<https://lpdd.org/pathway/stranded-assets/>

### Previous/Current Implementation

Montana,<sup>543</sup> Colorado,<sup>544</sup> and New Mexico<sup>545</sup> have passed legislation granting coal-owning utilities the option to pay off stranded assets by issuing bonds secured by the certainty of customers paying their bills.

### Co-Benefits

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<sup>543</sup> Authorize Securitization for Energy Infrastructure. Montana HB467. 2019.  
<https://www.billtrack50.com/BillDetail/1065790>

<sup>544</sup> Sunset Public Utilities Commission. Colorado SB19-326, 72nd General Assembly. 2019.  
<https://leg.colorado.gov/bills/sb19-236>

<sup>545</sup> Energy Transition Act. New Mexico SB 489. 2019.  
<https://www.nmlegis.gov/Legislation/Legislation?Chamber=S&LegType=B&LegNo=489&year=19>

- Securitization can help accelerate the shift from coal to renewable energy production ([A New Proposal Could Unlock The Coal-To-Clean Shift](#), *Forbes*).<sup>546</sup>
- Securitization generates savings on a net present value for ratepayers. On average, every \$100 million in coal plants retired through securitization can save around \$60 million in avoided capital costs. These savings can either be returned to consumers, or can be used to aid a [just transition](#) for communities affected by plant retirement ( ([Harnessing Financial Tools to Transform the Electric Sector](#))).<sup>547</sup>

### Obstacles/Shortfalls

- “One critical component of ratepayer-backed bond securitization is that the payment on the bond must be collected from ratepayers, and must be non-bypassable— i.e. there must be zero risk that future ratepayers will not pay the bond. Such guarantees ensure a high bond rating, and low financing costs. This type of irrevocable charge typically requires enabling state legislation” ([Harnessing Financial Tools to Transform the Electric Sector](#)).<sup>548</sup>
- Drawbacks to Colorado’s securitization legislation: “As a business incentive, this measure will have no significant impact on accelerating coal plant closures. If enacted, the ‘securitization’ plan would tie up ratepayer dollars for decades to come on an economically dead asset – those funds would be more productively deployed for renewable energy development and other much needed investments to improve Colorado’s electricity system as well as fight climate change” ([Colorado’s Energy Impact Assistance Act Is Short-sighted Securitization Risks Saddling Ratepayers with Long-Term Debt, Overlooks Coal Communities](#), Institute for Energy Economics and Financial Analysis).<sup>549</sup>

### Additional Resources

Varadarajan, Uday, Posner, David, and Fisher, Jeremy. “Harnessing Financial Tools to Transform the Electric Sector.” *Sierra Club*. November 2018.

<https://www.sierraclub.org/sites/www.sierraclub.org/files/sierra-club-harnessing-financial-tools-electric-sector.pdf>

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<sup>546</sup> Marcacci, Silvio. Closing Colorado Coal Would Save \$2.5 Billion. A New Proposal Could Unlock The Coal-To-Clean Shift. *Forbes*. January 9, 2019. <https://www.forbes.com/sites/energyinnovation/2019/01/09/closing-colorado-coal-could-save-2-5-billion-a-new-proposal-would-unlock-the-coal-to-clean-shift/#7a462bd94ca5>

<sup>547</sup> Varadarajan, Uday, Posner, David, and Fisher, Jeremy. “Harnessing Financial Tools to Transform the Electric Sector.” *Sierra Club*. November 2018. <https://www.sierraclub.org/sites/www.sierraclub.org/files/sierra-club-harnessing-financial-tools-electric-sector.pdf>

<sup>548</sup> Varadarajan, Uday, Posner, David, and Fisher, Jeremy. “Harnessing Financial Tools to Transform the Electric Sector.” *Sierra Club*. November 2018. <https://www.sierraclub.org/sites/www.sierraclub.org/files/sierra-club-harnessing-financial-tools-electric-sector.pdf>

<sup>549</sup> Sanzillo, Tom. Colorado’s Energy Impact Assistance Act Is Short-sighted Securitization Risks Saddling Ratepayers with Long-Term Debt, Overlooks Coal Communities. Institute for Energy Economics and Financial Analysis. April 2019. <https://ieefa.org/wp-content/uploads/2019/04/COLORADO-Energy-Impact-Assistance-Act-April-2019.pdf>

## Health Care for Affected Communities

### Description

- “Congress should maintain the coal excise tax rate[, which funds the Black Lung Disability Trust Fund,] at no less than \$1.10 per ton for underground coal and \$0.55 per ton for surface coal to help restore the solvency of the Black Lung Disability Trust Fund. ... Congress and stakeholders should explore a higher tax rate or alternative funding mechanisms to shore up the Trust Fund over the long term” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 294).
- “Congress should pass legislation to protect coal miners’ health and rights by strengthening the Black Lung Benefits Act to require operators to make full disclosure of all relevant medical evidence; provide miners with financial support to obtain quality legal representation in the claims process; establish criminal penalties for individuals who use false information to challenge a black lung benefit claim; and ensure the solvency of the Black Lung Disability Trust Fund” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 295).
- “Democrats will empower and stand with workers and communities who have put their health and lives on the line and who have been impacted by the changing energy market, including by fighting to protect retirees’ health and pension benefits” ([Biden-Sanders Unity Task Force Recommendations](#), p. 5).
- Establish a fund for mental health services for workers displaced by climate change and related policies ([Oregon House Bill 2020](#)).

Proposed by: [Black Lung Benefits Disability Trust Fund Solvency Act \(H.R. 3876\)](#); <sup>550</sup> [Black Lung Benefits Improvement Act of 2019 \(S. 2205\)](#); <sup>551</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Biden-Sanders Unity Task Force](#); [Oregon House Bill 2020](#); <sup>552</sup> [DNC Draft 2020 Policy Platform](#)

### Previous/Current Implementation

- The [Black Lung Benefits Act](#) <sup>553</sup> provides monthly payments and medical benefits to coal miners disabled by pneumoconiosis caused by exposure to coal dust in U.S. mines. The coal mine operator for which the miner worked is responsible for the payment of benefits. The Black Lung Disability Trust Fund steps in to pay benefits under certain circumstances, such as when the government cannot identify the liable coal mine operator or if the coal mine operator is no longer solvent. The Trust Fund has fallen into debt.

### Additional Resources

- Szymendera, Scott D. and Sherlock, Molly F. “The Black Lung Program, the Black Lung Disability Trust Fund, and the Excise Tax on Coal: Background and Policy Options.”

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<sup>550</sup> Black Lung Benefits Disability Trust Fund Solvency Act. H.R. 3876, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/house-bill/3876>

<sup>551</sup> Black Lung Benefits Improvement Act of 2019. S. 2205, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/senate-bill/2205>

<sup>552</sup> Oregon HB 2020. 80th Oregon Legislative Assembly. 2019.  
<https://olis.leg.state.or.us/liz/2019R1/Downloads/MeasureDocument/HB2020/Introduced>

<sup>553</sup> “Division of Coal Mine Workers Compensation (DCMWC).” *U.S. Department of Labor*.  
<https://www.dol.gov/owcp/dcmwc/>

Congressional Research Service. January 18, 2019.  
<https://fas.org/sgp/crs/misc/R45261.pdf>



## Green Recovery

### Description

Implementing green investment as well as racial and economic equity into COVID-19 pandemic recovery plans:

- “It is imperative that policymakers ... plan for a large, medium-term stimulus to counteract the economic downturn and ensure a just recovery. This stimulus should create millions of good, family-sustaining jobs with high-road labor standards; counter systemic inequities by directing investments to the working families, communities of color, and Indigenous communities who face the most economic insecurity; and tackle the climate crisis that is compounding threats to our economy and health. All three goals can be achieved simultaneously with public investments to rebuild our infrastructure, replace lead pipes, expand wind and solar power, build clean and affordable public transit, weatherize our buildings, build and repair public housing, manufacture more clean energy goods, restore our wetlands and forests, expand public services that support climate resilience, and support regenerative agriculture led by family farmers. Critically, stimulus packages should include conditions for industries to implement high-road labor standards, workforce development, and reductions in climate emissions and toxic pollution” ([People’s Bailout](#)).<sup>554</sup>
- “We propose an ambitious Green Stimulus of at least \$2 trillion. ... This stimulus should be automatically renewed annually at 4% of GDP per year (roughly \$850 billion) until the economy is fully decarbonized and the unemployment rate is below 3.5%” ([Green Stimulus Proposal](#)).<sup>555</sup>
- [C40 Mayors’ Agenda for a Green and Just Recovery](#)<sup>556</sup> principles: 1) the recovery should not be a return to ‘business as usual’ -- because that is a world on track for 3 degrees Celsius or more of over-heating. 2) The recovery must be guided by an adherence to public health and scientific expertise. 3) Excellent public services, public investment and increased community resilience will form the most effective basis for recovery. 4) The recovery must address issues of equity -- for example, workers who are now recognized as essential should be compensated. 5) The recovery must improve the resilience of our cities. 6) Climate action can help accelerate economic recovery and enhance social equity, through the use of new technologies and the creation of new industries and new jobs. 7) We commit to doing everything to ensure that the recovery from COVID-19 is healthy, equitable and sustainable. 8) We commit to ensuring that national governments support both cities and the investments needed in cities, to deliver an economic recovery that is healthy, equitable and sustainable. 9) We commit to ensuring that international and regional institutions invest directly in cities to support a healthy, equitable and sustainable recovery (p. 10).

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<sup>554</sup> *People’s Bailout*. <https://thepeoplesbailout.org/>

<sup>555</sup> Green Stimulus Proposal. “A Green Stimulus to Rebuild Our Economy.” *Medium*. March 22, 2020.

<sup>556</sup> “C40 Mayors’ Agenda for a Green and Just REcovery.” *C40 Knowledge*. July 2020.  
<https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q000000kVoY/kuR1PLHMGR2K9eEbo8aivV.xPegZVTqwt.EjX.4a.hk>

- Potential revenue sources include: a digital sales tax, a financial transaction tax, or carbon pricing ([The Playbook for Paradigm Shift: A Green Recovery in the COVID-19 Context](#), p. 5).<sup>557</sup>

Proposed by: [International Energy Agency](#);<sup>558</sup> [Dozens](#)<sup>559</sup> of climate groups (including 350.Org, the Sunrise Movement, BlueGreen Alliance, Natural Resources Defense Council, and Sierra Club); [C40 Mayors' Agenda for a Green and Just Recovery](#)<sup>560</sup>

#### Previous/Current Implementation

- Following the Great Recession of 2007-2009, Congress passed the [American Recovery and Reinvestment Act](#) of 2009,<sup>561</sup> which allocated \$112 billion to “green” spending, including to rail, renewables, the electricity grid, energy efficiency, water waste, and low carbon alternatives ([WRI](#)).<sup>562</sup>
- Europe has unveiled a stimulus package that includes a proposal for the European Union’s next trillion-euro budget for the years 2021–2027, of which €60 billion to €80 billion is allocated to electric vehicle sales and infrastructure, €91 billion to building retrofits, and €50 billion to renewables and green hydrogen ([The Playbook for Paradigm Shift: A Green Recovery in the COVID-19 Context](#), p. 3).<sup>563</sup>
- The Government of the Hong Kong Special Administrative Region is using part of its anti-epidemic fund to generate green jobs and promote electric vehicles by subsidizing charging infrastructure installation ([C40 Mayors' Agenda for a Green and Just Recovery](#), p. 14).<sup>564</sup>

#### Impact on GHGs

Europe’s green stimulus package is aligned with its goals to deliver net zero GHG emissions by 2050 ([The Playbook for Paradigm Shift: A Green Recovery in the COVID-19 Context](#), p. 3).<sup>565</sup>

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<sup>557</sup> Healy, Claire. “The Playbook for Paradigm Shift: A Green Recovery in the COVID-19 Context.” *Stanley Center for Peace and Security*. July 2020. <https://stanleycenter.org/wp-content/uploads/2020/07/AICC-PlaybookforParadigmShift720-1.pdf>

<sup>558</sup> “Sustainable Recovery.” *International Energy Agency*. June 2020. <https://www.iea.org/reports/sustainable-recovery#>

<sup>559</sup> *People’s Bailout*. <https://thepeoplesbailout.org/>

<sup>560</sup> “C40 Mayors’ Agenda for a Green and Just REcovery.” *C40 Knowledge*. July 2020. <https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q000000kVoY/kuR1PLHMGR2K9eEbo8aivV.xPegZVTqwt.EjX.4a.hk>

<sup>561</sup> “American Recovery and Reinvestment Act of 2009.” *National Telecommunications and Information Administration*. <https://www.ntia.doc.gov/page/2011/american-recovery-and-reinvestment-act-2009>

<sup>562</sup> Kennedy, Kevin. “Green Stimulus Spending by Country.” *World Resources Institute*. April 2009. <https://www.wri.org/resources/charts-graphs/green-stimulus-spending-country>

<sup>563</sup> Healy, Claire. “The Playbook for Paradigm Shift: A Green Recovery in the COVID-19 Context.” *Stanley Center for Peace and Security*. July 2020. <https://stanleycenter.org/wp-content/uploads/2020/07/AICC-PlaybookforParadigmShift720-1.pdf>

<sup>564</sup> “C40 Mayors’ Agenda for a Green and Just REcovery.” *C40 Knowledge*. July 2020. <https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q000000kVoY/kuR1PLHMGR2K9eEbo8aivV.xPegZVTqwt.EjX.4a.hk>

<sup>565</sup> Healy, Claire. “The Playbook for Paradigm Shift: A Green Recovery in the COVID-19 Context.” *Stanley Center for Peace and Security*. July 2020. <https://stanleycenter.org/wp-content/uploads/2020/07/AICC-PlaybookforParadigmShift720-1.pdf>

### Co-Benefits

A Green Recovery would provide economic relief and create jobs in green industries while also avoiding a rebound in U.S. GHG emissions.

### Additional Resources

- John Larsen, Emily Wimberger, Ben King, and Trevor Houser, “A Just Green Recovery.” *Rhodium Group*. July 2020. <https://rhg.com/research/a-just-green-recovery/>
- Healy, Claire. “The Playbook for Paradigm Shift: A Green Recovery in the COVID-19 Context.” *Stanley Center for Peace and Security*. July 2020. <https://stanleycenter.org/wp-content/uploads/2020/07/AICC-PlaybookforParadigmShift720-1.pdf>
- “Sustainable Recovery.” *International Energy Agency*. June 2020. <https://www.iea.org/reports/sustainable-recovery#>
- Griffith, Saul and Calisch, Sam. “Mobilizing for a Zero-Carbon America: A Jobs and Employment Study Report.” July 15, 2020. <https://static1.squarespace.com/static/5e540e7fb9d1816038da0314/t/5f1816357ae6ee1f6996b512/1595414198756/Jobs+Report.pdf>

## INNOVATION

### Clean Energy Research And Development

#### Description

- “The next President should work with Congress to increase federal investments into research and development on clean technologies and climate solutions to approximately \$35 billion annually over the next decade” ([Evergreen Action Plan](#), p. 61).
- “A \$400 billion commitment to clean energy research over ten years” ([Elizabeth Warren 2020 Presidential Campaign](#))
- The federal government should consider a rejuvenated and focused green patenting program for decarbonization technologies ([LPDD Resources](#), ch. 4).
- “Create a new Advanced Research Projects Agency on Climate, a new, cross-agency ARPA-C to target affordable, game-changing technologies to help America achieve our 100% clean energy target. ... Invest in our national laboratories, high-performance computing capabilities, and the design and construction of other critical infrastructure at and around those national laboratories. ... Strengthen land-grant universities, Historically Black Colleges and Universities (HBCUs), and other minority serving institutions (MSIs), expanding facilities, targeting grants, and supporting the training of talent” ([Joe Biden 2020 Presidential Campaign](#)- Industry and Clean Energy).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Industry and Clean Energy; [Elizabeth Warren 2020 Presidential Campaign](#); [CLEAN Future Act](#); [DNC Environment and Climate Crisis Council](#); [Energy Innovation](#); [Vision for Equitable Climate Action](#); [Wind Energy Research and Development Act of 2019](#)<sup>566</sup>; [BEST Act of 2019](#)<sup>567</sup>; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Bernie Sanders 2020 Presidential Campaign](#); Cory Booker 2020 Presidential Campaign; Andrew Yang 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; Beto O’Rourke 2020 Presidential Campaign; [The American Energy Innovation Act](#); [DNC Draft 2020 Policy Platform](#)

#### LPDD Recommendations:

- The federal government should provide direct funding of R&D for carbon reduction technologies. ([LPDD](#), pp. 118-19)
- The federal government should consider a rejuvenated and focused green patenting program for decarbonization technologies. ([LPDD](#), p. 120)
- The federal government should consider government-funded competitions and prizes to incentivize low-carbon technologies in addition to or instead of traditional research grants or contracts. ([LPDD](#), p. 120)
- Congress should induce higher levels of R&D in the private sector through an R&D tax credit for carbon reduction technologies. ([LPDD](#), p. 119)

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<sup>566</sup> Wind Energy Research and Development Act of 2019. S. 2660, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/2660/text>

<sup>567</sup> BEST Act of 2019. S. 1602, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/senate-bill/1602>

- Congress should put in place a strategy for inducing technological innovation for decarbonization, or authorize an existing or new entity within the federal government to perform this function. (LPDD, p. 121)
- FERC can fund additional research, technology, and development on a range of distribution network and smart grid developments, including energy storage. (LPDD, p. 542)
- DOE should redeploy funding for biofuels research to development of fuels that have high-value uses, such as biomass-based diesel. (LPDD, p. 703)

### LPDD Resources

- LPDD.org, “Technological Innovation”: <https://lpdd.org/pathway/technological-innovation/>
- LPDD.org, “Funding Innovation in Transmission, Distribution, and Storage”: <https://lpdd.org/pathway/funding-innovation/>
- LPDD.org, “Funding Nuclear Innovation”: <https://lpdd.org/pathway/funding-nuclear-innovation/>

### Previous/Current Implementation

- In 2017, DOE [announced nearly \\$67 million](#)<sup>568</sup> in grants awarded towards advanced nuclear energy research from a series of funding programs, including \$37 million to support university-led nuclear energy research, \$11 million towards three Integrated Research Projects, \$6 million in research towards advanced sensors, manufacturing methods, and materials
- Throughout 2019, the New York State Energy Research and Development Authority has put forward funding opportunities for advancing smart grid development in waves, including a [\\$15 million Future Grid Challenge](#),<sup>569</sup> [\\$30 million into the High Performing Grid program](#), and [\\$5 million specifically to support research on integrating renewable energy](#)<sup>570</sup> onto the grid.
- The DOE’s SunShot Initiative was launched in 2011 with the goal of reducing the cost of solar energy 75% by 2020, which target was met three years early. The program has set a 2030 goal to halve that target again, to reach utility-scale solar at \$0.03 per kilowatt hour.
- [Mission Innovation](#)<sup>571</sup> is a global initiative of 24 countries and the European Commission (on behalf of the European Union) with the goal of dramatically accelerating global clean energy innovation.

### Impact on GHGs

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<sup>568</sup> “Energy Department Invests Nearly \$67 Million to Advance Nuclear Technology.” *Department of Energy*. Une 14, 2017. <https://perma.cc/Z4T3-R32B>

<sup>569</sup> “Governor Cuomo Announces \$15 Million Future Grid Challenge to Modernize New York's Electric Grid.” *New York State*. July 11, 2019. <https://perma.cc/G55L-RKTH>

<sup>570</sup> “Governor Cuomo Announces \$30 Million to Support Modernization of New York's Electric Grid.” *New York State*. April 09, 2019. <https://perma.cc/M246-YS9B>

<sup>571</sup> *Mission Innovation*. <http://mission-innovation.net/>

A report by the Department of Energy finds that meeting all of DOE's clean energy RDD&D goals would reduce U.S. emissions in 2050 by almost 25% compared to a 2005 baseline. Additional R&D could reduce emissions by almost 40%

([Energy CO2 Emissions Impacts of Clean Energy Technology Innovation and Policy](#), U.S. Department of Generation, p. viii).<sup>572</sup>

#### Co-Benefits

Clean energy innovation will “help to increase clean energy options and reduce costs for producers and consumers, create new domestic jobs and commercial opportunities in clean energy, improve U.S. competitiveness in the rapidly expanding market for clean energy, and address global climate change” ([Energy CO2 Emissions Impacts of Clean Energy Technology Innovation and Policy](#), U.S. Department of Generation, p. viii).<sup>573</sup>

#### Additional Resources

- Gattari, Patrick. “The Role of Patent Law in Incentivizing Green Technology.” *Northwestern Journal of Technology and Intellectual Property*, Vol. 11, No. 2. 2013. <https://perma.cc/Y58T-YA8M>

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<sup>572</sup> Office of Energy Policy and Systems Analysis. Energy CO2 Emissions Impacts of Clean Energy Technology Innovation and Policy. U.S. Department of Generation. January 2017. <https://www.energy.gov/sites/prod/files/2017/01/f34/Energy%20CO2%20Emissions%20Impacts%20of%20Clean%20Energy%20Technology%20Innovation%20and%20Policy.pdf>

<sup>573</sup> Ibid.

## Agricultural Research and Development

### Description

- “The next administration should take on two particularly key initiatives as part of this agriculture innovation agenda: The creation of an Advanced Research Projects Agency - for Agriculture (ARPA-Ag, modeled on similar agencies for defense and energy innovation), and in the addition of innovation to the practice of Agricultural Extension Services. ... [These projects] should be focused on ensuring that farming practices maximize long-term natural carbon storage. The next administration and Congress should expand federal investment in research, development, demonstration and deployment of agricultural climate solutions. Additionally, the next administration should work to harness the promise of bio-energy” ([Evergreen Action Plan](#), p. 62)
- “Congress should ... increase funding for [Conservation Innovation Grants](#)<sup>574</sup> and add practices that reduce emissions and sequester carbon as a research priority” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 341).
- “Congress should direct USDA to implement a department-wide climate research agenda and direct the Office of the Chief Scientist, in consultation and coordination with all the research-based USDA agencies, to develop and prioritize a coordinated research framework for climate mitigation and resilience” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 360).

Proposed by: [Evergreen Action](#); [Agriculture Resilience Act \(2020\)](#);<sup>575</sup> [Joe Biden 2020 Presidential Campaign](#) - Climate (biofuel research and development); [Elizabeth Warren 2020 Presidential Campaign](#); [DNC Environment and Climate Crisis Council](#); Andrew Yang 2020 Presidential Campaign; Amy Klobuchar 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Bernie Sanders 2020 Presidential Campaign](#)

### LPDD Recommendations:

- Congress should couple increased financial support for climate-related agricultural research with generous fund-ing to disseminate climate-friendly practices and research. ([LPDD](#), p. 794)
- Congress should direct the National Institute of Food and Agriculture to steadily increase the portion of funding for climate mitigation and adaptation, shifting research funding to projects designed to reduce GHG emissions or increase carbon sequestration, while improving soil health and resilience. Congress should significantly expand funding to support climate-friendly practices at all research and extension entities within USDA (including Agricultural Research Service, National Institute of Food and Agriculture, the Sustainable Agriculture Research and Education program, Climate Hubs, and the

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<sup>574</sup> “Conservation Innovation Grants.” *USDA Natural Resources Conservation Service*. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/>

<sup>575</sup> Agriculture Resilience Act. H.R. 5861, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/5861?s=1&r=3>



Cooperative State Research and Extension Service) in order to achieve carbon neutrality while maintaining crop and livestock productivity. (LPDD, p. 795)

- Congress should dramatically increase the annual budget for the Sustainable Agriculture Research and Education (SARE), while also specifically appropriating funds for SARE to use to support the development of carbon farming. (LPDD, p. 796)
- USDA should design research to advance objectives other than mitigation, such as crop productivity or food safety, to bolster, and work in conjunction with, climate-friendly systems. (LPDD, p. 795)
- Agricultural Research Service and the National Institute of Food and Agriculture should prioritize funding for research into agroecology. (LPDD, p. 795)

#### LPDD Resources:

- LPDD.org, Supporting Climate-Friendly Agriculture R&D:  
<https://lpdd.org/pathway/supporting-climate-friendly-agriculture-rd/>

#### Previous/Current Implementation

The Sustainable Agriculture Research and Education (SARE) Program provides funding for on-farm research and efforts to increase knowledge about sustainable agricultural practices among farmers and agricultural professionals. Administered by NIFA, [SARE](#)<sup>576</sup> is the only USDA competitive grants program that focuses exclusively on sustainable agriculture. LPDD recommends dramatically increasing its funding ([LPDD Resources](#)).<sup>577</sup>

#### Impact on GHGs

Agricultural innovation has the potential to reduce sector emissions, which contributed to [10% of total U.S. emissions](#)<sup>578</sup> in 2018. Existing cropland management practices can reduce agricultural emissions by 2% in 2050, while livestock measures could reduce emissions by 10% by 2050 ([U.S. Policy Solutions Simulator v 2.1.1](#)). One [study](#)<sup>579</sup> estimates that by 2050, anaerobic digesters could mitigate 151 MMtCO<sub>2</sub>e, mostly from methane abatement, but also in part from reducing electricity emissions (Decarbonizing U.S. Agriculture, Forestry, and Land Use. [Center for Climate and Energy Solutions](#)).<sup>580</sup>

#### Co-Benefits

These initiatives will promote and accelerate sustainable economic development in rural America ([Evergreen Action Plan](#)).

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<sup>576</sup> “Sustainable Agriculture Research and Education.” SARE.Org. <https://www.sare.org/>

<sup>577</sup> “Sustainable Agriculture Research and Education Program.” *Model Laws for Deep Decarbonization*. <https://lpdd.org/resources/sustainable-agriculture-research-and-education-program/>

<sup>578</sup> “Sources of Greenhouse Gas Emissions.” *US Environmental Protection Agency*. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

<sup>579</sup> Zaks, David P. M., Winchester, Niven, Kucharik, Christopher J., Barford, Carol C., Paltsev, Sergey and Reilly, John M. Contribution of Anaerobic Digesters to Emissions Mitigation and Electricity Generation Under U.S. Climate Policy. *Environ. Sci. Technol.* 2011. <https://pubs.acs.org/doi/abs/10.1021/es104227y>

<sup>580</sup> Huber, Kristiane. Decarbonizing U.S. Agriculture, Forestry, and Land Use. Center for Climate and Energy Solutions. July 2018. <https://www.c2es.org/document/decarbonizing-u-s-agriculture-forestry-and-land-use/>

### Additional Resources

- This 2019 report from the National Academies of Sciences, Engineering, and Medicine outlines a research agenda for carbon sequestration, including a chapter on changes in agricultural practices that enhance soil carbon storage:
  - National Academies of Sciences, Engineering, and Medicine. “Negative Emissions Technologies and Reliable Sequestration: A Research Agenda.” The National Academies Press. 2019.  
<https://lpdd.org/wp-content/uploads/2020/03/25259.pdf>
- The International Federation of Organic Agriculture Movement’s 2016 report describes a 17-point action plan to advance organic agriculture through research, development, innovation and technology transfer
  - Niggli, Urs, Willer, Helga and Baker, Brian P. “A Global Vision and Strategy for Organic Farming Research.” TIPI - Technology Innovation Platform of IFOAM – Organics International, c/o Research Institute of Organic Agriculture. 2016.  
<https://perma.cc/7RYJ-PAG6>

## CLIMATE RESILIENCE

### Flood Mapping

#### Description

- “Require FEMA to use the best available climate change data and sea level rise mapping to reflect actual flood risk, to provide a nationwide plan for flood disclosure and risk, and to analyze and avoid impacts to wildlife habitat” ([DNC Environment & Climate Crisis Council](#), p. 10).
- “Congress should increase funding for NFIP mapping and direct FEMA to enhance and ensure the technical integrity and usefulness of NFIP flood hazard and risk information taking into account changing storm and flood frequency and severity due to climate change, update and maintain maps, and expand flood risk analysis and mapping to the entire United States” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 409).

Proposed by: [DNC Environment & Climate Crisis Council](#) (p. 10); [Vision for Equitable Climate Action](#) (p. 21); [Elizabeth Warren 2020 Presidential Campaign](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

#### Previous/Current Implementation

- “Over the past several years, FEMA has been evaluating and updating flood maps along all populated coastlines, in close collaboration with other federal agencies, states, local communities, non-profits and academia, and the private sector. Through collaboration with these partners, FEMA has developed methodologies for determining the flood risk along the coast, which are used to update the FIRMs [Flood Insurance Rate Maps]” ([FEMA](#)).<sup>581</sup>
- New York City is working with FEMA to revise the city’s FIRMs and issue new maps in the coming years that better reflect current flood risk ([NYC Flood Maps](#)).<sup>582</sup>

#### Co-Benefits

Flood mapping data is used to estimate flood risk more accurately. Mitigating flood risk poses social, ecological, and economic benefits. It protects residents from flooding, preserves natural floodplains, and reduces harm that flooding imposes on businesses ([Mapping the Zone: Improved Map Accuracy](#)).<sup>583</sup>

#### Obstacles and Shortfalls

Improved flood mapping requires more accurate and open-access model forcing (precipitation, discharge) and boundary data at the global level. It also requires better interoperability between

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<sup>581</sup> “Coastal Flood Risk Mapping Process.” *FEMA*. <https://www.fema.gov/coastal-flood-risk-mapping-process>

<sup>582</sup> “Flood Maps.” *NYC Flood Maps*. <https://www1.nyc.gov/site/floodmaps/index.page>

<sup>583</sup> National Research Council of the National Academies. “Benefits and Costs of Accurate Flood Mapping.” *Mapping the Zone: Improved Map Accuracy*. 2009. <https://www.nap.edu/read/12573/chapter/8>

data, models and output products ([The Challenges of Global Flood Hazard Mapping and Prediction](#), *EOS*).<sup>584</sup>

#### Additional Resources

- Benefits and Costs of Accurate Flood Mapping. *Mapping the Zone: Improving Flood Map Accuracy*. 2009.  
<https://www.nap.edu/read/12573/chapter/8>
- “Coastal Flood Mapping Process.” FEMA.  
<https://www.fema.gov/coastal-flood-risk-mapping-process>
- Association of State Floodplain Managers, Flood Mapping for the Nation: A Cost Analysis for Completing and Maintaining the Nation’s NFIP Flood Map Inventory. January 2020. [https://asfpm-library.s3-us-west2.amazonaws.com/FSC/MapNation/ASFPM\\_MaptheNation\\_Report\\_2020.pdf](https://asfpm-library.s3-us-west2.amazonaws.com/FSC/MapNation/ASFPM_MaptheNation_Report_2020.pdf)
- Association of State Floodplain Managers. “Flood Mapping for the Nation: A Cost Analysis for Completing and Maintaining the Nation’s NFIP Flood Map Inventory.” January 2020. [https://asfpm-library.s3-us-west2.amazonaws.com/FSC/MapNation/ASFPM\\_MaptheNation\\_Report\\_2020.pdf](https://asfpm-library.s3-us-west2.amazonaws.com/FSC/MapNation/ASFPM_MaptheNation_Report_2020.pdf)

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<sup>584</sup> Schumann, Guy J.-P. “The Challenges of Global Flood Hazard Mapping and Prediction.” *EOS*. July 9, 2018.  
<https://eos.org/editors-vox/the-challenges-of-global-flood-hazard-mapping-and-prediction>

## Flood Insurance

### Description

Policies to improve the National Flood Insurance Program (NFIP):

- “Congress should direct FEMA to develop and deploy accessible and multilingual educational materials along with flood hazard and risk information to help the public and community leaders interpret flood risk information and understand the limits of flood risk analysis, estimation, and prediction” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 409).
- “Congress should direct agencies and [Government Sponsored Enterprises] that administer housing and small business loans and loan guarantees, including the USDA, HUD, the SBA, and the Department of Veterans Affairs (VA), to consider securing all federal loans and loan guarantees with flood insurance. Congress should also direct FEMA to ensure that flood insurance provided through the NFIP is rated accurately for property location, including for properties not located in the [Special Flood Hazard Areas]” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 411).
- “Congress should direct FEMA to address flood insurance affordability for low-income households and small businesses through a combination of means-tested discounts, mitigation loans, and revolving loans, and allow policyholders to pay flood insurance premiums in monthly installments. Information about the full risk rate should accompany discounts, so that discount recipients understand the full cost of their flood insurance” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 412).
- “The NFIP should offer means-tested assistance to ensure that no household is displaced or forced out of coverage because of the rising costs of flood insurance. Means-tested assistance should clearly communicate the full-risk rates that are being offset, and provide support to help property owners and businesses reduce their flood risks with mitigation measures. The NFIP should be reformed to increase coverage or encourage private excess coverage for multifamily properties, to ensure adequate coverage based upon the size and uses of buildings” ([Strengthening The National Flood Insurance Program](#), *100 Resilient Cities*).<sup>585</sup>
- “Rather than tie flood insurance to risk ... I will make it easier for existing residents to move out of flood-prone properties – both inland and coastal – including a program to buy back those properties from low-income homeowners at market value. And within my first term I will ensure the Federal Emergency Management Agency’s (FEMA) flood maps are fully updated, so that we can raise the standard for new construction through the Federal Flood Risk Management Standard” ([Elizabeth Warren 2020 Presidential Campaign](#)).

Proposed by: [Vision for Equitable Climate Action](#) (p. 21); [Elizabeth Warren 2020 Presidential Campaign](#); [National Flood Insurance Program Reauthorization Act of 2019 \(H.R. 3167\)](#);<sup>586</sup> [The](#)

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<sup>585</sup> “Strengthening The National Flood Insurance Program.” *100 Resilient Cities*.

[http://www.100resilientcities.org/wp-content/uploads/2017/11/Resilient-Cities-stand-alone-ch3\\_revised\\_11.7.17.pdf](http://www.100resilientcities.org/wp-content/uploads/2017/11/Resilient-Cities-stand-alone-ch3_revised_11.7.17.pdf)

<sup>586</sup> National Flood Insurance Program Reauthorization Act of 2019. H.R. 3167, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/house-bill/3167>

[Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Julian Castro 2020 Presidential Campaign;

#### Previous/Current Implementation

- Through collaboration with state and local partners, FEMA has developed methodologies for determining the flood risk along the coast, which are used to update the FIRMs [Flood Insurance Rate Maps] ([FEMA](#)).<sup>587</sup>
- “FEMA has recently surveyed a sample of policyholders and is making multiple reforms to try to address policyholder concerns about the program in an effort to increase purchase of flood insurance. While there is not a complete data set available, estimates suggest roughly half of those in mapped 100-year floodplains have flood insurance, and much fewer have coverage outside these areas” (Center for Insurance Policy and Research, [Flood Risk and Insurance](#), p. 25).<sup>588</sup>
- The City of Roseville, California, achieved the highest rating under the National Flood Insurance Program (NFIP) Community Rating System<sup>589</sup> for adopting robust floodplain management standards,<sup>590</sup> resulting in a 45% discount on flood insurance premiums for the city’s NFIP policyholders.

#### Obstacles/Shortfalls

- Flood insurance reforms that raise premiums could lead to a home foreclosure crisis in low-income areas. Therefore, reform must also keep premiums affordable and FEMA should invest in flood prevention ([Vox](#)).<sup>591</sup>
- “The program is \$24.6 billion in debt to the U.S. Treasury and taxpayers; insurance rates are rising; subsidized insurance rates continue to mask the real risks of flooding to properties; the program fails to adequately reward community-level actions to reduce flood risks; and the floodplain maps that serve as the basis for rates and local land-use decisions are out-of-date, and do not account for current risk, let alone future risk” ([100 Resilient Cities](#)).<sup>592</sup>

#### Additional Resources

- Center for Insurance Policy and Research. “Flood Risk and Insurance.” April 2017. [https://www.naic.org/documents/cipr\\_study\\_1704\\_flood\\_risk.pdf](https://www.naic.org/documents/cipr_study_1704_flood_risk.pdf)
- Zou, Jie Jenny. “Climate Change and Soaring Flood Insurance Premiums Could Trigger Another Mortgage Crisis.” *Vox*. February 25, 2020.

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<sup>587</sup> “Coastal Flood Risk Mapping Process.” *FEMA*. <https://www.fema.gov/coastal-flood-risk-mapping-process>

<sup>588</sup> Altmaier, David, et al. Flood Risk and Insurance. Center for Insurance Policy and Research. April 2017. [https://www.naic.org/documents/cipr\\_study\\_1704\\_flood\\_risk.pdf](https://www.naic.org/documents/cipr_study_1704_flood_risk.pdf)

<sup>589</sup> “National Flood Insurance Program Community Rating System.” *FEMA*. <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

<sup>590</sup> “Floodplain Management.” *City of Roseville California*. [https://www.roseville.ca.us/government/departments/public\\_works/floodplain\\_management](https://www.roseville.ca.us/government/departments/public_works/floodplain_management)

<sup>591</sup> Zou, Jie Jenny. “Climate Change and Soaring Flood Insurance Premiums Could Trigger Another Mortgage Crisis.” *Vox*. February 25, 2020. <https://www.vox.com/2020/2/25/21146896/climate-change-fema-flood-insurance-mortgage-crisis>

<sup>592</sup> “Strengthening The National Flood Insurance Program.” *100 Resilient Cities*. [http://www.100resilientcities.org/wp-content/uploads/2017/11/Resilient-Cities-stand-alone-ch3\\_revised\\_11.7.17.pdf](http://www.100resilientcities.org/wp-content/uploads/2017/11/Resilient-Cities-stand-alone-ch3_revised_11.7.17.pdf)

<https://www.vox.com/2020/2/25/21146896/climate-change-fema-flood-insurance-mortgage-crisis>

- Adler, Dena and Scata, Joel. “Breaking the Cycle of ‘Flood-Rebuild-Repeat’: Local and State Options to Improve Substantial Damage and Improvement Standards in the National Flood Insurance Program.” *Sabin Center for Climate Change Law*. Columbia Law School. January 2019.

[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3364627](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3364627)

- Adler, Dena, Burger, Michael, Moore, Rob and Scata, Joel. “Changing the National Flood Insurance Program for a Changing Climate.” *Environmental Law Institute*. 2019.

[https://www.eli.org/sites/default/files/images/49.10320\\_.pdf](https://www.eli.org/sites/default/files/images/49.10320_.pdf)



## Development Restrictions In Vulnerable Communities

### Description

- “Congress should direct FEMA to conduct studies to estimate the avoided flood losses and other benefits of not allowing new development and redevelopment of [Special Flood Hazard Areas]” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 413).

Cross Reference: [Managed Retreat](#)

Proposed by: [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

### Previous/Current Implementation

- FEMA currently requires developers to acquire permits before constructing within Special Flood Hazard Areas.<sup>593</sup>
- In Mississauga, Canada, the Credit Valley Conservation Authority has committed to low-impact development infrastructure design centers in order to reduce runoff into the Credit Valley watershed ([International Institute for Sustainable Development](#)).<sup>594</sup>
- Nags Head, North Carolina adopted building standards more restrictive than required by either FEMA or the North Carolina Coastal Area Management Act (CAMA). Incentives encouraged development to be located as far back from the ocean as possible, including strict setbacks” (Neal, William J, et al. [Managed Retreat](#)).<sup>595</sup>
- The Maine Coastal Sand Dune Rules govern private and public development on the Maine sand dune system. Section 6 governs the standards for building and re-building on frontal dunes ([Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas](#), p. 91).<sup>596</sup>

### Co-Benefits

Development or redevelopment restrictions in vulnerable areas reduce the economic and human safety harms caused by flooding and storms ([Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas](#)).<sup>597</sup>

### Obstacles/Shortfalls

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<sup>593</sup> “Permit for Floodplain Development.” *FEMA*. <https://www.fema.gov/permit-floodplain-development>

<sup>594</sup> Venema, Hank. “Eight Ways Cities are Building Climate Resilience.” *International Institute for Sustainable Development*. 2017. <https://www.iisd.org/faq/building-a-climate-resilient-city/>

<sup>595</sup> Neal, William J., Bush, David and Pilkey, Orrin. “Managed Retreat.” *Encyclopedia of Coastal Science*. January 2017. [https://www.researchgate.net/publication/318184981\\_Managed\\_Retreat](https://www.researchgate.net/publication/318184981_Managed_Retreat)

<sup>596</sup> Siders, Anne. “Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas.” *Columbia Law School Center for Climate Change Law*. October 2013. [https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat\\_FINAL\\_Oct%2030.pdf](https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat_FINAL_Oct%2030.pdf)

<sup>597</sup> Siders, Anne. “Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas.” *Columbia Law School Center for Climate Change Law*. October 2013. [https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat\\_FINAL\\_Oct%2030.pdf](https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat_FINAL_Oct%2030.pdf)

Common obstacles include: entrenched property interests and escalating land values with property viewed as growth assets; local governments desire for continued growth (expanding the tax base); local governments with dominant representation by persons with vested interests in development; government programs intended to suppress development in hazard zones that actually encourage the opposite (subsidized flood insurance, support for beach nourishment, post-disaster support for restoring infrastructure); intentional vague or contradictory management legislation (lack of political will); lack of appropriate authority for managers and financial support for management programs; and the general trend for “taking” challenges vs. property rights to lose in the courts ([Managed Retreat](#)).<sup>598</sup>

#### Additional Resources

Siders, Anne. “Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas.” *Columbia Law School Center for Climate Change Law*. October 2013. [https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat\\_FINAL\\_Oct%2030.pdf](https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat_FINAL_Oct%2030.pdf)

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<sup>598</sup> Neal, William J., Bush, David and Pilkey, Orrin. “Managed Retreat.” *Encyclopedia of Coastal Science*. January 2017. [https://www.researchgate.net/publication/318184981\\_Managed\\_Retreat](https://www.researchgate.net/publication/318184981_Managed_Retreat)

## Managed Retreat

### Description

“In the coastal zone, managed retreat is the application of coastal zone management and mitigation tools designed to move existing and planned development out of the path of both short- and long-term coastal hazards (e.g., hurricanes/ typhoons, nor’easters, tsunamis, El Niños, king tides, erosion, flooding, storm surges, sea-level rise)” (“[Managed Retreat](#)”).<sup>599</sup>

- “Apply equity considerations in managed retreats to ensure that communities are resourced and treated with dignity and respect” ([Vision for Equitable Climate Action](#), p. 21).

Proposed by: [Vision for Equitable Climate Action](#)

### Previous/Current Implementation

- Examples of planned relocation of communities: [El Chonco in Colombia](#)<sup>600</sup> and the [Carteret Islands in the Pacific](#).<sup>601</sup>
- The aftermath of Katrina led to the planned move of Isle de Jean Charles, Louisiana, but no resettlement has taken place (“[Managed Retreat](#)”).<sup>602</sup>
- Nags Head, North Carolina incorporated retreat aspects into its management plans. The town adopted building standards more restrictive than required by either FEMA or the North Carolina Coastal Area Management Act (CAMA). Incentives encouraged development to be located as far back from the ocean as possible, including strict setbacks. (“[Managed Retreat](#)”).<sup>603</sup>

### Co-Benefits

Managed retreat is less costly than building sea walls to protect coastal communities. It also restores coastal ecosystems ([Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai‘i: Final Report](#)).<sup>604</sup>

### Obstacles/Shortfalls

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<sup>599</sup> Neal, William J., Bush, David and Pilkey, Orrin. “Managed Retreat.” *Encyclopedia of Coastal Science*. January 2017. [https://www.researchgate.net/publication/318184981\\_Managed\\_Retreat](https://www.researchgate.net/publication/318184981_Managed_Retreat)

<sup>600</sup> Correa, Ivan D. and Gonzalez, Juan. “Coastal Erosion and Village Relocation: A Colombian Case Study.” *Ocean & Coastal Management*. January 2000. [https://www.researchgate.net/publication/239356514\\_Coastal\\_erosion\\_and\\_village\\_relocation\\_A\\_Colombian\\_case\\_study](https://www.researchgate.net/publication/239356514_Coastal_erosion_and_village_relocation_A_Colombian_case_study)

<sup>601</sup> Iverson, Jason. “Funding Alaska Village Relocation Caused by Climate Change and Preserving Cultural Values During Relocation.” *Seattle University School of Law*, Vol. 12, No. 2. 2013. <https://digitalcommons.law.seattleu.edu/cgi/viewcontent.cgi?referer=https://www.researchgate.net/&httpsredir=1&article=1701&context=sjsi>

<sup>602</sup> Neal, William J., Bush, David and Pilkey, Orrin. “Managed Retreat.” *Encyclopedia of Coastal Science*. January 2017. [https://www.researchgate.net/publication/318184981\\_Managed\\_Retreat](https://www.researchgate.net/publication/318184981_Managed_Retreat)

<sup>603</sup> Ibid.

<sup>604</sup> Office of Planning, Coastal Zone Management Program. Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai‘i. Department of Business Economic Development & Tourism Office of Planning, Coastal Zone Management Program. February 2019. [http://files.hawaii.gov/dbedt/op/czm/ormp/assessing\\_the\\_feasibility\\_and\\_implications\\_of\\_managed\\_retreat\\_strategies\\_for\\_vulnerable\\_coastal\\_areas\\_in\\_hawaii.pdf](http://files.hawaii.gov/dbedt/op/czm/ormp/assessing_the_feasibility_and_implications_of_managed_retreat_strategies_for_vulnerable_coastal_areas_in_hawaii.pdf)

Common obstacles include: entrenched property interests and escalating land values with property viewed as growth assets; local governments desire for continued growth (expanding the tax base); local governments with dominant representation by persons with vested interests in development; government programs intended to suppress development in hazard zones that actually encourage the opposite (subsidized flood insurance, support for beach nourishment, post-disaster support for restoring infrastructure); intentional vague or contradictory management legislation (lack of political will); lack of appropriate authority for managers and financial support for management programs; and the general trend for “taking” challenges vs. property rights to lose in the courts ([Managed Retreat](#)).

#### Additional Resources

- Neal, William J., Bush, David and Pilkey, Orrin. “Managed Retreat.” *Encyclopedia of Coastal Science*. January 2017.  
[https://www.researchgate.net/publication/318184981\\_Managed\\_Retreat](https://www.researchgate.net/publication/318184981_Managed_Retreat)
- Office of Planning, Coastal Zone Management Program. “Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai‘i.” Department of Business Economic Development & Tourism Office of Planning, Coastal Zone Management Program. February 2019.  
[http://files.hawaii.gov/dbedt/op/czm/ormp/assessing\\_the\\_feasibility\\_and\\_implications\\_of\\_managed\\_retreat\\_strategies\\_for\\_vulnerable\\_coastal\\_areas\\_in\\_hawaii.pdf](http://files.hawaii.gov/dbedt/op/czm/ormp/assessing_the_feasibility_and_implications_of_managed_retreat_strategies_for_vulnerable_coastal_areas_in_hawaii.pdf)
- Siders, Anne. “Managed Coastal Retreat: A Legal Handbook on Shifting Development Away from Vulnerable Areas.” *Columbia Law School Center for Climate Change Law*. October 2013. [https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat\\_FINAL\\_Oct%2030.pdf](https://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/ManagedCoastalRetreat_FINAL_Oct%2030.pdf)

## Resilient Infrastructure

### Description

- “To insure current and future infrastructure investments against climate risk, the next President should take executive action to ensure all federal infrastructure dollars, and the entirety of the federal budget, are appropriated and spent with a focus on resilience. And, the next President should in particular take action to require a Climate Test as part of the National Environmental Policy Act (NEPA) process when reviewing all major infrastructure projects” ([Evergreen Action Plan](#), p. 66).
- “Congress should reauthorize [National Windstorm Impact Reduction Program] to 2025 and increase its appropriations to improve research into climate system variability and change as it relates to wind hazards and to translate this research into better engineering design of the built environment” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 423).
- “Congress should establish a national climate bank to finance targeted deployment of clean energy and other decarbonization technologies and climate-resilient infrastructure” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 227).
- “Congress should direct the EPA to require that all water infrastructure projects greater than \$5 million that receive federal financial assistance use lifecycle risk and cost analysis, and to site and design new projects and make improvements to existing facilities to meet the climate risks that are anticipated over the lifetime of the asset” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 187).
- “We will invest \$636.1 billion in our roads, bridges, and water infrastructure to ensure it is resilient to climate impacts, and another \$300 billion to ensure that all new infrastructure built over the next 10 years is also resilient” ([Bernie Sanders 2020 Presidential Campaign](#)).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [CLEAN Future Act](#) (2020); [Elizabeth Warren 2020 Presidential Campaign](#); Pete Buttigieg 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#); Amy Klobuchar 2020 Presidential Campaign; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [INVEST Act](#)

### Previous/Current Implementation

- The United States [Federal Highway Agency](#)<sup>605</sup> has developed a tool to support transportation agencies in selecting appropriate materials for road surfaces.
- [United States Climate Change Adaptation Resource Center \(ARC-X\)](#):<sup>606</sup> the Cross-Agency Working Group on Adaptation’s Climate Change Adaptation Resource Center (ARC-X) helps local and regional governments in small to mid-size US cities make

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<sup>605</sup> “Boosting Pavement Resilience.” *U.S. Department of Transportation Federal Highway Administration*. <https://www.fhwa.dot.gov/publications/publicroads/18autumn/04.cfm>

<sup>606</sup> “Climate Change Adaptation Resource Center.” *U.S. Environmental Protection Agency*. [https://www.epa.gov/arc-x#:~:text=EPA's%20Adaptation%20Resource%20Center%20\(ARC,tailored%20specifically%20to%20their%20needs](https://www.epa.gov/arc-x#:~:text=EPA's%20Adaptation%20Resource%20Center%20(ARC,tailored%20specifically%20to%20their%20needs)

decisions about resilience planning. It provides access to data on climate risks, guidance on developing adaptation strategies, case studies and information on potential funding opportunities.

- The County of Santa Clara’s Silicon Valley 2.0 Project created a decision-support tool that maps infrastructure assets and their exposure to climate-related hazards, and quantifies the risk of asset loss. The tool is accompanied by a Climate Adaptation Strategic Guide targeting cities, the County and other key agencies and stakeholders (OECD, p. 18).<sup>607</sup>
- Congress established the National Windstorm Impact Reduction Program (NWIRP) “...to achieve major measurable reductions in the losses of life and property from windstorms through a coordinated Federal effort, in cooperation with other levels of government, academia, and the private sector, aimed at improving the understanding of windstorms and their impacts and developing and encouraging the implementation of cost-effective mitigation measures to reduce those impacts.” (The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America, p. 423).

### Co-Benefits

Resilient infrastructure reduces costs associated with future maintenance or repairs: “Analysis by Hallegatte et al. (2013), for example, estimated that spending USD 50 billion per year (annualised) on flood defences for coastal cities would reduce expected losses in 2050 from USD 1 trillion to USD 60-63 billion” (OECD).<sup>608</sup> Climate resilient infrastructure can also conserve biodiversity and create jobs/prevent the loss of jobs.

### Obstacles/Shortfalls

Some benefits of increased climate resilience will occur beyond the time horizons considered by decision makers, while costs are incurred in the shorter term. There are also inherent uncertainties in modelling how the climate, and other factors affecting infrastructure resilience, will evolve in the future. This means that climate resilient infrastructure needs to be prepared for a range of possible future scenarios. Awareness and information on the risks from climate change, such as climate projections, may not be readily available to inform investment decisions. (OECD).

### Additional Resources

OECD. “Climate-Resilient Infrastructure: Policy Perspectives.” 2018.

<http://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>

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<sup>607</sup> Organisation for Economic Cooperation and Development. Climate-Resilient Infrastructure: Policy Perspectives. 2018. <http://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>

<sup>608</sup> Organisation for Economic Cooperation and Development. Climate-Resilient Infrastructure: Policy Perspectives. 2018. <http://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>

## Water Resources In A Changing Climate

### Description

“The next administration should work with Congress to deploy major investment into the suite of water infrastructure that must meet 21st century climate-smart standards” ([Evergreen Action Plan](#), p. 68):

- Increasing federal funding for water resource management in chronically under-funded programs at the U.S. Departments of Interior and Agriculture that help secure drought-resistant water supplies in river basins throughout the West ([Evergreen Action Plan](#), p. 68).
- Support programs that focus on water use efficiency, aquifer recharging, water reuse, community response and recovery, and coordination of the federal response to drought situations ([Evergreen Action Plan](#), p. 68).
- Prioritize building flood-resilient rural communities. This includes investments in the Army Corps of Engineers and EPA water infrastructure programs; up-front investments in the Federal Emergency Management Agency’s pre-disaster hazard mitigation and the Department of Housing & Urban Development’s community development block grants; using post-disaster investment to reduce future risk, including reforms to the National Flood Insurance Program; partnership with Congress to enact a federal flood risk management standard; and financial resources to support relocation grants ([Evergreen Action Plan](#), p. 68).
- “Congress should direct the EPA to require that all water infrastructure projects greater than \$5 million that receive federal financial assistance use lifecycle risk and cost analysis, and to site and design new projects and make improvements to existing facilities to meet the climate risks that are anticipated over the lifetime of the asset” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 187).
- “Congress should increase appropriations to cover the subsidy cost of providing [WIFIA](#)<sup>609</sup> credit assistance for a larger program to reach more borrowers” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 187).
- “Congress should increase the authorization and the funding cap for water recycling programs in the Bureau of Reclamation; provide additional funding for water storage, natural infrastructure projects, and the existing desalination program; and establish a predictable process for authorizing major federal water storage projects, similar to the Water Resources Development Act. Congress also should extend eligibility for these programs to include territories” ([Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 190).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Elizabeth Warren 2020 Presidential Campaign](#); [DNC Environment and Climate Crisis Council](#); [Vision for Equitable Climate Action](#); [Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Desalination Development Act \(H.R. 3723\)](#);<sup>610</sup> [The 21st](#)

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<sup>609</sup> “Water Infrastructure Finance and Innovation Act.” *U.S. Environmental Protection Agency*. <https://www.epa.gov/wifia>

<sup>610</sup> Desalination Development Act. H.R. 3723, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/3723>



[Century Conservation Corps for Our Health and Our Jobs Act \(S. 3684\)](#);<sup>611</sup> [Water Recycling Investment and Improvement Act \(H.R. 1162\)](#);<sup>612</sup> [Water Quality Protection and Job Creation Act of 2019 \(H.R. 1497\)](#);<sup>613</sup> [Puerto Rico WaterSMART Grants Eligibility Act \(H.R. 6050\)](#);<sup>614</sup> [Bernie Sanders 2020 Presidential Campaign](#); [WATER Act](#);<sup>615</sup> Cory Booker 2020 Presidential Campaign; Julian Castro 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; Beto O'Rourke 2020 Presidential Campaign;

#### Previous/Current Implementation

- The [Drinking Water State Revolving Fund](#)<sup>616</sup> (DWSRF) program is a federal-state partnership to help ensure safe drinking water. Created by the 1996 Amendments to the Safe Drinking Water Act (SDWA), the program provides financial support to water systems and to state safe water programs.
- The [Yakima Basin Integrated Plan](#)<sup>617</sup> in Washington State is a campaign to upgrade the river's irrigation systems, enhance water storage, institute a water market during drought years, and more.
- In 2019, the Mayors of the Mississippi River presented a "\$7.86 billion jobs, investment, and resilience [plan](#)"<sup>618</sup> that supports eight major economies, creates over 147,000 jobs, and generates more than \$23.58 billion in economic activity."
- [Floodplains by Design](#)<sup>619</sup> (FbD) is a public-private partnership led by the Department of Ecology, [the Nature Conservancy](#), and the [Puget Sound Partnership](#). FbD works to accelerate integrated efforts to reduce flood risks and restore habitat along Washington's major river corridors.
- In the Water Resources Reform and Development Act of 2014, Congress enacted [[The Water Infrastructure Finance and Innovation Act](#)]<sup>620</sup> to authorize EPA to provide federal credit assistance for water infrastructure projects through secured direct loans and loan guarantees.

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<sup>611</sup> The 21st Century Conservation Corps for Our Health and Our Jobs Act. H.R. 7264, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/7264/text>

<sup>612</sup> Water Recycling Investment and Improvement Act. H.R. 1162, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/1162?q=%7B%22search%22%3A%5B%22S+34%22%5D%7D>

<sup>613</sup> Water Quality Protection and Job Creation Act of 2019. H.R. 1497, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/1497>

<sup>614</sup> Puerto Rico WaterSMART Grants Eligibility Act. H.R. 6050, 116th Congress. 2020. <https://www.congress.gov/bill/116th-congress/house-bill/6050?s=1&r=3>

<sup>615</sup> Water Affordability, Transparency, Equity, and Reliability Act of 2019. H.R. 1417, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/1417/text?format=txt>

<sup>616</sup> "Drinking Water State Revolving Fund (DWSRF)." *US Environmental Protection Agency*. <https://www.epa.gov/dwsrf>

<sup>617</sup> "Learn More About the Integrated Plan." *Yakima Basin Integrated Plan*. <http://www.yakimariver.org/learn/>

<sup>618</sup> Mississippi River City and Towns Initiative. "2019 Federal Policy Platform of the Mississippi River Mayors: A Bold Plan to Revive and Reinforce the Infrastructure of the Mississippi River Corridor." 2019. <https://static1.squarespace.com/static/5845a70859cc6819f2dfdb9e/t/5c87b6096e9a7f38beaf70bb/1552397864078/Platform+One-Pagers+19.pdf>

<sup>619</sup> *Floodplains by Design*. <http://www.floodplainsbydesign.org/>

<sup>620</sup> "Water Infrastructure Finance and Innovation Act (WIFIA)." *U.S. Environmental Protection Agency*. <https://www.epa.gov/wifia>

### Co-Benefits

- Improving the nation's water infrastructure will create jobs and provide health improvements for residents who gain access to clean water, protection from floods, protection of ecosystems.
- "Water treatment and distribution require an enormous amount of energy, the production of which typically emits harmful CO<sub>2</sub>. Green technology can reduce water withdrawal, lower CO<sub>2</sub> emissions, and reduce water pollution. Minimizing leaks saves both water and energy" ([Improving Water Infrastructure and Management](#). The Navigating Impact Project).<sup>621</sup>

### Obstacles/Shortfalls

- "Small communities have unique challenges and receive targeted federal assistance, including: the majority of assistance agreements from the SRFs, USDA loans and grants set aside solely for small rural systems, and EPA and USDA training programs for small-system operators. Despite the availability of this assistance, small systems continue to struggle. One potential solution is to combine small-system service areas so that one system serves more people, reducing compliance and operation costs while enabling better, more focused training. However, consolidation of systems is not without political risks as small towns have a strong sense of identity often tied up in their utilities and other government services" ([Understanding America's Water and Wastewater Challenges](#), Bipartisan Policy Center, p. 20).<sup>622</sup>
- Population and demographic changes make it more difficult to project future water resource needs.

### Additional Resources

Bartlett, Steve, et al. "Understanding America's Water and Wastewater Challenges." Bipartisan Policy Center. May 2017.

<https://bipartisanpolicy.org/wp-content/uploads/2019/03/BPC-Infrastructure-Understanding-Americas-Water-and-Wastewater-Challenges.pdf>

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<sup>621</sup> "Improving Water Infrastructure and Management." *The Navigating Impact Project*.

<https://navigatingimpact.thegiin.org/strategy/improving-water-infrastructure-and-management/>

<sup>622</sup> Bartlett, Steve, et al. "Understanding America's Water and Wastewater Challenges." Bipartisan Policy Center. May 2017.

<https://bipartisanpolicy.org/wp-content/uploads/2019/03/BPC-Infrastructure-Understanding-Americas-Water-and-Wastewater-Challenges.pdf>

## Beach Nourishment and Shoreline Armoring Policy

### Description

- “Implement beach and dune nourishment and plant mangrove trees and seagrass to address sea level rise and violent storm impacts” ([Vision for Equitable Climate Action](#), p. 22).
- “‘Armoring’ is the practice of using physical structures to protect shorelines from coastal erosion” ([NOAA](#)).<sup>623</sup>

Proposed by: [Vision for Equitable Climate Action](#)

### Previous/Current Implementation

- In 1972, Congress enacted the [Coastal Zone Management Act](#)<sup>624</sup> (CZMA) to address increasing stresses on the nation’s coastal areas. Administered by the National Oceanic & Atmospheric Administration (NOAA), the CZMA created a partnership of federal and state government to reduce conflicts between land and water uses in the coastal zone, protect fragile coastal resources, and provide for economic development.
- The [San Francisco Bay Living Shorelines Project](#)<sup>625</sup> involves using structural and organic materials to reinforce the shoreline, minimize coastal erosion, and maintain coastal processes while protecting, restoring, enhancing, and creating natural habitat for fish and aquatic plants and wildlife ([Managing Coastal Armoring and Climate Change Adaptation in the 21st Century](#)).<sup>626</sup>

### Co-Benefits

Beach nourishment restores habitat for coastal wildlife and offers protection against rising sea levels and storms ([How Beach Nourishment Projects Work](#)).<sup>627</sup> It also maintains property values ([Shoreline Armoring Impacts and Management Along the Shores of Massachusetts and Kauai, Hawaii](#)).<sup>628</sup>

### Obstacles/Shortfalls

- Benefits of beach nourishment projects may only benefit coastal landowners and businesses at the expense of federal or state taxpayers’ money ([National Ocean Service](#)).<sup>629</sup>

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<sup>623</sup> “What is Shoreline Armoring?” NOAA. <https://oceanservice.noaa.gov/facts/shoreline-armoring.html>

<sup>624</sup> “Coastal Zone Management Act.” NOAA. <https://coast.noaa.gov/czm/act/#:~:text=Coastal%20Zone%20Management%20Act,resources%2C%20including%20the%20Great%20Lakes>.

<sup>625</sup> *San Francisco Bay Living Shorelines Project*. [http://www.sfbaylivingshorelines.org/sf\\_shorelines\\_about.html](http://www.sfbaylivingshorelines.org/sf_shorelines_about.html)

<sup>626</sup> Loughney Melius, Molly and Caldwell, Margaret R. *Managing Coastal Armoring and Climate Change Adaptation in the 21st Century*. Stanford Law School Environment and Natural Resources Law & Policy Program. 2015. <https://law.stanford.edu/wp-content/uploads/2015/07/CalCoastArmor-FULL-REPORT-6.17.15.pdf>

<sup>627</sup> ASBPA. *How Beach Nourishment Projects Work*. Shore Protection Assessment. 2007. <http://asbpa.org/wpv2/wp-content/uploads/2016/04/HowBeachNourishmentWorksPrimerASBPA.pdf>

<sup>628</sup> O’Connell, James F. *Shoreline Armoring Impacts and Management Along the Shores of Massachusetts and Kauai, Hawaii*. U.S. Geological Survey Scientific Investigations Report. 2010. [https://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254\\_chap7.pdf](https://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254_chap7.pdf)

<sup>629</sup> “Hedrick, Casey. State, Territory, and Commonwealth Beach Nourishment Programs: A National Overview. Office of Ocean & Coastal Resource Management. National Ocean Service. National Oceanic & Atmospheric Administration. U.S. Department of Commerce. March 2000. <https://coast.noaa.gov/data/czm/media/finalbeach.pdf>

- Beach nourishment projects are very expensive due to the high cost of moving sand from a borrow site to the beach and the subsequent costs involved in maintaining the beach. It is also difficult to find an available large supply of suitable sand ([National Ocean Service](#)).<sup>630</sup>
- Beach nourishment can negatively affect the environment, including by: disturbing species' feeding patterns; disturbing species' nesting and breeding habitats; elevating turbidity levels; burying intertidal and bottom plants and animals and their habitats in the surf zone; and, increasing sedimentation in areas seaward of the surf zone as the fill material redistributes to a more stable profile ([National Ocean Service](#)).<sup>631</sup>
- By restricting the natural movement of sediments, shoreline armoring has the potential to eliminate habitat for marine organisms and beach front for the public ([What is Shoreline Armoring?](#) NOAA).<sup>632</sup>
- In New York City, constructing storm surge gates along an identified six-mile long sea barrier would require decades and trillions of dollars ([Three Prongs for Prudent Climate Policy](#), p. 12).<sup>633</sup>

#### Additional Resources

- Greene, Karen. "Beach Nourishment: A Review of the Biological and Physical Impacts. ASMFC Habitat Committee." November 2002.  
<http://www.asmfc.org/uploads/file/beachNourishment.pdf>
- ASBPA. "How Beach Nourishment Projects Work. Shore Protection Assessment." 2007.  
<http://asbpa.org/wpv2/wp-content/uploads/2016/04/HowBeachNourishmentWorksPrimerASBPA.pdf>
- O'Connell, James F. "Shoreline Armoring Impacts and Management Along the Shores of Massachusetts and Kauai, Hawaii." U.S. Geological Survey Scientific Investigations Report. 2010.  
[https://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254\\_chap7.pdf](https://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254_chap7.pdf)
- Loughney Melius, Molly and Caldwell, Margaret R. "Managing Coastal Armoring and Climate Change Adaptation in the 21st Century." Stanford Law School Environment and Natural Resources Law & Policy Program. 2015.  
<https://law.stanford.edu/wp-content/uploads/2015/07/CalCoastArmor-FULL-REPORT-6.17.15.pdf>
- Hedrick, Casey. "State, Territory, and Commonwealth Beach Nourishment Programs: A National Overview." Office of Ocean & Coastal Resource Management. National Ocean Service. National Oceanic & Atmospheric Administration. U.S. Department of Commerce. March 2000.  
<https://coast.noaa.gov/data/czm/media/finalbeach.pdf>

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<sup>630</sup> Ibid.

<sup>631</sup> Ibid.

<sup>632</sup> What is Shoreline Armoring? NOAA. <https://oceanservice.noaa.gov/facts/shoreline-armoring.html>

<sup>633</sup> Aldy, Joseph E. and Zeckhauser, Richard. Three Prongs for Prudent Climate Policy. Resources for the Future. April 2020. [https://media.rff.org/documents/Three\\_Prongs\\_for\\_Prudent\\_Climate\\_Policy.pdf](https://media.rff.org/documents/Three_Prongs_for_Prudent_Climate_Policy.pdf)



## Disaster Preparedness, Response And Recovery

### Description

- The next President and administration should: reinstate and strengthen the Environmental Protection Agency's (EPA) Chemical Disaster Rule; commit to fully implementing the multi-agency National Mitigation Framework; direct the EPA Administrator to require that polluting facilities share information and emergency response plans with neighbors in case of explosions or chemical disasters and to require buffer zones between chemical facilities and homes and schools; task the EPA and the Federal Emergency Management Agency (FEMA) to ... implement continuous monitoring requirements for toxic pollutants; increase EPA inspections and monitoring [and] impose significant fines on facilities that spill toxic air and water contaminants ([Evergreen Action Plan](#), p. 67).
- The next administration and Congress should work together to ... create a Rebuild by Design pilot program ... to provide states and local governments with federal resilience investments that allow for creative and innovative solutions ([Evergreen Action Plan](#), p. 68).
- "Invest in programs that help vulnerable communities build resiliency by quintupling FEMA's Pre-Disaster Mitigation Program's funding" (Elizabeth Warren, [Fighting for Environmental Justice as We Combat the Climate Crisis](#)).<sup>634</sup>
- Dramatically improve fire mapping and prevention by investing in advanced modeling with a focus on helping the most vulnerable - incorporating not only fire vulnerability but community demographics (Elizabeth Warren, [Fighting for Environmental Justice as We Combat the Climate Crisis](#)).
- Congress should authorize and appropriate \$1 billion for the FEMA Flood Mitigation Assistance grant program, and it should ensure that Flood Mitigation Assistance grants for multifamily, attached, and semi-attached residences balance flood mitigation and affordability concerns ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 393).
- "Congress should increase funding to the [NIEHS Worker Training Program](#)<sup>635</sup> and direct the NIEHS to enhance training on climate resilience and disaster preparedness" ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#), p. 326).

Proposed by: [Evergreen Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Center for Climate and Energy Solutions](#); [DNC Environment and Climate Crisis Council](#); [Vision for Equitable Climate Action](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [DNC Draft 2020 Policy Platform](#).

### Previous/Current Implementation

- "EPA put the Chemical Disaster Rule in place [in 2017] to strengthen chemical plants' prevention and preparedness requirements for explosions and other catastrophes, ensure

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<sup>634</sup> "Fighting for Environmental Justice as We Combat the Climate Crisis." *ElizabethWarren.Com*.  
<https://elizabethwarren.com/plans/environmental-justice>

<sup>635</sup> "About the Worker Training Program." *National Institute for Environmental Health Sciences*.  
[https://www.niehs.nih.gov/careers/hazmat/about\\_wetp/index.cfm](https://www.niehs.nih.gov/careers/hazmat/about_wetp/index.cfm)

better and more frequent coordination with first responders, and bolster community access to information about the chemical hazards they live next to.” The Trump Administration repealed this rule in 2019 ([EarthJustice](#)).<sup>636</sup>

- “The Pre-Disaster Mitigation Program, authorized by Section 203 of the [Robert T. Stafford Disaster Relief and Emergency Assistance Act](#),<sup>637</sup> is designed to assist states, territories, federally-recognized tribes, and local communities in implementing a sustained pre-disaster natural hazard mitigation program” ([FEMA.Gov](#)).<sup>638</sup>
- “In response to the devastating impacts of Hurricane Sandy in October 2012, [President Obama] convened the Hurricane Sandy Rebuilding Task Force to help homeowners stay in and repair their homes, strengthen small businesses, revitalize local economies, and help communities withstand and recover from future storms. In August 2013, that group – led by Federal officials, with input from an advisory group of State, local, and tribal leaders – released the [Hurricane Sandy Rebuilding Strategy](#)<sup>639</sup>” (Council on Climate Preparedness and Resilience, [Opportunities to Enhance the Nation’s Resilience to Climate Change](#)).<sup>640</sup>
- FEMA ran [Project Impact](#)<sup>641</sup> from 1997-2001 and provided technical assistance and project funds for community organizing and disaster preparedness.

### Co-Benefits

For every dollar invested in mitigation, the government and communities save [\\$6](#) overall. Mitigation investments would prevent 600 deaths, 1 million nonfatal injuries and 4,000 cases of post-traumatic stress disorder (PTSD) in the long term ([National Institute of Building Sciences](#)).<sup>642</sup>

### Obstacles/Shortfalls

Novel crisis disasters, which differ from “routine” emergencies, require improvised and unpredictable responses. In addition, local jurisdictions or states will require unexpected quantities of supply in times of crisis. Addressing the need for surge capacity requires careful advance assessment of potential needs, allocation of sufficient budgetary resources, and detailed

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<sup>636</sup> Kayne, Eric. “Trump’s EPA Revoked Chemical Disaster Prevention Rules. Now Groups Are Suing.” *EarthJustice*. December 19, 2019. <https://earthjustice.org/news/press/2019/trumps-epa-revoked-chemical-disaster-prevention-rules-now-groups-are-suing#:~:text=EPA%20put%20the%20Chemical%20Disaster,hazards%20they%20live%20next%20to>.

<sup>637</sup> “Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and Related Authorities as of June 2019.” *FEMA*. <https://www.fema.gov/media-library/assets/documents/15271>

<sup>638</sup> “Pre-Disaster Mitigation Grant Program.” *FEMA*. <https://www.fema.gov/pre-disaster-mitigation-grant-program>

<sup>639</sup> Hurricane Sandy Rebuilding Task Force. Hurricane Sandy Rebuilding Strategy. August 2013. <https://www.hud.gov/sites/documents/HSREBUILDINGSTRATEGY.PDF>

<sup>640</sup> Council on Climate Preparedness and Resilience. Opportunities to Enhance the Nation’s Resilience to Climate Change. The Obama Whitehouse. October 2016. <https://obamawhitehouse.archives.gov/sites/default/files/finalresilienceopportunitiesreport.pdf>

<sup>641</sup> “Project Impact: Building A Disaster-Resistant Community.” *FEMA*. <https://www.fema.gov/news-release/1999/11/22/project-impact-building-disaster-resistant-community>

<sup>642</sup> “National Institute of Building Sciences Issues New Report on the Value of Mitigation.” *National Institute of Building Sciences*. January 11, 2018. <https://www.nibs.org/news/381874/National-Institute-of-Building-Sciences-Issues-New-Report-on-the-Value-of-Mitigation.htm>



logistical planning for transporting resources to disaster sites ([Katrina and the Core Challenges of Disaster Response](#)).<sup>643</sup>

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<sup>643</sup> Howitt, Arnold M. and Leonard, Herman B. Katrina and the Core Challenges of Disaster Response. *The Fletcher Forum of World Affairs*, Vol. 30, No. 1. Winter 2006.  
<https://pdfs.semanticscholar.org/6a39/5b80841fc81dc765bocf685c08fe0d3ed8ao.pdf>

## Public Health and Health Infrastructure

### Description

- “Congress should direct [Health and Human Services] to develop a comprehensive national strategic action plan to address the physical and operational risks from climate change to public health systems and health care facilities, and to assist communities and public health departments in preparing for and responding to the public health risks of the climate crisis, including mental health and food insecurity. This strategic planning process should provide for meaningful public input, particularly from vulnerable populations and frontline communities” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 315).
- “Congress should increase funding to the CDC Climate and Health Program to assist [State, Local and Tribal Territory (SLTT)] health departments with climate risk assessments, resilience planning, and implementation of actions to increase preparedness to extreme weather and other climate impacts” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 316).
- “Congress should increase funding for CDC grant programs to SLTT departments to
- reduce health disparities for frontline communities affected by the climate crisis, including the REACH program and Good Health and Wellness in Indian Country” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 320).
- “Congress should direct the [Health and Human Services Office of the Assistant Secretary for Preparedness and Response (HHS ASPR)] to conduct an annual assessment of weather-related threats to health care infrastructure and supply chains that could impair response to disasters and public health emergencies” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 322).

Proposed by: [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [Section 45001 of the Energy and Commerce Committee Democrats’ Leading Infrastructure for Tomorrow’s \(LIFT\) America Act \(H.R. 2741\)](#);<sup>644</sup> [Improving Social Determinants of Health Act of 2020 \(H.R. 6561\)](#);<sup>645</sup> [Vision for Equitable Climate Action](#)

### Previous/Current Implementation

- The [HHS Office of the Assistant Secretary for Preparedness Response](#)<sup>646</sup> (ASPR) was established in 2006 to lead federal efforts on preparedness and response for public health emergencies. [The ASPR National Health Security Strategy \(2019-22\)](#)<sup>647</sup> provides a high-level strategy for coordinating around emerging public health threats, including climate-related disasters.

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<sup>644</sup> Leading Infrastructure for Tomorrow’s (LIFT) America Act. H.R. 2741, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/house-bill/2741>

<sup>645</sup> Improving Social Determinants of Health Act of 2020. H.R. 6561, 116th Congress. 2020.  
<https://www.congress.gov/bill/116th-congress/house-bill/6561/text?r=1&s=2>

<sup>646</sup> “HHS Office of the Assistant Secretary for Preparedness and Response.” *U.S. Department of Health and Human Services*. <https://www.phe.gov/about/aspr/Pages/default.aspx>

<sup>647</sup> “National Health Security Strategy.” *U.S. Department of Health and Human Services*.  
<https://www.phe.gov/Preparedness/planning/authority/nhss/Pages/default.aspx>

- [The CDC Racial and Ethnic Approaches to Community Health](#)<sup>648</sup> (REACH) program provides grants to state and local health departments, tribes, universities, and community-based organizations to reduce racial and ethnic health disparities. The [CDC Good Health and Wellness in Indian Country Program](#)<sup>649</sup> provides grants to tribes and tribal organizations to implement evidence-based strategies to support healthy living and chronic disease prevention.
- The [CDC Epidemiology and Laboratory Capacity Cooperative Agreement program](#)<sup>650</sup> provides grants to public health departments to increase their capacity to detect, respond to, control, and prevent infectious diseases, including those diseases whose incidence and impacts are exacerbated by the climate crisis.
- The [CDC Climate and Health Program](#)<sup>651</sup> leads efforts to anticipate the health effects of climate change, to ensure that systems are in place to detect and track them, and to take steps to prepare for, respond to, and manage associated risks.

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<sup>648</sup> “REACH.” *Centers for Disease Control and Prevention*.

[https://www.cdc.gov/chronicdisease/resources/publications/factsheets/reach.htm#:~:text=CDC's%20Racial%20and%20Ethnic%20Approaches%20to%20Community%20Health%20\(REACH\)%20program,to%20make%20healthy%20choices%20easier](https://www.cdc.gov/chronicdisease/resources/publications/factsheets/reach.htm#:~:text=CDC's%20Racial%20and%20Ethnic%20Approaches%20to%20Community%20Health%20(REACH)%20program,to%20make%20healthy%20choices%20easier).

<sup>649</sup> “Good Health and Wellness in Indian Country.” *Centers for Disease Control and Prevention*.

<https://www.cdc.gov/healthytribes/ghwic.htm#:~:text=Good%20Health%20and%20Wellness%20in%20Indian%20Country%2C%20a%205%20year,living%20and%20chronic%20disease%20prevention>.

<sup>650</sup> “Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Diseases (ELC).” *Centers for Disease Control and Prevention*. <https://www.cdc.gov/ncezid/dpei/epidemiology-laboratory-capacity.html>

<sup>651</sup> “CDC’s Climate and Health Program.” *Centers for Disease Control and Prevention*. <https://www.cdc.gov/climateandhealth/default.htm>

## NEGATIVE EMISSIONS

### Negative Emissions/Carbon Removal Technologies

#### Description

Negative Emissions Technologies (NETs) “are technologies that capture or consume more CO<sub>2</sub> than they emit on a cumulative basis, and DAC [direct air capture], loosely defined, is a subset of NETs that use any industrialized chemical or physical methods to remove GHGs from the ambient atmosphere and then store or reuse those gases typically in a way that does not allow them to escape back into the atmosphere” ([LPDD Resources](#), ch. 29).

- The next President should “[transform] the DOE Office of Fossil Energy into an Office of Industrial Decarbonization, and through it, [fund] advanced technology research, development and demonstration of innovative materials science and industrial-use carbon capture” ([Evergreen Action Plan](#), p. 63).
- “Establishes a carbon mitigation program funded by [alternative compliance payments (ACPs)] made under section 203 and civil penalties under section 209. Funding is distributed to states and may be used for activities that: ... promote direct air capture and permanent sequestration or utilization of CO<sub>2</sub>” (CLEAN Future Act, [Summary](#) p. 2)
- “Congress should launch a 10-year, multi-agency RD&D program for carbon removal” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 278).

Proposed by: [Evergreen Action](#); [CLEAN Future Act](#); [Energy Innovation](#) (p. 5); [Joe Biden 2020 Presidential Campaign](#) - Climate; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#)

#### LPDD Recommendations:

- The federal government can reduce barriers to negative emissions technologies (NETs) from legal requirements, environmental permitting requirements, or environmental impact reviews in a manner that will not expose the public or the environment to unwarranted environmental risks. Congress can reduce barriers to NETs posed by land acquisition or authorization requirements by, where necessary, utilizing their power to authorize condemnation of property needed for these projects. Congress could adopt legislation to provide favorable waivers or reduced environmental reviews of NET projects similar to the limited federal waiver from state permitting requirements on the same model used for CERCLA. ([LPDD](#), p. 767)
- The federal government should explicitly endorse and support research, development, and implementation of NETs as appropriate in conjunction with other decarbonization strategies. ([LPDD](#), p. 766)
- Congress or federal agencies could explore the possibility of offering certain liability protections for NET operators that meet size, operational, and safety requirements. ([LPDD](#), p. 768)
- Congress should impose a carbon tax or other pricing mechanism that would expressly allow NET operators to obtain a financial return on the CO<sub>2</sub> they capture from the atmosphere. ([LPDD](#), p. 769)

- EPA can adopt: (1) standardized approval and review procedures for NETs that use common procedures or similar physical designs; and (2) general permits for NETs that will likely have either small or predictable and controlled impacts to the environment. EPA can explore whether to reduce permitting barriers or environmental review disincentives for laboratory research or limited field testing of NETs. ([LPDD](#), p. 767)
- EPA should craft a combination of regulatory options to allow NET research and limited deployment to occur without significant delays from permitting disputes or protracted environmental impact reviews. ([LPDD](#), p. 768)
- EPA could consider the use of NET removal of CO<sub>2</sub> as an alternative control strategy to consider during their selections of BACTs for prevention of significant deterioration permits to control emissions of other regulated pollutants. EPA could promote the investigation and deployment of NETs through incorporating them into GHG control permit requirements and emission control standards. ([LPDD](#), p. 769)
- EPA could promote the reuse of captured CO<sub>2</sub> as a feedstock or commercial product by issuing guidance or a regulatory determination that CO<sub>2</sub> captured through NETs would not constitute a pollutant under the Clean Water Act (CWA) or CAA or a discarded hazardous waste or substance under RCRA or CERCLA if reused. ([LPDD](#), p. 769)

#### Previous/Current Implementation

- The U.K.'s Natural Environment Research Council and several other agencies have dedicated £8.6 million to Greenhouse Gas Removal Research Programme grants to evaluate the feasibility and impacts of various technologies ([National Environmental Research Council](#)).<sup>652</sup>
- Since 1997, the Department of Energy has funded R&D of aspects of the three main steps leading to an integrated CCS system. Since FY2010, Congress has provided over \$5 billion in annual appropriations for CCS activities at the Department of Energy. The [Recovery and Reinvestment Act of 2009](#)<sup>653</sup> provided an additional \$3.4 billion, and the [Bipartisan Budget Act of 2018](#)<sup>654</sup> increased the tax credit for permanent sequestration from from \$20 to \$50 per ton of CO<sub>2</sub> ([Carbon Capture and Sequestration \(CCS\) in the United States](#)).<sup>655</sup>

#### Impact on GHGs

Capturing 20% of CO<sub>2</sub> emissions from electricity and industry sectors by 2050 would reduce emissions by 607 million metric tons in 2050, or by 10% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)). Total global deployment of NETs until 2100 is associated

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<sup>652</sup> "Greenhouse Gas Removal from the Atmosphere." *National Environmental Research Council*. <https://nerc.ukri.org/research/funded/programmes/ggr/>

<sup>653</sup> "American Recovery and Reinvestment Act of 2009." *National Telecommunications and Information Administration*. <https://www.ntia.doc.gov/page/2011/american-recovery-and-reinvestment-act-2009>

<sup>654</sup> Bipartisan Budget Act of 2018. H.R. 1892, 115th Congress. 2018. <https://www.congress.gov/bill/115th-congress/house-bill/1892/text>

<sup>655</sup> Folger, Peter. Carbon Capture and Sequestration (CCS) in the United States. Congressional Research Service. August 9, 2018. <https://fas.org/sgp/crs/misc/R44902.pdf>

with a cumulative removal of 150 to 1,000 gigatonnes of CO<sub>2</sub> (Gt CO<sub>2</sub>) ([Seven key things to know about ‘negative emissions’](#)).<sup>656</sup>

### Co-Benefits

- Captured carbon dioxide can be used in enhanced oil recovery and the manufacture of fuels, building materials, and more ([Center for Climate and Energy Solutions](#)).<sup>657</sup>
- Accelerated research, development, and deployment of CCS technology could add \$190 billion to US annual GDP by 2040, and add 780,000 jobs over the same period ([Once on the Sidelines, Carbon Capture is Now Being Touted as an Economic Win](#)).<sup>658</sup>

### Obstacles/Shortfalls

- Depending on the conditions of employment, NETs could increase CO<sub>2e</sub> emissions ([Can BECCS deliver sustainable and resource efficient negative emissions?](#)).<sup>659</sup>
- Legal “challenges would arise from the disruptions and effects of locating, constructing, and provisioning NET operations and facilities. ... Other obstacles may arise from the anticipated impacts that routine large-scale NET operations might have on adjoining properties and neighbors. ... The operators of NET systems may also face potential tort liability if they create conditions that either negligently injure other persons and resources or create nuisances and trespasses. In addition to legal questions raised by NET siting, infrastructure, and operations, some of these facilities (particularly DAC units) will also likely generate substantial gas product streams and wastes. Such materials will evoke traditional environmental regulatory issues, such as the management and sequestration of potentially vast quantities of captured CO<sub>2</sub> (unless the gas is reused as a feedstock or product) and the disposition of wastes generated by the CO<sub>2</sub> capture and removal process itself (e.g., spent chemicals or other process residues)” ([Legal Pathways to Negative Emissions Technologies and Direct Air Capture of Greenhouse Gases](#)).<sup>660</sup>

### Additional Resources

- Hester, Tracy. “Legal Pathways to Negative Emissions Technologies and Direct Air Capture of Greenhouse Gases.” *Environmental Law Institute*. 2018. <https://lpdd.org/wp-content/uploads/2019/05/29-LPDD-Negative-Emissions-Technologies-and-Direct-Air-Capture.pdf>
- “Negative Emissions Technologies and Reliable Sequestration: A Research Agenda.” Consensus Study Report. 2018. <https://www.nap.edu/resource/25259/Negative%20Emissions%20Technologies.pdf>

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<sup>656</sup> “Guest post: Seven key things to know about ‘negative emissions.’” *Carbon Brief*. June 1, 2018. <https://www.carbonbrief.org/guest-post-seven-key-things-to-know-about-negative-emissions>

<sup>657</sup> “Carbon Capture.” *Center for Climate and Energy Solutions*. <https://www.c2es.org/content/carbon-capture/>

<sup>658</sup> “Once on the Sidelines, Carbon Capture is Now Being Touted as an Economic Win.” *Quartz*. July 25, 2018. <https://qz.com/1335075/once-on-the-sidelines-carbon-capture-is-now-being-touted-as-an-economic-win/>

<sup>659</sup> Fajardy, Mathilde and Mac Dowell, Niall. Can BECCS deliver sustainable and resource efficient negative emissions? *Energy and Environmental Science*. 2017. <https://pubs.rsc.org/en/content/articlelanding/ee/2017/c7ee00465f#!divAbstract>

<sup>660</sup> Hester, Tracy. Legal Pathways to Negative Emissions Technologies and Direct Air Capture of Greenhouse Gases. *Environmental Law Institute*. 2018. <https://lpdd.org/wp-content/uploads/2019/05/29-LPDD-Negative-Emissions-Technologies-and-Direct-Air-Capture.pdf>

- European Academies Science Advisory Council. “Negative emission technologies: What role in meeting Paris Agreement targets?” February 2018.  
[https://unfccc.int/sites/default/files/resource/28\\_EASAC%20Report%20on%20Negative%20Emission%20Technologies.pdf](https://unfccc.int/sites/default/files/resource/28_EASAC%20Report%20on%20Negative%20Emission%20Technologies.pdf)
- Gerrard, Michael B. and Hester, Tracy, eds. *Climate Engineering and the Law: Regulation and Liability for Solar Radiation Management and Carbon Dioxide Removal*. Cambridge University Press, 2018.  
<https://www.cambridge.org/core/books/climate-engineering-and-the-law/CC93F3228AE1FBB028ED18C6DE6E19B8>



## Carbon Capture and Sequestration

### Description:

“Carbon capture and sequestration (or storage)—known as CCS—is a process that involves capturing man-made carbon dioxide (CO<sub>2</sub>) at its source and storing it permanently underground” ([Carbon Capture and Sequestration \(CCS\) in the United States](#)).<sup>661</sup>

- “Establishes a carbon mitigation program funded by [alternative compliance payments (ACPs)] made under section 203 and civil penalties under section 209. Funding is distributed to states and may be used for activities that: ... promote direct air capture and permanent sequestration or utilization of CO<sub>2</sub>” (CLEAN Future Act, [Summary](#) p. 2).
- Specific proposals call for: “(1) ... Executive Orders to create federal and state markets for purchase of power generated by CCS equipped power plants; (2) ... federal and state legislation to provide financial incentives to spur capture of carbon dioxide; (3) tightening of federal and state regulatory requirements for new and existing sources to directly or indirectly require widespread use of CCS; (4) action by federal and state actors to streamline permitting and improve interagency coordination; (5) expansion of public-private partnerships to build out the existing pipeline infrastructure ... ; and (6) use of federal funds to build and operate several sequestration facilities on federally owned lands located near existing or proposed large sources of captured carbon dioxide ([Legal Pathways to Widespread Carbon Capture and Sequestration](#), p. 11023).<sup>662</sup>
- “Congress should expand the type of projects eligible for financing through private activity bonds to include ... carbon capture facilities” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 231).

Proposed by: [CLEAN Future Act](#) (Summary, p. 2); [Joe Biden 2020 Presidential Campaign - Climate](#); [Evergreen Action](#); [Energy Innovation](#) (p. 5); [Center for Climate and Energy Solutions](#) (p. 3); [Legal Authority for Presidential Executive Action on Climate](#); [Carbon Capture Improvement Act of 2019 \(H.R. 3861/S. 1763\)](#);<sup>663</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); [DNC Draft 2020 Policy Platform](#)

### LPDD Recommendations:

- The federal government can help stabilize and subsidize prices for CCS-generated electricity by a variety of mechanisms, including via power purchase agreements and contracts for differences. ([LPDD](#), p. 726)
- The federal government should develop a federal siting and permitting scheme for interstate CO<sub>2</sub> pipelines under the jurisdiction of FERC, but provide interstate pipeline developers an opt-out option by which they would instead undergo a multistate or regional process. ([LPDD](#), p. 739)

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<sup>661</sup> Folger, Peter. Carbon Capture and Sequestration (CCS) in the United States. Congressional Research Service. August 9, 2018. <https://fas.org/sgp/crs/misc/R44902.pdf>

<sup>662</sup> Jacobs, Wendy B. and Craig, Michael. Legal Pathways to Widespread Carbon Capture and Sequestration. *Environmental Law Institute*. 2017. <https://lpdd.org/wp-content/uploads/2019/05/28-LPDD-Carbon-Capture-and-Sequestration.pdf>

<sup>663</sup> Carbon Capture Improvement Act of 2019. H.R. 3861/S. 1763, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/3861/all-info?r=5&s=1>

- Congress can authorize additional funds for federal loan guarantees for CCS. (LPDD, p. 729)
- Congress can authorize DOI and DOE to own and control several sequestration sites. (LPDD, p. 744)
- Congress can expand tax credit programs under §§48A and 48B of the Internal Revenue Code by: (1) explicitly extending them to NGCC plants that capture CO<sub>2</sub>; (2) enlarging the five-year time frame; and (3) appropriating additional funds. (LPDD, p. 727)
- Congress could create a regulatory framework for offshore CO<sub>2</sub> sequestration. (LPDD, p. 744)
- Congress could create an investment tax credit for CO<sub>2</sub> pipelines. Congress could direct DOE to analyze whether existing oil and natural gas pipelines could be repurposed to transport captured CO<sub>2</sub>. DOE could finance CO<sub>2</sub> pipeline expansion. (LPDD, p. 738)
- Congress could enact legislation to encourage private investment in CCS technology via private activity bonds. (LPDD, p. 728)
- Congress could expand the existing production tax credit for renewable generation to include electricity that is produced by plants that use CCS. (LPDD, p. 728)
- Congress could require emitters and storers of CO<sub>2</sub> to pay a fee to fund a liability program in exchange for certain limits on their potential liability for damages resulting from sequestration. EPA could shorten the time frame for which owners and operators of sequestration wells would be liable under the underground injection control program, provided that the scientific support for such relief is demonstrated on a site-specific basis. (LPDD, pp. 744-46)
- The president could issue an Executive Order to direct agencies to purchase a minimum amount of CCS-produced energy. (LPDD, p. 725)
- Federal agencies could streamline permitting and improve interagency coordination for integrated CCS projects. (LPDD, p. 737)
- EPA could modify the NSPS for new coal-fired units by requiring full CO<sub>2</sub> capture (i.e., 90%) beginning in the early 2020s. EPA could strengthen the NSPS for new NGCCs to require at least partial CO<sub>2</sub> capture beginning in the mid-2020s. (LPDD, p. 730, 736)
- BLM can prioritize sequestration on federal lands. (LPDD, p. 747)

#### LPDD Resources:

- LPDD.org, Carbon Capture and Sequestration: <https://lpdd.org/pathway/carbon-capture-and-sequestration/>

#### Previous/Current Implementation

- Since 1997, the Department of Energy has funded R&D of aspects of the three main steps leading to an integrated CCS system. Since FY2010, Congress has provided over \$5 billion in annual appropriations for CCS activities at the Department of Energy. The [Recovery and Reinvestment Act of 2009](#)<sup>664</sup> provided an additional \$3.4 billion, and the [Bipartisan Budget](#)

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<sup>664</sup> “American Recovery and Reinvestment Act of 2009.” *National Telecommunications and Information Administration*. <https://www.ntia.doc.gov/page/2011/american-recovery-and-reinvestment-act-2009>

[Act of 2018](#)<sup>665</sup> increased the tax credit for permanent sequestration from from \$20 to \$50 per ton of CO<sub>2</sub> ([Carbon Capture and Sequestration \(CCS\) in the United States](#)).<sup>666</sup>

- The Petra Nova–W.A. Parish Generating Station in Texas opened in 2017, and it is the first and only industrial-scale coal-fired electricity generating plant with CCS in the United States ([Carbon Capture and Sequestration \(CCS\) in the United States](#)).<sup>667</sup>

### Impact on GHGs

Capturing 20% of CO<sub>2</sub> emissions from electricity and industry sectors by 2050 would reduce U.S. GHG emissions by 607 million metric tons in 2050, or by 10% compared to a BAU baseline ([U.S. Policy Solutions Simulator v 2.1.1](#)).

### Co-Benefits

- Captured carbon dioxide can be used in enhanced oil recovery and the manufacture of fuels, building materials, and more ([Center for Climate and Energy Solutions](#)).<sup>668</sup>
- Accelerated research, development, and deployment of CCS technology could add \$190 billion to US annual GDP by 2040, and add 780,000 jobs over the same period ([Once on the Sidelines, Carbon Capture is Now Being Touted as an Economic Win](#)).<sup>669</sup>

### Obstacles

The first major obstacle is the high cost of capturing and compressing carbon dioxide at power plants, and the uncertain extent of potential liability and cost associated with sequestration. The second major obstacle is the absence of a strong national legislative or policy driver. The third hurdle has been the persistently low price of natural gas combined with the current federal regulatory regime, which together incentivize near-term construction of natural gas plants with no CCS. Fourth, the existing pipeline infrastructure for transporting captured carbon dioxide from its source to suitable sequestration facilities is insufficient in location and size to carry the quantity of carbon dioxide that a national driver for capture would generate ([Legal Pathways to Widespread Carbon Capture and Sequestration](#)).<sup>670</sup>

### Additional Resources

Hester, Tracy. “Legal Pathways to Negative Emissions Technologies and Direct Air Capture of Greenhouse Gases.” *Environmental Law Institute*. 2018. <https://lpdd.org/wp-content/uploads/2019/05/29-LPDD-Negative-Emissions-Technologies-and-Direct-Air-Capture.pdf>

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<sup>665</sup> Bipartisan Budget Act of 2018. H.R. 1892, 115th Congress. 2018. <https://www.congress.gov/bill/115th-congress/house-bill/1892/text>

<sup>666</sup> Folger, Peter. Carbon Capture and Sequestration (CCS) in the United States. Congressional Research Service. August 9, 2018. <https://fas.org/sgp/crs/misc/R44902.pdf>

<sup>667</sup> Folger, Peter. Carbon Capture and Sequestration (CCS) in the United States. Congressional Research Service. August 9, 2018. <https://fas.org/sgp/crs/misc/R44902.pdf>

<sup>668</sup> “Carbon Capture.” *Center for Climate and Energy Solutions*. <https://www.c2es.org/content/carbon-capture/>

<sup>669</sup> “Once on the Sidelines, Carbon Capture is Now Being Touted as an Economic Win.” *Quartz*. July 25, 2018. <https://qz.com/1335075/once-on-the-sidelines-carbon-capture-is-now-being-touted-as-an-economic-win/>

<sup>670</sup> Jacobs, Wendy B. and Craig, Michael. Legal Pathways to Widespread Carbon Capture and Sequestration. *Environmental Law Institute*. 2017. <https://lpdd.org/wp-content/uploads/2019/05/28-LPDD-Carbon-Capture-and-Sequestration.pdf>

## Oceans – Blue New Deal

### Description

- The Blue New Deal is a proposal to expand offshore renewable energy, build climate-ready fisheries, expand community-based seafood markets, invest in regenerative ocean farming, build climate smart ports, protect and restore marine habitats, and adapt to flooding, storms, and sea-level rise (Elizabeth Warren 2020 Presidential Campaign - [We Need a Blue New Deal for Our Oceans](#)).<sup>671</sup>
- “Given the ocean’s role as a planetary carbon sink, the next President should sign an executive order directing NOAA to establish a domestic blue carbon program that will support ocean-based carbon sequestration projects, ranging from regenerative ocean farming of kelp and shellfish, to reforestation of mangrove forests, seagrass beds and wetlands. And Blue Carbon Zones should be established in federal waters to identify and better manage highly productive carbon sinks. ... Given the cross jurisdictional nature of our oceans, the next President should ensure the U.S. joins Canada, France, Chile and other nations, and several U.S. states, in the International Alliance to Combat Ocean Acidification.” ([Evergreen Action Plan](#), p. 70).

Proposed by: [Elizabeth Warren 2020 Presidential Campaign](#); [Evergreen Action](#)

### Impact on GHGs

Goals such as deploying renewable energy and electrifying ports would reduce greenhouse gas emissions. Oceans also act as a carbon sink (it is estimated to concentrate 50 times more carbon than the atmosphere). By combatting ocean acidification, a Blue New Deal could avoid a decrease in the efficiency of ocean carbon removal ([The Ocean, a Carbon Sink](#)).<sup>672</sup>

### Co-Benefits

A Blue New Deal would create jobs in offshore renewable energy, fisheries, seafood markets, and more. Elizabeth Warren’s [proposal](#)<sup>673</sup> claims that in renewable energy alone, the Blue New Deal would bring 36,000 jobs. Fishing and associated industries could support an additional 500,000 jobs - often in rural communities with rebuilt and sustainable fish stocks. The plan would also reduce ocean acidification, overfishing, and the destruction of coastal communities.

### Obstacles/Shortfalls

This plan largely focuses on domestic policy, but “limiting the scope of the plan to the United States is inadequate when considering the current climate change threat.” Furthermore, rebuilding fisheries could threaten fragile ecosystems ([MotherJones](#)).<sup>674</sup>

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<sup>671</sup> “We Need a Blue New Deal for Our Oceans.” *ElizabethWarren.Com*. <https://elizabethwarren.com/plans/blue-new-deal>

<sup>672</sup> “The Ocean, a Carbon Sink.” *Ocean & Climate Platform*. 2016. [https://ocean-climate.org/?page\\_id=3896&lang=en](https://ocean-climate.org/?page_id=3896&lang=en)

<sup>673</sup> “We Need a Blue New Deal for Our Oceans.” *ElizabethWarren.Com*. <https://elizabethwarren.com/plans/blue-new-deal>

<sup>674</sup> Peischel, Will. “An Environmental Lawyer Explains Where Elizabeth Warren’s Blue New Deal Falls Short.” *MotherJones*. December 10, 2019. <https://www.motherjones.com/environment/2019/12/an-environmental-lawyer-explains-where-elizabeth-warrens-blue-new-deal-falls-short/>

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## INTERNATIONAL ISSUES

### Paris Climate Agreement

#### Description

“The Paris Agreement central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change. ... The Paris Agreement requires all Parties to put forward their best efforts through nationally determined contributions (NDCs) and to strengthen these efforts in the years ahead” ([The Paris Agreement](#), UN Climate Change).<sup>675</sup>

- “The next President must take immediate action to recommit America to the Paris Agreement, and to increase both U.S. and global ambition through the pact with a new, stronger Nationally Determined Contribution (NDC) of 50% reduction in domestic greenhouse gas pollution by 2030” ([Evergreen Action Plan](#), p. 72).

Proposed by: [Evergreen Action](#); [Legal Authority for Presidential Executive Action on Climate](#); [DNC Environment and Climate Crisis Council](#); [Vision for Equitable Climate Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [Elizabeth Warren 2020 Presidential Campaign](#); [All 2020 democratic presidential candidates](#); [DNC Draft 2020 Policy Platform](#)

#### Impact on GHG Emissions

Before withdrawing from the agreement, the U.S. pledged a 26-28% domestic reduction in greenhouse gases by 2025 compared to 2005, making its best effort to reach the 28% target.

#### Co-Benefits

The goals set by nations under the Paris Agreement would improve air quality and thus provide human health benefits ([Health Co-benefits and Mitigation Costs as per the Paris Agreement Under Different Technological Pathways for Energy Supply](#)).<sup>676</sup> Furthermore, keeping temperature rise in this century below 2 degrees Celsius would, to a certain extent, avoid sea level rise, loss of biodiversity, increased frequency/intensity of storms, droughts, and floods as well as other harms associated with climate change ([IPCC](#)).<sup>677</sup>

#### Obstacles/Shortfalls

The Paris Agreement is unenforceable, and many nations have not complied with their target emissions reductions. Many pledges will not sufficiently reduce global GHG emissions ([The](#)

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<sup>675</sup> “The Paris Agreement.” *United Nations Climate Change*. <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

<sup>676</sup> Sampedro, Jon, et al. Health Co-benefits and Mitigation Costs as per the Paris Agreement Under Different Technological Pathways for Energy Supply. *Environmental International*, Vol. 136. March 2020. <https://www.sciencedirect.com/science/article/pii/S016041201933911X>

<sup>677</sup> Intergovernmental Panel on Climate Change. Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emissions Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty. 2018. [https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15\\_SPM\\_version\\_stand\\_alone\\_LR.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf)

[Paris Climate Problem: A Dangerous Lack of Urgency](#)).<sup>678</sup> Furthermore, certain climate change-associated harms (such as sea level rise, biodiversity loss, and increased instances of droughts and floods) will still occur even if warming is limited to below 2 degrees Celsius ([IPCC](#)).<sup>679</sup>

#### Additional Resources

- Torstad, Vegard. “Evaluating the Effectiveness of the Paris Agreement: An Integrative Approach.” *SSRN Electronic Journal*. January 2018.  
[https://www.researchgate.net/publication/326709177\\_Evaluating\\_the\\_Effectiveness\\_of\\_the\\_Paris\\_Agreement\\_An\\_Integrative\\_Approach](https://www.researchgate.net/publication/326709177_Evaluating_the_Effectiveness_of_the_Paris_Agreement_An_Integrative_Approach)
- Liu, Weifeng, et al. “Global Economic and Environmental Outcomes of the Paris Agreement.” *Climate and Energy Economics Discussion Paper*. January 7, 2019.  
[https://www.brookings.edu/wp-content/uploads/2019/01/ES\\_20190107\\_Paris-Agreement.pdf](https://www.brookings.edu/wp-content/uploads/2019/01/ES_20190107_Paris-Agreement.pdf)

-- Biniaz, Susan, “Reversing the Paris Reversal ... and More,” *Columbia Climate Blog*, July 28, 2020, <http://blogs.law.columbia.edu/climatechange/2020/07/28/reversing-the-paris-reversal-and-more/>

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<sup>678</sup> Gustin, Georgina. “The Paris Climate Problem: A Dangerous Lack of Urgency.” *Inside Climate News*. November 7, 2019. <https://insideclimatenews.org/news/07112019/paris-climate-agreement-pledges-lack-urgency-ipcc-timeline-warning>

<sup>679</sup> Intergovernmental Panel on Climate Change. *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emissions Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. 2018. [https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15\\_SPM\\_version\\_stand\\_alone\\_LR.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf)



## Welcoming People Displaced by Climate Change

### Description

- “The next President should fully consider immigration and refugee policies in the context of climate change. The President should at a minimum raise the ceiling for annual refugee admissions to allow acceptance of historic numbers of refugees. ... The administration should repeal the Trump Administration’s “Remain in Mexico” policy ... [and the] decisions that eliminated Temporary Protected Status (TPS) protections for immigrants and refugees from El Salvador, Haiti, Honduras, and Nicaragua, and for individuals in the Deferred Enforced Departure (DED) program. The President should ... cancel the funding streams ... [for] Trump’s border wall. The next administration should restore and expand U.S. foreign assistance funding for the Northern Triangle nations of El Salvador, Guatemala, and Honduras. And it should restore the Central American Minors (CAM) program to allow for reunification of qualifying minor children from the region, as well as expand in-country processing of immigrants seeking entry to the United States from these nations. It should further evaluate options for adoption of the U.N. Global Compact for Safe, Orderly and Regular Migration” ([Evergreen Action Plan](#), p. 74).
- “Congress should require the Secretary of State and USAID Administrator to develop a Global Climate Resilience Strategy, designate a State Department official to manage federal efforts to address international climate impacts, and provide formal protections to [Climate Displaced Persons (CDPs)], admitting at least 50,000 CDPs to the United States per year, on top of existing U.S. refugee programs” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 514).

Proposed by: [Evergreen Action](#), Elizabeth Warren 2020 Presidential Campaign; [DNC Environment and Climate Crisis Council](#); [Legal Authority for Presidential Executive Action on Climate](#); [Vision for Equitable Climate Action](#); [Climate Displaced Persons Act of 2019 \(H.R. 4732\)](#); [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Julian Castro 2020 Presidential Campaign

### Previous/Current Implementation

- The Obama Administration in its final year set the national refugee ceiling at 110,000. The U.S. resettled more than 69,000 refugees in 2015 and nearly 85,000 in 2016 ([The Atlantic](#)).<sup>680</sup>
- In January 2020, a UN body issued a [ruling](#)<sup>681</sup> declaring that governments cannot return people to countries where their lives might be threatened by climate change.

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<sup>680</sup> Alvarez, Priscilla. September 12, 2018. “Canada May Soon Outpace the U.S. in Refugee Admissions.” *The Atlantic*. September 12, 2018. <https://www.theatlantic.com/politics/archive/2018/09/trump-refugee-cap/570049/>

<sup>681</sup> “Views Adopted by the Committee Under Article 5(4) of the Optional Protocol, Concerning Communication No. 2728/2016.” *United Nations Covenant on Civil and Political Rights*. January 7, 2020. [https://tbinternet.ohchr.org/\\_layouts/15/treatybodyexternal/Download.aspx?symbolno=CCPR%2fC%2f127%2fd%2f2728%2f2016&Lang=en](https://tbinternet.ohchr.org/_layouts/15/treatybodyexternal/Download.aspx?symbolno=CCPR%2fC%2f127%2fd%2f2728%2f2016&Lang=en)

- 193 countries adopted the 2030 Sustainable Development Goals (SDGs), which address both migration and climate change. Several of the 169 targets established by the SDGs lay out general goals that could be used to protect climate migrants ([Brookings](#)).<sup>682</sup>
- “The [Organization of American States](#)<sup>683</sup> has ... passed a series of resolutions offering member states additional guidance on how to respond to refugees, asylum seekers, stateless persons, and others in need of temporary or permanent protection” ([Does the United States Need a Climate Refugee Policy?](#)).<sup>684</sup>
- “U.S. refugee policy once recognized that those displaced by “natural calamity” were vulnerable and deserved protection. The [1953 Refugee Relief Act](#),<sup>685</sup> for example, defined a refugee as ‘any person in a country or area which is neither Communist nor Communist-dominated, who because of persecution, fear of persecution, natural calamity or military operations is out of his usual place of abode and unable to return thereto... and who is in urgent need of assistance for the essentials of life or for transportation.’ The 1965 Immigration Act (Hart-Celler Act) established a visa category for refugees that included persons “uprooted by catastrophic natural calamity as defined by the President who are unable to return to their usual place of abode” ([Does the United States Need a Climate Refugee Policy?](#)).<sup>686</sup>

### Co-Benefits

Accepting climate refugees will avoid emergency mass migrations, or mass extinctions for those unable to flee their homelands, in the next 20 to 50 years ([Protecting Climate Refugees is Crucial for the Future](#)).<sup>687</sup>

Studies show that welcoming refugees has positive impacts on the national economy: [Challenges of Refugee Resettlement Policy and Psychosocial Factors](#), 2019.

### Obstacles/Shortfalls

Welcoming climate refugees will come with a series of challenges regarding refugee resettlement and ensuring that refugees have access to housing, jobs, health care, and other necessities. ([Challenges of Refugee Resettlement Policy and Psychosocial Factors](#)).

### Additional Resources

- Vong, Suong. “Protecting Climate Refugees is Crucial for the Future.” *Humanity in Action*. May 2017.  
[https://www.humanityinaction.org/knowledge\\_detail/protecting-climate-refugees-is-crucial-for-the-future/](https://www.humanityinaction.org/knowledge_detail/protecting-climate-refugees-is-crucial-for-the-future/)

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<sup>682</sup> Podesta, John. “The Climate Crisis, Migration, and Refugees.” *Brookings*. July 25, 2019.  
<https://www.brookings.edu/research/the-climate-crisis-migration-and-refugees/>

<sup>683</sup> “Refugees.” *Organization of American States*. <http://www.oas.org/en/topics/refugees.asp>

<sup>684</sup> García, María Cristina. “Does the United States Need a Climate Refugee Policy?” *Historical Climatology*. April 25, 2019. <https://www.historicalclimatology.com/features/does-the-united-states-need-a-climate-refugee-policy>

<sup>685</sup> “Refugee Relief Act (1953).” *Immigration History*. <https://immigrationhistory.org/item/1953-refugee-relief-act/>

<sup>686</sup> García, María Cristina. “Does the United States Need a Climate Refugee Policy?” *Historical Climatology*. April 25, 2019. <https://www.historicalclimatology.com/features/does-the-united-states-need-a-climate-refugee-policy>

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[https://www.jstor.org/stable/43953626?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/43953626?seq=1#metadata_info_tab_contents)
- Podesta, John. “The Climate Crisis, Migration, and Refugees.” *Brookings*. July 25, 2019.  
<https://www.brookings.edu/research/the-climate-crisis-migration-and-refugees/>

## U.S. Contributions To Green Climate Fund And Other International Funds

### Description

- “The next administration should immediately double America’s commitment and then go further in investing in the Green Climate Fund, to help meet and then exceed prior commitments to mobilize \$100 billion per year in climate mitigation and adaptation initiatives in developing countries” ([Evergreen Action Plan](#), p. 77).
- “In order to help countries of the Global South with climate adaptation efforts, the U.S. will invest \$200 billion in the Green Climate Fund for the equitable transfer of renewable technologies, climate adaptation, and assistance in adopting sustainable energies” ([Bernie Sanders 2020 Presidential Campaign](#)).
- “Prioritize investment in climate solutions through federal international trade and finance agencies, such as the Export-Import Bank (Ex-Im), the International Development Finance Corporation (IDFC, formerly OPIC), the Millennium Challenge Corporation (MCC), the Trade and Development Agency (TDA), the Department of Commerce’s Foreign Commercial Service, and the Department of Agriculture’s Foreign Agricultural Service” ([Evergreen Action Plan](#), p. 77).

Proposed by: [Joe Biden 2020 Presidential Campaign](#) - Climate; [Vision for Equitable Climate Action](#); [DNC Environment and Climate Crisis Council](#); [Green Climate Fund Authorization Act of 2019 \(H.R. 4986\)](#); <sup>688</sup> [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Kamala Harris 2020 Presidential Campaign; Pete Buttigieg 2020 Presidential Campaign; [Bernie Sanders 2020 Presidential Campaign](#); Cory Booker 2020 Presidential Campaign; [Asia Society Policy Institute](#)

### Previous/Current Implementation

In 2014, under the Obama Administration, the U.S. pledged \$3 billion to the GCF. However, the Trump Administration withdrew \$2 billion from the pledged amount and has made no additional contributions.<sup>689</sup>

### Impact on GHGs

As of 2020, “The GCF has approved \$4.6 billion for 93 projects in 102 countries, worth a total of \$16.4 billion. These projects, ranging from solar installations to reforestation projects, anticipate avoiding 1.6 billion tons of carbon emissions” ([Green Climate Fund](#)).<sup>690</sup>

### Co-Benefits

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<sup>688</sup> Green Climate Fund Authorization Act of 2019. H.R. 4986, 116th Congress. 2019. <https://www.congress.gov/bill/116th-congress/house-bill/4986/text?r=27&s=1>

<sup>689</sup> Yeo, Sophie. “Green Climate Fund Attracts Record US\$9.8 Billion for Developing Nations.” *Nature.Com*. November 1, 2019. <https://www.nature.com/articles/d41586-019-03330-9#:~:text=Developed%20nations%20have%20together%20pledged,the%20impacts%20of%20climate%20change.>

<sup>690</sup> InterAction. Green Climate Fund. 2020. <https://www.interaction.org/choose-to-invest/fy2020/multilateral-assistance/green-climate-fund/#:~:text=The%20GCF%20has%20approved%20%244.6,home%20to%20272%20million%20people.>

GCF projects provide grid electricity to rural communities, promote resilience against climate change, improve ecological diversity, and create jobs.<sup>691</sup>

### Obstacles/Shortfalls

The Green Climate Fund faces challenges due to disagreements among contributing nations, particularly those with differing levels of wealth.<sup>692</sup> In addition, U.S. contributions to GCF require congressional support, but some members of congress are wary of “international processes that could impose costs on the United States, redirect funds from domestic budget priorities, undermine national sovereignty, or lead to competitive advantages for other countries.”<sup>693</sup>

### Additional Resources

- Green Climate Fund. Analysis of the Expected Role and Impact of the Green Climate Fund. 2015.  
<https://www.greenclimate.fund/sites/default/files/document/gcf-bo9-o6.pdf>

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<sup>691</sup> Green Climate Fund. Analysis of the Expected Role and Impact of the Green Climate Fund. 2015.  
<https://www.greenclimate.fund/sites/default/files/document/gcf-bo9-o6.pdf>

<sup>692</sup> Darby, Megan and Mathiesen, Karl. “Crucial global Climate Fund Facing ‘Massive Challenges.’” *Climate Change News*. September 8, 2018. <https://www.climatechangenews.com/2018/08/09/crucial-global-climate-fund-facing-massive-challenges/>

<sup>693</sup> Congressional Research Service. The Green Climate Fund (GCF). October 2, 2019.  
<https://fas.org/sgp/crs/misc/IF10382.pdf>

## International Trade

### Description

- “The next administration should focus the attention of federal international trade and finance agencies, such as the Export-Import Bank (Ex-Im), the Overseas Private Investment Corporation (OPIC), the Millennium Challenge Corporation (MCC), and the Foreign Agricultural Service, to accelerate American clean energy and sustainable products exports. ... Additionally, federal lawmakers should work together to ensure that America’s trade policies support ... the global transition toward clean energy, by implementing a Climate Duty to close the carbon loophole and promote continuous climate pollution reductions across nations” ([Evergreen Action Plan](#), p. 32).
- “U.S. trade policies must be reviewed, rewritten, and implemented in a manner consistent with the goals of the Paris Agreement. Such policies must not allow companies to offset or export their emissions overseas; they must not encourage fossil fuel production; and they must not be weaponized—such as through investor-state dispute settlement mechanisms— to prevent other countries from implementing policies to combat climate change” ([Vision for Equitable Climate Action](#), p. 31).
- “If Congress enacts domestic performance standards for emissions-intensive industries or a carbon price, Congress should also enact a border adjustment mechanism, such as import tariffs and export subsidies, for key emissions-intensive industries, including [Emissions Intensive Trade Exposed] goods. The design of the border adjustment mechanism should be such that an imported good with a higher emissions intensity than the benchmark would be charged a tariff, prorated by the difference between the emissions intensity of the good compared to the benchmark. Conversely, an exported good with a lower emissions intensity compared to the subsector standard set by the receiving country (or the average subsector emissions intensity within the country, if no standard exists) would be given a subsidy” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 263)
- “Congress should direct the EPA to develop, through rulemaking, a certification system and label program for low-emission industrial goods that consumers can use to compare products on the global market” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 266)
- Farm bill and trade policy must address global destruction of ecosystems for new production ([Food from Family Farms Act](#)).<sup>694</sup>
- “Not only have agreements like NAFTA and Permanent Normal Trade Relations with China outsourced millions of American jobs, they have allowed corporations to outsource their pollution. Trade deals have been written in secret by billion-dollar companies to give polluters special handouts and protections, as well as the right to sue governments that pursue stronger environmental protections. Under a Sanders Administration, this will end. Trade deals will be renegotiated to ensure strong and binding climate standards, labor rights, and human rights with swift enforcement” ([Bernie Sanders 2020 Presidential Campaign](#)).

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<sup>694</sup> “Food from Family Farms Act.” *National Family Farm Coalition*. <https://nffc.net/what-we-do/fffa/>

Proposed by: [Evergreen Action](#); [Vision for Equitable Climate Action](#); [Elizabeth Warren 2020 Presidential Campaign](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [DNC Environment and Climate Crisis Council](#); Jay Inslee 2020 Presidential Campaign; Andrew Yang 2020 Presidential Campaign; Cory Booker 2020 Presidential Campaign; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#); Bernie Sanders 2020 Presidential Campaign; [Asia Society Policy Institute](#)

#### LPDD Recommendations:

- As the U.S. government develops decarbonization laws and policies that contain local content rules (LCRs), it should make every effort to ensure that they do not “constitute a means of arbitrary or unjustifiable discrimination” or a “disguised restriction on international trade.” They should comply with national treatment requirements under GATT Article III, or one of the exceptions under GATT Article XX. (LPDD, pp. 205-07)
- Congress should include border tax adjustments that comply with GATT Articles I and III and the Agreement on Subsidies and Countervailing Measures in a comprehensive carbon tax or other broad climate change policy. Congress should use carbon-based border tax adjustments to address leakage concerns as part of a broad climate change policy that may include a cap-and-trade scheme. (LPDD, p. 208)
- The U.S. Department of State should play a lead role in addressing border tax adjustments and other decarbonization strategies within the negotiation phase of preferential trade agreements, particularly regional and plurilateral agreements. (LPDD, p. 209)
- As part of the negotiations for a multilateral agreement on environmental goods and services, the U.S. Department of State should take a lead role in advocating clarifications to trade rules to more clearly allow feed-in tariff programs. (LPDD, p. 210)
- The U.S. Department of State and U.S. Trade Representative should further a (preferably federal) decarbonization strategy tied to climate change mitigation and clean energy strategies when negotiating preferential trade agreements. In drafting new preferential trade agreements, the U.S. Trade Representative (USTR) should consider lessons that can be learned from the structure of the EU-Canada Comprehensive Economic and Trade Agreement. (LPDD, p. 215)
- Congress should consider incorporation into their laws any relevant internationally applied decarbonization labeling standards or requirements. (LPDD, p. 211)

#### LPDD Resources:

- LPDD.org, “International Trade”: <https://lpdd.org/pathway/international-trade/>

#### Previous/Current Implementation

“The 21 countries participating in the Asia-Pacific Economic Cooperation (APEC) forum pledged to lower import duties on a list of ‘environmental goods’ in 2011. Existing [climate-related provisions](#)<sup>695</sup> in bilateral trade deals include support for renewable energy and energy efficiency,

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<sup>695</sup> Morin, Jean-Frédéric and Jinnah, Sikina. “The Untapped Potential of Preferential Trade Agreements for Climate Governance.” *Environmental Politics*. 2018.  
<https://www.tandfonline.com/doi/full/10.1080/09644016.2017.1421399>



requirements that the parties ratify international climate agreements, harmonization of climate regulation, and measures for climate change adaptation. ... The Paris Agreement on climate change foresees that countries will include trade-related provisions in the self-administered and self-monitored pledges they made to reduce emissions” ([Using Trade Policy to Fight Climate Change](#)).<sup>696</sup>

### Impact on GHGs

In the United States, GHG emissions from both the production and consumption of goods and services in 2004 totaled 14.7 billion tonnes. Globally, trade produced 332.3 billion tonnes of CO<sub>2</sub>e emissions that year. Producing goods with lower GHG intensities can both increase access to environmentally-beneficial products as well as reduce emissions associated with international trade. ([International Trade and Global Greenhouse Gas Emissions](#)).<sup>697</sup>

### Additional Resources

- Tamiotto, Ludevine, et al. “Trade and Climate Change: A Report by the United Nations Environment Programme and the World Trade Organization.” The UNEP and WTO. 2009.  
[https://www.wto.org/english/res\\_e/booksp\\_e/trade\\_climate\\_change\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/trade_climate_change_e.pdf)
- Climate Strategies. “Summary: The Trade System and Climate Action: Ways Forward Under the Paris Agreement.” October 2016.  
<https://climatestrategies.org/wp-content/uploads/2016/01/Trade-and-Paris-Agreement-Summary.pdf>

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<sup>696</sup> “Using Trade Policy to Fight Climate Change.” *NewAmerica.Org*. <https://www.newamerica.org/political-reform/reports/trade-2020-whats-it-all-about/using-trade-policy-to-fight-climate-change/>

<sup>697</sup> Erickson, Peter, et al. “International Trade and Global Greenhouse Gas Emissions.” *Stockholm Environment Institute*. 2013. <https://mediamanager.sei.org/documents/Publications/Climate/sei-3c-2013-pr-trade-ghg-lr.pdf>

## National Security Issues

### Description

- “Directs the National Security Advisor and the Director of the Office of Science and Technology Policy to establish a Climate and National Security Working Group. Tasks the Working Group with coordinating a strategic approach to identifying, assessing, and sharing information on current and projected climate-related impacts on national security interests. ... Requires federal agencies to develop individual implementation plans to address the impact of climate change on their national security missions” ([CLEAN Future Act](#), Summary p. 22).
- “The President should ... create a new Deputy National Security Advisor charged with overseeing coordination and building capacity across agencies and departments that will enable rapid response to climate-related security risks and events and develop and implement Climate Security Roadmaps” ([Evergreen Action Plan](#), p. 8).
- “Congress should direct [the Department of Defense (DOD)] to require that domestic military installations coordinate their resilience planning with hazard mitigation and climate resilience planning by state, tribal, territorial, and local governments adjacent to and within commuting distance of their facilities” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 505).
- “Congress should re-establish the position of Assistant Secretary of Defense for Energy, Installations, and Environment to ensure integrated and synergistic development of policies related to climate resilience and direct DOD to update the 2014 Climate Change Adaptation Roadmap. Strategic decisions regarding military installations must consider risks associated with climate change” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), p. 506).
- “Congress should direct the Climate Security Advisory Council to oversee periodic, scenario-based stress testing of countries, regions, and critical systems to measure their ability to cope with potentially disruptive climate events of concern. ... Congress should task the Climate Security Advisory Council with developing a strategy and procedures to connect the research, development, and analysis capabilities present in unclassified environments to support the full range of national security assessments needed by the intelligence community” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#), pp. 509-510).

Proposed by: [CLEAN Future Act](#); [Evergreen Action](#); [Joe Biden 2020 Presidential Campaign](#) - Climate; [The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America](#); [The Department of Defense Climate Resiliency and Readiness Act \(H.R. 2759/S. 1498\)](#); <sup>698</sup> [Asia Society Policy Institute](#)

### Previous/Current Implementation

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<sup>698</sup> Department of Defense Climate Resiliency and Readiness Act. H.R. 2759, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/house-bill/2759?s=1&r=4>

The FY2020 [National Defense Authorization Act](#)<sup>699</sup> “requires the DOD to deploy a climate risk assessment tool to aid facility planners; assess the feasibility of a climate change-focused model for sea level rise to quantify flood risk; create a direct air capture and blue carbon removal research and development program; and to begin to budget for the mitigation of effects of extreme weather on military networks, systems, installations, facilities, and other assets and capabilities of the Department in a dedicated budget line” ([The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient and Just America](#) p. 505).

### Co-Benefits

Assessing and mitigating climate-related impacts on national security interests will protect military installations from climate disasters and save money associated with the costs of repairing military installations. In addition, “there is some evidence that framing climate change as a national security risk has moved public opinion, raised awareness of climate risks and motivated the U.S. government to formulate adaptation strategies” ([WRI](#)).<sup>700</sup>

### Obstacles/Shortfalls

“Overemphasis of climate change as a national security threat risks under-appreciating the interdisciplinary and interdependent nature of successful adaptation solutions. One must be careful not to invite military responses -- rather than necessary international assistance -- to address vexing problems caused by climate change. In cases where the climate change issue is militarized, the development community is easily overlooked” ([WRI](#)).<sup>701</sup>

### Additional Resources

- King, Marcus. “Climate Change Adaptation and National Security.” *World Resources Institute*.  
<https://www.wri.org/our-work/project/world-resources-report/climate-change-adaptation-and-national-security>
- Environmental and Energy Study Institute. The National Securities Impacts of Climate Change. December 2017.  
[https://www.eesi.org/files/IssueBrief\\_Climate\\_Change\\_Security\\_Implications.pdf](https://www.eesi.org/files/IssueBrief_Climate_Change_Security_Implications.pdf)

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<sup>699</sup> National Defense Authorization Act for Fiscal Year 2020. S. 1790, 116th Congress. 2019.  
<https://www.congress.gov/bill/116th-congress/senate-bill/1790>

<sup>700</sup> King, Marcus. “Climate Change Adaptation and National Security.” *World Resources Institute*.  
<https://www.wri.org/our-work/project/world-resources-report/climate-change-adaptation-and-national-security>

<sup>701</sup> Ibid.

## Taking on Petro-States

### Description

- “Under the next President, the United States must establish accountability on climate change as a hallmark of American diplomacy and global relations. This means rejecting the foreign policy goals and anti-democratic practices of “Axis of Oil” countries such as Russia, Saudi Arabia and Iran. The next administration should utilize anti-corruption authority in U.S. law to impose consequences for undermining climate international cooperation.... The next President must challenge China to dramatically shift the priority to clean energy and other green projects under its BRI. ... Finally, and crucially, the next President must fight to end all global fossil fuel subsidies” ([Evergreen Action Plan](#), p. 79).
- “Stop China from subsidizing coal exports and outsourcing carbon pollution. ... Demand a worldwide ban on fossil fuel subsidies” ([Joe Biden 2020 Presidential Campaign](#) - Climate).

Proposed by: [Evergreen Action](#); [Joe Biden 2020 Presidential Plan](#) - Climate.

### Previous/Current Implementation

- The United States has imposed sanctions on Iran since the mid-1980s, targeting the country’s oil sector and restricting trade and investment.
- “In Venezuela, the United States has imposed sanctions since the mid-2000s, largely based on human rights abuses and the regime’s support for terrorism. But after 2017, sanctions have targeted the oil sector more explicitly, with three main focus areas: ‘(1) access to short-term debt finance and cash distributions; (2) petroleum trade between the United States and Venezuela; and (3) Venezuela oil sales to non-U.S. buyers’” ([Center for Strategic & International Studies](#), p. 12).<sup>702</sup>
- The United States has sanctioned Russia’s oil sector and its ability to access finance, goods, and services to develop deepwater, the offshore Arctic, and shale ([Center for Strategic & International Studies](#)).<sup>703</sup>

### Impact on GHGs

Reform of fossil fuel subsidies could have a significant impact on global heating. An International Institute for Sustainable Development study of 20 countries with large fossil fuel subsidies found that a 30% swap to renewables would reduce emissions by between 11% and 18% ([IISD](#)).<sup>704</sup>

### Obstacles/Shortfalls

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<sup>702</sup> Ladislav, Sarah and Tsafos, Nikos. Race to the Top: The Case for a New U.S. International Energy Policy. Center for Strategic & International Studies. July 2020. [https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200706\\_SRF\\_Racetothetop\\_WEB\\_v2%20FINAL.pdf?utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=newsletter\\_axiosgenerate&stream=top](https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200706_SRF_Racetothetop_WEB_v2%20FINAL.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top)

<sup>703</sup> Ibid.

<sup>704</sup> Bridle, Richard, Sharma, Shruti, Mostafa, Mostafa and Geddes, Anna. “Fossil Fuel to Clean Energy Subsidy Swaps: How to Pay for an Energy Revolution.” International Institute for Sustainable Development. 2019. <https://www.iisd.org/sites/default/files/publications/fossil-fuel-clean-energy-subsidy-swap.pdf>

Pressuring or applying consequences to Petro states could have negative impacts on foreign political relations.

#### Additional Resources

- Ladislav, Sarah and Tsafos, Nikos. “Race to the Top: The Case for a New U.S. International Energy Policy.” Center for Strategic & International Studies. July 2020.  
[https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200706\\_SRF\\_Racetothetop\\_WEB\\_v2%20FINAL.pdf?utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=newsletter\\_axiosgenerate&stream=top](https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200706_SRF_Racetothetop_WEB_v2%20FINAL.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top)