

NEAR-TERM FEDERAL ACTIONS TO ADDRESS CLIMATE CHANGE



A growing majority of Americans favor stronger government action to address climate change. Recent events demonstrate both the rising costs of climate change to U.S. communities and taxpayers and the economic benefits of a clean energy-transition. While the United States has made progress in reducing its greenhouse gas emissions, much steeper reductions are needed to avert the worst impacts of climate change. This requires stronger action by the private sector and at all levels of government to mobilize the innovative technologies key to a thriving low-carbon economy. Proposals for carbon pricing and a Green New Deal have launched a vital debate about the broad contours of a comprehensive long-term response. But there are also important opportunities right now for progress on meaningful near-term steps. This policy brief, part of C2ES's Climate Innovation 2050 initiative, outlines near-term federal actions that could garner bipartisan support and strengthen the foundation for comprehensive long-term solutions.

OVERVIEW

The rising incidence of costly extreme weather events has underscored to many Americans the growing risks presented by climate change. Much stronger efforts are needed both to strengthen the climate resilience of our communities and critical infrastructure and to accelerate the clean energy transition now under way.

Market and technology forces, in many cases enabled by federal and state policies, have reduced U.S. greenhouse gas emissions 12.9 percent from their 2007 peak. As recently underscored, however, by the Intergovernmental Panel on Climate Change and the U.S. National Climate Assessment, stronger action is more urgent than ever. Whether or not the United States leaves the Paris Agreement, the country's vital economic, security and environmental interests remain intimately linked to achieving its long-term goal: reducing net global emissions to zero by the second half of the century. For the United States, this implies reducing emissions at least 80 percent by 2050.

C2ES remains firm in the belief that a cornerstone of a cost-effective national response is an economy-wide policy that harnesses market forces by putting a price

on carbon. Achieving the political support needed to enact such a policy will, however, take time. In the interim, there are important steps the federal government can take to advance the broad portfolio of technologies needed to decarbonize the U.S. economy.

This policy brief is a product of Climate Innovation 2050, a multi-year collaboration with leading companies addressing the U.S. decarbonization challenge. It outlines a wide range of near-term actions the federal government can take as interim steps toward long-term climate solutions. Grouped by topic, and not in priority order, these include actions to:

- Strengthen technology innovation efforts.
- Modernize American infrastructure.
- Support advanced energy and transportation solutions.
- Advance carbon capture and biological sequestration.
- Boost energy efficiency.
- Examine market-based strategies.
- Reduce short-lived climate pollutants.

STRENGTHEN TECHNOLOGY INNOVATION EFFORTS

The United States has made significant advances in the development and deployment of clean energy technologies, but the pace of innovation must rapidly accelerate. A wide range of low- and zero-carbon technologies is needed to reduce emissions while ensuring stable and affordable energy supplies. Successful innovation efforts can also produce jobs and economic growth and strengthen U.S. competitiveness in rapidly expanding global clean energy markets. While stronger private investment is needed, the federal government must play a vital role. These efforts should include:

Increasing and Targeting Low-Carbon RDD&D

Funding – Congress should continue to increase funding for low-carbon research, development, demonstration and deployment (RDD&D) at the Department of Energy (DOE) in line with the Mission Innovation objective of doubling investments in the next few years. Support should be expanded for mission-oriented, interdisciplinary, multi-stakeholder efforts such as the Energy Innovation Hubs, Energy Frontier Research Centers, and the Manufacturing USA institutes. Funding also should be restored for the Loan Program Office (LPO) and DOE should streamline the application process to help reduce administrative costs. To regularly assess gaps and opportunities and better target federal RDD&D support, Congress should codify the Quadrennial Technology Review.

Reauthorizing and Fully Funding ARPA-E – Congress should reauthorize the *Advanced Research Projects Agency for Energy* (ARPA-E) and set a path toward the full funding levels (\$1 billion per year) envisioned in the report by the National Academies of Sciences, Engineering and Medicine (NAS) that led to ARPA-E's creation. A recent NAS assessment shows that ARPA-E is making clear progress in its mission to develop transformational technologies. The program should be put on firm, long-term footing.

Strengthening Public-Private Cooperation – Companies are often deterred from engaging in research projects with DOE by lengthy, costly administrative requirements. The secretary of energy should more regularly exercise discretion under the Energy Policy Act of 2005 to exempt high-impact, first-of-a-kind technology projects

from cost-sharing requirements and to ease, where appropriate, reporting requirements under grants and cooperative R&D agreements. DOE also should consult the private sector more closely as it plans and pursues research portfolios. The laboratory agreement processing reform recently announced by DOE is a promising start.

MODERNIZE AMERICAN INFRASTRUCTURE

Modernizing the nation's infrastructure presents important opportunities to reduce carbon emissions, strengthen resilience to extreme weather and other climate impacts, and create jobs and growth. An earlier C2ES policy brief, *Policy Options for Climate-Resilient Infrastructure*, outlines ways new federal infrastructure efforts can strengthen U.S. resilience to worsening climate impacts. Here we outline steps the federal government can take to reduce emissions while upgrading transportation and energy infrastructure.

Expanding Transportation Options – America's transportation system is on the verge of major transformation with the rapid growth of ride-sharing and electric vehicles and with the advent of connected and autonomous vehicles. These and other advances offer significant potential to reduce transportation emissions while also easing congestion, improving the health of vulnerable populations, and contributing to economic growth. The federal government can help on many fronts.

Building Charging and Fueling Infrastructure – To support the growth of electric vehicle (EV) charging and hydrogen and biofuel refueling networks, Congress should:

- Extend the tax credit for EV charging and alternative fuel vehicle refueling facilities and raise the current cap of \$30,000, which provides too little incentive for projects with high upfront costs such as hydrogen refueling stations.
- Increase funding for the Federal Highway Administration's Alternative Fuel Corridors program to help make drivers aware of available EV charging and alternative fueling facilities.
- Encourage states and localities receiving federal highway funds to work collaboratively to incorporate EV charging, including DC-fast charging, and

alternative fueling infrastructure into their transportation plans.

- Provide funding through the Community Development Block Grant (CDBG) program, “Better Utilizing Investments to Leverage Development” (BUILD) grants (formerly known as “TIGER” grants), and the Rural Utility Service to support EV charging infrastructure.
- Mandate EV charging facilities at military bases, national parks and other major federal facilities.

Enabling Smart Mobility – Connected and autonomous vehicles (AVs), and ridesharing, could significantly reduce traffic congestion, fuel use and emissions. Congress and DOT should provide financial and technical support to states and cities, public transit agencies, and metropolitan planning agencies to ensure the safe and efficient piloting and deployment of autonomous vehicles and smart transportation infrastructure. Examples include targeting funding to states to pilot autonomous trucks moving freight on highways, and to cities to enhance “last-mile options;” integrate AVs with public transportation; and maximize the use of ride-sharing.

Supporting State and Local Efforts – The federal government also should do more to support state and local efforts to reduce congestion and emissions by encouraging lower-carbon shared transportation. Examples include increasing funding through the Rural Cooperative Development Grant Program to expand options for hybrid or electric vanpools for commuters and agricultural workers; increasing funding for BUILD grants to support the purchase or lease of electric buses, electrified and hybrid regional trains, and mass transit.

Expanding and Modernizing the Grid – Investments to improve or expand transmission infrastructure could reduce the need for new electricity generation, better integrate renewable sources, and create a “smarter” grid to more efficiently manage supply and more quickly recover from outages). The backstop authority Congress provided to the Federal Energy Regulatory Commission (FERC) and DOE to site transmission lines under Section 216 of the Federal Power Act in 2005 is not sufficient to build out high-voltage direct current (HVDC) transmission at the scale needed. Congress should consider providing FERC with broader authority to site interstate HVDC transmission lines to better

connect renewable sources with demand load centers in consultation with state, local, and tribal governments. Congress also should help states integrate their transmission, storage, and distribution planning to reduce costs for consumers, improve cybersecurity, strengthen climate resilience, and move towards a more integrated, potentially national, grid.

Facilitating Transportation of CO₂ – For captured carbon to be either stored or utilized, it must be transported from its emissions source. Building out an interstate system of CO₂ pipelines will ensure that the nation’s capacity for geologic storage can be fully used in addressing climate change. Congress should enact legislation to improve permitting and facilitate interstate cooperation in building CO₂ transportation infrastructure.

Encouraging Better Climate Data – Congress and DOT should encourage recipients of BUILD grants and other infrastructure investments to provide more information about the greenhouse gas emissions of proposed projects, including a lifecycle assessment of the construction materials used, and the resilience of the investments to climate change impacts. Over the long term, standardized information of this kind could help agencies prioritize low-carbon and climate-resilient investments.

SUPPORT ADVANCED ENERGY AND TRANSPORTATION SOLUTIONS

In both the transportation and power sectors—the two largest sources of U.S. greenhouse gas emissions—companies are setting ambitious goals and making significant investments to reduce carbon emissions while meeting the needs of a growing economy. In addition to the RDD&D and infrastructure efforts described above, the federal government can accelerate progress in these critical sectors through efforts focused on nuclear power, offshore wind power, energy storage and zero emission vehicles, and by leveraging the power of federal procurement.

Supporting Zero-Emission Vehicles – The existing tax credit for purchases of new electric vehicles (EVs) has been effective in encouraging sales, but U.S. automakers are now reaching the per manufacturer cap (200,000 EVs sold). Congress should extend and revamp the tax credit to continue scaling up zero-emission vehicle (ZEV) deployment. It should raise or remove the per

manufacturer cap; expand the tax credit to all ZEVs (including fuel cell EVs); and allow it to be used at the point of sale to increase its utility to households less able to defer its value. To support the use of electric vehicles to transport goods, Congress also should provide an extended credit for medium-duty vehicles designed for commercial use.

Sustaining Zero-Carbon Nuclear Power – At present, nuclear energy supplies more than half of the country’s zero-carbon electricity, providing reliable round-the-clock power to balance out variable renewable supplies. But economic pressures are forcing early plant retirements. As transportation and other sectors rely more heavily on the power sector to electrify, nuclear will be a critical component of a diversified low-carbon power supply. Stronger federal support is needed both to prevent the early retirement of existing plants and to speed the development and deployment of advanced nuclear power. Priorities include:

Investing in Existing Plants – Federal tax credits for investments in existing nuclear plants would help support the continued operation of these zero-carbon generation resources. A tax credit for capital spending at existing plants would put nuclear energy on par with other non-emitting sources.

Ensure timely review for subsequent license renewals – The existing nuclear fleet provides more than half of the emission free electricity in the United States. Many of these facilities are nearing the end of their current licenses and will require renewals to continue operating for an additional 20 years. The Nuclear Regulatory Commission should conduct these reviews expeditiously, under recently established rules and safety standards, with congressional oversight to ensure a timely process.

Supporting Advanced Research – The Oak Ridge National Laboratory is working to develop accident-tolerant fuels that can withstand a loss of coolant, preventing the kind of core damage seen in the Fukushima accident, and is experimenting with 3-D printing of nuclear fuel assemblies. Additional funding is needed to speed this groundbreaking work. Congress also should prioritize funding for the Idaho National Laboratory’s Versatile Test Reactor, which would provide a fast-neutron test bed that could be used by startup companies developing advanced reactor designs.

Expanding Offshore Wind Power – Several offshore wind projects are now being developed off the coasts of New England and the Mid-Atlantic and on the West Coast, but offshore wind remains a largely untapped renewable resource. DOE and the Department of the Interior (DOI) have begun implementing a national offshore wind strategy. To facilitate stronger investment in this emerging market. Congress should:

- Establish a dedicated investment tax credit to provide more certainty for offshore wind development given the anticipated expiration of existing tax credits for wind power.
- Increase funding to DOI to support site characterization, information critical to the private sector in weighing future investments in offshore wind, and to DOE to demonstrate advanced offshore wind technologies, such as the use of floating foundations off the Pacific Coast.
- Ease supply chain constraints by authorizing and funding the Maritime Administration to support state and local port modernization efforts and incentivize the production of purpose-built domestic vessels capable of supporting the unique needs of the offshore wind industry.

Increasing Energy Storage – Improved energy storage will help advance the electrification of the transportation sector. In the power sector, expanding storage capabilities can better compensate for renewable energy intermittencies, support grid reliability, ease the need for transmission and distribution upgrades, and help balance the grid when electricity demand and supply are out of sync. In buildings, innovative storage technologies can also help balance thermal heating and cooling loads. To advance energy storage technologies, Congress should increase support to DOE in areas including:

- Research and development of advanced battery technologies, including next-generation solid-state and silicon-dominant batteries as well as materials research
- Research and development of thermal storage technologies for buildings—for instance, exploring how phase change materials, which absorb energy from ambient heat and release it when the air is cooler, can be incorporated into building envelopes
- The Fuel Cell Technologies Office, which is

conducting vital research on hydrogen storage and fuel cell vehicle technologies, both of which have unique potential across a range of energy storage applications.

Exploring Vehicle-to-Grid Integration – The storage capacity of EV batteries could be a useful resource for the electricity grid. Studies show that as few as 10 EVs can store enough energy to power up to 1,000 homes for an hour. Expanded vehicle-to-grid storage also could increase resilience to extreme weather events that disrupt electricity generation and distribution. DOE should increase R&D for vehicle-to-grid technologies, evaluate how to mitigate the grid and battery degradation impacts of bidirectional charging, and identify infrastructure needs for vehicle-to-grid integration.

ADVANCE CARBON CAPTURE AND BIOSEQUESTRATION

In parallel with steps to reduce greenhouse gas emissions, stronger efforts are needed to capture emissions for use or storage, and to enhance the ability of America's vast land resources to absorb carbon from the atmosphere. In addition to their climate benefits, technological and biological sequestration can provide important economic returns for industry and agriculture. Priorities include:

Expanding Carbon Capture and Use – Carbon capture, utilization and storage (CCUS) is especially critical as a means of reducing industrial greenhouse gas emissions. In 2018, Congress expanded the 45Q tax credit, providing a significant catalyst for new CCUS projects, but further steps are essential for CCUS to reach scale. Specific priorities include:

Maximizing the Impact of 45Q – The Internal Revenue Service should issue practical implementing guidance for the 45Q tax credit to allow project developers to make full use of the credit, ensuring the greatest amount of CO₂ stored and utilized.

Incentivizing Private Investment – Carbon capture can also be facilitated through the use of “private activity bonds” (PABs) underwritten by the federal government, much the way it underwrites home mortgages. Congress should make capture projects eligible for PABs to help reduce the costs to retrofit power plants and industrial facilities.

Strengthening RDD&D Support – DOE's Fossil Energy

Research and Development program has significantly advanced understanding of capture technologies and geologic storage opportunities. Congress should continue federal RDD&D support and increase it for critical new areas including CO₂ utilization and direct air capture.

Enhancing Agricultural and Forest Sequestration – Forest and agricultural lands can serve as important carbon sinks, absorbing more carbon than they emit. Studies indicate that increased land sequestration could offset up to 45 percent of economy-wide emissions in 2050. The federal government can advance these efforts through its management of federal lands, by supporting research into advanced technologies, and by strengthening incentives for farming practices that improve soil carbon storage. Helping farmers adopt more sustainable practices can also help diversify farm income, producing economic benefits especially critical in rural communities highly dependent on agriculture. Priorities include:

Promoting Soil Conservation – Congress should strengthen existing agricultural conservation incentive programs by:

- Fully funding agricultural conservation programs to improve incentives and enable greater enrollment of agricultural land
- Directing the National Resources Conservation Service (NRCS) to promote carbon mitigation and sequestration through its Conservation Stewardship and Regional Conservation Partnership Programs, and the Farm Service Agency to encourage sequestration through its loan programs
- Authorizing adjustments to the federal crop insurance program to reduce barriers to, and provide incentives for, carbon farming practices.

Improving Carbon Monitoring – Technologies to more accurately and affordably measure soil carbon can improve sequestration efforts and help farmers participate in carbon markets. Congress should support the development of technology and infrastructure to better monitor soil carbon and to track and certify carbon benefits.

Improving Forest Management – The U.S. Forest Service manages 193 million acres and supports 500 million acres of private, state and tribal forest management. Congress should:

- Direct the U.S. Forest Service to research forestry

management that optimizes carbon sequestration while reducing wildfire risk and addressing pests and disease.

- Fund grants to private landowners to manage their lands for carbon sequestration.

BOOST ENERGY EFFICIENCY

Greenhouse gas emissions from the energy used in commercial and residential buildings account for nearly a third of total U.S. emissions. Innovative technologies and updated building codes can significantly improve energy efficiency in new buildings, including through the use of linked “intelligent efficiency” technologies. But efforts also are needed to upgrade existing buildings, and to switch to lower-carbon energy sources including electricity. Priorities include:

Supporting State and Local Efforts – The federal government should do more to facilitate action by state and local governments to expand energy efficiency. In particular, Congress should increase funding through the CDBG program to help local governments develop cost-share programs enabling landlords and tenants to equitably share the benefits of efficiency upgrades in multi-family and other rental housing. Congress should also increase funding for the Weatherization Assistance Program, which improves energy efficiency while providing cost savings and health benefits for vulnerable populations.

Tapping ‘Intelligent Efficiency’ – Intelligent efficiency, which uses networked devices, sensors and other information and communications technologies to provide systems-level energy savings, can play an important role in reducing emissions. Congress should direct DOE to provide financial and technical resources to state and local governments to help foster the use of intelligent efficiency technologies in buildings. In updating model building energy codes and efficiency standards, DOE should encourage the integration of systems allowing dynamic building energy management through the networking of smart devices and sensors; develop standards for energy efficient network devices and systems; and consider how to incorporate direct current power. Congress and DOE should also prioritize intelligent efficiency in setting priorities to help lower technical, institutional, and market barriers to deployment.

REDUCE SHORT-LIVED CLIMATE POLLUTANTS

Phasing Down HFCs – Hydrofluorocarbons (HFCs), which were introduced to replace ozone-depleting substances, are now the fastest-growing greenhouse gases globally. Widely used in refrigeration, air conditioning and other applications, HFCs are thousands of times more potent than carbon dioxide in trapping heat in the atmosphere. Given their relatively short atmospheric lifetimes, lowering HFC emissions in the near term will significantly reduce warming in coming decades. The United States led countries in negotiating the Kigali Amendment to the Montreal Protocol, which aims to reduce HFCs by 80 percent in 30 years. U.S. companies are leading suppliers of HFC alternatives, and there is strong bipartisan support for U.S. ratification of Kigali. However, recent court action has created ambiguities about EPA’s authority to implement corresponding domestic measures. To enhance U.S. competitiveness and ensure a smooth phasedown of HFCs, the administration should forward the Kigali Amendment to the Senate for its advice and consent, and Congress should provide EPA with clear authority to take the steps necessary to implement it.

Reducing Methane Emissions – Methane, another potent short-term climate pollutant, accounts for roughly 10 percent of total U.S. greenhouse gas emissions. Major sources include agriculture, landfills and fossil fuel production, including the extraction, transportation and processing of natural gas. Building on state regulations and voluntary industry efforts, the federal government can take several important steps to curb methane emissions throughout the natural gas value chain:

Reduce Upstream Emissions – The members of the Oil and Gas Climate Initiative (OGCI), which represent 30 percent of global oil and gas production, have established a target reduction for the collective average methane intensity in their aggregated upstream oil and gas operations to below .25 percent by 2025. Congress should pursue legislative options to apply such a performance standard to all U.S. oil and gas production.

Support Methane Detection R&D – Innovative technologies, such as mobile monitoring from drones and planes, can identify methane leaks more accurately and cost-effectively. DOE’s Natural Gas Technologies program should be funded to expand research into the

detection of methane emissions across the natural gas value chain.

Improve natural gas supply infrastructure – Better maintenance of local natural gas distribution systems can both reduce methane leakage and improve public safety. Congress should fund grants to states to offer incentives to natural gas distribution utilities to upgrade iron and steel pipelines and conduct inspection and maintenance programs.

Addressing Black Carbon – Black carbon, produced by forest fires and the incomplete combustion of fossil fuels, is a significant contributor to climate change. EPA’s Clean Diesel program should receive increased funding to address black carbon emissions from diesel engines. Congress also should establish a new program to help homeowners replace wood heaters with cleaner-burning stoves that emit far less pollution, including black carbon.

EXAMINE MARKET-BASED STRATEGIES

Experience has demonstrated that well-designed **market-based policies** can reduce emissions more cost-effectively than traditional command-and-control regulations by giving emitters the incentive to find the lowest-cost reductions. Market-based policies to reduce greenhouse gas emissions can take different forms; the common feature is that they all put a price on carbon emissions. A carbon price starting at a relatively modest level and escalating over time would provide a strong market signal driving the development and deployment of clean energy technologies and long-term emission reductions.

An economy-wide market-based program would require careful design and broad-based political support. While enactment of a comprehensive program may not be foreseeable in the near term, Congress should work now to lay the groundwork by closely examining the relevant issues and options. The major options include:

Cap and trade – Ten U.S. states already price carbon through **cap-and-trade programs**, and a handful of

others are considering similar programs. A cap-and-trade program sets an overall cap on emissions and allows emitters to trade emission units, with the market setting the price.

Carbon tax – An alternative market-based approach is to set the carbon price, rather than the emissions level. A **carbon tax** or fee may provide less certainty on the emissions outcome, but still gives emitters an incentive to reduce and the flexibility to choose their lowest-cost options. A carbon tax could be designed to be revenue-neutral, for instance by using revenue to offset reductions in payroll or other taxes. **Several carbon tax proposals** were introduced in the 115th Congress.

Clean energy standard – A standards-based approach can effectively set a price on carbon if emitters are permitted to trade the certificates needed to demonstrate compliance. Twenty-nine states and the District of Columbia now have an **energy standard** requiring electric utilities to deliver a certain amount of electricity from renewable or other clean sources. A national clean energy standard could include not only renewables, but other zero-emission technologies including nuclear power and fossil energy with carbon capture, as well as energy efficiency and storage.

SUMMARY

With climate impacts imposing rising costs on U.S. communities and taxpayers, and a growing majority of Americans favoring stronger climate action, the federal government must take the lead in addressing climate change. As we engage in a vital debate on the broad contours of a comprehensive long-term strategy, we must also seize immediate opportunities for near-term progress. The options outlined here can both deliver meaningful results and build a bipartisan foundation for the stronger efforts needed in the years ahead to achieve a thriving low-carbon economy.

Other C2ES Resources:

Decarbonizing U.S. Agriculture, Forestry, and Land Use, July 2018.

<https://www.c2es.org/document/decarbonizing-u-s-agriculture-forestry-and-land-use>

Decarbonizing U.S. Buildings, July 2018.

<https://www.c2es.org/document/decarbonizing-u-s-buildings>

Decarbonizing U.S. Industry, July 2018.

<https://www.c2es.org/document/decarbonizing-u-s-industry>

Decarbonizing U.S. Oil and Gas, July 2018.

<https://www.c2es.org/document/decarbonizing-u-s-oil-and-gas>

Decarbonizing U.S. Power, July 2018.

<https://www.c2es.org/document/decarbonizing-u-s-power>

Decarbonizing U.S. Transportation, July 2018.

<https://www.c2es.org/document/decarbonizing-u-s-transportation>

Policy Options for Climate-Resilient Infrastructure, January 2018.

<https://www.c2es.org/document/policy-options-for-climate-resilient-infrastructure>



The Center for Climate and Energy Solutions (C2ES) is an independent, nonpartisan, nonprofit organization working to forge practical solutions to climate change. We advance strong policy and action to reduce greenhouse gas emissions, promote clean energy, and strengthen resilience to climate impacts.