

policy

Executive Summary

technology

Executive Summary: The "10-50" Solution

Addressing the challenge of global climate change will require a significant reduction in annual greenhouse gas (GHG) emissions in the United States and throughout the world—by 2050. This will require a fundamental shift from an economy predominantly based on fossil fuels to one based on efficiently managed low-carbon energy sources and technologies that capture and store carbon from fossil fuels. Such a transition could also have other benefits, including increased energy security, improved public health, and increased economic development. But the transition will not be easy, as significant technological challenges, social and economic concerns, and political constraints exist.

Achievement of this transition depends on both near-term and long-term actions. In the near term, it is essential to take advantage of current technologies and opportunities, and also to make substantial investments in the technologies of the future. But most of all, the United States needs a clearly enunciated policy. Without such a policy, businesses, consumers, and citizens are missing opportunities for cost-effective GHG reductions and investment for the future. Too often the debate over GHG emission reductions pits near-term actions against long-term investments in technology, when in fact both are necessary and are each more effective if undertaken together. A variety of policies, public and private leadership, and broad societal engagement will be needed to bring low-carbon technologies into the market. Because of the long-lived nature of most energy infrastructure, it is critical that action begin now to promote the development and use of low-carbon energy technologies.

The Pew Center on Global Climate Change and the National Commission on Energy Policy (NCEP) recently held a conference to address both near-term and long-term challenges and opportunities in attaining a low-carbon future—"The 10-50 Solution: Technologies and Policies for a Low-Carbon Future." The title reflects the need to initiate policies and conduct research within this decade ("10"), but also to sustain policies and promote research, development, and deployment (RD&D) of new technologies over the next half-century ("50").

In preparation for the workshop, the Pew Center and NCEP commissioned analyses—in the form of overview and contributing papers—in five key areas: efficiency, hydrogen, carbon sequestration/coal gasification, advanced nuclear technologies, and renewables. In addition to exploration of these key technologies, the workshop featured discussions of opportunities in industry to reduce GHG emissions from processes and products, the role of natural gas in the transition to a low-carbon future, and examples of states and other countries enacting climate and clean-energy policy.

Several common themes and cross-cutting and technology-specific policy recommendations emerged from the workshop and the background papers. A brief discussion of these themes and policy recommendations is below.

Common Themes and Policy Recommendations

- *Clear and consistent policy signals are urgently needed.* Both broad (economy-wide) and technology-specific policies are essential. There is also a need to balance policy flexibility with reasonable policy certainty. A sustained carbon price signal—through policies such as cap-and-trade or carbon taxes—was identified as the most important cross-cutting policy driver by a number of participants. While such a program is being developed, an important first step would be mandatory GHG emission reporting—an essential tool for identifying and stimulating reductions.
- *A portfolio of technologies and policies will be needed to drive the absolute reductions of GHG emissions necessary to address climate change.* No single technology or policy will be sufficient to enable a low-carbon future by 2050. All of the technologies studied have the potential to enable significant GHG reductions, yet increased and revamped RD&D is necessary in all of them. Efficiency will provide the greatest opportunity in the near term and will remain important over the long term as well. In addition, natural gas can play a key role in the transition to a low-carbon future, subject to price and supply constraints. While specific technologies are likely to be important players, it is important to avoid the temptation to pick “winners.” The challenge is to design policies that are neutral enough to promote the development and deployment of a suite of low-carbon technologies, yet also tailored enough to push and pull some specific technologies that might not enter the market under a broad policy mechanism. Finally, cooperative international efforts can reduce the burden on all countries of developing low-carbon energy technologies.
- *A low-carbon technology revolution will require both leadership and broad engagement throughout society.* Policies should address climate change in the context of other societal goals (e.g., clean air, energy security) thereby taking advantage of co-benefits and creating public/private partnerships and non-traditional “alliances.” Leadership is needed in both the public and private sectors, and clear and unambiguous targets set by corporate leaders and governments can have a significant positive effect on achieving GHG reductions. Consumers and citizens must be involved in the transition to a low-carbon economy, and a greater focus on critical energy challenges (both in terms of resources and innovative capacity) is needed from U.S. universities and private-sector research laboratories.
- *It is essential to start now.* Finally, there was broad consensus that it is imperative to begin now with clear statements of policy and both cross-cutting and technology-specific policies and investments in order to achieve a low-carbon economy by 2050.

Technology-Specific Policies

In addition to the widespread support among workshop participants for broad national policies and investments, there was also recognition of the need for “husbandry” of certain key technologies.

Energy Efficiency

The technological potential for energy efficiency improvements now and in the future is significant, yet this potential is not likely to be realized through market forces alone. Accordingly, policies that address the technical, cost, and societal hurdles facing widespread improvements in energy efficiency are needed. In addition to price signals and reporting, certain standards, incentives, and RD&D programs can increase the use of efficient technologies. These options include :

- adoption and promotion of codes and standards focused on maximizing GHG reductions (e.g., for buildings, vehicles, appliances);
- increases in public RD&D in innovative energy efficiency technologies; and
- incentives for the private and public procurement of highly efficient technologies.

Hydrogen in Transportation

Specific policies are needed to address the major challenges to hydrogen becoming the low-carbon transportation fuel of the future (probably after 2025). Near-term policy options identified to enable future widespread deployment of hydrogen and other potentially low-carbon transportation technologies include:

- continued and increased federal support for hydrogen-related R&D in targeted areas (e.g., low-carbon hydrogen production, storage, and fuel cells);
- national and international harmonization of hydrogen codes and standards;
- continued federal and state government support for, and participation in, public/private partnerships;
- incentives to increase the development and deployment of lower-GHG transportation technologies (e.g., hybrids), many of which are part of an evolutionary path toward the use of hydrogen and fuel cells; and
- increased consumer and public education regarding transportation, energy use, and GHG emissions.

Carbon Sequestration/Coal Gasification

In order to answer critical R&D questions and to commercialize carbon capture and storage by 2025, significant effort must be made over the next 10 to 15 years. Near-term steps include:

- A coordinated international effort to deploy coal gasification with carbon capture and sequestration (CCS) through trial projects that focus on remaining technical issues (e.g., four to six international projects);
- establishment of carbon sequestration trial projects in the United States to validate the integrity of geologic storage (e.g., four such projects);
- removal of policy disincentives to shutting down old coal plants;
- beginning to establish a regulatory framework for underground carbon dioxide (CO₂) storage;
- conducting R&D to reduce the cost of separation and capture technologies; and
- increasing education efforts to inform citizens about the use of fossil fuels combined with geologic carbon sequestration.

Advanced Nuclear Generation

The ability of nuclear power to play a significant role in reducing GHG emissions over the next half-century depends upon what happens in the next 10 to 15 years. The question is whether, in that time frame, the nuclear industry can overcome serious obstacles, including economic concerns, waste, and safety, and launch a major deployment of nuclear power plants. Near-term policy options identified through the 10-50 Workshop to address these barriers include:

- re-ordering of the priorities the U.S. Department of Energy (DOE) nuclear fuel cycle R&D to focus on the “once-through” fuel cycle;
- electricity production tax credits for “first mover” nuclear plants;
- significant expansion in size and scope of the U.S. DOE’s nuclear waste management R&D;
- strengthening and reorienting of the current international non-proliferation regime; and
- public dialogue and education regarding the costs and benefits of nuclear power, especially in the context of climate change.

Renewables

Despite the significant potential for growth of renewables, these sources currently provide only a small fraction of commercial energy in the United States and around the world. Closing the gap between the current low level of renewables deployment and their high potential will require significant and sustained policies. Near-term policy options include:

- establishment of a national Renewable Portfolio Standard with set-asides for specific generation technologies and with tradable renewable energy credits;
- a major RD&D effort by the U.S. DOE focused on the use of renewables beyond niche markets;

- national test beds for new electricity grid systems that enable a broader set of power supply options, including intermittent and distributed energy and combined heat and power;
- increased research on expanding energy storage options;
- pollution fees for polluting energy sources; and
- continued support (e.g., through tax credits) to help renewables become competitive with fossil fuels for electricity generation.

Conclusions

Using a portfolio of energy technologies and policies, the United States can be well into a transition to a low-carbon future by 2050. However, achieving such a future necessitates a significant, explicit, and comprehensive commitment to climate-friendly policy and investment. In addition to economy-wide policies that establish a carbon price, technology-specific policies would stimulate further improvements in key technologies. An effective policy portfolio should work to both push and pull a wide variety of low-carbon energy technologies into the market. More, better-managed, and stable funding of RD&D is needed over the short, medium, and long term as well. Public and private leadership, consumer and citizen involvement, engagement of the research community, and international cooperation will also be key to such a transition. Most importantly, it is critical to start now on all fronts—policy and education, and research, demonstration, and deployment—to spur the investments necessary to provide for a low-carbon future both domestically and internationally by 2050.