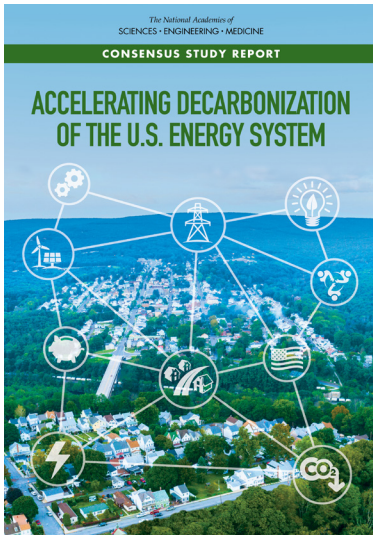


February 2021

Accelerating Decarbonization of the U.S. Energy System

A Comprehensive Policy Approach to a Just Transition



The world is transforming its energy system from one dominated by fossil fuel combustion to one with net-zero emissions of carbon dioxide (CO₂), the primary anthropogenic greenhouse gas. This energy transition is critical to mitigating climate change, protecting human health, and revitalizing the U.S. economy. To help policymakers, businesses, communities, and the public better understand what a net-zero transition would mean for the United States, the National Academies of Sciences, Engineering, and Medicine convened a committee of experts to investigate both how the U.S. could best decarbonize its transportation, electricity, buildings, and industrial sectors and the broader opportunities and challenges that decarbonization would create for the country. This report, *Accelerating Decarbonization of the U.S. Energy System*, concludes that decarbonization is not only a technological transition of the energy sector but also a social and economic transformation of unprecedented scope and scale that will reach into every corner of American work and life.

The first ever National Academies' report to fully address the societal, economic, and equity dimensions of a net-zero transition, *the report assesses the risks and benefits that will accompany the transition, identifies key socio-economic goals and priorities, and lays out a policy blueprint for critical near-term actions for the next decade.* The report's recommendations encourage Congress to adopt policies that strengthen the U.S. economy and workers, support communities that will be most impacted, and ensure equity and justice in transition processes and outcomes.

ADVANCING PEOPLE-CENTERED ENERGY TRANSITIONS

A complete transformation of the energy system will affect most aspects of life in the United States, with impacts far beyond the deployment of new technologies. Unless the United States grapples with the societal challenges of decarbonization head on, it will not accomplish a just transition to net zero emissions, and progress on the technical dimensions of the transition may be delayed or stopped altogether. To ensure no one is left behind and that the benefits and costs of energy transitions are shared fairly and equitably among all Americans, the report recommends that U.S. federal energy policies target four key socio-economic objectives alongside net-zero carbon emissions targets.



Strengthen the U.S. economy: Global demand for clean energy and climate solutions will reach trillions of dollars over the coming decades. The transition to a net-zero emissions economy provides an opportunity to revitalize U.S. manufacturing, construction, and commercial sectors, and, with appropriate policies, to grow the number of high-quality jobs across the country.



Promote equity and inclusion: U.S. policies should promote equitable access to the benefits of clean energy systems, including reliable and affordable energy, new training and employment opportunities, and opportunities for wealth creation. Policies that facilitate the transition to a net-zero emissions economy should also work to eliminate inequities in the current energy system that disadvantage historically marginalized and low-income populations.



Support communities, businesses, and workers: Any fundamental technological and economic transition creates new opportunities as well as job losses and other associated impacts in legacy industries. There will be a need to identify and mitigate impacts on labor sectors and communities negatively impacted by the transition of the U.S. economy to net-zero emissions. U.S. policies should promote fair access to new long-term employment opportunities and provide transparent information as well as financial and other support to communities that might be harmed by the transition.



Maximize cost-effectiveness: A cost-effective strategy (balanced by equity considerations) will reduce carbon emissions, strengthen the U.S. economy, and avoid undue burdens on American households and businesses during the transition to a net-zero emissions economy. If the country can avoid spending more than necessary to achieve net-zero emissions, additional resources will be available to meet other societal needs.

KEY POLICIES TO ENSURE A FAIR AND EQUITABLE TRANSITION

Americans broadly support accelerated action to decarbonize the economy. Yet many communities also have justified concerns about how the transition away from fossil fuels will impact their lives and livelihoods. Responding to these concerns, the report recommends a comprehensive suite of national policies designed to fully integrate social innovation and investment with new energy technologies in order to ensure that the energy transition works for everyone.

The report recommends strengthening U.S. capacity to ensure a just transition by assessing the social and economic impacts of the transition; providing transparent information to communities, workers, businesses, and leaders; and holding U.S. policy accountable for fair and equitable outcomes. Specific recommendations include:

- Establish a 2-year **National Transition Task Force** of appropriate experts and stakeholders to identify, plan, and carry out **comprehensive analyses of the vulnerabilities of U.S. workers and communities** to losses of employment, economic base, and public revenues in the transition away from fossil fuels
- Establish **metrics and standards for an equitable transition** and create a White House **Office of Equitable Transitions** to oversee and collect, analyze, and report data on the performance of policies, agencies, and companies in meeting those metrics.
- Fund **social science research** on the dynamics of industry, workforce, and community transitions and effectiveness of strategies for improving economic transition outcomes
- Strengthen the **research capacity and screening tools** supporting federal environmental and energy justice decision-making at EPA.

The report recommends that the U.S. proactively support communities and workers impacted by the transition through investments in clean energy jobs and manufacturing, education, economic development, and direct support for those that need it the most. Specific recommendations include:

- Establish a **National Transition Corporation** to provide assistance funding to communities and workers, invest in renewable energy infrastructure and manufacturing, coordinate federal economic development assistance, and remediate abandoned legacy infrastructures.
- Establish a **Green Bank**, initially capitalized at \$30 Billion, and prioritize financing for investments in low-carbon infrastructure, manufacturing, and business creation in communities impacted by the transition.
- Establish appropriate **labor standards** to ensure creation of high-quality jobs and **procurement standards** to encourage U.S. clean energy manufacturing growth
- Invest in **comprehensive education and training opportunities**, including a \$5 Billion GI-Bill type program to support college education and significant investments in educational programs focused on energy transitions. These programs should proactively enable workers to pursue career alternatives while also raising educational attainment across the board in resource-dependent communities.

The report recommends that the U.S. leverage the opportunity afforded by the transition to a carbon-neutral U.S. energy system to help confront and redress an array of injustices connected to energy systems that affect BIPOC, low-income, and other disadvantaged communities. Specific recommendations include:

- Establish strong rules and practices to **support inclusive participation in energy transition decision-making** and invest in community-based organizations to build and strengthen the capacity of communities to participate effectively.
- **Increase funding for investments in energy efficiency**, renewable generation, and other improvements to buildings and equipment via weatherization and low-income home energy assistance programs to reduce energy poverty and ensure these families are not left behind by the transition.
- Invest in **electrification on tribal lands and broadband access** for low-income communities.
- **Encourage philanthropic organizations to address racial justice and equity disparities** in their funding of NGOs and improve the diversity of their board and staff.
- **Set and enforce rules for inclusive public participation in siting of decarbonization infrastructure**, including but not limited to low-carbon electricity generation, transmission lines, EV charging networks, and CO₂ pipelines.

The report recommends that the U.S. provide resources to support and coordinate action by policymakers at the local, state, and regional levels as they navigate the complex dynamics of the energy transition. Specific recommendations include:

- Invest in **community block grants** that support local transition planning, community-based action, and community-benefiting economic and technological change.

- Incentivize states to establish **state energy transition offices** to provide statewide, cross-sectoral coordination.
- Establish **regional centers** to enable mayors, governors, and industry leaders to identify, deliberate, and solve cross-border problems and address regional infrastructure needs and coordination.
- Invest in robust new **data, modeling, and knowledge infrastructure** to support local, state, and regional decision-making for transition planning and ensuring that knowledge is responsive to data needs, timely, and delivered effectively to decision makers.

Finally, the report recommends that all stakeholders involved in the energy transition—including the energy sector, local, state, and federal governments, and civil society organizations—systematically engage the public and take action to strengthen public support for U.S. decarbonization. A robust social contract is essential if the U.S. is to accelerate the technological and economic transformation necessary to achieve carbon neutrality by 2050.

DOWNLOAD THE REPORT AND REPORT RESOURCES

For more information about the report, please check out our digital report overview at nap.edu/decarbonization. Visit nap.edu/decarbonization-policies for a filterable table that allows readers to sort recommendations by different criteria. Learn more about the study and sign up for updates at nationalacademies.org/decarbonization.

COMMITTEE ON ACCELERATING DECARBONIZATION IN THE UNITED STATES—TECHNOLOGY, POLICY, AND SOCIETAL DIMENSIONS:

Stephen W. Pacala, NAS, *Chair*, Princeton University; Colin Cunliff, Information Technology and Innovation Foundation; Danielle Deane-Ryan, Libra Foundation; Kelly Sims Gallagher, Tufts University Fletcher School; Julia Haggerty, Montana State University; Chris Hendrickson, NAE, Carnegie Mellon University; Jesse D. Jenkins, Princeton University; Roxanne Johnson, BlueGreen Alliance; Timothy C. Lieuwen, NAE, Georgia Institute of Technology; Vivian Loftness, Carnegie Mellon University; Clark A. Miller, Arizona State University; William A. Pizer, Duke University; Varun Rai, University of Texas – Austin; Ed Rightor, American Council for an Energy-Efficient Economy; Esther Takeuchi, NAE, Stony Brook University; Susan F. Tierney, Analysis Group; Jennifer Wilcox, Worcester Polytechnic Institute

This Consensus Study Report Highlights was prepared by the National Academies' Board on Energy and Environmental Systems based on the report *Accelerating Decarbonization of the U.S. Energy System* (2021). This study was sponsored by the Alfred P. Sloan Foundation, Heising-Simons Foundation, Quadrivium Foundation, Gates Ventures, ClearPath Foundation, and Incite Labs, with support from the National Academy of Sciences Thomas Lincoln Casey Fund, the National Academy of Sciences Arthur L. Day Fund, and the National Academy of Sciences Andrew W. Mellon Foundation Fund. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of the sponsors. Download the report at nap.edu/decarbonization.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

The nation turns to the National Academies of Sciences, Engineering, and Medicine for independent, objective advice on issues that affect people's lives worldwide.

www.national-academies.org