

Sustainability Practice

America 2021: Renewing the nation's commitment to climate action

To America's leaders, innovators, and changemakers: here's how you can help build a low-carbon economy that is resilient, competitive, prosperous, and fair.

by Dickon Pinner and Matt Rogers



The new federal administration has arrived in Washington with ambitious plans to address the climate crisis—and in so doing, revitalize the US economy and reclaim a leadership position on the international stage. During their campaign, President Joe Biden and Vice President Kamala Harris highlighted “the opportunity to build a more resilient, sustainable economy—one that will put the United States on an irreversible path to achieve net-zero emissions, economy-wide by no later than 2050 [...] and, in the process, create millions of good-paying jobs.”

Their vision recognizes that the global transition to a low-carbon economy is well under way. The cost of many clean-energy technologies fell significantly during the past decade—as much as 90 percent for some renewable-energy projects. The capital markets are funding the use of these technologies at historically low costs of capital, thereby accelerating scale-up investments. A climate-friendly policy tilt is taking hold in many places. With China, Japan, and the European Union having announced targets to achieve net-zero emissions, more than 110 countries, accounting for more than 70 percent of global GDP, have made net-zero pledges. Of the US states, 23 have established emissions-reduction goals and 12 have instituted carbon-pricing policies. Groups representing prominent American companies have endorsed the use of market-based mechanisms to promote emissions reductions. Some large businesses, along with four former Federal Reserve chairs (including the new treasury secretary), have voiced support for a nationwide carbon tax. These trends are creating possibilities for American leadership, innovation, entrepreneurship, competitive advantage, and economic growth.

With the wind at their backs, government agencies and private-sector organizations can continue advancing the new national climate agenda that’s been set in motion already. The stimulus and government appropriations bill of December 2020, which received bipartisan support, set out tax

incentives and funding for energy innovation and climate-related programs. And within days of his inauguration, President Biden signed executive orders initiating the process to reenter the Paris Agreement, positioning climate as a foreign-policy and national-security issue and calling on federal agencies to coordinate an all-government push to cut greenhouse-gas emissions, purchase clean-energy technologies, support innovation, conserve nature, and create economic opportunities across America.¹ Making good on these intentions will require new information, products, operations, and market innovations from public officials and business leaders. To inform their work, this memo highlights four sets of practices with notable potential to deliver the prosperity, security, and social-justice outcomes that the administration has prioritized.

1. Fortifying and modernizing America’s infrastructure

Much of America’s infrastructure—the electricity and gas grids, seaports and airports, highways and railways, water and sewer systems, public housing and schools—is outdated or in disrepair. What’s more, infrastructure assets are vulnerable to storms, wildfires, extreme heat, floods, and other physical hazards associated with climate change² (Exhibit 1). McKinsey analysis suggests that through 2050, the typical US utility could suffer some \$1.7 billion in costs and lost revenues due to storm damage.³

Federal agencies have now been directed to plan how they will make their facilities more resilient to climate impacts and to ensure that every federal infrastructure investment helps reduce climate pollution. Constructing new infrastructure assets could also enable the growth of clean-energy industries. Here are some actions that would support progress in these directions:

- **Map and measure climate risks.** New analytical tools and information assets could help federal agencies, state and local governments, and

¹ “Executive order on tackling the climate crisis at home and abroad,” The White House, January 27, 2021, [whitehouse.gov](https://www.whitehouse.gov).

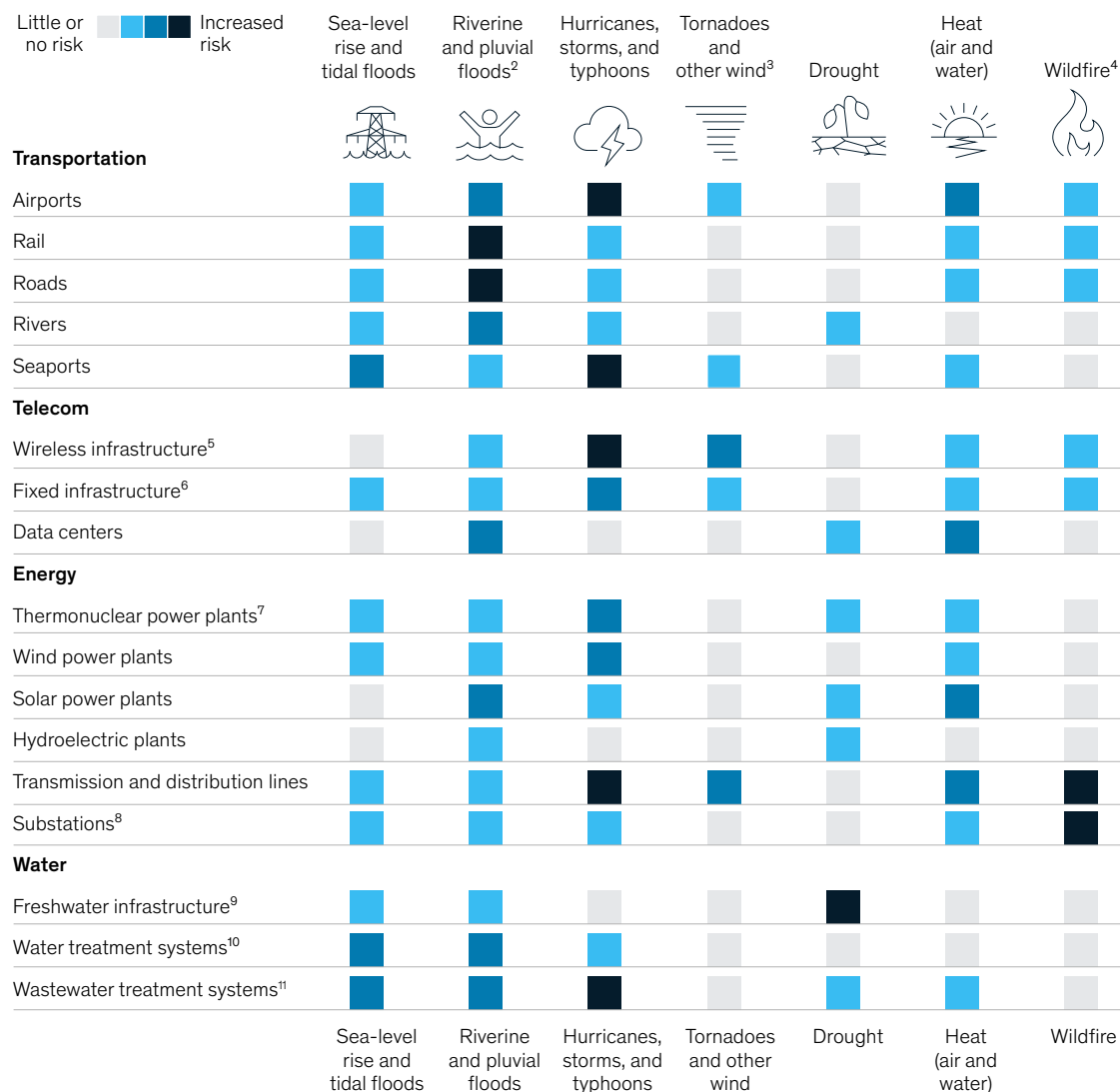
² “Will infrastructure bend or break under climate stress?,” McKinsey Global Institute, August 2020, [McKinsey.com](https://www.mckinsey.com).

³ Sarah Brody, Matt Rogers, and Giulia Siccardi, “Why, and how, utilities should start to manage climate-change risk,” April 2019, [McKinsey.com](https://www.mckinsey.com).

Exhibit 1

Globally, infrastructure assets have highly specific vulnerability to hazards: At least one element in each type of infrastructure system sees high risk.

Risk (defined as potential future losses resulting from exposure to climate hazards)¹



¹Losses are defined as asset interruption, damage, or destruction. ²Pluvial flooding is flooding caused by extreme precipitation, independent of the actions of rivers and seas. ³Including both rain and wind impacts. ⁴Wildfire is a derivative risk primarily driven by drought. ⁵Base substations and radio towers. ⁶Including above- and below-ground cable. ⁷Including nuclear, gas, and oil. ⁸Including large power transformers. ⁹Reservoirs, wells, and aquifers. ¹⁰Plants, desalination, and distribution. ¹¹Plants and distribution.

Source: Dawson et al., 2016; Federal Communications Commission, 2016; Mobile Association, 2018; *New York Times*, 2006; Pablo, 2005; Prelenato, 2019; Pyatkova, 2019; Xi, 2016; McKinsey Global Institute analysis

utilities and infrastructure businesses to target investments in both immediate improvements as well as long-term upgrades. Such tools might include a nationwide map indicating present and projected physical climate hazards⁴ (Exhibit 2) and models quantifying the physical risks to infrastructure. With these, agencies could better assess the exposure of infrastructure assets and update resilience strategies based on forward-looking decisions about what assets to retire, relocate, or modernize and harden.

— ***Eliminate infrastructure bottlenecks.***

Bottlenecks in the power grid,⁵ road network, and other systems limit decarbonization and make it harder to achieve strong returns on the capital necessary to build resilience. Even in places with abundant energy resources, like Texas and Wyoming, the aging grid contributes to reliability and resilience issues. To pinpoint and address bottlenecks such as these, federal officials can use new tools. A “digital twin,” or virtual model, of the electricity transmission and

distribution grid would help energy planners model system performance under alternative scenarios and prioritize upgrades.

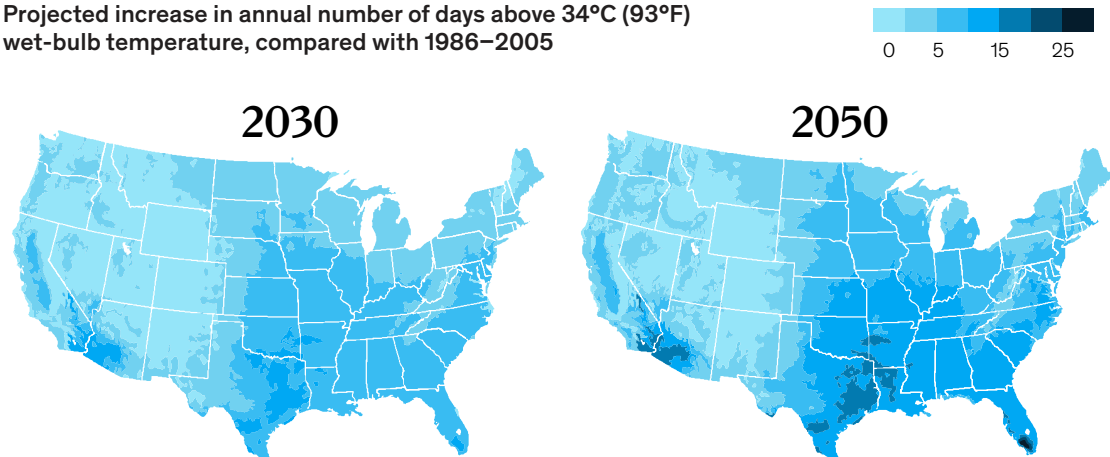
— ***Incentivize capital-stock turnover.*** Building new green facilities gets attention, but making brown sites greener is no less important for decarbonization. The federal government has several mechanisms it can use to support the transition from brown to green assets. For example, giving businesses incentives to turn over capital stock quickly (think “cash for clunkers” for aging power plants) could speed improvements that increase reliability, cut costs, stimulate demand for greener assets, and improve health and environmental outcomes.

— ***Prepare to build next-generation assets.*** The emergence of new, globally competitive American industries, such as carbon capture and hydrogen production, will depend in part on whether next-generation infrastructure assets are built. The federal government has begun

Exhibit 2

Mapping climate hazards such as extreme heat can help decision makers see where risks might arise in the coming years.

Projected increase in annual number of days above 34°C (93°F) wet-bulb temperature, compared with 1986–2005



Source: McKinsey Climate Analytics

⁴ “Climate risk and response: Physical hazards and socioeconomic impacts,” McKinsey Global Institute, January 2020, McKinsey.com.

⁵ Rory Clune, Ksenia Kaladiouk, Jesse Noffsinger, and Humayun Tai, “A 2040 vision for the US power industry: Evaluating two decarbonization scenarios,” February 2020, McKinsey.com.

Federal agencies could increase financial assistance for low-carbon innovation to usher in a new wave of American entrepreneurship.

funding some of this infrastructure; for example, the Energy Act of 2020 provides tax incentives and program funding to unlock private investment. Recent legislation supports the creation of hubs for carbon capture and storage (CCS) and infrastructure for transporting CO₂. These assets could help bring CCS costs below \$50 per ton of CO₂, making US liquefied natural gas (LNG) and crude more competitive in a global market where buyers want low-carbon commodities. Hubs for making hydrogen and hydrogen-derived products, like ammonia, could turn the United States into a major exporter of these low-carbon-intensity goods (either as commodities or as materials used in refined products such as fertilizer or steel).

2. Stimulating innovation of low-carbon technologies

Putting innovation onto a fast track could help the United States capture the opportunities associated with burgeoning markets for low-carbon technologies such as vehicle electrification; carbon capture, use, and storage;⁶ hydrogen and sustainable fuels; and advanced materials. The capital markets are eager to invest in these technologies. But many of the most promising technologies are not yet at the point of attracting private equity and debt capital. Funds generated from sales of voluntary carbon credits can supply innovators with some of the early-stage capital they require.⁷ More financing will likely be needed.

During the previous decade, federal funding and research aided the development of America's renewable-energy sector. Federal agencies could now increase financial and technical assistance for low-carbon innovation to help usher in a new wave of American entrepreneurship.

— *Reinvigorate federal research programs.*

The Advanced Research Projects Agency-Energy has sponsored projects that have attracted more than \$6.3 billion in private-sector funding and led to the formation of nearly 90 companies working on a wide range of energy technologies, from solid-state automotive batteries and long-duration energy storage to fuel cells and renewable fuels. Creating incentives that link future funding levels to commercial success could help stimulate the innovation that will be necessary to deliver market-ready technologies at scale.

— *Accelerate vehicle electrification.* The run-up in the valuation of electric-vehicle (EV) companies, along with pledges by traditional automakers to increase EV manufacturing, provide strong signals of the opportunity in this segment of the \$3 trillion global automotive market. The EV opportunity is hardly limited to passenger cars and trucks; it also spans other vehicle categories (such as buses and commercial vehicles), the EV supply chain, and EV-charging infrastructure. The Department of Energy's loan-guarantee

⁶ "Driving CO₂ emissions to zero (and beyond) with carbon capture, use, and storage," *McKinsey Quarterly*, June 30, 2020, McKinsey.com.

⁷ Christopher Blaufelder, Joshua Katz, Cindy Levy, Dickon Pinner, and Jop Weterings, "How the voluntary carbon market can help address climate change," December 17, 2020, McKinsey.com.

program still has roughly \$22 billion in loan-guarantee authority applicable to what it calls “advanced-technology vehicles” and to EV-charging infrastructure. Officers might consider using some guarantees to finance megafactories for EVs, charging stations, batteries, and components. To support agencies’ efforts to electrify federal fleets and transition to zero-emissions vehicles, the loan program could streamline funding processes and build partnerships to attract private capital as a financing multiplier.

- ***Transform the power and gas sectors.*** President Biden has announced a goal of achieving a zero-carbon power sector by 2035. Several innovations could help bring America closer to this goal and also reshape power markets globally. New technologies for long-duration energy storage⁸ would help reduce its cost enough to enable wider use of intermittent renewable power. Next-generation nuclear power, in the form of small modular fission, or even fusion, could potentially generate zero-emissions energy. Manufacturing of “blue hydrogen” from natural gas could blend into the natural-gas system, supporting load-following, grid-resilience, and industrial-heat applications until “green hydrogen” made with renewable power can be produced in substantial volumes.
- ***Drive down the cost of the next generation of zero-carbon fuels.*** Medium- and long-term innovation opportunities await in the promising market for low- or zero-carbon fuels. Sectors such as steel and cement could drastically reduce their emissions by using hydrogen as fuel. Hydrogen could also improve the economics of renewable fuels (including sustainable biofuels for aviation, trucking, and shipping), thereby accelerating uptake and speeding emissions reductions. All this activity could have a significant economic impact: some \$140 billion in revenue and 700,000 jobs by 2030, according to one study.⁹ A federally supported moonshot effort,

aimed at making hydrogen affordable enough to use widely within the next few years, could catalyze the hydrogen industry’s development.

- ***Create better materials.*** New materials could deliver order-of-magnitude improvements in emissions performance. For example, graphene—a material consisting of a one-atom-thick layer of carbon—can make batteries and solar cells significantly more efficient. Perovskites, a class of minerals, could also boost the efficiency of solar cells. And if researchers learn how to scale up production of low-carbon versions of concrete and steel, American companies could become the world leaders in manufacturing them. US national laboratories, universities, and public companies could lead the world in this field.

3. Strengthening communities by creating jobs and supporting environmental justice

Carbon-emissions reductions are just one measure of America’s progress on climate change. Also significant are measures of national and individual health and wellbeing. Decarbonizing could help protect people and assets from climate risks—but it could also create near-term risks, notably the risk of job losses. Oil-industry job losses in the United States due to the OPEC price war and the COVID-19 pandemic exceeded 100,000 in 2020. If the transition away from high-carbon-intensity fuels is not carefully managed, more job losses could occur and trigger negative economic and social impacts on American communities.

For a national decarbonization program to succeed in the long term, potential job losses would need to be more than offset by job creation in low-carbon industries.¹⁰ The president has ordered agencies to use climate spending to create good-paying jobs and established a working group on driving development and job creation in coal and power-plant communities. Here are some ideas for how

⁸ David Frankel, Sean Kane, and Christer Tryggstad, “The new rules of competition in energy storage,” June 2018, McKinsey.com.

⁹ *Road map to a US hydrogen economy*, Fuel Cell and Hydrogen Energy Association, December 2019, ushydrogenstudy.org.

¹⁰ “How a postpandemic stimulus can both create jobs and help the climate,” May 2020, McKinsey.com.

leaders can bring the benefits of the low-carbon transition to communities around the country:





- **Facilitate workforce transitions.** The new directive to establish a civilian climate corps, combined with the new national conservation goal, should generate conservation jobs nationwide. To further ease the effects of local job losses, public-sector and private-sector organizations could work together on matching people who need jobs with opportunities across the United States. Cross-sector collaboration on reskilling American workers could also help prepare them for new jobs in sectors, such as renewable energy and buildings, that are likely to expand as the clean-energy transition progresses (Exhibit 3).

- **Help protect household assets.** Physical climate hazards threaten not only Americans' incomes but also their wealth. In Florida,¹¹ storm surges cause an annual average of \$2 billion in damages to residential real estate, and residential properties exposed to tidal flooding have lost approximately \$5 billion of value. New insurance requirements (to mitigate risk, not just transfer it) or funding assistance could help protect Americans from these effects.¹² A way to sustain the federal flood-insurance program could be putting limits on rebuilding within flood zones: repeatedly flooded properties have historically accounted for 1 percent of properties but 25 to 30 percent of flood claims.

Exhibit 3

On average, climate adaptation and decarbonization measures would create ten US jobs per million dollars invested.

Economic benefits of climate adaptation and decarbonization

Type	Measure	Jobs per \$ million	Average salary, \$	GVA ² multiplier	Ease of implementation	Speed
Heat adaptation 	Urban forestry	16–23	40,000	1.80×	Medium	<6 months
	Subsidize AC for low-income seniors	5–6	40,000	1.27×	Easy	<3 months
Flood adaptation 	Sea walls	10–11	45,000	1.57×	Hard	>12 months
	Mangroves	16–20	40,000	1.35×	Medium	>12 months
Transport decarbonization 	Subsidize municipal transit operations	16–23	50,000	1.60×	Medium	<6 months
	Expand EV ¹ charging networks	10–22	55,000	1.44×	Medium	<6 months
Electricity decarbonization 	Solar rooftops	9–13	55,000	1.50×	Medium	<6 months
	Home electrification ³	13–14	60,000	1.57×	Medium	<6 months

¹Electric vehicle.

²Gross value added.

³For example, electric heat pumps.

¹¹ *Will mortgages and markets stay afloat in Florida?*, McKinsey Global Institute, April 2020, McKinsey.com.

¹² "How insurance can help combat climate change," January 2021, McKinsey.com.

- *Foster environmental justice.* As a matter of concern for national climate policy, environmental justice goes hand in hand with economic justice. Air pollution, for example, is a problem both widespread (45 percent of Americans live in counties with unhealthy levels of ozone or particle pollution¹³) and especially harmful to minority communities (Black Americans are exposed to 50 percent more fine particulates than the population at large¹⁴). Establishing an interagency process on environmental justice is important. What's more, the Environmental Protection Agency has been tasked with identifying zones that are heavily affected by local pollution or by climate hazards and could help leaders target these zones with support. Federal financing, for example, could make it easier for disadvantaged communities and households to invest in environmental cleanup and resilience.
- *Set an example for states and municipalities.* The federal government could show the way for state and local governments to pursue aggressive decarbonization programs.¹⁵ Some elements of this approach are now in place, such as the requirement that federal agencies purchase zero-carbon electricity and vehicles. Building on these requirements, every federal agency could deliver a plan, within the administration's first year, to dramatically reduce carbon emissions from operations and purchasing, including contract awards. The General Services Administration, for example, might help by allowing agencies to purchase the most energy-efficient technologies available, from light bulbs to heat pumps, and launching projects to light and heat federal buildings using zero-carbon hydrogen. The Department of Defense could become a leading buyer of clean fuels, including sustainable aviation fuels.

4. Mobilizing finance and trade

To facilitate an effective transition in its real economy, the United States would also need to support a transition in the financial economy and in global trade. The nation now has a window to engage in constructive dialogue on these topics. For example, draft rules on matters such as risk analysis and capital mobilization are meant to be finalized at the global climate-policy summit, the 26th UN Climate Change Conference (COP26), in Glasgow late this year.

As in 2014, when America's climate deal with China helped lay the groundwork for the 2015 Paris Climate Conference known as COP21, federal finance and trade specialists can lay the groundwork for a successful COP26 by instituting exemplary financial practices and rules and encouraging other nations to do the same. Here are ideas for how the United States can endeavor to maintain the competitiveness of the US financial system:

- *Provide standards and certainty with respect to climate risk-management practices.* Financial institutions and public companies in the United States and elsewhere face rising expectations from regulators to manage and report climate risks¹⁶ as well as the carbon intensity of their business activities and the global temperature increase implied by their emissions-reduction plans. These expectations are emerging primarily from foreign regulatory bodies. For example, financial regulators in France and England have announced they will conduct stress tests to check banks' resilience to climate risk. Other governments, including Brazil, Canada, and Hong Kong, are exploring the use of such tests. The United States can help promote the certainty and consistency of these regulatory approaches so that they support effective, efficient delivery of risk reduction. This would require US regulators to collaborate with each

¹³ *State of the air 2020*, American Lung Association, April 2020, stateoftheair.org.

¹⁴ Ihab Mikati et al., "Disparities in distribution of particulate matter emission sources by race and poverty status," *American Journal of Public Health*, April 2018, Volume 108, Number 4, pp. 480–5, ajph.aphapublications.org.

¹⁵ Sarah Brody, Tom Dohrmann, Zealan Hoover, Dickon Pinner, and Leah Pollack, "Responding to climate risk: Actions for US state and local leaders," December 2015, McKinsey.com.

¹⁶ Joseba Eceiza, Holger Harreis, Daniel Härtl, and Simona Viscardi, "Banking imperatives for managing climate risk," June 2020, McKinsey.com.

other and with major foreign financial supervisors. The Federal Reserve's recent decision to join 80 other central banks in the Network for Greening the Financial System, formed to share practices on climate-risk management in finance, is one example of gaining a seat at the table.

- ***Design a disclosure regime that yields quality information for investors.*** It is not just regulators who want more insight into climate performance: investors' demands of private and public companies are increasing, too. For example, Climate Action 100+, a group of more than 500 institutional investors that together manage more than \$47 trillion of assets, has asked the world's 161 highest-emitting companies to release their plans for achieving net-zero emissions by 2050. Some major investors have also called on companies to explain how their long-term business strategies will allow them to navigate the transition to a net-zero economy. Facilitating investor judgments on any topic requires institutional disclosures that meet standard criteria such as comparability, reliability, auditability, and consistency. With respect to climate change, disclosures of both climate risk and carbon emissions (intensity or absolute levels) could prove useful to investors.

Establishing global standards for such disclosures could help companies as well, by reducing the complexity of the various reporting requirements they now face.

- ***Promote a trade system that favors decarbonization.*** The United States has a relatively large services economy, relatively low carbon intensity in some of its major geographies, and major industries (such as agriculture, automotive, oil and gas, and steel) that are lower in carbon intensity than many international competitors. These features should become advantages in the transition to a low-carbon economy. For this to happen, global trade rules would need to reward companies everywhere for achieving low carbon intensity, and financial rules and price signals would need to encourage the flow of capital toward investments with low carbon intensity. Negotiations on such rules have begun, with some OECD countries discussing whether to implement border-adjustment taxes or carbon-intensity product markets that price carbon emissions into the value of traded goods. An important enabler of such rules will be "track and trace" systems that let regulators and buyers see how carbon emissions build up across value chains.

To facilitate an effective transition in its real economy, the United States would also need to support a transition in the financial economy and in global trade.

— **Measure the government's own financial risks from climate change.** As a major owner of financial assets, the US government itself is subject to climate risks. These risks could affect the government's multitrillion dollar loan-guarantee programs, such as the National Flood Insurance Program, or the value of its vast land holdings. Effective identification and measurement of both physical and transition risks could help the federal government set an example for other asset owners and establish credibility in the financial markets.

working toward a 30 percent conservation target could help create economic and employment opportunities. Conservation areas in designated climate-resilience zones, for example, could provide coastal urban areas with low-cost protection against storms, floods, and rising seas. Financing for some conservation projects could come from sales of carbon credits and natural-capital services. That will happen more readily if voluntary carbon markets grow, as the Taskforce on Scaling Voluntary Carbon Markets explains in a report it developed with McKinsey.¹⁹

— **Encourage nature conservation.** Global cooperation can also increase returns on investments in conserving nature,¹⁷ which a report from the World Economic Forum and McKinsey¹⁸ shows will be critical for reaching net-zero emissions targets. The United Nations has initiated an effort to create a global treaty on protecting 30 percent of the world's land and oceans by 2030—and the president's executive order establishes the same goal for the United States. Since the country protects 26 percent of its ocean waters but just 12 percent of its land,

With low interest rates and rapid technological innovation, US leaders have a remarkable opportunity to put America on a path to net-zero emissions—a path that can also lead to greater global competitiveness, resilience, economic growth, and community wellbeing. Cooperation across government and the private sector can help establish the United States as a world leader in economic and environmental innovation.

¹⁷ See "Valuing nature conservation," on McKinsey.com.

¹⁸ *Consultation: Nature and net zero*, World Economic Forum, January 2021, [weforum.org](https://www.weforum.org).

¹⁹ *Taskforce on scaling voluntary carbon markets: Final report*, Institute of International Finance, January 2021, [iif.com](https://www.iif.com).

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