

U.S. POLICY



REACHING FOR 2030: CLIMATE AND ENERGY POLICY PRIORITIES



Center for Climate and Energy Solutions
February 2023

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Legislative and administrative successes in the next two years will be critical in order to fully realize the potential of recent federal climate policy actions. The Center for Climate and Energy Solutions (C2ES) has worked closely with leading companies to assess legislative and executive policy options that can best align climate and economic objectives. Drawing on these discussions, this policy brief recommends a set of policy priorities to drive private sector investments, enhance the competitiveness of U.S. industries, empower communities to respond to the impacts of climate change, and further reduce emissions across the entire economy. Taken together, these actions will build on the momentum of the last Congress to advance a set of policies that can serve both climate and economic development objectives.

INTRODUCTION

The need to address climate change remains urgent. Over the past 15 months, the U.S. Congress has passed meaningful legislation that has the potential to dramatically reduce emissions, and—importantly—allow the United States to lead in accelerating the global transition toward a net-zero economy. Three significant pieces of legislation—the Infrastructure Investment and Jobs Act (IIJA), the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act, and the Inflation Reduction Act (IRA)—provide the United States with the opportunity for unprecedented investment in climate and clean-energy solutions.

Estimates project that these policies could reduce U.S. net greenhouse gas emissions to 32 to 42 percent below 2005 levels in 2030.¹ While this represents a significant down payment on the U.S. goal under the Paris Agreement—50 to 52 percent reductions below 2005 levels by 2030 and net-zero emissions by 2050—much work remains in achieving this target.²

The next two years will be crucial in determining whether we can maintain that momentum and realize the promise of recent gains. Climate action, however, continues to face headwinds from the ongoing energy crisis resulting from Russia's invasion of Ukraine,

persistent inflation, supply chain disruptions, high commodity prices, and higher interest rates. Meanwhile, continuing partisan political divides provide an added layer of complexity.

Nevertheless, the private sector continues to invest in low-carbon technologies, both to reduce emissions and to capitalize on growing markets for low-carbon goods and services. Companies and the communities they operate in both stand to benefit substantially from these opportunities, but the private sector can move further and faster with targeted policy support. Policymakers will need to prioritize climate and energy policies to realize those benefits and accelerate the transition to a thriving, just, and resilient net-zero emissions economy.

Realizing the full potential of the low-carbon economy will require not only the strategic implementation of the IIJA, CHIPS Act, and IRA, but also new legislative and regulatory actions. Implemented well, these three laws will catalyze much-needed investment in low-carbon technologies, clean-energy infrastructure, and climate resilience. But they alone cannot transform the economy. Hard-to-abate sectors will require further support, including clear market signals to speed the low-carbon transition. Additionally, supply chains will need reimagining; any carbon-pricing and trade policy must align; paths to climate resilience must be defined and cleared; and our workforce will need to evolve to meet the needs of growing sectors.

This brief lays out a set of legislative and executive recommendations that fall into four major priority categories:

- **Investment:** Policies to drive private sector investment in clean-energy and low-carbon technologies, as well as approaches to minimize investment risk.
- **Competitiveness:** Policies to enhance the competitiveness of U.S. industries, particularly manufacturing, by growing domestic markets and supply chains, innovating new and exportable low-carbon technologies, and building on the U.S. carbon advantage.
- **Community:** Policies to empower local communities not only to prepare for the impacts of a changing climate, but to also build the necessary capacity to capitalize on emerging economic development opportunities in the low-carbon transition.
- **Whole of economy:** Policies to further reduce emission across the entire economy.

These recommendations have been informed through a series of discussions with companies across a wide range of sectors to identify specific legislative and regulatory approaches that can best align climate and economic objectives. What follows is a set of recommendations developed with the benefit of that input, which can help grow the U.S. economy while taking significant steps to further reduce emissions. C2ES is grateful to these companies for their contributions.

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A company's participation does not represent an endorsement of the full contents of this brief.

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TABLE 1: Summary of Policy Priorities

This table summarizes the legislative and administrative policy priorities outlined in this brief. The column labelled “LEAD” indicates whether the policy falls under legislative **L** and or administrative **A** purview.

CATEGORIES	SECTIONS	POLICY PRIORITY	LEAD
1. Investment	1.1 Permitting for new clean energy	1.1.1 Conduct a review for categorical exclusions	A
		1.1.2 Develop renewable energy zones	A
		1.1.3 Consider public policy objectives in transmission needs analysis	A
		1.1.4 Expand qualifying resources in the instance of repurposing existing electricity infrastructure	L
		1.1.5 Increase bonus credits for brownfields energy infrastructure	L
		1.1.6 Increase funding for energy infrastructure-related projects	L
		1.1.7 Increase funding for advanced reactor demonstration projects	L
		1.1.8 Propose new standards for equipment and appliances	L A
	1.2 IRA tech-neutral tax guidance	1.2.1 Swiftly issue guidance on new technology-neutral tax credits	A
	1.3 Decarbonizing transportation	1.3.1 Set harmonized tailpipe emissions standards	A
		1.3.2 Fund indirect charging costs	L A
		1.3.3 Incorporate recycled battery content	A
		1.3.4 Establish a low-carbon fuel standard	L
		1.3.5 Extend tax credits to promote SAF development	L
		1.3.6 Adopt best practice life cycle assessment methodologies for SAF production	A
	1.4 Accelerating industrial and building efficiency and decarbonization	1.4.1 Extend and expand tax credits to incentivize renewable thermal energy	L
		1.4.2 Increase funding for decarbonizing buildings	L
	2. Competitiveness	2.1 Supply chain for critical minerals	2.1.1 Continue agency coordination on critical minerals
2.2 Hydrogen		2.2.1 Expand the hydrogen market	L
		2.2.2 Treat all hydrogen production life cycle assessments equitably	A
		2.2.3 Clarify FERC authority to regulate hydrogen infrastructure	L
2.3 Accelerating industrial efficiency and decarbonization		2.3.1 Leverage 48C for broader industrial electrification	A
2.4 Clean procurement and embodied carbon		2.4.1 Set standards around embodied emissions reporting of construction materials	A
		2.4.2 Expand Buy Clean procurement rules to all federal agencies	A
2.5 Climate and trade		2.5.1 Grow U.S. clean technology exports	L A
		2.5.2 Establish a carbon border adjustment mechanism	L
		2.5.3 Establish a carbon club	A

CATEGORIES	SECTIONS	POLICY PRIORITY	LEAD	
3. Communities	3.1 Minimizing harms and expanding access to benefits	3.1.1 Standardize the federal approach to community and worker benefits	A	
		3.1.2 Enhance community engagement and justice-related analysis through NEPA	L A	
	3.2 Building local capacity	3.2.1 Invest in energy communities	L	
	3.3 Preparing the workforce for the clean-energy economy	3.3.1 Expand career and technical education resources	L	
	3.4 Climate resilience	3.4.1 Develop a national climate resilience strategy	L	
		3.4.2 Make permanent HUD disaster recovery funding	L	
		3.4.3 Codify the Federal Flood Risk Management Standard	L	
		3.4.4 Establish climate resilience clearinghouse for the electric grid	A	
	4. Whole of economy	4.1 Methane	4.1.1 Finalize EPA methane rule	A
			4.1.2 Finalize BLM methane rule	A
4.2 Nature-based solutions		4.2.1 Expand research, technical assistance, and workforce development for nature-based solutions	L	
4.3 Agriculture		4.3.1 Help producers finance climate-aligned farming equipment	L A	
		4.3.2 Incentivize resilience and climate mitigation through crop insurance	L	
4.4 Carbon Dioxide Removal and Recycling		4.4.1 Designate federal siting authority for interstate carbon dioxide pipelines	L	
		4.4.2 Provide life cycle assessment guidance for DAC project developers	A	
		4.4.3 Expand support for carbon utilization RD&D	L	
4.5 Market-based policies		4.5.1 Work towards a federal market-based climate policy	L A	
		4.5.2 Ensure emerging standards on the VCM are incorporated in any federal rule making	A	
4.6 Climate-related financial risk	4.6.1 Finalize SEC Rule on Climate-Related Disclosures	A		

1. INVESTMENT

New policies can drive private-sector investments in clean-energy and low-carbon technologies, as well as approaches to minimize investment risk.³

1.1 PERMITTING FOR NEW CLEAN ENERGY

Deploying enough clean electricity to decarbonize the power sector and support a range of new electrified end uses in all sectors can be achieved with a two-pronged approach.⁴ First, to realize a vastly greater potential of U.S. renewable resources, an extensive pipeline of nearly shovel-ready projects (on the scale of hundreds of gigawatts) must be rapidly identified and significant transmission to connect these projects to the electricity grid will be required. Secondly, to minimize the amount of permitting required, a range of brownfield development actions should be incentivized and undertaken, which can make use of existing previously permitted infrastructure.

While shifting to a non-emitting electricity system is the goal, it is also critical to continuously maintain affordability and system reliability. Moving away from coal to less carbon-intensive, dispatchable technologies and supporting infrastructure will likely be necessary in the short- and medium-term; these technologies and infrastructure will require permitting. Strategies and timelines to convert new, lower-carbon, dispatchable generation to non-emitting power sources should be generally agreed before constructing them.

Historically, siting large renewable energy projects has been challenging, and permitting high-voltage transmission projects can take a decade or more. Getting projects approved more quickly, at the speed and scale necessary to reduce emissions in line with U.S. climate goals, requires a high degree of cooperation between cities, counties, states, and the federal government. A coordinated approach can maximize the country's use of the best (most appropriate) resources, minimize total infrastructure required, protect land and critical habitat to the largest extent possible, avoid jeopardizing cultural and tribal resources, and mitigate negative community impacts. Stakeholders (e.g., communities and tribes) should always be consulted early and be involved in planning, zoning, and siting. Additionally, they should be included in discussions that involve establishing categorical exclusions. In general, new

project development should favor previously disturbed areas (brownfields development). Ultimately, customers will benefit from greater regional connectivity.

To expedite permitting of high-priority projects with large climate benefits:

1.1.1 Conduct a review for categorical exclusions:

Federal agencies overseeing permitting projects with clear net climate benefits (e.g., significantly reduces carbon pollution, while minimizing land-use change, impacts to ecosystems, and habitat for endangered species) should conduct a review and establish which actions and projects would be most suitable for categorical exclusion, primarily focusing on projects with significant emission reduction potential that would benefit from faster timelines.⁵

To deploy and connect large-scale, high-quality clean electricity:

1.1.2 Develop renewable energy zones: A lead agency, U.S. Department of Energy (DOE) or Federal Energy Regulatory Commission (FERC), should encourage states, where appropriate, to develop renewable energy zones (REZ), where many clean projects can be developed and connected to high-voltage transmission.⁶ These pre-screened zones will contain high-quality renewable resources (i.e., reliable sun or strong winds over most hours throughout the year), suitable topography (i.e., avoid environmentally sensitive areas and other social constraints) along with garnering strong stakeholder collaboration and coordination of regulatory authorities at all levels.⁷ This policy priority is likely more impactful for central and southwestern states with low population densities and very high renewable energy potential, though any state could benefit from this strategy.

1.1.3 Consider public policy objectives in transmission needs analysis: A lead agency, DOE or FERC, should focus on permitting and deploying a few dozen of the most impactful projects—designating National Interest Electric Transmission Corridors and associated transmission lines—based on public policy objectives and state-determined REZ, wherever possible. Presently, under the Energy

Policy Act of 2005, transmission congestion is the primary driver for identifying the need for new interregional transmission capacity. Public policy objectives like clean electricity delivery, among other things, should supplement the existing transmission congestion driver. These lines would typically cross between Regional Transmission Organizations (RTOs), Independent System Operators (ISOs), and balancing authorities, helping to realize the potential of the nation's best renewable resources; minimizing total infrastructure deployments; and protecting communities, critical land, and habitat, among other things.

To minimize and offset permitting needs for transmission:

- 1.1.4 Expand qualifying resources in the instance of repurposing existing electricity infrastructure:** Congress should modify the new Section 45Y clean production tax credit (PTC) and the Section 48E investment tax credit (ITC) extension for qualifying energy resources in energy communities (e.g., brownfield development) to ensure inclusion of energy storage; fossil-fuel generation that uses a decarbonized fuel (e.g., renewable natural gas, hydrogen), or carbon capture, utilization, and storage (CCUS); and new nuclear projects. Allowing a broader range of cleaner electricity sources to qualify for these tax credits will help ensure that these sites get utilized. Repurposing retired, remediated, and retiring fossil fuel plants with new cleaner electricity generation allows us to take advantage of existing electricity infrastructure—including switchyards, substations, transmission, and distribution—and minimize permitting timelines and total investment required.
- 1.1.5 Increase bonus credits for brownfields energy infrastructure:** Congress should modify the 45Y and 48E to allow qualifying energy resources located in energy communities to receive a 20 percent additional credit instead of ten percent as currently enacted. Providing additional incentives in these locations will further ensure the sites are utilized, accelerating the clean electricity transition.
- 1.1.6 Increase funding for energy infrastructure-related projects:** Congress should double the funding and duration of the Energy Infrastructure Reinvestment (EIR) program from \$5 billion through fiscal year 2026 to \$10 billion through fiscal year 2031. Expanding EIR will further guarantee loans to projects that retool, repower, repurpose, or replace energy infrastructure that has ceased operations, or enable operating energy infrastructure to avoid, reduce, utilize, or sequester air pollution or greenhouse gas emissions. EIR projects must engage with and provide benefits to the local community.
- 1.1.7 Increase funding for advanced reactor demonstration projects:** Congress should increase funding for the DOE's Advanced Reactor Demonstration Projects (ARDP) by an additional \$1 billion by fiscal year 2025 from the current \$2.5 billion. Increased funding for ARDP will further accelerate the demonstration and commercialization of advanced and small modular reactors through cost-shared partnerships with U.S. industry. Uniquely, these small-footprint, clean-energy facilities can directly support industry's need for medium- and higher-temperature clean heat in addition to economywide decarbonization. These reactors can be sited adjacent to industrial facilities and or at decommissioned fossil fuel sites, minimizing the need for new permitting.
- 1.1.8 Propose new standards for equipment and appliances:** Congress and the administration should incentivize deploying energy efficiency to the greatest extent possible across distribution and end uses to minimize losses and the total amount of energy required to operate the clean-energy system of the future. Moreover, increasing energy efficiency and reducing energy demand will reduce the aggregate need for new energy infrastructure, mining of new materials, and all the requisite permitting. Circularity, recycling, and upcycling are among the many efficiency measures that should be encouraged and expanded.

1.2 IRA TECH-NEUTRAL TAX GUIDANCE

Much of IRA's clean-energy investment is delivered through tax incentives, which promise to catalyze investments in low- and zero-carbon technologies. The administration must move swiftly to issue guidance on all new tax credits created under IRA. The U.S. Department of Treasury has issued a number of requests for information to help inform their efforts to implement key provisions, such as clean-energy generation incentives.⁸ IRA extends clean energy 48 ITC and the 45 PTC to the end of 2024. After which, the clean-energy tax credit will transition to a new technology-neutral 45Y PTC and 48E ITC starting in 2025. Guidance on these new technology-neutral tax credits will be critical to realize the full emission reduction potential of IRA.

To expedite investments in low- and zero-carbon technologies:

1.2.1 Swiftly issue guidance on new technology-neutral tax credits: The administration should issue guidance on the new 45Y and 48E credits as soon as possible, and no later than mid-2024 and take steps to ensure their rapid implementation. The guidance should be consistent in defining qualified facilities used in other energy tax credits, aligning conflicting definitions to favor deploying clean energy and expanding the domestic clean-energy supply chains, and creating certainty around the timing of direct pay refunds so as not to disincentivize use of credits. In addition, the Internal Revenue Service (IRS) should defer to congressional intent when resolving any technical drafting errors within the IRA.

1.3 DECARBONIZING TRANSPORTATION

Transportation is the largest direct source of greenhouse gas emissions in the United States, accounting for 27.2 percent of total emissions in 2020. Most of these emissions came from light-duty cars and trucks, while medium- and heavy-duty freight transportation accounted for about a quarter.⁹ The aviation and maritime sectors contributed the least to the transportation's total emissions, but due to nascent options for carbon-free technology solutions (e.g., sustainable aviation fuel [SAF]), these sectors could represent a significant share of future emissions growth.¹⁰ While continued improvement in vehicle efficiency can help to reduce emissions, a more promising strategy to

decarbonize the transportation sector is transitioning away from fossil fuels to lower-carbon fuels (e.g., electricity) for most on-road vehicles, and clean liquid fuels for heavy transport applications.¹¹

Between IIJA and IRA, a range of incentives exist to support the deployment of electric vehicles (EVs) and other zero-emitting vehicles (ZEVs). But those incentives must be implemented in ways that catalyze private investment, accelerate technology development, and enable rapid manufacturing, delivery, and deployment.¹² Effective implementation of these incentives will accelerate the decarbonization of transportation, in turn making more stringent federal emissions standards more achievable.

To decarbonize on-road vehicles:

1.3.1 Set harmonized tailpipe emissions standards:

The U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA) should pursue harmonized standards when designing tailpipe emissions standards and fuel economy standards. They should set reductions targets that become significantly more stringent in five-year increments rather than in one-year increments, with the goal of prioritizing increasing percentages of ZEVs rather than simultaneous incremental improvements in internal combustion engine vehicles' fuel economy. These targets should be consistent with the goal of reducing transportation emissions 100 percent by midcentury.

1.3.2 Fund indirect charging costs: The U.S.

Department of Transportation (DOT) and the Department of Treasury should allow grant funding through the National Electric Vehicle Infrastructure Formula Program and grants for alternative fuel corridors, as well as the Section 30C tax credit for commercial charging and alternative fueling infrastructure, to cover indirect costs, such as prerequisite interconnection and local grid upgrades, to ensure EV charging infrastructure build-out is as comprehensive and expedient as possible. Also, Congress should pass legislation to provide additional grant funding for utilities to make transmission and infrastructure upgrades in anticipation of the expansion of the country's EV charging network.

1.3.3 Incorporate recycled battery content: IRS should treat recycled battery content, regardless of its original origin, as meeting the eligibility requirements for critical minerals as being U.S. sourced (i.e., domestic content) for any batteries included in future EV and ZEV sales.

To incentivize production of low-carbon fuels:

1.3.4 Establish a low-carbon fuel standard: Congress should establish a low-carbon fuel standard, or clean fuel standard, for the transportation sector to complement or replace the Renewable Fuel Standard (RFS), consistent with achieving net-zero emissions by midcentury. The new technology-neutral fuel standard should offer an “opt in” approach for aviation and maritime fuels until they achieve a specific milestone (e.g., a certain level of market penetration or a certain number of years after enactment). Furthermore, it should provide compliance flexibility by allowing credit trading and credits for captured carbon and direct air capture.

1.3.5 Extend tax credits to promote SAF development: Congress should extend some combination of tax credits for SAF—Section 40B SAF blender’s tax credit and or Section 45Z Clean Fuel Production—for a total of ten years. The IRA provides five years of tax credits for SAF, first in the form of the two-year 40B tax credit and then in the form of the three-year 45Z tax credit. An extension of these tax credits would further incentivize the development and deployment of SAF in order to build supply to meet growing demand in the aviation industry.

1.3.6 Adopt best practice life cycle assessment methodologies for SAF production: The IRS should release its guidance for the 45Z tax credit early this year to assure SAF project developers that there will be a smooth transition from 40B to 45Z without compromising project timelines. The IRS should consider adopting scientifically-based life cycle assessments for SAF carbon intensity that are updated frequently, as currently utilized by states.

1.4 ACCELERATING INDUSTRIAL AND BUILDING EFFICIENCY AND DECARBONIZATION

To address industrial emissions—making up more than a quarter of U.S. emissions and rising—IRA, in part,

provides tax incentives for the production of clean hydrogen and carbon capture and storage.¹³ Both will be needed to drive investment in decarbonizing hard-to-abate industrial sectors, particularly those that demand high-temperature heat, use natural gas-derived hydrogen as a feedstock, or release considerable emissions from chemical reactions in production processes in addition to those from burning fossil fuels for thermal energy. However, there are significant sources of industrial emissions that can be more cost effectively addressed, and on a shorter time horizon, for which the IRA does not provide sufficient tools. For instance, 43 percent of industrial thermal emissions come from low-temperature manufacturing processes (<130 degrees C) and 35 percent from medium-temperature processes (130–500 degrees C) for which a range of established technologies could be dispatched in the near term, particularly various electrification technologies (e.g., industrial heat pumps, electrical resistance, and thermal storage) and solar thermal.¹⁴ This is especially true for sectors such as food and beverage and paper, the fourth and fifth-highest emitting U.S. industrial sectors, respectively, by energy use.¹⁵

Provisions to advance industrial electrification in particular are noticeably absent from the IRA. There are tangible ways to both maximize the impact of the IRA on emissions from industrial process heat through its implementation and through targeted expansions or extensions of relevant provisions.

To incentivize investment in renewable heating and cooling for the industrial sectors:

1.4.1 Extend and expand tax credits to incentivize renewable thermal energy: Congress should extend the 48 ITC for certain energy-related technologies used to produce heat that would otherwise expire after 2024, including solar thermal, biogas renewable natural gas, low- or zero-emission combined heat and power for industrial users, and geothermal. Congress should also expand this tax credit to include thermal storage for industrial processes.

To increase federal support for building efficiency and decarbonization:

Decarbonizing the building sector requires significantly improving energy efficiency and reducing reliance on fossil fuels, primarily through increased investment in electrification (e.g., heat pumps, electric stoves) while

considering customer impacts and affordability. Given the long lifespan of buildings, decarbonization efforts must focus both on ensuring that new construction is climate-smart and on retrofitting the nation's existing building stock.

In addition to reducing emissions, improved energy efficiency produces net cost savings over time. Lower residential energy bills especially benefit low-income families, who tend to devote a higher-than-average portion of their income to energy expenses. However, stronger incentives and standards are needed to overcome the high upfront costs of energy-saving measures and the challenge of “split incentives,” wherein building owners bear the cost of energy upgrades while tenants realize the resulting savings.¹⁶

2. COMPETITIVENESS

New policy actions can enhance the economic competitiveness of U.S. industries, particularly manufacturing, by growing domestic markets and supply chains, innovating new and exportable low-carbon technologies, and building on the U.S. carbon advantage.

2.1 SUPPLY CHAIN FOR CRITICAL MINERALS

Establishing and improving domestic supply chains for critical minerals would both support economy-wide decarbonization (e.g., for EV batteries, power generation) and strengthen U.S. competitiveness. To do so, several concerns across the value chain must be addressed simultaneously from permitting provisions for mining key materials, to developing workforce capacity, and from investing in onshore processing and manufacturing, to creating the infrastructure and incentives needed for critical materials management at scale; to collaborating with U.S. partners abroad on supply chain diversification and resilience.

In February 2021, President Biden signed Executive Order 14017 on America's Supply Chains, requiring the federal government to identify solutions needed across different agencies to develop resilient supply chains. In implementing this order, agencies were directed to consult with outside stakeholders, including industry, academia, non-governmental organizations,

1.4.2 Increase funding for decarbonizing buildings:

Congress should significantly increase funding for DOE's Building Technologies Office (BTO), to at least \$1 billion by fiscal year 2025 from the current \$307.5 million. BTO plays a critical role in supporting technologies—like heat pumps, heat exchangers, thermal storage, advanced building energy management systems, and advanced appliances—by accelerating their adoption and working to lower their costs. BTO also funds critical work advancing grid-responsive buildings that can optimize energy use; innovative construction techniques that boost efficiency; and training, technical assistance, and certifications for states, local governments, and others to set ambitious energy codes.

communities, labor unions, and state, local, and tribal governments to strengthen American supply chains.¹⁷ In February 2022, the White House issued a capstone report on its efforts to strengthen domestic supply chains, including investing in rare earth processing capacity, updating outdated mining laws and regulations, expanding efforts to recover critical minerals from mine waste, advancing sustainability standards for minerals used in electronics, and strengthening critical mineral stockpiling.¹⁸ Given the breadth of issues that span multiple federal agency jurisdictions, a critical need still exists to ensure that incentives, investments, and deployment of IIJA and IRA funding continues to build reliable and resilient supply chains that support a clean-energy economy.

To further coordinate federal efforts on developing resilient supply chains:

2.1.1 Continue agency coordination on critical minerals: The White House should continue to coordinate across federal agencies tasked with implementing E.O. 14017 to assess progress, identify persistent challenges, and identify where additional work is needed. Federal agencies should continue to engage stakeholders on the following issues: permitting for domestic mining of critical minerals while protecting communities

and natural resources and ensuring equitable outcomes; growing the necessary workforce; identifying new research, development, and deployment (RD&D) priorities; and building interstate infrastructure to encourage materials reclamation and circularity.

2.2 HYDROGEN

An electrification-alone approach to economy-wide decarbonization is limiting, costly, and may not be practical for many applications. Due to the urgency of climate change, it is prudent to pursue multiple promising decarbonization pathways simultaneously; low-carbon fuels, for instance, will be necessary in certain hard-to-decarbonize subsectors. Cleanly-produced low- and zero-carbon fuels (e.g., hydrogen, ammonia, renewable natural gas, biofuels, synthetic fuels, etc.) have certain advantages over electricity (e.g., portability, storability, energy-density) These may offer a better climate solution for certain applications, including for industrial process heating, heavy-duty long-haul trucking, shipping, and aviation.

To develop and increase hydrogen use:

2.2.1 Expand the hydrogen market: Congress should establish a grant program within the DOE Office of Clean Energy Demonstrations to support as many demonstration projects as possible for end-use industrial applications of hydrogen, including in the production of steel, cement, glass, and chemicals, as well as projects in the transportation and electricity sectors. While the IRA offers incentives for cleanly produced hydrogen and clean hydrogen production facilities, it would be beneficial to create additional market pull and provide incentives to expand the hydrogen market economywide (i.e., beyond refining and fertilizers). Furthermore, the grant program should consider the necessary infrastructure to support such projects.

2.2.2 Treat all hydrogen production life cycle assessments equitably: DOE should treat all hydrogen production methods consistently when determining the fuel's life cycle greenhouse gas emissions target rate under the proposed Clean Hydrogen Production Standard, including

whether it is derived from water or from natural gas. Life cycle emissions are a direct determinant of the amount of production tax credit that a producer can claim.

2.2.3 Clarify FERC authority to regulate hydrogen infrastructure: Congress should clarify that FERC has jurisdiction to regulate interstate hydrogen infrastructure (e.g., pipelines, compressor stations, and storage facilities).

2.3 ACCELERATING INDUSTRIAL EFFICIENCY AND DECARBONIZATION

The competitiveness of any given manufacturer in a climate-constrained world is likely to increasingly depend on its adoption of low-carbon technologies and processes. This will often mean both significant capital investment over long time horizons and retrofits of industrial facilities, especially when electrifying an existing production process.¹⁹ The federal government has a role to play in supporting companies in making this transition, and the IRA acknowledged this role by expanding the Section 48C Advanced Manufacturing Tax Credit for retrofits at industrial facilities that yield significant emissions reductions. It is critical, however, that the implementation of a revived 48C recognizes the newly expanded role of the program.

To support retrofits and technology deployments for low-carbon production at industrial facilities:

2.3.1 Leverage 48C for broader industrial electrification: The IRS should issue guidance to ensure that the selection criteria for funding the 48C tax credit allows for investments in industrial electrification and the necessary facility retrofits to reduce process emissions by at least 20 percent, and for those projects to compete with advanced energy manufacturing projects on an equal footing. The IRS and DOE are both involved with the 48C tax credit: The IRS issues the notice with criteria co-developed with DOE. Once program criteria are in place, DOE continues to play a role by assessing projects for funding recommendations.

2.4 CLEAN PROCUREMENT AND EMBODIED CARBON

Reliable product-level data on the life cycle emissions of emissions-intensive materials (e.g., steel, cement, concrete) is fundamental to advancing policies like Buy Clean initiatives, which leverage public funding for infrastructure and buildings to develop markets for low-carbon goods. The scale and nature of public procurement has historically proven to catalyze growing markets for new products by providing the demand certainty companies need to invest in reducing emissions.²⁰ Nascent markets for low-carbon materials require strong demand signals to ensure the competitiveness of early movers and reward their investments in climate mitigation. Buy Clean initiatives also help ensure U.S. firms are rewarded for generally lower-carbon production relative to many leading trading partners.

Environmental product declarations (EPDs), which are grounded in international standards, are currently a widely practiced means of demonstrating product-level embodied carbon. As more states and localities have passed Buy Clean laws, where EPDs would be used as the basis for procurement criteria, divergences in standards on EPD reporting have become more evident.²¹ The federal government has a crucial role to play in ensuring harmonization of reporting rules, especially as it implements IRA provisions on embodied carbon and as the administration advances a federal Buy Clean program.

To harmonize standards on measuring embodied carbon and expand Buy Clean policies:

2.4.1 Set standards around embodied emissions reporting of construction materials: Where satisfactory product category rules already exist, EPA should set standards on EPDs reporting for priority building and construction materials to ensure that supply chain-specific data is used for upstream processes that contribute 80 percent or more of a product's life cycle emissions. Where significant emissions occur during the operational phases of a product's life cycle, reporting standards should encompass those phases. EPA should also set standards and provide guidance on the use of secondary data in EPDs and other forms of life cycle assessment

(LCA) while providing greater support for U.S.-based life cycle inventory databases.

2.4.2 Expand Buy Clean procurement rules to all federal agencies: The administration should expand the Buy Clean initiative to cover all federal agency procurements and federally-funded projects for identified priority materials (e.g., steel, concrete, asphalt). This program should include minimum standards for allowable emissions per unit of a covered material where data is available through industry-average EPDs or other methods that are deemed sufficiently reliable. Where setting minimum standards on allowable emissions per unit of covered material is not yet feasible, agencies should have discretion to set other requirements, such as environmentally preferable purchasing criteria that are known to address significant emissions sources.

2.5 CLIMATE AND TRADE

International trade has a tremendous impact on global emissions, and policies that reflect this reality could not only help significantly reduce emissions but also play a potentially transformative role in defining the 21st-century economy. To illustrate, in 2015, 27 percent of global carbon dioxide emissions were linked to the buying and selling of goods between nations.²² Yet, climate has not historically been addressed through trade agreements and measures. More closely aligning trade and climate policy can help to accelerate emissions reductions globally while protecting, and even enhancing, the competitiveness of U.S. workers and industries. This is especially true for U.S. companies producing clean-energy technologies, which can be supported through development finance and trade measures that help reduce global greenhouse gas emissions in the process.

To grow U.S. exports of clean-energy technologies:

2.5.1 Grow U.S. clean technology exports: Congress should provide significantly more funding for the U.S. Export-Import Bank (EXIM) and the U.S. International Development Finance Corporation (DFC) than it did in fiscal year 2023 to scale up U.S. exports of clean-energy technologies. EXIM should provide additional low-carbon financing to boost exports and increase deployment of clean-

energy technologies; DFC should increase funding for climate-smart investments in the developing world through direct loans, loan guarantees, and equity investments. Priority should be given to countries that have made strong climate commitments and require support to meet them.

To implement a carbon border adjustment:

A carbon border adjustment is an instrument designed to reduce the potential for carbon leakage among emissions-intensive, trade-exposed sectors in response to a domestic carbon price or other domestic policy for reducing emissions. In the context of carbon pricing, a border adjustment offers advantages over other methods of protection against carbon leakage, such as free allocation of emissions allowances to vulnerable sectors in a cap-and-trade system. A carbon border adjustment can also help drive climate policy ambition and alignment among trading partners.

How best to harness the relative carbon efficiency of key industrial sectors—as well as the U.S. economy as a whole—is an area of active discourse in climate policy. The best way to ensure the United States maintains this advantage is to combine a carbon price or a performance standard with a carbon border adjustment mechanism (CBAM). A proper market signal will reward investment in lower-carbon production and help maintain or even grow the U.S. carbon advantage, while the latter would help ensure a level playing field so domestic firms are not disadvantaged by taking climate action.

2.5.2 Establish a carbon border adjustment

mechanism: Congress should enact legislation creating a carbon border adjustment. To promote the durability of the U.S. carbon advantage and ensure a fair approach, the CBAM should be linked to a program that requires reductions in emissions from domestic firms over time, such as a performance standard with fee that applies to domestic and foreign firms alike and

is differentiated by sector, or an economy-wide carbon pricing system (i.e., a carbon tax or cap-and-trade program).²³

To establish a carbon club:

While the Paris Agreement is an historic accomplishment that anchors global climate action, commitments to date fall short of what is needed to achieve its temperature goals. The world is now entering a critical phase where countries will need to aggressively implement domestic policies that drastically curb emissions to avoid the worst impacts of climate change. As many industrialized and emerging economies face the same overarching challenges, more opportunities for international cooperation are needed. In June 2022, the Group of Seven (G7) countries agreed to act on Germany's suggestion to establish a "climate club" to strengthen cooperation and support the Paris goals by "accelerating climate action and increasing ambition."²⁴

2.5.3 Establish a carbon club: The administration should work to advance the concept of a carbon club in relevant international forums—from bilateral agreements to multilateral organizations—to accelerate and heighten international action against climate change. For example, the United States and the EU are working toward replacing tariffs on steel and aluminum with the first-ever carbon-based sectoral arrangement by 2024; the arrangement should be open to any country interested in joining that meets minimum requirements. Meanwhile, in December 2022, the G7 countries agreed to establish a climate club to accelerate climate action and increase ambition in support of implementing the Paris Agreement.²⁵ The administration should support the creation of such a club while pushing to expand it to countries outside the G7 as quickly as possible.

3. COMMUNITIES

New policy actions can empower communities not only to prepare for the impacts of a changing climate but also to build the necessary capacity to capitalize on emerging economic development opportunities brought on by the low-carbon transition and growing clean-energy economy.

3.1 MINIMIZING HARMS AND EXPANDING ACCESS TO BENEFITS

The harmful impacts of climate change—as well as the costs of our efforts to address it—fall disproportionately across society, often landing heaviest on communities that already experience social, economic, or racial injustice.²⁶ Decarbonization strategies must aim to mitigate, rather than perpetuate, these burdens and ensure that all communities can equitably benefit from the transition to a zero-carbon economy. A balance needs to be struck between the urgency of deploying clean-energy infrastructure and projects and minimizing harms to communities and the environment. Federal efforts, such as the Biden administration’s Justice40 initiative, are working toward these goals, but more needs to be done to standardize the federal approach to community benefits and to minimize harms to communities during project permitting.

To reduce community burdens and expand access to benefits:

3.1.1 Standardize the federal approach to community and worker benefits: The White House should issue guidance to encourage all federal agencies dispensing clean energy- and climate-related funding to integrate consideration of community and worker benefits in application processes. With billions of dollars in federal funding going toward low-carbon infrastructure projects, it is critical to make sure that these projects do not exacerbate community-level inequities, that developers actively work to engage with and provide benefits for affected groups, and that a consistent approach is applied across federal agencies. Agencies should follow the model of DOE, which has already integrated community benefit considerations into its scoring criteria for many IIJA and IRA programs (including promoting creation of community benefit agreements, project labor agreements, and other mechanisms).

3.1.2 Enhance community engagement and justice-related analysis through NEPA: Federal agencies involved in the siting and permitting of energy, transportation, and other infrastructure through the National Environmental Policy Act (NEPA) should thoroughly engage affected communities at the start of these processes. They should also analyze potential disproportionate environmental and climate justice impacts associated with that infrastructure, and do everything within their authorities to avoid them. The Council on Environmental Quality (CEQ) is in the process of updating regulations that would affect public involvement and consideration of environmental justice in NEPA processes. It also recently published interim guidance on evaluating the climate impacts of proposed projects under the law, which includes some considerations relevant to environmental justice communities.²⁷ CEQ should strengthen its regulations by providing detailed guidance on how to consider disproportionate environment- and climate-related impacts of proposed actions, as well as by creating more robust guidance on strategies for accessible community consultation, including strategies for engaging remote, indigenous, and limited English proficiency populations. Congress should also increase CEQ’s budget to provide the agency with the funding and staff capacity to implement this recommendation.

3.2 BUILDING LOCAL CAPACITY

In order to access federal resources, states, regions, and local communities need to have the administrative capacity to apply for and comply with funding opportunities. In communities with small tax bases—especially rural and marginalized communities, as well as communities that are particularly impacted by the energy transition (“energy communities”)—it is difficult to build and maintain this capacity.²⁸ Unfortunately, many of the communities that struggle in this respect are those most in need of federal support, particularly as it relates to upgrading essential infrastructure, adopting emissions mitigation technologies and practices, and preparing for the coming impacts of climate change.²⁹ Bolstering their capacity can enhance their local competitiveness and their ability to seize the economic opportunities of a net-zero future.

To bolster energy communities' capacity:

3.2.1 Invest in energy communities: Congress should equip energy communities with the resources to identify and take advantage of locally relevant opportunities in the clean-energy transition, including by creating new grants for regional strategic transition planning, ramping up local capacity building programs (e.g., expanding funding and staffing for technical assistance), and codifying the Interagency Working Group (IWG) on Coal and Power Plant Communities and Economic Revitalization. IIJA and IRA channel significant investment toward promoting economic development and clean-energy projects in energy communities, but additional support is needed to bolster their ability to take advantage of that funding and to effectively plan for a clean-energy future. While the IWG has been a central coordinating body providing such support, it is not congressionally mandated or permanent, and should be made so to ensure the lasting impact of IIJA and IRA funding and of other federal efforts to support these communities in transition.

3.3 PREPARING THE WORKFORCE FOR THE CLEAN-ENERGY ECONOMY

Currently, there is a significant gap between the workforce needs of the growing clean-energy industry and the number of workers who have the necessary skills and certifications to fill the available roles.³⁰ Workforce development should not only support existing workers transitioning away from high-carbon industries, but also focus on ensuring young people preparing to enter the workforce are aware of and equipped for emerging opportunities in low-carbon industries.³¹ In particular, outreach should target both energy communities and historically-marginalized communities, including low-income communities with low rates of college education. This can help all communities capitalize on the economic opportunities of the low-carbon transition.

To expand workforce training and education:

3.3.1 Expand career and technical education resources: Congress should expand Department of Education resources for career and technical education that can support recent graduates and mid-career workers in skilled trades to acquire expertise relevant to the clean-energy

industry. Congress should also fund K-12 outreach programs that educate young people—especially those in marginalized communities—on career opportunities and skills needs in the sector. Currently, this kind of training, outreach, and certification is led at the local level by a patchwork of non-government actors. Federal funding and standardization are needed to ensure the workforce has access to high quality career and technical training and subsequent opportunities.

3.4 CLIMATE RESILIENCE

Climate change is increasing the frequency and intensity of natural disasters such as wildfires, floods, droughts, and extreme temperatures, inflicting rising costs on communities and businesses across the country.³² In 2022, 18 severe climate and extreme weather events were responsible for \$165 billion in losses, marking the seventh consecutive year in which the United States experienced ten or more events each causing over \$1 billion in losses each.³³ The costs and impacts of climate change are only estimated to mount. By bolstering and better coordinating federal resources, policymakers can help strengthen pre- and post-disaster state, local, and private sector resilience efforts and can help protect U.S. taxpayers from the rising costs of disaster relief.³⁴ The codification of climate science-based resilience standards for federal investments will help build resilience in communities across the country and also encourage businesses to adopt similar resilience standards for private investments.³⁵

To coordinate federal climate resilience efforts:

3.4.1 Develop a national climate resilience strategy:

Congress should require, and provide funding for, the federal government to develop a quadrennial national resilience strategy. This strategy should identify national adaptation goals and metrics, emphasize proactive adaptation and identify priority projects, guide federal actions to achieve those goals, and report on progress. In doing so, the federal government should build upon the climate vulnerability assessments and resilience programs already underway, including state, local, tribal, and private sector efforts. A chief resilience officer should direct a coordinated, whole-of-government effort to build climate resilience in the United States.

To support state, local, and private sector resilience efforts:

3.4.2 Make permanent HUD disaster recovery

funding: Congress should permanently authorize the Department of Housing and Urban Development’s (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program and provide a sustained level of funding. Congress generally appropriates CDBG-DR funds after a disaster, creating a situation where the communities in need must wait months or even years to receive assistance.³⁶ Permanently authorizing the program and appropriating baseline funds (e.g., based on average program need of previous five years) will reduce the administrative burden and delays at all levels of government and better ensure financial assistance reaches disaster-impacted communities quickly. In addition, the program should prioritize funding for proactive resilience planning and projects that build resilience to future disasters, especially in low-income communities. Proactive investments are more cost-effective than post-disaster investments and help protect public health and livelihoods.³⁷

3.4.3 Establish climate resilience clearinghouse for the electric grid: DOE should establish a resilience clearinghouse where energy companies share how they are addressing the risks associated with extreme weather and climate change. This

collaborative effort should enable the exchange of information and highlight best practices for assessing the costs and benefits of resilience actions, identify metrics for measuring success in enhancing resilience, and identify gaps and opportunities related to the development and deployment of resilience energy technologies, practices, and policies.

To better protect public and private property against future flood risks:

3.4.4 Codify the Federal Flood Risk Management

Standard: Congress should pass legislation codifying the Federal Flood Risk Management Standard (FFRMS) to reduce flood risk to federally funded projects by requiring the use of protective design standards and forward-looking climate science when building or rebuilding federally funded buildings and infrastructure, including projects funded through CDBG-DR or other programs. Making this standard practice will help mitigate the damage caused by future flood-related disasters, which have resulted in \$900 billion in costs nationwide since 2000.³⁸ While the Biden administration has reinstated the FFRMS, codifying this standard would make its impact durable and ensure that federal investments made by future administrations continue to mitigate this risk.

4. WHOLE OF ECONOMY

Solutions with an economy-wide scope can have a multiplier effect on the vast majority of existing climate- and energy-targeted programs as well as the policies recommended in this brief. New policy actions to reduce emissions across the entire economy can be powerful signals guiding the net-zero transition.

4.1 METHANE

In addition to reducing carbon dioxide emissions across the economy, stronger efforts are needed to reduce emissions from other potent greenhouse gases, such as methane. Methane is a short-lived climate pollutant, as it does not persist in the atmosphere as long as other

gases like carbon dioxide, but it has a stronger near-term warming effect. Methane is over 80 times more potent than carbon dioxide over a 20-year time frame, and makes up over ten percent of U.S. greenhouse gas emissions.³⁹ Near-term efforts to reduce methane can produce significant, immediate climate benefits.

To dramatically reduce methane emissions:

4.1.1 Finalize EPA methane rule: EPA should work expeditiously to finalize the proposed rule for methane emissions from existing and new oil and gas facilities by the agency’s self-imposed August 2023 deadline. EPA released the proposed

rule in November 2021, and in November 2022, issued a supplemental proposal that updated, strengthened, and expanded the proposed rule. The updated proposal includes comprehensive monitoring requirements, a “super-emitter” response program, and zero-emissions standards for pneumatic pumps. The final rule will have a direct bearing on the methane fee that will go into effect in 2024.

4.1.2 Finalize BLM methane rule: The Bureau of Land Management (BLM) should finalize its proposed methane waste prevention rule for oil and gas facilities on federal and tribal lands to require stringent limits on flaring and venting of gas during drilling, well completion, and production operations. The proposed rule would work in conjunction with the EPA’s methane rule to minimize methane leakage, once both are finalized.

4.2 NATURE-BASED SOLUTIONS

Nature-based solutions enhance the ability of aquatic and terrestrial ecosystems—including forests, agricultural lands, wetlands, grasslands, coastlines, and oceans—to both mitigate climate change and bolster resilience. They are a critical tool to offset emissions from other sectors: The land use, land-use change, and forestry sector offset 13.6 percent of emissions in 2020.⁴⁰ Still, more needs to be done to maximize their climate contribution: One 2018 study found accelerating nature-based solutions like reforestation and avoided forest and grassland conversion could mitigate up to 1.2 billion metric tons of carbon dioxide equivalent per year by 2025 in the United States (equal to offsetting 20 percent of 2020 emissions).⁴¹

To support climate mitigation and resilience in U.S. ecosystems:

4.2.1 Expand research, technical assistance, and workforce development for nature-based solutions: Congress should increase funding for research, technical assistance, and workforce development programs to advance carbon sequestration, emissions reductions, and resilience in the country’s lands and waters. IJJA and IRA directed significant funding to nature-based solutions, but both technical assistance (e.g., through U.S. Department of Agriculture’s [USDA]

Natural Resources Conservation Service) and workforce recruitment and training programs (e.g., through federal agencies’ youth corps programs) are still needed to prepare the next generation of workers and private land stewards to implement nature-based solutions. In addition, research gaps remain regarding the long-term carbon sequestration ability of various ecosystems, especially soils and blue carbon ecosystems. These gaps must be filled to build confidence in nature-based solutions.

4.3 AGRICULTURE

An economy-wide approach to addressing climate change must involve the agriculture sector, which accounts for approximately 11 percent of U.S. greenhouse gas emissions. In addition to reducing emissions, efforts are also needed to enhance agricultural lands’ carbon storage potential and bolster farmers’ and ranchers’ resilience to a changing climate. Significant federal investment has gone toward all three ambitions, most prominently through the IRA and USDA’s Partnerships for Climate-Smart Commodities program. While these efforts have significantly increased funding available to producers to implement climate-smart practices, additional financial incentives, including through USDA loan programs and the Federal Crop Insurance Program (FCIP), can help producers overcome cost barriers to adoption.

To incentivize climate-aligned farming:

4.3.1 Help producers finance climate-aligned farming equipment: Congress should authorize and fund a Conservation Equipment Loan Program under the Farm Service Agency (FSA), either through an existing program or as a standalone endeavor. This would finance equipment purchases that could help producers achieve climate and conservation goals. While the FSA loan and loan guarantees provide financing for a range of equipment, producers still face barriers to accessing conservation-related equipment, for which the upfront cost can be prohibitively expensive.⁴² A targeted loan program would offer financial incentives (e.g., lower interest rates and longer terms compared to traditional FSA loans) to help producers access equipment necessary for climate-smart and conservation practices, such

as precision agriculture equipment or tools like roller-crimpers, which terminate cover crops without soil tillage. The agency should prioritize applications for equipment that directly facilitates greenhouse gas reductions or carbon sequestration.

4.3.2 Incentivize resilience and climate mitigation through crop insurance: Congress should incentivize climate-smart and conservation practices through FCIP by instituting premium discounts for producers who implement approved risk-reducing practices. While multiple climate-smart management practices can bolster farmers' resilience to natural disasters and reduce risk on their operations, FCIP does not currently consider the benefits of these practices in implementing the program. An existing USDA incentive program for cover crops offered in 2021 and 2022 offers a good model for Congress to expand to other practices (e.g., reduced tillage, agroforestry).⁴³

4.4 CARBON DIOXIDE REMOVAL AND RECYCLING

Carbon dioxide removal has a vital role to play in meeting our net-zero goals. The National Academy of Sciences estimated that the United States needs to remove one gigaton of carbon dioxide per year by 2050 to reach net-zero emissions.⁴⁴ Even with rapid scale-up of decarbonization efforts (e.g., renewable energy, electrification, energy efficiency, etc.), the United States will still need removal technologies—which include both nature-based removals, such as restoring forests and managing rangelands to store carbon in the soil, and engineered approaches such as direct air capture (DAC)—to meet its target.⁴⁵

To promote development, deployment, and utilization of carbon:

4.4.1 Designate federal siting authority for interstate carbon dioxide pipelines: Congress should clearly designate a federal agency as having regulatory authority over the siting of interstate carbon dioxide pipelines. While DOT's Pipeline and Hazardous Materials Safety Administration regulates carbon dioxide pipelines safety, siting oversight of these pipelines at the federal level needs clarification. At present, pipeline siting authority rests mainly at the state and local level, where confusion and delays caused by differing usage of eminent domain, rights of way, and

lawsuits could potentially hinder deployment of interstate carbon dioxide pipelines and the deployment of carbon capture technologies.

4.4.2 Provide life cycle assessment guidance for DAC project developers: DOE should develop a DAC LCA toolkit to help project developers accurately measure the amount of qualified oxide for the Section 45Q tax credit to ensure the integrity of claimed credits for captured and removed emissions. This toolkit should accommodate a range of DAC technologies to allow different developers and grant recipients to benefit. Under IRS rules, LCAs must conform with certain international standards, which an LCA toolkit would reflect while simultaneously incorporating best practices from the DAC research community and practitioners.

4.4.3 Expand support for carbon utilization RD&D: Congress should provide additional, expanded funding for DOE's Carbon Conversion Program to support research, development, and deployment of carbon utilization pathways to reduce the costs of low-carbon products (e.g., fuels, chemicals, building materials) to be more competitive with traditional products.

4.5 MARKET-BASED POLICIES

Experience has demonstrated that market-based policies can reduce emissions more cost-effectively than traditional regulations by giving emitters the flexibility to find the lowest-cost options for reductions. Market-based policies to reduce greenhouse gas emissions can take different forms (e.g., carbon tax, cap and trade, sector-based performance standards with trading); the common feature is that they all place a price on carbon emissions in one form or another.

In addition to driving decarbonization, some market-based policies can generate significant revenue. This revenue can be used to support climate mitigation and resilience efforts, address impacts to low-income households and affected workers and communities, or address broader fiscal concerns. A market-based pricing policy must include provisions to ensure environmental integrity, address environmental justice concerns, safeguard the global competitiveness of U.S. industry, provide for equivalent state carbon pricing programs, and provide for the appropriate use of offsets (including for carbon removal).⁴⁶

To advance market-based climate policies:

A durable, economy-wide market-based program would require careful design and broad-based political support. While some sectors are better suited for carbon pricing than others, an economy-wide approach would enhance the efficiency of the program, facilitating emissions reductions where they are most cost-effective. While enactment of a comprehensive program faces challenges in the near term, Congress should work now to lay the groundwork by closely examining the relevant issues and options.

4.5.1 Work toward a federal market-based climate

policy: The administration and Congress should examine its options and work toward enacting an economy-wide market-based carbon reduction program that could contribute to the achievement of net-zero emissions by 2050. Work on such a program could include conducting analyses, developing policy principles, drafting bipartisan legislation, conducting workshop discussions, and holding committee hearings.

To ensure high integrity in the voluntary carbon market:

The voluntary carbon market (VCM)—wherein private sector actors buy and sell carbon reductions and removals to offset portions of their own emissions—surged to \$2 billion in 2021 and could reach upward of \$50 billion by 2030.⁴⁷ While this growth represents vast potential for the VCM to serve as a key complementary tool for channeling finance toward climate action, there are significant risks and reputational challenges. Academic research and investigative reporting have exposed real concerns about the integrity of carbon credits and claims by companies that buy them.⁴⁸ Currently, the market is facilitated by different verifiers operating under standards of varying quality with limited government oversight. In order to scale the VCM and ensure it acts as a vehicle for sustainable finance, we need better standards and market oversight to ensure projects represent real, additional, and permanent emissions reductions.

Accordingly, U.S. agencies have shown an interest in using their rulemaking authority and guidance to ensure greater transparency and integrity within the VCM.

4.5.2 Ensure emerging standards on the VCM are incorporated in any federal rule making: Where references to engaging the VCM would apply,

federal entities, such as the U.S. Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC), should incorporate principles and standards from multi-stakeholder groups working on the integrity of the VCM (e.g., Integrity Council for the Voluntary Carbon Market) into any forthcoming regulations or guidance.

4.6 CLIMATE-RELATED FINANCIAL RISK

Investors, companies, and financial regulators have begun to recognize and respond to the risks that climate change poses to financial assets across all industry sectors. In recent years many companies have begun to implement the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) to provide fuller disclosure of their physical risks from climate change and the transition risks they face from potential regulatory action, technological shifts, and market changes resulting from new demand.

Market participants must have access to consistent, comparable, and reliable information on climate-related risks and mitigation and resilience opportunities to ensure that markets are fair, capital can be efficiently allocated, and investors are protected. Mandatory climate-related financial risks disclosure would provide greater consistency and transparency across industry, better enabling investors to allocate capital to those companies that are decarbonizing their assets, building their climate resilience, and developing new goods and services intended for a low-carbon future.

To ensure full consideration of climate-related financial risks in investment decisions:

4.6.1 Finalize SEC Rule on Climate-Related

Disclosures: SEC should finalize its proposed rule requiring standardized climate-related disclosures to investors.⁴⁹ The rule should require companies include climate-related financial disclosures in financial filings, with the option to file this information using a separate form and on a different date from their annual 10-K filings given that complete annual greenhouse gas emissions data is often not available until months after their financial filing. Companies should be allowed to develop their emissions inventories based on the previous calendar year (which would accord with how many companies develop their annual

emissions using the Greenhouse Gas Protocol). The rule should require companies to include disclosure of all scopes 1, 2, and 3 emissions that meet the definition of materiality consistent with the definition under U.S. securities law. SEC should also issue guidance for how companies should assess materiality as it relates to climate change. The rule should strengthen safe harbors

for scope 3 emissions and for all forward-looking statements. Broadly, the SEC should work with the Financial Accounting Standards Board (FASB) to support the development of authoritative accounting guidance for climate-related expenditures. The SEC should also support the separate development of auditing standards for climate-related expenditures.⁵⁰

CONCLUSION

Recent progress on climate is encouraging, but much more will be needed to cut emissions enough to meet our climate goals. The policy priorities outlined in this document focus on critical building blocks for the next phase of climate policy following passage of IIJA, the CHIPS Act, and IRA. The next two years present an opportunity to build on this foundation with concrete proposals to meet our 2030 emissions goal, while

positioning American communities and companies to capitalize on growing market opportunities. Public and private sector cooperation will be crucial for achieving durable results, while bipartisan collaboration can further strengthen the foundation for a modern economy which innovates to mitigate the worst aspects of climate change and integrates resilience in every sector.

ENDNOTES

- 1 John Larsen et al., *A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act* (Washington, DC: Rhodium Group, 2022), <https://rhg.com/research/climate-clean-energy-inflation-reduction-act>.
- 2 “FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies,” last modified April 22, 2021, The White House, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies>.
- 3 Unless otherwise cited, tax provisions mentioned were enacted through the Inflation Reduction Act.
- 4 The suggested approach explicitly targets large, gigawatt (GW) scale actions. Smaller projects, e.g., rooftop solar, solar gardens, and so forth will also be helpful.
- 5 Categorical exclusion is a class of actions that a federal agency has previously determined to have no significant environmental impact, and as a result, does not require an environmental assessment or environmental impact statement. The use of categorical exclusions can reduce paperwork and speed up the permitting process. See “Categorical Exclusions,” Council of Environmental Quality, last accessed February 24, 2023, <https://ceq.doe.gov/nepa-practice/categorical-exclusions.html>.
- 6 Large, utility-scale projects are the least expensive and most productive sources of renewable electricity. Utilities and developers need to have a massive pipeline (i.e., hundreds of gigawatts of capacity) of nearly shovel-ready projects; states and government agencies can help identify these projects.
- 7 David Hurlbut, Ilya Chernyakhovskiy, and Jaquelin Cochran, *Renewable Energy Zones: Delivering Clean Power to Meet Demand*, Greening the Grid (Golden, CO: National Renewable Energy Laboratory, 2016), <https://www.nrel.gov/docs/fy16osti/65988.pdf>.
- 8 “IRS asks for comments on upcoming energy guidance,” Internal Revised Service, last modified October 5, 2022, <https://www.irs.gov/newsroom/irs-asks-for-comments-on-upcoming-energy-guidance>.
- 9 “Federal Vehicle Standards,” Center for Climate and Energy Solutions, last modified February 3, 2023, <https://www.c2es.org/content/regulating-transportation-sector-carbon-emissions>.
- 10 U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020* (Washington, DC: U.S. Environmental Protection Agency, 2022), <https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf>.
- 11 Ashley Lawson and Fatima Maria Ahmad, *Decarbonizing U.S. Transportation* (Arlington, VA: Center for Climate and Energy Solutions, 2018), <https://www.c2es.org/document/decarbonizing-u-s-transportation>.
- 12 Stephanie Gagnon, *Accelerating Vehicle Electrification in Michigan* (Arlington, VA: Center for Climate and Energy Solutions, 2022), <https://www.c2es.org/document/accelerating-vehicle-electrification-in-michigan>.
- 13 U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2020*.
- 14 Renewable Thermal Collaborative, *The Renewable Thermal Vision: Finding a Path Forward for Decarbonizing Thermal Energy in the U.S. Industrial Sector* (Arlington, VA; Renewable Thermal Collaborative, 2022), <https://www.renewablethermal.org/vision>.
- 15 U.S. Department of Energy, *Industrial Decarbonization Roadmap* (Washington, DC: U.S. Department of Energy, 2022), <https://www.energy.gov/sites/default/files/2022-09/Industrial%20Decarbonization%20Roadmap.pdf>.

- 16 Dan York et al., *Building Decarbonization Solutions for the Affordable Housing Sector* (Washington, DC: American Council for an Energy-Efficient Economy, 2022), <https://www.aceee.org/sites/default/files/pdfs/u2204.pdf>.
- 17 “Executive Order 14017 of February 24, 2021,” *Federal Register* 86, no. 2021-04280: 11849-11854 (February 1, 2021), <https://www.federalregister.gov/documents/2021/03/01/2021-04280/americas-supply-chains>.
- 18 Jake Sullivan and Brian Deese, *Executive Order on America’s Supply Chains: A Year On Action and Progress* (Washington, DC: The White House, 2022), <https://www.whitehouse.gov/wp-content/uploads/2022/02/Capstone-Report-Biden.pdf>.
- 19 Global Efficiency Intelligence and the Renewable Thermal Collaborative, *Electrifying U.S. Industry: a Technology- and Process-Based Approach to Decarbonization* (Arlington, VA; Renewable Thermal Collaborative, 2021), <https://www.renewablethermal.org/electrifying-us-industry>.
- 20 Nicholas Vonortas, Pushmeet Bhatia, and Deborah Mayer, *Public Procurement and Innovation in the United States* (Washington, DC: The George Washington University, 2011), https://www.ige.unicamp.br/geoideias/wp-content/uploads/sites/51/2015/07/Report_Public-Procurement_2011.pdf.
- 21 Chris Kardish, *A Building Block for Climate Action: Reporting on Embodied Emissions* (Arlington, VA: Center for Climate and Energy Solutions, 2021), <https://www.c2es.org/wp-content/uploads/2022/11/a-building-block-for-climate-action-reporting-on-embodied-emissions.pdf>.
- 22 Norihiko Yamano and Joaquim Guilhoto, *CO₂ emissions embodied in international trade and domestic final demand: Methodology and results using the OECD Inter-Country Input-Output Database* (Paris, France: Organisation for Economic Cooperation and Development, 2020), doi.org/10.1787/8f2963b8-en.
- 23 Chris Kardish, Nat Keohane, and Jason Ye, *Carbon Border Adjustments: Considerations for Policymakers* (Arlington, VA: Center for Climate and Energy Solutions, 2022), <https://www.c2es.org/document/carbon-border-adjustments-considerations-for-policymakers>.
- 24 “G7 Statement on Climate Club,” G7 Germany, last modified June 28, 2022, <https://www.g7germany.de/resource/blob/974430/2057926/2a7cd9f10213a481924492942dd660a1/2022-06-28-g7-climate-club-data.pdf>.
- 25 “G7 establishes Climate Club,” G7 Germany, last modified December 12, 2022, <https://www.bmwk.de/Redaktion/EN/Pressemitteilungen/2022/12/20221212-g7-establishes-climate-club.html>.
- 26 U.S. Environmental Protection Agency, *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts* (Washington, DC: U.S. Environmental Protection Agency, 2021), <http://www.epa.gov/cira/social-vulnerability-report>; Daniel Raimi, Sanya Carley, and David Konisky, “Mapping county-level vulnerability to the energy transition in US fossil fuel communities,” *Scientific Reports* 12, (September 2022), doi.org/10.1038/s41598-022-19927-6.
- 27 National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change, 88 Fed. Reg. 1196 (January 9, 2023).
- 28 The Interagency Working Group (IWG) on Coal and Power Plant Communities and Economic Revitalization defines Energy Communities as those most impacted by coal and power plant closures, including “workers directly employed in coal mining and power generation, and also the workers in related jobs in logistics and services, residents who are dependent on coal-related tax revenue to fund schools, fire houses, police stations, and infrastructure—as well as fenceline communities and other communities impacted by environmental and health effects of fossil energy generation.” See Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, *Initial Report to the President on Empowering Workers through Revitalizing Energy Communities* (Washington, D.C., IWG and U.S. Department of Energy’s National Energy Technology Laboratory, 2021), https://netl.doe.gov/sites/default/files/2021-04/Initial%20Report%20on%20Energy%20Communities_Apr2021.pdf.

29 Brad Townsend and Stephanie Gagnon, *Investing in West Virginia's Future: Aligning Climate and Economic Development* (Arlington, VA: Center for Climate and Energy Solutions, 2021), <https://www.c2es.org/document/investing-in-west-virginias-future-aligning-climate-and-economic-development>; see also Christina Cilento, *Investing in Arizona's Future: Driving Equitable, Low-Carbon Economic Growth* (Arlington, VA: Center for Climate and Energy Solutions, 2022), <https://www.c2es.org/document/investing-in-arizonas-future-driving-equitable-low-carbon-economic-growth>.

30 David Keyser et al., *United States Energy & Employment Report 2022* (Washington, DC: U.S. Department of Energy Office of Policy, Office of Energy Jobs, 2022), https://www.energy.gov/sites/default/files/2022-06/USEER%202022%20National%20Report_1.pdf; See also, for example: Solar Energy Industries Association et al., *National Solar Jobs Census 2020* (Washington, DC: Solar Energy Industries Association, The Solar Foundation, Interstate Renewable Energy Council, and BW Research, 2021), <https://www.seia.org/sites/default/files/2021-05/National-Solar-Jobs-Census-2020-FINAL.pdf>.

31 See: Stephanie Gagnon, *Accelerating Vehicle Electrification in Michigan*.

32 Center for Climate and Energy Solutions, *Science and Impacts* (Arlington, VA: Center for Climate and Energy Solutions, 2019), <https://www.c2es.org/document/science-and-impacts>.

33 "Billion-Dollar Weather and Climate Disasters," NOAA National Centers for Environmental Information (NCEI), last accessed February 24, 2023, <https://www.ncei.noaa.gov/access/billions>.

34 Center for Climate and Energy Solutions, *What is Climate Resilience, and Why Does it Matter?* (Arlington, VA: Center for Climate and Energy Solutions, 2019), <https://www.c2es.org/document/what-is-climate-resilience-and-why-does-it-matter>.

35 For additional federal climate resilience policy recommendations, see Amy Bailey and Laura Brush, *A Federal Policy Action Plan to Accelerate Local Climate Resilience* (Arlington, VA: Center for Climate and Energy Solutions, 2021), <https://www.c2es.org/document/a-federal-policy-action-plan-to-accelerate-local-climate-resilience>.

36 Stan Gigmont, "CDBG-DR Program's Lack of a Permanent Authorization Has Unintended Consequences for Recent Allocations," Bipartisan Policy Center blog, Bipartisan Policy Center, last modified March 28, 2022, <https://bipartisanpolicy.org/blog/cdbg-dr-programs-lack-of-a-permanent-authorization-has-unintended-consequences-for-recent-allocations>.

37 J. Alfredo Gómez, *Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources*, GAO-20-127 (Washington DC: United States Government Accountability Office, 2019), <https://www.gao.gov/assets/gao-20-127.pdf>.

38 "Pew Applauds Executive Order Restoring Flood Resilience Standard for America's Communities," Pew Charitable Trust, last modified January 15, 2021, <https://pewtrusts.org/en/about/news-room/press-releases-and-statements/2021/01/20/pew-applauds-executive-order-restoring-flood-resilience-standard-for-americas>.

39 U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020*

40 U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020*.

41 Joseph E. Fargione et al., "Natural climate solutions for the United States," *Science Advances* 4, no. 11, (November 2018), doi.org/10.1126/sciadv.aat1869; U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020*.

42 Christina Cilento, *Unlocking Precision Agriculture's Climate Potential* (Arlington, VA: Center for Climate and Energy Solutions, 2022), <https://www.c2es.org/document/unlocking-precision-agricultures-climate-potential>.

43 "Pandemic Cover Crop Program," USDA Risk Management Agency, last updated March 2022, <https://www.rma.usda.gov/en/Fact-Sheets/National-Fact-Sheets/Pandemic-Cover-Crop-Program>.

44 National Academies of Sciences, Engineering, and Medicine, *Negative Emissions Technologies and Reliable Sequestration: A Research Agenda* (Washington, DC: The National Academies Press, 2019), doi.org/10.17226/25259.

45 Mahmoud Abouelnaga, *Engineered Carbon Dioxide Removal: Scalability and Durability* (Arlington, VA: Center for Climate and Energy Solutions, 2022), <https://www.c2es.org/wp-content/uploads/2022/10/engineered-carbon-dioxide-removal-scalability-and-durability.pdf>.

46 Janet Peace and Jason Ye, *Market Mechanisms: Options for Climate Policy* (Arlington, VA: Center for Climate and Energy Solutions, 2020), <https://www.c2es.org/document/market-mechanisms-options-for-climate-policy>.

47 Stephen Donofrio et al., *The Art of Integrity Ecosystem Marketplace's State of the Voluntary Carbon Markets 2022 Q3* (Washington, DC: Ecosystem Marketplace, 2022).

48 Among others: Grayson Badgley et al., "Systematic over-crediting in California's forest carbon offsets program", *Global Change Biology* (October 2021): 1433–1445; Anja Kollmuss, Lamert Schneider, and Vladyslav Zhezherin, *Has Joint Implementation Reduced GHG Emissions? Lessons Learned for the Design of Carbon Market Mechanisms* (Stockholm, Sweden: Stockholm Environment Institute, 2015), <https://mediamanager.sei.org/documents/Publications/Climate/SEI-WP-2015-07-JI-lessons-for-carbon-mechs.pdf>; Lisa Song, "Why Carbon Credits for Forest Preservation May be Worse Than Nothing," *Pro Publica*, May 22, 2019, <https://features.propublica.org/brazil-carbon-offsets/inconvenient-truth-carbon-credits-dont-work-deforestation-redd-acre-cambodia>.

49 See Center for Climate and Energy Solutions, *Comments on the proposed SEC rule on climate-related financial disclosures* (Arlington, VA: Center for Climate and Energy Solutions, 2021), <https://www.c2es.org/document/comments-on-the-proposed-sec-rule-on-climate-related-financial-disclosures>.

50 Center for Climate and Energy Solutions, *Comments to the SEC Regarding Proposed Regulation S-X Provisions* (Arlington, VA: Center for Climate and Energy Solutions, 2023), <https://www.c2es.org/document/comments-to-the-securities-and-exchange-commission-regarding-alternative-to-proposed-sx>.



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