



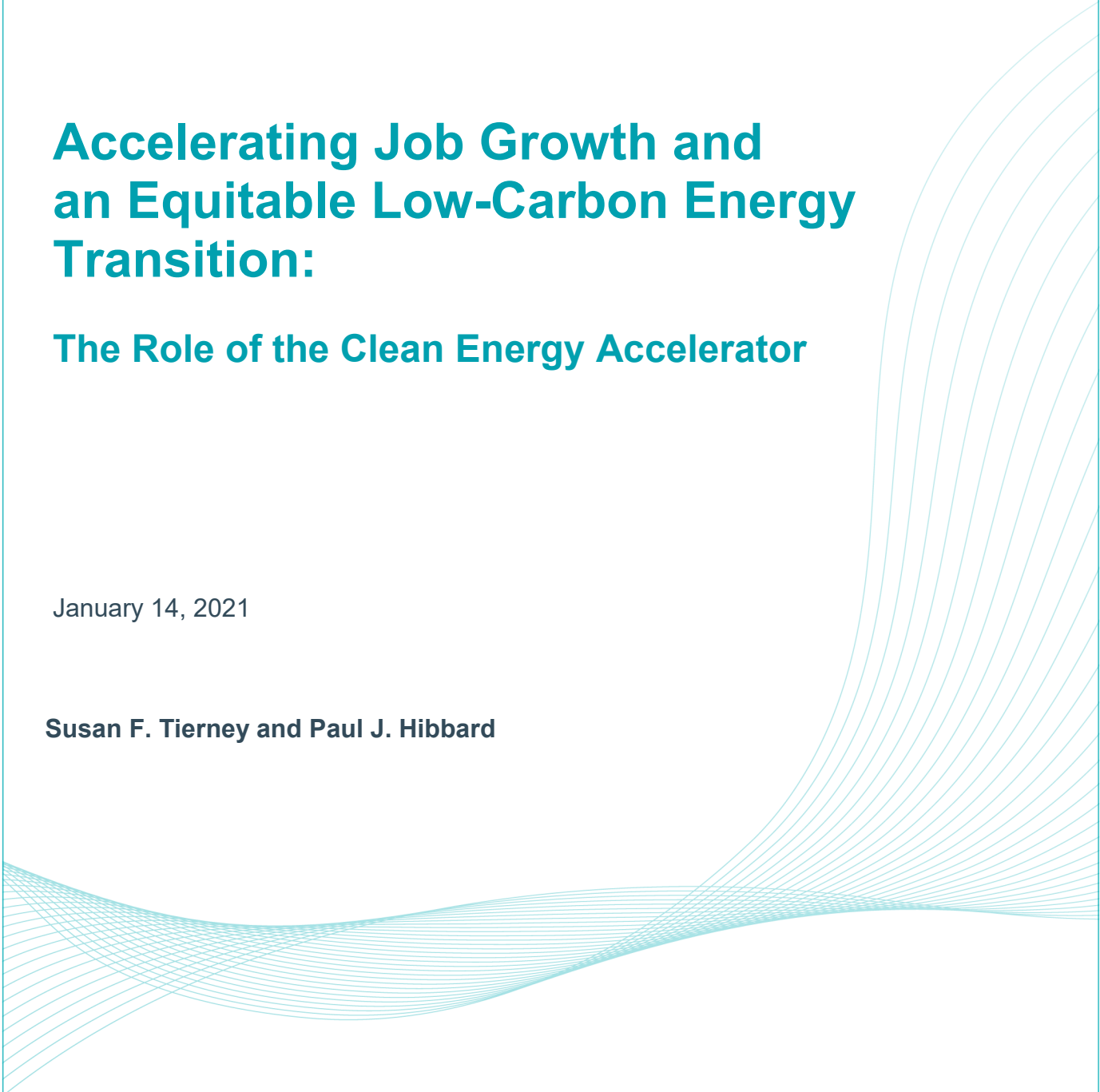
ANALYSIS GROUP

Accelerating Job Growth and an Equitable Low-Carbon Energy Transition:

The Role of the Clean Energy Accelerator

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Acknowledgments

This is an independent white paper prepared by Susan Tierney and Paul Hibbard of Analysis Group at the request of the Coalition for Green Capital.

The Tierney/Hibbard paper is part of a project that included a companion paper (“Clean Energy and Sustainability Accelerator: Opportunities for Long-Term Deployment”) prepared by a team from the Brattle Group that involved Frank Graves, Bob Mudge, Roger Lueken, and Tess Counts. The Analysis Group paper focuses on the institutional features of a new Accelerator, and how it would fit into the economic, equity and clean-energy and climate objectives of an economic recovery package. The Brattle Group paper focuses on the types of financings and investments that the Accelerator could select and administer in both in the near term and over the longer term to help debottleneck the market for clean energy deployment.

This Tierney/Hibbard paper reflects their independent research, analysis and judgment, and not those of the Coalition for Green Capital, Brattle Group, others at Analysis Group, or their other affiliations.

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About Analysis Group

Analysis Group is one of the largest international economics consulting firms, with over 1,000 professionals across 14 offices in North America, Europe, and Asia. Since 1981, Analysis Group has provided expertise in economics, finance, analytics, and strategy to top law firms, Fortune Global 500 companies, government agencies, and other clients. The firm’s energy and environment practice area is distinguished by its expertise in economics, finance, market modeling and analysis, regulatory and policy analysis, and infrastructure development. Analysis Group’s consultants have worked for a wide variety of clients, including energy suppliers, energy consumers, utilities, regulatory commissions, other federal and state agencies, tribal governments, power system operators, foundations, financial institutions, start-up companies, and others.

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Summary for Policy Makers

Federal policy makers face decisions about whether to endorse and support a national green bank as part of economic recovery package to help address the economic and other crises that presently overwhelm the American people. This paper aims to inform that question.

Like many nations, the United States faces several simultaneous and urgent crises: the global pandemic; the devastation to so many workers, small and large business owners, subnational governments, non-profits, and sectors of the economy; systemic and pervasive racial injustice and social inequities; and the damaging impacts of climate change. Countless articles and analyses have been written about these crises. Some combination of impacts from them has been directly experienced in personal ways by every American, with the harshest impacts befalling marginalized, disadvantaged, low income populations and communities of color.

Earlier this year, the federal government acted relatively quickly to inject dollars into the bank accounts of individuals and small businesses around the country. That provided an important but temporary financial safety net. Even with further relief provided by Congress at the end of 2020, much more help is needed to get the economy back on track.

As Congress and the new President move beyond the relief stages of economic packages into more structural investment to create jobs and drive economic recovery, opportunities exist to also use those federal dollars to address the many crises in the near term, and to lay the groundwork for long-term benefits to the U.S. economy, health, and welfare. This could be done by targeting stimulus investments towards supporting an equitable transition of the nation's energy sector to low- and zero-carbon technologies. On the campaign trail, President-Elect Biden pledged to spend \$2 trillion on green infrastructure over his first term.

As part of a 2020 study conducted a few months into the pandemic, a team of distinguished economists (including Nobel Laureate Joseph Stiglitz and Lord Nicholas Stern) surveyed over 230 economic and financial experts about the effectiveness of different economic stimulus approaches. Taking into consideration such factors as speed of implementation, long-term economic-multiplier effects, and climate impact potential, the survey indicated a strong preference for five categories of investments in clean energy: physical clean energy infrastructure, building efficiency retrofits, investment in education and training, natural capital investment, and clean energy R&D.¹

Multiple policy options exist to stimulate energy-related job creation and investment, including tax incentives for various types of investments, formula-based grant programs, and programs like loan guarantees. These options involve trade-offs, such as in their ability to move funding to recipients quickly (e.g., tax incentives, formula grants, categorical grants like weatherization) versus targeting certain types of investment over longer time periods (e.g., Department of Energy loan guarantees for zero-carbon technologies; ARPA-E project funding).

¹ More specifically, these investment clusters were: (1) "clean physical infrastructure investment in the form of renewable energy assets, storage (including hydrogen), grid modernisation and CCS technology;" (2) "building efficiency spending for renovations and retrofits including improved insulation, heating, and domestic energy storage systems;" (3) "investment in education and training to address immediate unemployment from COVID-19 and structural shifts from decarbonization;" (4) "natural capital investment for ecosystem resilience and regeneration including restoration of carbon-rich habitats and climate-friendly agriculture;" and (5) "clean R&D spending." Cameron Hepburn, Brian O'Callaghan, Nicholas Stern, Joseph Stiglitz and Dimitri Zenghelis, "Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?" Oxford Review of Economic Policy, Smith School Working Paper, May 4, 2020.

During the last economic stimulus program that included large energy-related funding (i.e., through the American Recovery and Reinvestment Act of 2009 (“ARRA”)), virtually all of these policy tools were used, along with a preference for action through existing federal authorities to avoid the need for new government programs. The operative phrase for the ARRA package at the time was “targeted, timely and temporary.”

This time, there’s the opportunity to add “transformative” to the “targeted, timely, and temporary” strategy for a 2021 stimulus approach. The lessons learned from the ARRA — “be opportunistic,” “target, target, target,” “keep it simple,” “keep your eye on the prize”² — would be supported by including a new national green bank as part of an economic stimulus package aimed at recovery and growth.

The idea would be for the federal government to authorize and provide seed funding for the “Clean Energy and Sustainability Accelerator” (or “Accelerator,” as the national green bank is called in two bills passed in 2020 by the House of Representatives). Congress would fund the Accelerator, a new, non-profit corporation with the mandate to combat “the causes and effects of climate change through the rapid deployment of mature technologies and scaling of new technologies” that reduce greenhouse gas (“GHG”) emissions in the U.S. The Accelerator’s own charter would empower it to do so by fast-tracking — *accelerating* — the pace of clean-energy technology deployment, economic development and equitable energy transitions.

The Accelerator fits the economic-stimulus profile of being targeted, timely, temporary, and transformative, while also being opportunistic, simple, and strategically focused on the prize.

- **Targeted:** In the near term, the Accelerator would focus on getting money rapidly into the economy by supporting projects that implement mature clean-energy technologies. This could be done by the Accelerator quickly channeling funding to existing state and local green banks to lend to projects already in their queues, thus moving dollars into local economies and delivering jobs, economic activity, GHG emission reductions, and equitable outcomes. The Accelerator can also directly solicit and review project proposals that reduce pollution in disadvantaged and environmental-justice communities, create job and ownership opportunities for the local workforce and residents, and leverage private capital that would not otherwise be attracted to such projects. It can target projects with high GHG emissions reduction per dollar invested, and with other high payoff in terms of employment multipliers and

The Clean Energy and Sustainability Accelerator: The Basics

The Accelerator’s mission would be to:

- (1) provide support for financing investment in low/zero-emission technologies and processes;
- (2) catalyze (but not compete with) private capital to support clean technologies;
- (3) enable climate-impacted communities to benefit from projects/investments;
- (4) provide support for workers and communities as part of the low-carbon energy transition;
- (5) support the creation of green banks in the U.S.; and
- (6) hasten the transition to a clean energy economy while lowering costs where possible.

The Accelerator would move funds into the market in two ways:

- directly, by financing or investing in eligible projects that reduce GHG emissions, through a number of financial instruments;
- indirectly, by providing capital and other assistance to state or local green banks which in turn lend to their own projects.

In making investments and assisting in financing for projects that reduce GHG emissions, the Accelerator would prioritize equitable transitions, environmental justice, and the creation of good jobs.

The Accelerator would be an independent non-profit organization with its own board. Its Congressional funding provisions would require public accountability and transparency consistent with its public mission.

² Joseph E. Aldy, “A Preliminary Assessment of the American Recovery and Reinvestment Act’s Clean Energy Package,” *Review of Environmental Economics and Policy*, 7, 136-155, January 2013.

equity outcomes. It would ensure that 40 percent of its investment activity is directed to serve climate-impacted communities. It can target different approaches to suit the needs of different states and regions.

- **Timely and opportunistic:** The legislative language to establish the Accelerator is ready, having been twice approved by the House. It could be introduced again in the House and the Senate. President-Elect Biden has pledged to accelerate investment related to infrastructure and a clean and equitable energy economy; the Accelerator fits this profile. It builds on the lessons learned from the states' decade of experience in successfully setting up and operating green banks, in relying upon public funds to leverage private-sector dollars (with green bank investments of \$1.5 billion since 2011 leveraging an additional \$3.8 billion in private co-investment, for a total of \$5.3 billion).³ That experience provides a sound template for how to invest in good projects with positive financial outcomes, which can inform how the non-profit Accelerator could carry out its mandates and do so at greater scale. With interest rates currently so low, the federal government can afford to support an aggressive infusion of stimulus dollars into infrastructure, according to leading economic experts.⁴
- **Temporary and Simple:** Federal action is streamlined, temporary and simple, because once Congress authorizes and provides initial funding for the Accelerator, the next and only subsequent federal action is for the President to nominate three members of the Accelerator's board—no more than two of which may be from the same party—and then for the Senate to confirm those nominations. Thereafter, the Accelerator's implementation moves into the non-profit sector. After the initial seed-

**Accelerator Funded Project Example #1:
Retrofitting and modernizing homes and communities where low and moderate income households live**

Accelerator funding can expand the market for privately funded and publicly funded delivery of efficiency measures and investments, rooftop solar projects, community solar, storage resources, and fuel switching appliances and heating systems in underserved sectors and climate-impacted communities.

Benefits include lower energy bills and reduced energy burden for households in communities of color, improved health, and job creation where work is most needed.

Projects can be designed to provide opportunities for low and moderate income households to participate in owning a share of facilities, thus leveraging public and private dollars to stimulate increased economic activity, employment, and wealth creation. The use of near-term dollars funded through the economic stimulus program can lead to on-going GHG emissions reduction in these communities.

**Accelerator Funded Project Example #2:
Funding "smart surfacing" to reduce urban heat islands, lower energy bills, mitigate heat-related public health impacts, and reduce GHG emissions**

Urban populations are feeling the effects of climate change. One example is the presence of "heat islands" in cities, which are created by the prevalence of dark surfaces (dark rooftops, pavement, buildings) and the lack of vegetation to absorb heat and pollution, and provide shade.

The impact is significant: Dark surfaces make affected areas of cities almost ten degrees (F) warmer on average than other urban areas, with the highest impacts felt in the most densely populated (and often low-income) inner-city neighborhoods. Heat islands degrade the health and comfort of those that work and live in cities, and increase deaths and hospitalization.

Investments to lighten surfaces in urban areas include simple actions (such as planting trees, and painting roofs and parking lots) as well as investments in solar panels. The Accelerator can provide financing assistance and help bring together lenders, building owners, city/state agencies, and contractors in the relevant sectors. These projects can provide an immediate injection of dollars in inner city neighborhoods to generate economic activity, create local jobs, decrease residents' energy costs, reduce mortality and health impacts, lower GHG emissions, and make cities more livable.

³ American Green Bank Consortium, "Green Banks in the United States: 2020 US Green Bank Annual Industry Report," 2020.

⁴ Jason Furman and Lawrence Summers, "DISCUSSION DRAFT A Reconsideration of Fiscal Policy in the Era of Low Interest Rates," November 30, 2020 (hereafter "Furman and Summers, 2020").

funding of the Accelerator by the federal government, its work would not require further appropriations and upon the end of its 30-year life, the Accelerator would return funds to the federal government and the American people. During that period, the Accelerator's investments would be transparent, with regular reporting to Congress.

- **Strategic and transformative:** In addition to providing near-term employment and economic stimulus, Congressional authorization and seed funding of the Accelerator could help keep the eye on the combined prize of economic recovery and growth, job creation, and an equitable transition to a low-carbon economy. The pandemic-induced economic crisis — however devastating its widespread impacts — creates a moment to invest federal dollars to stimulate the economy while also addressing racial injustice, public health, and the climate crisis. Experience has shown that clean-energy investments have positive and significant macroeconomic and job multipliers.⁵ Directing economic stimulus dollar to accelerate the nation's equitable and economically sustainable transition to a clean energy economy with lower GHG emissions is something that the public, states, communities, and corporations support.⁶ And there are opportunities to invest in clean-energy projects in every state.

**Accelerator Funded Project Example #3:
Financing the electrification of municipal bus fleets**

Electrification of medium/heavy-duty vehicles will be needed to meet decarbonization targets, yet will be difficult to accomplish due to cost and other barriers to adoption. Public bus fleets present a unique opportunity for the use of Accelerator funds to speed up vehicle electrification and spur domestic economic activity in the vehicle industry, in a way that promises to save money for municipalities and broadly distribute air quality benefits across states and municipalities.

Buses are ideal candidates for electrification, because: (1) they operate in so many urban areas; (2) they transport children and low-income populations who are often more susceptible to damage from air pollution; (3) they tend to operate for limited periods so that battery charging can occur at other times; and (4) when not in operation, they are generally located in a common place, allowing for centralized charging infrastructure.

The Accelerator's financings and investments can support electric transitions in municipal bus fleets, helping to overcome cost barriers that would otherwise deter uptake, and boosting demand for the supply of new electrification technologies that can be produced domestically. The Accelerator can support a coordinated and integrated approach to accelerating the process of bus fleet electrification. With support and expertise, the Accelerator could overcome many of the administrative barriers to system integration and advantageous pricing. Investments could be targeted to ensure benefits accrue in urban and rural settings, and across municipalities that are geographically and economically diverse.

This white paper discusses the potential role of a new national green bank — specifically, the Clean Energy and Sustainable Accelerator — in addressing the nation's economic, social justice and climate crises. The paper provides an overview of the Accelerator concept, including its mandate and mission, how it would be organized and governed, how it would conduct its work, and how it would differ from other state and local green banks in the United States. The paper describes the types of problems that the Accelerator is designed to tackle, and how it can address them. Finally, the paper provides examples of ways that the Accelerator can stimulate new, near-term clean-energy investment, jobs, equitable transitions, and progress in reducing GHG emissions through immediate action and investments.

This paper focuses on near-term economic stimulus outcomes that could result from the Accelerator. A companion paper by The Brattle Group looks at what the Accelerator could accomplish over its longer life.

⁵ See Analysis Group state-specific stimulus studies for Advanced Energy Economy, summarized in the Appendix.

⁶ "Two-thirds (66%) of Americans want future federal stimulus packages to include creating new jobs and new technologies to reduce future global warming." Jon Krosnick and Bo MaInnis, "Climate Insights 2020 Surveying American Public Opinion on Climate Change and the Environment," Resources for the Future, September 23, 2020.

I. The Clean Energy and Sustainability Accelerator: The core idea

A. A new independent non-profit financial institution funded by Congress

In 2020, two separate infrastructure and energy bills passed by the U.S. House of Representatives included provisions for creation of the nation's first green bank, called the "Clean Energy and Sustainability Accelerator." The "Moving Forward Act"⁷ (H.R. 2), passed by the House in July 2020, and the "Clean Energy Jobs and Innovation Act"⁸ (H.R. 4447), passed in September 2020, would have established and authorized seed funding for a new, non-profit corporation⁹ with the mandate to combat "the causes and effects of climate change through the rapid deployment of mature technologies and scaling of new technologies"¹⁰ to reduce greenhouse gas emissions in the U.S.

B. Mandate, mission and functions

The purpose of the new, independent, non-profit financial institution—called "the Accelerator" for short—would be to fast-track the pace of technology deployment, economic activity and equitable energy transitions. The Congressional funding would mandate that the "Accelerator shall make the United States a world leader in combating the causes and effects of climate change through the rapid deployment of mature technologies and scaling of new technologies by maximizing the reduction of emissions in the United States for every dollar deployed by the Accelerator."¹¹ The Accelerator's mission would be to:

- (1) provide support for financing investment in low- and zero-emission technologies and processes;
- (2) catalyze (but not compete with) private capital to support clean technologies;
- (3) enable climate-impacted communities¹² to benefit from projects/investments;
- (4) provide support for workers and communities as part of the low-carbon energy transition;
- (5) support the creation of green banks in the U.S.; and
- (6) hasten the transition to a clean energy economy while lowering costs where possible.

⁷ <https://www.congress.gov/116/bills/hr2/BILLS-116hr2eh.pdf> (hereafter referred to as "H.R. 2"); <https://transportation.house.gov/imo/media/doc/BILLS-116HR2-RCP116-54.pdf>.

⁸ <https://rules.house.gov/bill/116/hr-4447>; <https://docs.house.gov/billsthisweek/20200921/BILLS-116HR4447-RCP116-63.pdf>.

⁹ Section 1622 of H.R. 2: "(a) IN GENERAL.—Not later than 1 year after the date of enactment of this subtitle, there shall be established a nonprofit corporation to be known as the 'Clean Energy and Sustainability Accelerator'. (b) LIMITATION.—The Accelerator shall not be an agency or instrumentality of the Federal Government. (c) FULL FAITH AND CREDIT.—The full faith and credit of the United States shall not extend to the Accelerator. (d) NONPROFIT STATUS.—The Accelerator shall maintain its status as an organization exempt from taxation under the Internal Revenue Code of 1986 (26 U.S.C. 1 et seq.)."

¹⁰ Section 1623 of H.R. 2.

¹¹ Section 1623 of H.R. 2.

¹² Section 1621 of H.R. 2 includes an expansive definition of the term 'climate-impacted communities': "(A) communities of color, which include any geographically distinct area the population of color of which is higher than the average population of color of the State in which the community is located; (B) communities that are already or are likely to be the first communities to feel the direct negative effects of climate change; (C) distressed neighborhoods, demonstrated by indicators of need, including poverty, childhood obesity rates, academic failure, and rates of juvenile delinquency, adjudication, or incarceration; (D) low-income communities, defined as any census block group in which 30 percent or more of the population are individuals with low income; (E) low-income households, defined as a household with annual income equal to, or less than, the greater of—(i) an amount equal to 80 percent of the median income of the area in which the household is located, as reported by the Department of Housing and Urban Development; and (ii) 200 percent of the Federal poverty line; and (F) rural areas, which include any area other than—(i) a city or town that has a population of greater than 50,000 inhabitants; and (ii) any urbanized area contiguous and adjacent to a city or town described in clause (i)."

The Accelerator would move funds into the market through two means: First, it could directly finance or invest in eligible projects that reduce GHG emissions, through use of a number of financial instruments.¹³ In this mode, the Accelerator would originate, evaluate, underwrite, and close on transactions for specific projects, and it could partner with private capital providers to attract their own new investment into underpenetrated markets and into projects that reduce GHG emissions. This would leverage the Accelerator's publicly funded dollars with private investment.

Second, where the Accelerator determined that monies would be more productively served if funded by a local financial entity, the Accelerator could directly provide capital to state or local green banks which would in turn lend to their own eligible projects, with the Accelerator thus indirectly supporting those projects.¹⁴ Indeed, the Accelerator would provide a service to the field by "providing technical assistance and start-up funding to States and other political subdivisions that do not have green banks to establish green banks in those States and political subdivisions, including by working with relevant stakeholders in those States and political subdivisions."¹⁵

C. Project eligibility and priorities

A wide variety of projects could be eligible for direct or indirect support by the Accelerator: facilities that generate renewable electricity; energy efficiency, fuel-switching and electrification of appliances, heating systems, process systems and other equipment that use fossil fuels in buildings and industrial applications; zero-emission vehicles and related charging and fueling infrastructure;¹⁶ smart-grid and other technologies in transmission, distribution and storage systems; low-carbon agriculture and forestry projects; and "climate resilient infrastructure"¹⁷ and other project categories identified by the Board as consistent with the Accelerator's mandate.¹⁸

The Congressional funding provisions would establish several priorities for how the Accelerator uses its funding, as it makes investment and financing decisions for particular GHG-emission reduction projects. The priorities focus on environmental justice, equitable transitions and good job creation:

¹³ The "Accelerator may provide capital to qualified projects in the form of—(1) senior, mezzanine, and subordinated debt; (2) credit enhancements including loan loss reserves and loan guarantees; (3) aggregation and warehousing; (4) equity capital; and (5) any other financial product approved by the Board." Section 1624(b) of H.R. 2.

¹⁴ Section 1624(c) of H.R. 2 "STATE AND LOCAL GREEN BANK CAPITALIZATION.—The finance and investment division of the Accelerator shall make capital available to State and local green banks to enable such banks to finance qualifying projects in their markets that are better served by a locally based entity, rather than through direct investment by the Accelerator." Section 1621 of H.R. 2 defines "green banks" as: "a dedicated public or nonprofit specialized finance entity that—(A) is designed to drive private capital into market gaps for low- and zero-emission goods and services; (B) uses finance tools to mitigate climate change; (C) does not take deposits; (D) is funded by government, public, private, or charitable contributions; and (E) invests or finances projects—(i) alone; or (ii) in conjunction with other investors."

¹⁵ Section 1625 of H.R. 2.

¹⁶ H.R. 2 calls out, in particular, zero-emission fleet and infrastructure financing in Section 1626: "Not later than 1 year after the date of establishment of the Accelerator, the Accelerator shall explore the establishment of a program to provide low- and zero-interest loans, up to 30 years in length, to any school, metropolitan planning organization, or nonprofit organization seeking financing for the acquisition of zero-emissions vehicle fleets or associated infrastructure to support zero-emissions vehicle fleets."

¹⁷ Section 1621 of H.R. 2: "The term 'climate resilient infrastructure' means any project that builds or enhances infrastructure so that such infrastructure—(A) is planned, designed, and operated in a way that anticipates, prepares for, and adapts to changing climate conditions; and (B) can withstand, respond to, and recover rapidly from disruptions caused by these climate conditions."

¹⁸ Section 1621(10) of H.R. 2.

- The Accelerator shall “prioritize the provision of program benefits and investment activity that are expected to directly or indirectly result in the deployment of projects to serve, as a matter of official policy, climate-impacted communities.”
- Also, the “Accelerator shall ensure that over the 30-year period of its life, 20 percent of its investment activity is directed to serve climate-impacted communities.” (Note that current discussions relating to the refiling of the Accelerator bill would raise this amount to 40 percent.)
- The Accelerator shall ensure that laborers and mechanics employed by contractors and subcontractors in construction work financed directly by the Accelerator will be paid wages not less than those prevailing on similar construction in the locality...[and] projects financed directly by the Accelerator with total capital costs of \$100,000,000 or greater utilize a project labor agreement.

The Accelerator’s mandate thus combines financing mechanisms for clean energy, leveraging private dollars through funds originating in the public sector, and focusing on equity and environmental justice.

D. Governance and Accountability

As a non-profit corporation, the Accelerator would have an independent governing board comprised of seven people.¹⁹ The first three board members would be Presidential appointees confirmed by the Senate, with no more than two such appointed directors belonging to the same political party. These appointed directors in turn would elect the other four members through unanimous votes. Board members would serve under specific terms²⁰ and could not be employed by the federal government or any other unit of government. The Board members would receive no, or *de minimus*, compensation for their work, consistent with the charitable nature of the Accelerator’s status as a non-profit organization.

Together, the members of the Board collectively must have expertise in the following fields: “(1) the fields of clean energy, electric utilities, industrial decarbonization, clean transportation, resiliency, and agriculture and forestry practices; (2) climate change science; (3) finance and investments; and (4) environmental justice and matters related to the energy and environmental needs of climate impacted communities.”²¹

The Board and management of the Accelerator would have the benefit of information and counsel through a formal Advisory Committee of no more than 13 members appointed by the Board and comprised of individuals broadly representative of interests concerned with the environment, production, commerce, finance, agriculture, forestry, labor, services, and State Government.”²² In addition to advising the Accelerator, the Advisory Committee would be

¹⁹ Section 1628 of H.R. 2: Board of Directors.

²⁰ “TERMS.—The terms of the initial members of the Board shall be as follows: (A) The three members appointed and confirmed ... shall have initial 5-year terms. (B) Of the four members elected ..., two shall have initial 3-year terms, and two shall have initial 4-year terms. (c) SUBSEQUENT COMPOSITION AND TERMS.—(1) SELECTION.—Except for the selection of the initial members of the Board for their initial terms under subsection (b), the members of the Board shall be elected by the members of the Board...(3) TERMS.—All members elected pursuant to paragraph (1) shall have a term of 5 years.” Section 1628(b)(2) and Section 1628(c) of H.R. 2.

²¹ Section 1628(d) of H.R. 2: Qualifications.

²² Section 1628(m) of H.R. 2: Advisory Committee. “(A) not fewer than three shall be representatives of the small business community; (B) not fewer than two shall be representatives of the labor community, except that no two members may be from the same labor union; (C) not fewer than two shall be representatives of the environmental nongovernmental organization community, except that no two members may be from the same environmental organization; (D) not fewer than two shall be representatives of the environmental justice nongovernmental organization

required to submit to the Congress an annual report commenting on the extent to which the Accelerator is meeting its mandate and including any suggestions for improvement.

Although the Accelerator would be an independent non-profit organization with its own board, the Congressional funding authorization would require public accountability and transparency consistent with its public mission. The Board would have a standing Audit Committee and a standing Risk Management Committee.²³ The Accelerator would be required to provide an annual report to the President and to Congress,²⁴ as well as quarterly reports to relevant Congressional committees describing “financial activities, emissions reductions, and private capital mobilization metrics.”²⁵ The inspector general of the Department of Energy would have oversight responsibilities over the Accelerator, which may also be audited by the Government Accountability Office.²⁶

E. Distinguishing the Accelerator from other green banks in the U.S.

There are now 18 state, local, and regional green banks throughout the United States.²⁷ These include a dozen state agency financing entities, as well as a half dozen green banks that are tied to a local government or are profit-making or non-profit financial-services organizations that lend and/or invest money to support clean-energy activities (e.g., energy efficiency, rooftop solar). Another half dozen green banks are under development in various states, as shown in Figure 1.²⁸

These entities support a common purpose: providing financing assistance for support public-sector and/or private investments in renewable projects, energy efficiency measures, and/or other clean energy projects. As explained by Weiss and Konschnik, green banks fill in investment gaps or barriers, and “crowd in” (or encourage) private investment, because they address and/or overcome such things as: large upfront costs (even where many clean energy projects provide operational savings); split incentives (in which landlords own energy-using equipment and decide whether to make investments to saving operational costs that would accrue to tenants); risk aversion of lenders in light of limited

community, except that no two members may be from the same environmental organization; (E) not fewer than two shall be representatives of the consumer protection and fair lending community, except that no two members may be from the same consumer protection or fair lending organization; and (F) not fewer than two shall be representatives of the financial services industry with knowledge of and experience in financing transactions for clean energy and other sustainable infrastructure assets.

²³ Section 1630 of H.R. 2: Establishment of Risk Management Committee and Audit Committee

²⁴ Section 1631 of H.R. 2.

²⁵ Section 1629(d) of H.R. 2.

²⁶ Section 1629(d) of H.R. 2.

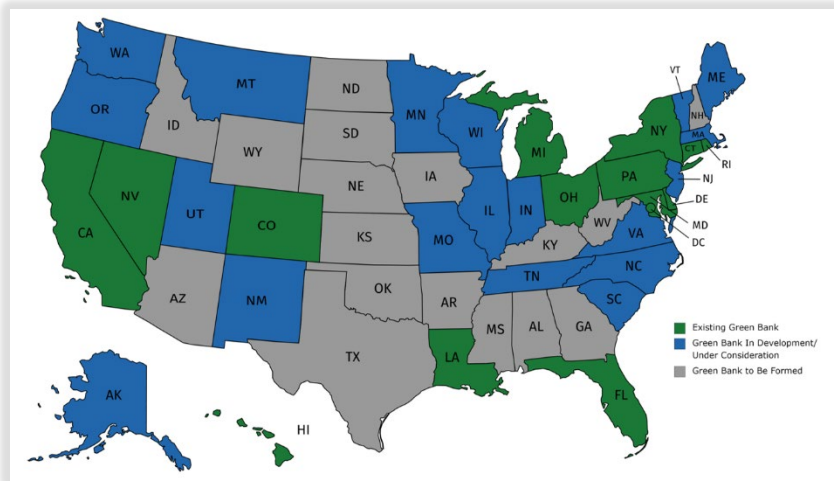
²⁷ These include the following state green banks as of Q4 2020: California Alternative Energy and Advanced Transportation Financing Authority (and the GO Green Energy Fund); California Pollution Control Financing Authority; Colorado Clean Energy Fund; Connecticut Green Bank; DC Green Bank; Energize Delaware; Hawaii Green Infrastructure Authority; GEMS (Green Energy Money Saver) Financing Program; Maryland Clean Energy Center; Michigan Saves; Nevada Clean Energy Fund; New York Green Bank (A Division of NYSERDA); and Rhode Island Infrastructure Bank. Other green banks associated with local governments, non-profits, or profit-making organizations include the following, as of Q4 2020: the CDFI Solar & Energy Loan Fund (SELF) in Florida; the Climate Access Fund in Maryland; the Montgomery County (Maryland) Green Bank; Finance New Orleans; NYCEEC (New York City Energy Efficiency Corporation); Inclusive Prosperity Capital in Connecticut; and Growth Opportunity Partners in Ohio. Sources: Green Bank Consortium members, at <https://greenbankconsortium.org/>; and Green Bank Consortium, 2018 Annual Industry Report, May 2019, at <http://coalitionforgreencapital.com/wp-content/uploads/2019/07/GreenBanksintheUS-2018AnnualIndustryReport.pdf>.

²⁸ These include: Alaska, Illinois, Indiana, Maine, Massachusetts, Minnesota, Missouri, Montana, New Jersey, New Mexico, North Carolina, Oregon, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington State, Wisconsin. Coalition for Green Capital, “Clean Energy & Sustainability Accelerator: Creating Jobs Through Rapid, Just Investment in Clean Energy & Climate Infrastructure,” November 2020, <https://coalitionforgreencapital.com/wp-content/uploads/clean-energy-accelerator-20.11.11-1.pdf>.

track records of performance and payment history for clean energy and energy efficiency financing; and an undeveloped secondary market, with non-standardized financial products and low volume of loans.²⁹

State and Local Green Banks: Existing and In Development

The experience of these state and local green banks provides significant information about what has worked and what has not worked, which is helpful in establishing the terms and conditions of establishing and operating a national green bank, and well as setting expectations about performance. Since 2011, these state and local green banks have funded \$1.5 billion in project investment, leveraging an additional \$3.8 billion in private investment, leading to \$5.3 billion in clean energy investment through these institutions during the past decade. Each green-bank dollars accounted to \$3.6 total investment dollars. (See the text box below.)



American Green Bank Consortium

Like the Accelerator, the mission of these green banks is to lend to clean energy projects. But unlike the Accelerator, these green banks are fundamentally financial institutions above all else and they expect and need to have their financings be repaid. This is not the precisely the same as the Accelerator’s institutional goal, which prioritizes financings and investments that reduce GHG emissions, repayments and returns, *and* equity considerations (which could lead the Accelerator to forgive loans and thus transform them into grants). The Accelerator could thus tolerate losses. Although many of the current green banks want to and do finance projects with an equity lens, these green banks do not have the mandate to do so and they are charged with ensuring repayment of loans.

Moreover, the Accelerator would have a much-larger pool of funds (perhaps as large as \$100 billion in Congressional seed funding, compared to the \$1.5 billion expended to date by the group of state and local green banks). This scale, and the national scope of the Accelerator, would enable it to take on projects of significant size and leverage hundreds of billions of private dollars. That said, the existence of these state and local green banks that are up and operating, with eyes on the investment and lending opportunities to advance clean energy deployment around the country, provides a ready-made platform for moving money into the economy quickly, if that funding came through the establishment and seed-funding of the Accelerator.

²⁹ Jennifer Weiss and Kate Konschnik, “Beyond Financing: A Guide to Green Bank Design in the Southeast,” Nicholas Institute for Environmental Policy Solutions, Duke University, 2018, <https://nicholasinstitute.duke.edu/sites/default/files/publications/a-guide-to-green-bank-design-in-the-southeast-web.pdf>.

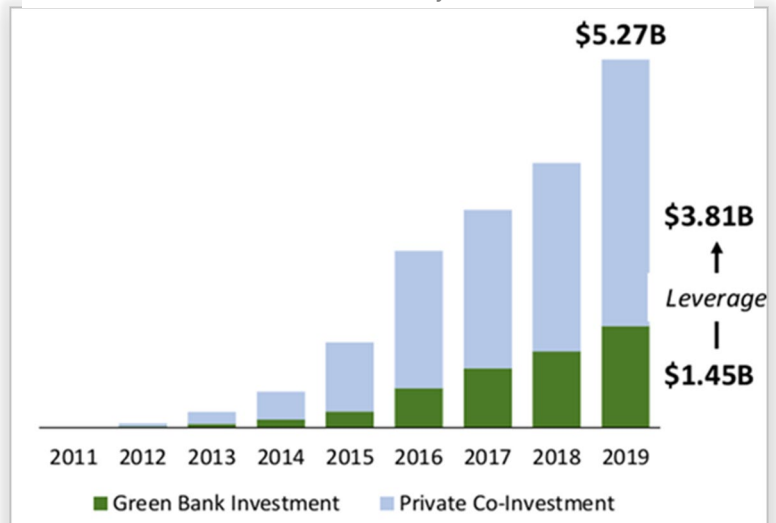
Green Banks: A Track Record of Success at the State Level

States are often proving grounds for innovative programs to address social, economic and environmental challenges, and this has held true for green banks/clean energy accelerators in the U.S. The green banks have consistently demonstrated success financially and programmatically, providing proof of concept for a national clean energy accelerator.

Existing state green banks deploy a range of financial products, advice and expertise tailored to each one's mission and the unique industry and financial conditions within each state. Overall, state and local green banks have caused total investment on the order of \$5.3 billion over the past decade (American Green Bank Consortium, 2020 Report). The bulk was private investment (of \$3.8 billion), stimulated by \$1.5 billion in green bank investments and other activities. And in 2019, state accelerators generated roughly \$60 million in net revenues from operations, achieving the objective of being financially self-sustaining.

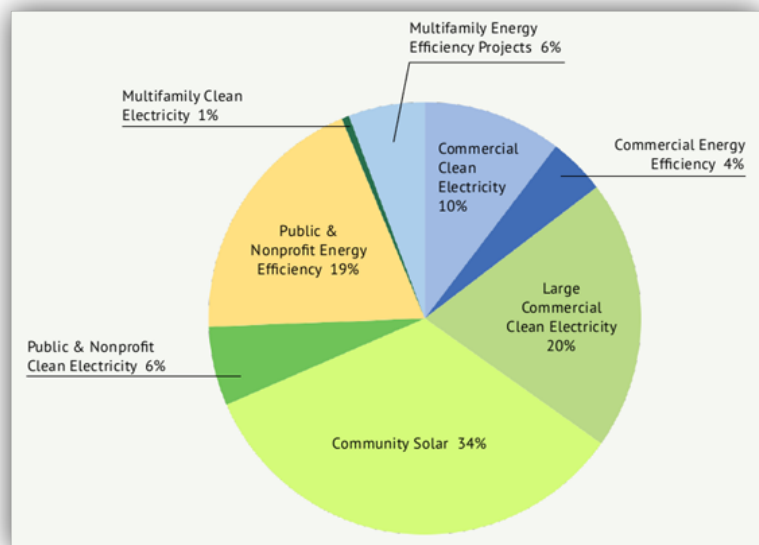
State green banks have used different financial tools to fund and facilitate private investment in a diverse range of projects with a focus on clean energy technologies that reduce GHG emissions. Generally, state green banks target community-level investments in technologies and programs that would otherwise be bypassed by the private investment community, due to the small size of investments, technological immaturity, or financial risks. State green banks help to consolidate and/or lower the risk associated with such investments in order to draw in private capital that would otherwise not emerge. The investments spurred by state green banks include energy efficiency measures in buildings (residential, commercial, public sector), on-site clean electricity, and community solar installations.

Cumulative Investment Stimulated by Green Banks: 2011-2019



<https://coalitionforgreencapital.com/wp-content/uploads/clean-energy-accelerator-20.11.11-1.pdf>

Green Bank Investments in Publicly Profiled Projects



<https://greenbankconsortium.org/annual-industry-report>

F. Distinguishing the Accelerator from other federal clean-energy financing mechanisms or proposals

The federal government has considered and in some cases adopted a number of financing programs for clean energy, using a variety of instruments. For example, the Department of Energy administers a variety of loan programs, including the Title 17 Innovative Clean Energy Loan Guarantee Program (for advanced nuclear and fossil energy projects, and for renewable energy and efficiency projects), and the Advanced Technology Vehicles Manufacturing Direct Loan Program.³⁰

To supplement these programs, in 2009 a “Clean Energy Deployment Administration” (“CEDA”) was proposed and passed by the House as part of the Waxman-Markey bill. Although not ultimately enacted into law, CEDA would have been an independent federal financing agency³¹ with access to low-cost federal debt for the purpose of accelerating the deployment of clean energy technologies developed in the U.S. CEDA could have used a range of policy tools to use federal financial support to leverage much greater private sector investment in clean energy. CEDA would have focused on two areas: direct support, in the form of loans, loan guarantees, letters of credit, insurance products, and other credit enhancements or debt instruments to projects employing innovative clean energy technologies; and indirect support for projects through securitization or other means of credit enhancement. Recently, there is renewed interest in the CEDA approach for using federal dollars to support clean energy development deployment.³²

There are a number of differences between the CEDA proposal and the Accelerator. First, CEDA would be a government entity, with political appointees on its board; some advocates for CEDA have suggested that board members should be relevant members of the Cabinet.³³ By contrast, the Accelerator would be a not-profit entity, with only its original three members being appointed by public officials and with none of its board members being an employee of the federal government.³⁴ The institutional separation of the Accelerator from the federal government would enable the bank to continue its work with an arm’s length from politics, which will be helpful for accessing capital without a political risk premium and for providing greater predictability for project implementation and for stakeholders engaging in the process.

Further, like a bank, CEDA would be required to be self-sustaining, with the need for the portfolio of investments to manage risks and satisfy financial standards so as to “recapture the funds so they can be plowed back into follow-on projects.”³⁵ As a Congressionally funded non-profit entity with a 30-year life and with a multi-pronged mandate that includes “enabling climate-impacted communities to benefit from and afford projects and investments that reduce

³⁰ Addison Stark, “Establish a Clean Energy Deployment Administration,” Bipartisan Policy Center, April 29, 2020, at <https://bipartisanpolicy.org/wp-content/uploads/2020/04/CEDA-Recovery-Proposal-BPC-FINAL.pdf>.

³¹ CEDA would have established as an independent agency with an administrator and a nine-member board of directors selected by the President and including the Secretary of Energy.

³² Dan Reicher, “The U.S. Clean Energy Deployment Administration: A Business-Driven Approach to Leveraging Private Sector Investment in Clean Energy Innovation and Commercialization,” American Energy Innovation Council, June 2020 (hereafter “Reicher, 2020”), at <http://americanenergyinnovation.org/wp-content/uploads/2020/06/Looking-Forward-with-a-Clean-Energy-Deployment-Administration.pdf>.

³³ Jake Caldwell and Richard Caperton, “A New Clean Energy Development Administration,” Center for American Progress, June 16, 2020, at <https://www.americanprogress.org/issues/green/news/2010/06/16/7964/a-new-clean-energy-deployment-administration/>.

³⁴ Section 1628(e) of H.R. 2.

³⁵ Reicher, 2020.

emissions,” the Accelerator would have a fundamental social and public purpose as well as a financial one. The Board’s ability to approve new financial products (e.g., even including grants) in support of its multi-pronged mission would also distinguish it from CEDA.

As a governmental entity, CEDA would be subject to supervision and approvals by the Office of Management and Budget (as directed by the Federal Credit Reform Act)³⁶; the Accelerator would have greater nimbleness and flexibility while also retaining sound credit and risk-management policies. Further, a non-profit entity like the Accelerator has the ability to do community-specific targeted investments, which is much harder for federal agencies to do.

³⁶ “Office of Management and Budget. The Office of Management and Budget (OMB) is responsible for reviewing legislation to establish new credit programs or to expand or modify existing credit programs; monitoring agency conformance with the Federal Credit Reform Act of 1990 (FCRA); formulating and reviewing agency credit reporting standards and requirements; reviewing and clearing testimony pertaining to credit programs and debt collection; reviewing agency budget submissions for credit programs and debt collection activities; developing and maintaining the Federal credit subsidy calculator used to calculate the cost of credit programs; formulating and reviewing agency implementation of credit management and debt collection policy; approving agency credit management and debt collection plans; working with agencies to identify and implement common policies, processes, or other resources to increase efficiency of credit program portfolio management functions; and providing training to credit agencies.” OMB Circular No. A-129 Revised, “Policies for Federal Credit Programs and Non-Tax Receivables,” January 2013.

II. What problems is the Accelerator designed to address and tackle?

The U.S. faces numerous, and urgent crises: the global pandemic; the related and unprecedented economic downturn, with devastation to so many workers, small and large business owners, subnational governments, non-profits, and sectors of the economy;³⁷ systemic and pervasive racial injustice and social inequities; and the damaging impacts of climate change. Countless articles, papers, and analyses have been written about these concurrent crises, and everyone living in the U.S. is well aware of the breadth and depth of these challenges.

Addressing these crises requires a complex set of undertakings. There is a need for fundamental economic relief, stimulus and near-term job creation. The stimulus should aspire to avoid or minimize long-term harm to the overall economy. Especially in light of the disproportionately adverse economic impacts on communities of color and low-income populations, the economic recovery must be equitable. For growth, some share of the near-term stimulus dollars should help to position the economy for long-term strength; given the climate crisis, this points to the need for investments to transition the economy toward a low-carbon energy system. Those investments need to ensure that climate-impacted communities are benefited or at least not hurt as a result of the transition.

A. Need for stimulus for economic recovery and near-term job creation

The national governments of most major economies around the world have implemented rescue and relief packages. Those measures have been extraordinarily important to address the economic pain that has attended the pandemic's adverse impact on so many sectors. With the exception of the European Union ("EU"), most governments have not yet implemented major economic recovery stimulus packages.³⁸

As of October 2020, the U.S. federal government has disbursed \$2.3 trillion in COVID-related relief and recovery stimulus spending, an amount equivalent to 11 percent of U.S. GDP.³⁹ Approximately 1 percent (\$26 billion) was for green stimulus with the rest focused — understandably — on pandemic emergencies and on mitigating the impacts on households and businesses. The new stimulus bill enacted at the end of December, 2020, added another \$35 billion for clean energy investments, out of the total \$900 in new spending.⁴⁰ This brings the U.S.'s 2020 stimulus funding on clean energy to \$61 billion, or 2 percent of stimulus spending. For comparison, the EU adopted a green stimulus

³⁷ Cameron Hepburn, Brian O'Callaghan, Nicholas Stern, Joseph Stiglitz and Dimitri Zenghelis, "Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?" Oxford Review of Economic Policy, Smith School Working Paper, May 4, 2020, at <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf>; Lauren Bauer, Kristen Broady, Wendy Edelberg, and Jimm O'Donnell, "Ten Facts about COVID-19 and the U.S. Economy," Brookings, September 17, 2020, at <https://www.brookings.edu/research/ten-facts-about-covid-19-and-the-u-s-economy/>.

³⁸ Kate Larsen, Primit Pal Chaudhuri, Jacob Funk Kirkegaard, John Larsen, Logan Wright, Alfredo Rivera, and Hannah Pitt, "It's Not Easy Being Green: Stimulus Spending in the World's Major Economies," Rhodium Group, September 2, 2020 (hereafter "Rhodium Group 2020") at <https://rhg.com/wp-content/uploads/2020/09/Its-Not-Easy-Being-Green-Stimulus-Spending-in-the-Worlds-Major-Economies.pdf>.

³⁹ This \$26 billion was to support public transit in urban and rural areas, and for Amtrak when their ridership dropped. Rhodium Group 2020; and Rhodium Group Green Stimulus and Recovery Tracker, at https://rhg.com/data_story/green-stimulus-and-recovery-tracker/.

⁴⁰ Coral Davenport, "Congress included climate change legislation in its coronavirus relief deal," *New York Times*, December 22, 2020, at <https://www.nytimes.com/live/2020/12/22/us/joe-biden-trump#congress-included-climate-change-legislation-in-its-coronavirus-relief-deal>.

package in the summer of 2020, amounting to \$276 billion, which represented 19 percent of total EU stimulus spending.⁴¹

Countries around the world have been developing ideas for green stimulus packages in the COVID era, and these include similar types of policy approaches, including subsidies and tax reductions for green products, loans and grants for green investments, green R&D subsidies, investments in nature-based solutions and sustainable agriculture, as well as other interventions to stimulate economic activity with an environmental payoff.⁴²

During the last economic stimulus program that included large energy-related funding — the American Recovery and Reinvestment Act of 2009 — many approaches⁴³ were used to stimulate economic activity.⁴³ The operative phrase for the design of that entire package at the time was “targeted, timely and temporary.”⁴⁴ That said, post-mortem assessments of the ARRA indicate that while there were many successes that resulted from that stimulus package, some elements were not as targeted or as timely as hoped-for.⁴⁵

In a 2020 paper⁴⁶ published a few months into the pandemic, a team of prominent economists (including Nobel laureate Joseph Stiglitz and Lord Nicholas Stern) examined prior studies of the Global Financial Crisis (“GFC”) of 2008–2009 and drew some distinctions between that crisis and the current ones, with implications for the design of any economic recovery package in the near future:

[Those studies] suggest that the economic success of fiscal stimulus is strongly affected by two attributes: the speed at which the stimulus delivers real-world impact; and the short- and long-run economic multiplier, or return for every dollar of expenditure (Freedman et al., 2009, Coenen et al., 2012, Ramey, 2019). Compared to the GFC, the COVID-19 crisis has had a severe and broad impact; it is not focused on a particular sector (as distinct from 1973–5, 1981–2, 2001, and 2008–9). The rescue packages have had to be rapidly acting. Given the sudden need, limitations on administrative capacities have affected the design of programs and have been a binding constraint. Speed is important but less critical for the recovery packages, where there is greater scope for carefully directing resources towards investments in high productivity assets, with

⁴¹ Rhodium Group, Green Stimulus and Recovery Tracker, at https://rhg.com/data_story/green-stimulus-and-recovery-tracker/.

⁴² Other common measures include corporate bailouts with green strings attached and reinforcing environmental regulations. Vivid Economics, “Green Stimulus Index,” July 14, 2020, at https://www.vivideconomics.com/wp-content/uploads/2020/10/201028-GSI-report_October-release.pdf.

⁴³ Council of Economic Advisors, “A Retrospective Assessment of Clean Energy Investments in the Recovery Act,” February 2016, at https://obamawhitehouse.archives.gov/sites/default/files/page/files/20160225_cea_final_clean_energy_report.pdf; Joseph Aldy, “What Green New Deal advocates can learn from the 2009 economic stimulus act,” The Conversation, February 15, 2019, at <https://theconversation.com/what-green-new-deal-advocates-can-learn-from-the-2009-economic-stimulus-act-111577>.

⁴⁴ Douglas W. Elmendorf and Jason Furman, “Three Keys to Effective Fiscal Stimulus,” Brookings, January 26, 2008, at <https://www.brookings.edu/opinions/three-keys-to-effective-fiscal-stimulus/>.

⁴⁵ Joseph Aldy, “What Green New Deal advocates can learn from the 2009 economic stimulus act,” The Conversation, February 15, 2019, at <https://theconversation.com/what-green-new-deal-advocates-can-learn-from-the-2009-economic-stimulus-act-111577>; Luis Mundaca and Jessika Luth Richter, “Assessing ‘green energy economy’ stimulus packages: Evidence from the U.S. programs targeting renewable energy,” Renewable and Sustainable Energy Reviews, 2015, at <https://www.sciencedirect.com/science/article/pii/S1364032114008855#s0065>.

⁴⁶ Cameron Hepburn, Brian O’Callaghan, Nicholas Stern, Joseph Stiglitz, and Dimitri Zenghelis, “Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?” Oxford Review of Economic Policy, Smith School Working Paper, May 4, 2020 (hereafter “Hepburn et al., May 2020”) at <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf>.

higher economic multipliers, to deliver a capital stock and a labour force suited to the challenges of the future (Hepburn et al, 2020).⁴⁷

The highlight of this paper is the results of the authors' survey of "231 central bank officials, finance ministry officials, and other economic experts from G20 countries on the relative performance of 25 major fiscal recovery archetypes across four dimensions: speed of implementation, economic multiplier, climate impact potential, and overall desirability."⁴⁸ These 25 economic recovery measures included a combination of emergency financial relief (e.g., liquidity support for large corporations; bailouts for the airlines and for non-profits, educational and research institutions; income tax cuts; business tax deferrals; targeted direct cash payments) and other expansionary fiscal policies (e.g., healthcare investment; worker retraining; infrastructure investment for the transportation sector, for broadband ("connectivity"), for clean energy, for green spaces, building energy efficiency).

In the figure below, excerpted from the study, the measures on the right side of the matrix are ones with strong economic multiplier effects (defined as an increase in output greater than the government expenditure). (Each circle in the figure represents a different policy measure (with the key to identify those measures shown below the figure) and with the size of the circle indicating the number of experts (out of 231) who rated the measure along the high-to-low economic multiplier effect. The color of the circle indicates the relative speed of implementation, with policies that can be quickly implemented shown in blue, and policies that take longer shown in brown.)

In this set of survey results for high-income countries, significant numbers of economic and financial experts attribute fast implementation speed and high long-run multipliers to several emergency relief measures (such as liquidity support for households, start-ups and small-to-medium enterprises ("SMEs"), direct provision of basic needs, and targeted direct cash transfers or temporary wage increases). Those were important to getting money or goods into the hands of people and businesses in need.

The study also plotted the measures according to another metric: their impacts on reducing GHG emissions. The study concluded that five policies have a high potential on both economic multiplier and climate impact metrics: clean physical infrastructure, building efficiency retrofits, investment in education and training, natural capital investment, and clean R&D. The economic-stimulus effects of these policies would roll out more slowly, but have a positive sustained effect on economic output.

The authors observed that during "the GFC, many governments needlessly wasted the opportunity for significant long-run economic benefits and climate impact....Extreme urgency was appropriate in introducing rescue packages during

⁴⁷ Hepburn et al., May 2020. The articles referenced in this quoted section are:

Freedman et al. (2009). C. Freedman, M. Kumhof, D. Laxton, and J. Lee, "The Case for Global Fiscal Stimulus," Staff Position Note No. SPN/09/03, International Monetary Fund, 2009.

Coenen et al (2012). G. Coenen, C.J. Erceg, C. Freedman, D. Furceri, M. Kumhof, R. Lalonde, D. Laxton, J. Lindé, A. Mourougane, D. Muir, S. Mursula, C. de Resende, J. Roberts, W. Roeger, S. Snudden, M. Trabandt, and J. in't Veld, "Effects of Fiscal Stimulus in Structural Models," *American Economic Journal: Macroeconomics*, 2012.

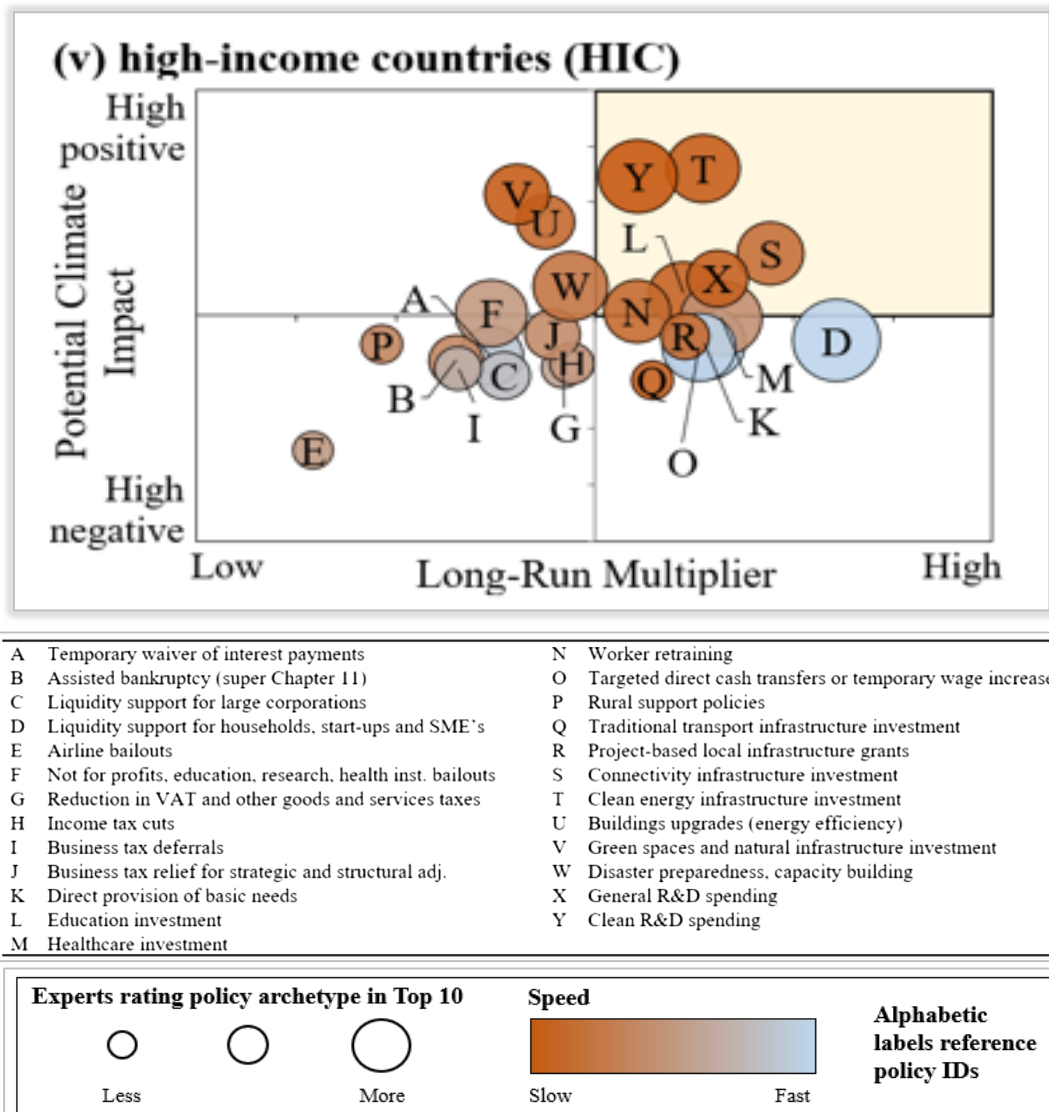
Ramey (2019). V.A. Ramey, "Ten Years After the Financial Crisis: What Have We Learned from the Renaissance in Fiscal Research?," *The Journal of Economic Perspectives*, 2019.

Hepburn et al. (2020). C. Hepburn, N. Stern, C. Xie, and D. Zenghelis, "Strong, sustainable and inclusive growth in a new era for China – Paper 1: Challenges and ways forward," Grantham Research Institute on Climate Change and the Environment, 2020.

⁴⁸ Hepburn et al., May 2020.

the lockdown phase. There is probably more time to ensure that the recovery packages prioritise the sorts of investments that deliver productive assets for the future.”⁴⁹

Perceived Policy Ratings by Economic and Fiscal Experts in Survey



Source: Hepburn et al., May 2020.

B. Need to avoid or minimize long-term macroeconomic harm

A long-standing concern of economists and financial experts in designing economic recovery and stimulus programs is to avoid taking on massive debt that creates large deficits that will be a future drag on the overall economy and

⁴⁹ Hepburn et al., May 2020.

introduce intergenerational inequities, as future taxpayers bear the tail-end effects of the stimulus spending. As explained by economists Jason Furman and Lawrence Summers: “Economic textbooks teach that government deficits raise interest rates, crowd out private investment, and leave everyone poorer. Cutting deficits, on the other hand, reduces interest rates, spurring productive investment....”⁵⁰

These textbook arguments made their way into debates among leading economists in Washington, D.C., discussions about the size of government spending and about how much debt the U.S. economy could take on in 2009 to stimulate recovery and grow.⁵¹ Some retrospective studies conclude that the ARRA was a success, others say it was not, in part because it was too small.⁵²

But Furman and Summers now suggest that policy makers should consider the context in which debt was undertaken, and focus on the purposes served by taking on additional federal debt. “Low interest rates also create numerous opportunities. They expand the scope for expansionary fiscal policy, make the debt more sustainable and increase the scope of public investments that will pay for themselves over time.”⁵³ Further, they argue that “[p]oliticians and policymakers should focus on urgent social problems, not deficits....Much more pressing are the problems of languishing labor-force participation rates, slow economic growth, persistent poverty, a lack of access to health insurance, and global climate change. Politicians should not let large deficits deter them from addressing these fundamental challenges.”⁵⁴

Similarly, investments in infrastructure that have a rate of return higher than the cost of government debt are worth making and with a sufficient rate of return they will repay themselves as well....

Research also finds that there are substantial spillovers from investment in research and development, particularly basic research, and implies current levels of investment are below their socially optimal level....

The above points depend heavily on what the additional debt is used for. If it is used to fund effective public programs with high rates of return, like research, infrastructure, education and investments and support for children, it is very likely to have benefits far greater than the costs of any additional

⁵⁰ Jason Furman and Lawrence Summers, “Who’s Afraid of Budget Deficits? How Washington Should End its Debt Obsession,” *Foreign Affairs*, March/April 2019 (hereafter “Furman and Summers, 2019”), at <https://www.foreignaffairs.com/articles/2019-01-27/whos-afraid-budget-deficits>.

⁵¹ Chad Stone, “Fiscal Stimulus Needed to Fight Recessions: Lessons from the Great Recession,” Center on Budget and Policy Priorities, April 16, 2020, at <https://www.cbpp.org/sites/default/files/atoms/files/4-16-20econ.pdf>; Reed Hundt, *A Crisis Wasted: Barack Obama’s Defining Decisions*, RosettaBooks, 2019; Paul Krugman, “Too Little of a Good Thing,” *New York Times*, November 1, 2009; Nobel Laureate Paul Krugman: Too Little Stimulus in Stimulus Plan,” February 19, 2009, at <https://knowledge.wharton.upenn.edu/article/nobel-laureate-paul-krugman-too-little-stimulus-in-stimulus-plan/>.

⁵² “It was striking at the DC conference on [America’s Fiscal Choices](#) that liberal economist Paul Krugman and conservative economist Martin Feldstein agreed the country urgently needs a really big stimulus – three times the size of the 2009 stimulus – to fill a \$1 trillion dollar GDP gap.” Eileen Appelbaum, “Panelists: Stimulus was Too Small, More Action Needed to Jumpstart Economy,” Center for Economic Policy and Research, October 6, 2010, at <https://www.cepr.net/panelists-stimulus-was-too-small-more-action-needed-to-jumpstart-economy/>. See also: Dylan Matthews, “Did the stimulus work? A review of the nine best studies on the subject,” *Washington Post*, August 24, 2011. https://www.washingtonpost.com/blogs/ezra-klein/post/did-the-stimulus-work-a-review-of-the-nine-best-studies-on-the-subject/2011/08/16/gIQATHbibJ_blog.html.

⁵³ Jason Furman and Lawrence Summers, “DISCUSSION DRAFT A Reconsideration of Fiscal Policy in the Era of Low Interest Rates,” November 30, 2020 (hereafter “Furman and Summers, 2020”), at <https://www.brookings.edu/wp-content/uploads/2020/11/furman-summers-fiscal-reconsideration-discussion-draft.pdf>.

⁵⁴ Furman and Summers, 2019.

debt accumulation. Wasteful and poorly designed spending programs or tax cuts, however, are not justified by this logic.

Also, in the case of infrastructure, even if the investment pays for itself or offsets much of its cost it still may be desirable to pay for it if the pay for itself has a policy rationale, like a gas tax or vehicle miles travelled fee that addresses other externalities and helps ensure that existing infrastructure is used better. Nevertheless, if these first best policies are not possible for political reasons it is still worth doing the second best of unpaid for infrastructure investments.

Overall, it is impossible to be sure exactly what the right balance is but given the very low interest rates currently and in the foreseeable future it is more likely to be a mistake to excessively reduce the debt at the expense of more deferred maintenance and foregone investments than it is to make the opposite mistake and overinvest.⁵⁵

This analysis suggests that with extremely low interest rates, on the one hand, and the pressing need to address the current economic, inequity and climate-change crises, concerns over increasing the deficit should not hamper use of significant economic-recovery dollars for infrastructure investment.

C. Need for an equitable economic recovery

Public officials, scholars, and the media have highlighted the many ways in which the pandemic and related economic crises have disproportionately and adversely impact communities of color and low income households.⁵⁶ The Centers for Disease Control have summarized some of the evidence of the health disparities of COVID-19 for racial and ethnic minority groups, as well as the many factors that lead to these outcomes. Among these factors are:

- Systemic discrimination and racism of many forms and across countless systems, which “can lead to chronic and toxic stress and shapes social and economic factors that put some people from racial and ethnic minority groups at increased risk for COVID-19.”
- Lack health insurance and consistent, quality health care (due to many factors besides low income, including “lack of transportation, child care, or ability to take time off of work; communication and language barriers”).
- Disproportionate “employment in essential work settings such as healthcare facilities, farms, factories, grocery stores, and public transportation.”
- Educational, income, and wealth gaps, with more limited job options and need to avoid missed days at work; living in crowded conditions.
- Growing and disproportionate unemployment rates for some racial and ethnic minority groups during the COVID-19 pandemic may lead to greater risk of eviction and homelessness or sharing of housing.”⁵⁷

⁵⁵ Furman and Summers, 2020.

⁵⁶ Illustratively, see: Statement of the American Hospital Association for the Committee on Ways and Means of the U.S. House of Representatives, “The Disproportionate Impact of COVID-19 on Communities of Color,” May 27, 2020, at <https://www.aha.org/testimony/2020-05-27-testimony-disproportionate-impact-covid-19-communities-color>; Pinar Karaca-Mandic, Archelle Georgiou, and Soumya Sen, “Assessment of COVID-19 Hospitalizations by Race/Ethnicity in 12 States,” *Journal of the American Medical Association*, August 17, 2020, at <https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2769369>; Eva Clark, Karla Fredricks, Laila Woc-Colburn, Maria Elena Bottazzi, Jill Weatherhead, “Disproportionate impact of the COVID-19 pandemic on immigrant communities in the United States,” *PLOS Neglected Tropical Diseases*, July 2020, at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7357736/pdf/pntd.0008484.pdf>.

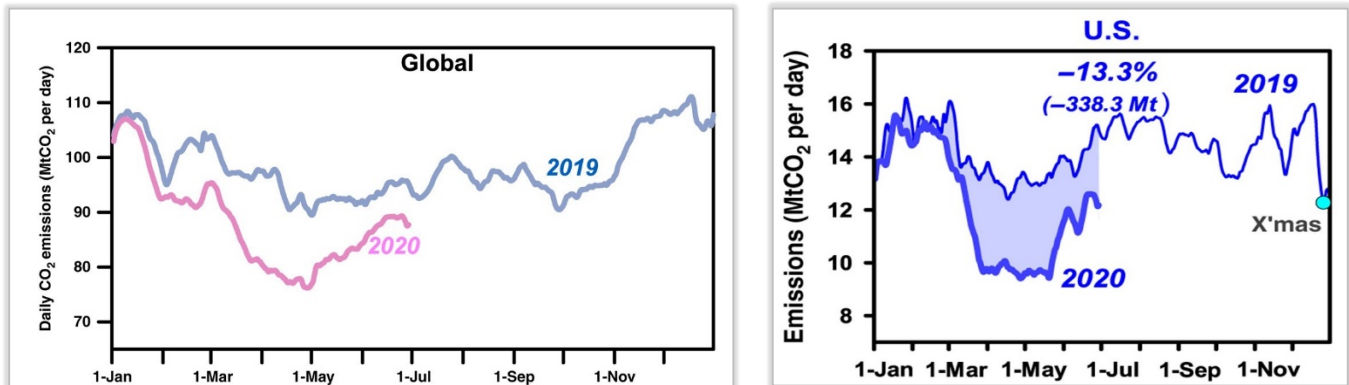
⁵⁷ “Health Equity Considerations and Racial and Ethnic Minority Groups,” Centers for Disease Control, July 24, 2020, at <https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/race-ethnicity.html#fn2>.

Given these acute problems on already systematically disadvantaged groups, the economic stimulus package needs to be designed in ways that ensure an equitable recovery.

D. Need to use the near-term dollars to position the economy for GHG-emission reductions

As the pandemic emerged in 2020 and governments began to shut down their economies, global GHG emissions dropped relative to 2019 levels of emissions. As shown in the figures below, CO₂ emissions per day dipped in the second quarter of 2020, but depending upon the timing of governments’ easing of the pandemic restrictions, economic activity began to come bank slowly, with more emissions than during their lowest levels. As shown in the figure below for the U.S., daily emission rates in 2020 were 13 percent below the prior year.

Daily CO₂ Emissions (Global and U.S.): 2020 v 2019



Source: Zhu Liu, et al., “Near-real-time monitoring of global CO₂ emissions reveals the effects of the COVID-19 pandemic,” *Nature Communications*, (2020). <https://www.nature.com/articles/s41467-020-18922-7>.

A recent report by the World Meteorological Organization (“WMO”), however, indicates that although the pandemic and economic contraction reduced overall emissions rates in 2020, there were still positive emissions and the current economic and health crises have had little effect on mitigating the increase in concentrations of CO₂ in the atmosphere. CO₂ levels increased to 410 parts per million in 2019, and the rise has continued in 2020.⁵⁸ As summarized by the head of the WMO:

The COVID-19 pandemic is not a solution for climate change. However, it does provide us with a platform for more sustained and ambitious climate action to reduce emissions to net zero through a complete transformation of our industrial, energy and transport systems. The needed changes are economically affordable and technically possible and would affect our everyday life only marginally.

⁵⁸ “The lockdown has cut emissions of many pollutants and greenhouse gases such as carbon dioxide. But any impact on CO₂ concentrations - the result of cumulative past and current emissions - is in fact no bigger than the normal year to year fluctuations in the carbon cycle and the high natural variability in carbon sinks like vegetation.” The head of the WMO said that the “lockdown-related fall in emissions is just a tiny blip on the long-term graph. We need a sustained flattening of the curve.” WMO Press Release, “Carbon dioxide levels continue at record levels, despite COVID-19 lockdown,” November 23, 2020, at <https://public.wmo.int/en/media/press-release/carbon-dioxide-levels-continue-record-levels-despite-covid-19-lockdown>.

It is to be welcomed that a growing number of countries and companies have committed themselves to carbon neutrality. There is no time to lose.⁵⁹

The survey results and analysis in May 2020 paper by renowned economists provided insights into how to use the economic recovery as a moment to align nations' economic and social needs with the need to address climate change: "Recovery packages that seek synergies between climate and economic goals have better prospects for increasing national wealth, enhancing productive human, social, physical, intangible, and natural capital."⁶⁰ The paper concluded that:

Sustainable recovery packages from governments are *necessary* to address climate change. Without a sustainable recovery, emissions will rise, the private sector will not invest enough in clean technology in a depressed economy, and the Paris goals will be nearly impossible to meet. Given the scale of recovery packages, a sustainable recovery could also be nearly *sufficient* to address climate change.

Once the macroeconomy has recovered and the costs of clean technologies are low enough, the private sector would need limited further encouragement.

This blending of macroeconomic and microeconomic considerations is atypical of the approach to public economics involving a sequential focus on (i) stabilisation of national income; (ii) economic efficiency; and (iii) fair distribution... get the macro right before worrying about micro issues such as carbon prices. However, the macro and micro are inescapably interlinked here, due to the scale and timing of the climate challenge and the pandemic.⁶¹

Notably, as described above, the policy areas with highest value from both an economic-multiplier point of view and GHG-emissions outcomes are "clean physical infrastructure investment, building efficiency retrofits, investment in education and training to address immediate unemployment from COVID-19 and structural unemployment from decarbonization, natural capital investment for ecosystem resilience and regeneration, and clean R&D investment."⁶²

E. Need for an equitable clean-energy transition

Not only have communities of color and other marginalized communities borne the worst impacts of COVID and the economic downturn, they have long also experienced local health impacts from living near power plants, living in inefficient and unhealthy buildings, living in urban neighborhoods considered "heat islands", living near roads with diesel trucks, and living in areas with cumulative impacts from all of those and other effects. They pay a higher portion

⁵⁹ WMO Press Release, "Carbon dioxide levels continue at record levels, despite COVID-19 lockdown," November 23, 2020, at <https://public.wmo.int/en/media/press-release/carbon-dioxide-levels-continue-record-levels-despite-covid-19-lockdown>.

⁶⁰ Hepburn et al., May 2020.

⁶¹ Hepburn et al., May 2020.

⁶² Hepburn et al., May 2020.

of their income on energy costs.⁶³ They are likely to experience disproportionately harsh impacts from climate change itself. These conditions have been characterized as “The Climate Gap.”⁶⁴

Increasing numbers of groups are demanding that addressing climate change must simultaneously and deliberately advance multiple interrelated environmental justice, racial justice, economic justice goals.⁶⁵ For example, more than 300 organizations⁶⁶ have signed on to an “Equitable & Just National Climate Policy Agenda” that would

drive actions that result in real benefits at the local and community level, including pollution reduction, affordable and quality housing, good jobs, sustainable livelihoods, and community infrastructure.... We understand that progress will be needed on multiple fronts and require the use of a combination of policy tools. We favor policy tools that help achieve both local and national emissions reductions of carbon and other forms of pollution. The shift to a non-greenhouse gas future will require substantial new forms of capital investment by both the public and private sectors to build a new national infrastructure as well as democratic community participation to help set infrastructure investment priorities. Unless justice and equity are central components of our climate agenda, the inequality of the carbon-based economy will be replicated in the new economy.⁶⁷

In the 2008/2009 economic stimulus discussion, equity groups called for a stimulus package to explicitly address these concerns.⁶⁸ These inequities can now be addressed in a 2021 clean-energy economic stimulus package, but this will not happen without explicit attention to these issues as part of policy design.

⁶³ Eva Lyubich, “The Race Gap in Residential Energy Expenditures,” Energy Institute at Haas, University of California at Berkeley, Energy Institute Working Paper, 306, June 2020, at <https://haas.berkeley.edu/wp-content/uploads/WP306.pdf>.

⁶⁴ Rachel Morello-Frosch, Manuel Pastor, James Sadd, and Seth B. Shonkoff, “The Climate Gap: Inequalities in How Climate Change Hurts Americans & How to Close the Gap, Program for Environmental and Regional Equity (PERE), University of Southern California, at May 2009, at https://dornsife.usc.edu/assets/sites/242/docs/ClimateGapReport_full_report_web.pdf.

⁶⁵ J. Mijin Cha, et al., “A Roadmap to an Equitable Low-Carbon Future: Four Pillars for a Just Transition,” Prepared for the Climate Equity Network, April 2019, at https://dornsife.usc.edu/assets/sites/242/docs/JUST_TRANSITION_Report_FINAL_12-19.pdf.

⁶⁶ The list of organizations that have signed on to the “Equitable & Just National Climate Platform” is at <https://ajustclimate.org/index.html#platformSign>.

⁶⁷ <https://ajustclimate.org/index.html#platform>.

⁶⁸ http://greenforall.nationbuilder.com/memo_on_a_green_and_equitable_stimulus_sent_to_obama_team.

III. How could the Accelerator address these needs?

A. Overview

Given these complex, urgent and compelling needs — for economic recovery and job creation, to do so in ways that avoid or minimize long-term macroeconomic harm, that assure an equitable economic recovery, that position the U.S. economy for GHG emission reductions, and that provide an equitable clean-energy transition — how could the Accelerator fit into the economic-recovery policy package?

First, it has garnered political support, having twice been part of bills that have passed the House of Representatives. It aligns with President-Elect Biden’s climate change pledge for “Building Back Better,”⁶⁹ by investing in clean energy infrastructure and an equitable energy transition. The Accelerator bill in the Senate was co-sponsored by Senator Kamala Harris, now the Vice-President Elect.

Second, with interest rates currently so low, the federal government can afford to support an aggressive infusion of stimulus dollars into clean-energy infrastructure, according to economic experts.⁷⁰

Third, the states’ decade of experience in setting up and administering green banks provides a body of work to build upon. They have shown how it is possible to use public funding to leverage multiples of private-sector dollars and to invest in good projects with financial success. They can be partners with the Accelerator, which can take the green-banking concept to scale and with a deliberate focus on using clean-energy dollars to stimulate economic activity and advance an equitable clean-energy transition.

Fourth, the Accelerator would have the advantage of being a federally funded non-profit, with a mission to reduce GHG emissions in ways that leverage private capital, operate nimbly and flexibly, support projects that advanced equity, and use its charitable status to balance its financial objectives as well as its social and public purposes.

Fifth, the establishment of the Accelerator as part of an economic recovery package would complement rather than conflict with other, subsequent policies put in place to address climate change. The Accelerator’s ability to target investments and financial assistance to assist marginalized communities could serve as a counterpart to other policies that are less targeted toward local impacts.

⁶⁹ <https://BuildBackBetter.Com/Priorities/Climate-Change>; <https://joebiden.com/clean-energy/>.

⁷⁰ “Long-term structural declines in interest rates mean that policymakers should reconsider the traditional fiscal approach that has often wrong-headedly limited worthwhile investments in such areas as education, health care, and infrastructure. Yet many remain fixated on cutting spending,.... That is a mistake. Politicians and policymakers should focus on urgent social problems, not deficits.... Congress should pay for new measures with either spending cuts or extra revenues, except during recessions, when fiscal stimulus will be essential given the increased constraints on monetary policy now. This approach would provide a ready way to prioritize: if something is truly worth doing, it should be worth paying for.... Even so, the national debt presents just one of many problems the United States faces—and not the most pressing. Much more pressing are the problems of languishing labor-force participation rates, slow economic growth, persistent poverty, a lack of access to health insurance, and global climate change. Politicians should not let large deficits deter them from addressing these fundamental challenges.” Jason Furman and Lawrence H. Summers, “Who’s Afraid of Budget Deficits? How Washington Should End Its Debt Obsession,” January 28, 2020, at <http://larrysummers.com/2019/01/28/whos-afraid-of-budget-deficits/>. See also: J. Bradford DeLong and Lawrence H. Summers, “Fiscal Policy in a Depressed Economy,” *Brookings Papers on Economic Activity*, 2012, 43:1, Spring 2012, at https://www.brookings.edu/wp-content/uploads/2012/03/2012a_DeLong.pdf.

B. Near-term stimulus for economic recovery and job creation

The Accelerator fits the design criteria for economic-stimulus policies in that it would fund activities that are targeted, timely, temporary, transformative, while also being opportunistic, simple, and strategically focused on the prize.

- **Targeted:** In the near term, the Accelerator would focus on getting money rapidly into the economy by supporting projects that implement mature clean-energy technologies. This could be done quickly relying on providing funding to existing state and local green banks to lend to projects already in their queues, thus moving dollars into local economies and delivering jobs, economic activity, GHG emission reductions, and equitable outcomes. The Accelerator can also directly solicit and review project proposals that reduce pollution in disadvantaged and environmental-justice communities, create job and ownership opportunities for the local workforce and residents, and leverage private capital that would not otherwise be attracted to such projects. It can target projects with high GHG emissions reduction per dollar invested, and with other high payoff in terms of employment multipliers as well as equity outcomes. It can target different types of approaches to suit the needs of different regions.
- **Timely and opportunistic:** The legislative language to establish the Accelerator is ready, having been twice approved by the House and with a parallel bill in the Senate. President-Elect Biden has pledged to accelerate investment related to infrastructure and a clean and equitable energy economy. The states' decade of experience in successfully setting up and operating green banks, in relying upon public lending to leverage private-sector dollars, and in investing in good projects with positive financial outcomes provides important templates for the work that the non-profit Accelerator needs to carry out. With interest rates currently so low, the federal government can afford to support an aggressive infusion of stimulus dollars into infrastructure, according to leading economic experts.
- **Temporary and Simple:** Federal action is streamlined, temporary and simple, because once Congress authorizes and provides initial funding for the Accelerator, the next and only subsequent action is for the President to nominate three members of the Accelerator's board—no more than two of which may be from the same party—and then for the Senate to confirm those nominations. Thereafter, the Accelerator's implementation moves into the non-profit sector. After the initial seed-funding of the Accelerator by the federal government, its work would not require further Congressional appropriations and upon the end of its 30-year life, would return funds to the federal government and the American people.
- **Strategic and transformative:** In addition to providing near-term employment and economic stimulus, Congressional authorization and seed funding of the Accelerator could help to keep the eye on the combined prize of economic recovery and growth, job creation, and an equitable transition to a low-carbon economy. The pandemic-induced economic crisis—however devastating are its widespread impacts—does create a moment to invest federal dollars to stimulate economic while also addressing racial injustice, public health, and the climate crisis. Experience has shown that clean-energy investments attract additional private capital and have positive and significant job multipliers. Directing economic stimulus dollar to accelerate the nation's equitable and economically sustainable transition to a clean energy economy with lower GHG emissions is something that the public, states, communities, corporations enthusiastically support. And there are opportunities to invest in clean-energy projects in every state.

As described above, investments in clean energy infrastructure, energy efficiency and other retrofits in buildings, education and worker training, natural capital investment, and clean R&D have good economic multiplier effects. These investments are squarely within the mandate and mission of the Accelerator. The experience of state and local green banks indicates that every billion dollars of public investment produces \$3.5 billion of total investment, including private dollars.⁷¹ Were the Accelerator to be established with \$35 billion in initial funding, it would lead to \$122.5 billion in clean-energy and equitable transition investments. At an initial \$100 billion, the Accelerator would produce \$350 billion in projected financed through public and private monies.

A recent analysis of the job-creation impacts of such investment found that with an initial \$35-billion capitalization of the Accelerator would leverage private dollars and produce significant economic growth and employment. Using financial modeling of various financial tools (e.g., loans, loan guarantees, and equity investments) and different bundles of investment projects (e.g., renewable energy projects, efficiency measures in buildings, electric grid enhancements, agriculture and reforestation projects, and clean transportation investments), Vivid Economics estimated that such investments could deliver 5.4 million new job years over five years.⁷²

Analysis Group's own analyses of macroeconomic impacts from clean energy investments in various states produced similar results. In a series of state-specific studies led by Paul Hibbard and Pavel Darling, the results showed significant attraction of private capital in response to public investments in low-carbon energy technologies, and highly positive job and economic impacts for different combinations of investments in clean energy technology and infrastructure across states representing diverse geographies and economies. The states revealed varied but universally strong employment and economic multipliers as a result of the portfolios of investments appropriate to the state.⁷³

C. Avoidance or minimization of long-term macroeconomic economic harm

The low-interest-rate conditions that exist in the U.S., combined with the high rates of return for public investment in infrastructure, provide an important moment in which it would be important to seed fund the Accelerator and charge it with financing projects that can accelerate an equitable clean-energy transition. The advice from leading economists suggests that the current conditions would encourage federal policy makers to support significant funding for policies that lead to clean infrastructure investment and that use private dollars to leverage private investment.⁷⁴

Further, evidence from the experience of state and local green banks strongly suggest that the Accelerator's public dollars would "crowd in" rather than "crowd out" or compete with private investment. The investments targeted for

⁷¹ American Green Bank Consortium, "Green Banks in the United States: 2020 US Green Bank Annual Industry Report," 2020, at <https://greenbankconsortium.org/annual-industry-report>.

⁷² Vivid Economics, "Bounce Back Greener," June 2020, at <https://www.vivideconomics.com/wp-content/uploads/2020/06/Bounce-Back-Greener-The-Economic-Impact-Potential-of-a-Clean-Energy-Jobs-Fund-v3.pdf>.

⁷³ In the studies of eight states (Arizona, California, Colorado, Florida, Illinois, Michigan, Nevada, Texas), each dollar of investment in clean energy led to economic value added in the range of \$3.9 to \$13.9, with most states falling in the range of \$6.0 to \$8.3. See the set of reports authored by Paul Hibbard and Pavel Darling on "Economic Impact of Stimulus Investment in Advanced Energy", 2020, at <https://info.aee.net/advanced-energy-stimulus-reports?hsCtaTracking=c2a0ed1a-3fdf-47e1-8a88-4731fc7daa47%7C6880625f-b754-4bdf-8543-511cf7abd2f9>.

⁷⁴ "Overall, it is impossible to be sure exactly what the right balance is but given the very low interest rates currently and in the foreseeable future it is more likely to be a mistake to excessively reduce the debt at the expense of more deferred maintenance and foregone investments than it is to make the opposite mistake and overinvest." Furman and Summers, 2020.

assistance are ones that cannot on their own attract commercial lending or investment:⁷⁵ “Importantly, green banks fill market gaps where critically important climate investments lack the scale, financial returns, or maturity for commercial financing.”⁷⁶

D. Equitable economic recovery and equitable energy transition

Perhaps one of the most important features of the Accelerator is its mandate to use the public’s funds to invest in projects that provide clean energy, reduce GHG emissions, leverage private dollars, *and* do so in ways that provide marginalized communities with the opportunity to benefit from the clean-energy transition.

Other green banks are doing the hard work to stimulate investment in clean energy infrastructure, and have to do so with the constraint of financing projects that will repay or return the public financings. Although the Accelerator would also aspire for such financial outcomes, it would also have the option, where appropriate, to forgive loan repayment or equity returns when doing so would advance the mission of reducing GHG emissions in ways that advance an equitable energy transition.

E. Near-term dollars to position the economy for long-term GHG-emission reductions

Fundamentally, the Accelerator’s mission is to reduce GHG emissions for each dollar of public investment. The Congressional funding provisions make it clear that that goal is the Accelerator’s North Star, with the additional mandate to allocate public dollars to projects that reduce GHG emissions while also advancing equity and cost-effective outcomes. The Accelerator can move money quickly into the economy for projects with a payoff for long-term benefits. The work over the past decade to ready the Accelerator for implementing its mission will enable it to move quickly to move funding into the economy, and support projects that will both reduce GHG emissions in the near term as well as accelerate market transitions that will lead to long term GHG emission reductions.

⁷⁵ Organization of Economic Cooperation and Development, “Green Investment Banks,” Policy Perspectives, December 2015, at <https://www.oecd.org/environment/cc/Green-Investment-Banks-POLICY-PERSPECTIVES-web.pdf>; Jeffrey Schub, “Green Banks: Growing Clean Energy Markets by Leveraging Private Investment with Public Financing,” *Journal of Structured Finance*, September 2015, at <https://www.cfainstitute.org/research/cfa-digest/2016/05/green-banks-growing-clean-energy-markets-by-leveraging-private-investment-with-public-financing>; Tamara Grbusic and Laurie Stone, “Green Banks 101,” Rocky Mountain Institute, May 28, 2020, at <https://rmi.org/green-banks-101/>.

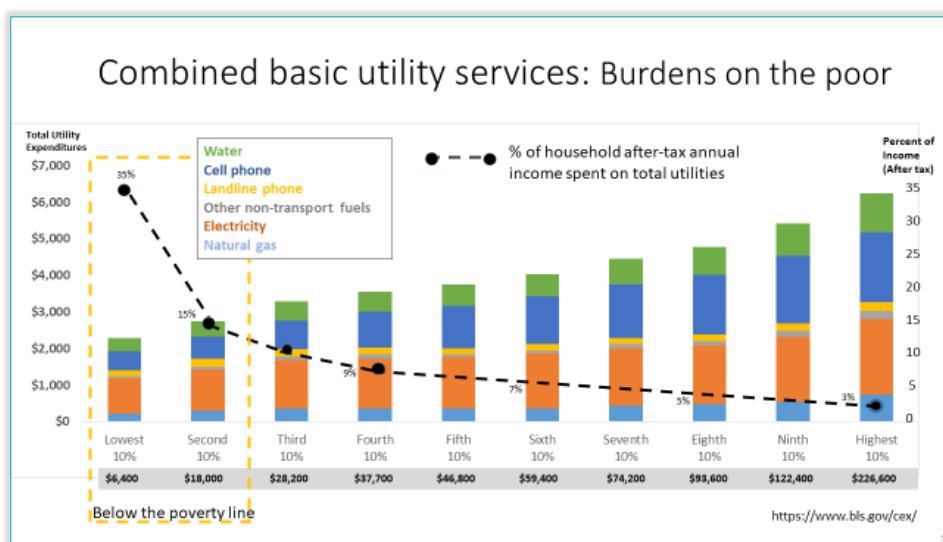
⁷⁶ Tamara Grbusic, “Green Banks for Economic Recovery and Climate Mitigation,” Rocky Mountain Institute, April 30, 2020, at <https://rmi.org/green-banks-for-economic-recovery-and-climate-mitigation/>.

IV. Examples of how the Accelerator could do its work: Use cases for the Accelerator’s near-term investment

There are numerous examples of how the Accelerator could be used to meet the goals of near-term stimulus, economic growth and job creation, equitable distribution of associated economic and public health benefits, and long-term clean energy infrastructure development and commercialization. In a companion whitepaper, the Brattle Group authors identify several examples⁷⁷ of how the Accelerator can seed long-term growth in decarbonization infrastructure. Here, we provide several examples that focus on near-term investments, growth, and economic returns, but that also set the stage for longer-term and equitable economic growth and reduction in GHG emissions.

A. Retrofitting and modernizing homes where low/moderate income households live

Energy costs, combined with other basic utility services, make up a disproportionately high percentage of low and moderate income (“LMI”) consumers’ budgets, yet due to income and institutional factors, these customers often can do little to control energy costs.



Energy costs are disproportionately high relative to total income for LMI customers.⁷⁸ This results from many factors, such as income constraints, the relative inefficiency of housing stock occupied by LMI household (and Black households in particular), and greater tendency to be renters rather than home owners (and therefore subject to split incentives on investments to button up the efficiency of rented space). These consumers also lack access to resources, government

⁷⁷ The Brattle Group report describes the ways in which the Accelerator could provide targeted financings and investments, and remove bottlenecks that impede private capital from investing in otherwise sound and socially valuable projects that reduce carbon emissions. The examples they use to illustrate possible investment opportunities are the following: (1) de-risking of community solar investments; (2) de-risking of utility-scale renewable investments; (3) addressing stranded costs from coal shutdowns (especially for coal-plant owners that are not investor owned utilities); (4) capital investments in building electrification technologies (like heat pumps); and (5) electric vehicle charging infrastructure.

⁷⁸ Eva Lyubich, “The Race Gap in Residential Energy Expenditures,” Energy Institute at Haas, University of California at Berkeley, Energy Institute Working Paper, 306, June 2020, at <https://haas.berkeley.edu/wp-content/uploads/WP306.pdf>.

programs and financial incentives to invest in energy efficiency (“EE”) and distributed energy resources (“DER”). This is especially the case with respect to EE/DR investments in multi-family housing stock occupied by LMI people. Despite carve-outs for low-income customers, more utility-funded EE programs tend to be available to non-LMI customers and single-family homes with higher benefit-cost ratios.

Tax benefits for investments in EE and distributed resources (e.g., solar, storage, heating electrification) are diminished, ineffective or non-existent for lower-income customers. Even where they own their own housing, LMI customers face obstacles in accessing capital for up-front EE/DER investments that might provide a beneficial return on investment. Credit history, low returns, and default risk both reduce the availability and increase the costs of grants and loans for EE/DER projects, and reduce opportunities to pay for such investments over time through on-bill financing or similar mechanisms.

Conversely, LMI household often reside in communities disproportionately and adversely affected by health problems arising from proximity to activities associated with energy production and use: they live near roadways with diesel trucks, or in urban zones with a concentration in power generation, and in neighboring next to industrial development. These also represent economically depressed commercial zones, with limited opportunities for employment, especially good paying jobs.

Accelerator funding could expand the market for privately funded and publicly funded delivery of efficiency measures and investments, rooftop solar projects, community solar, storage resources, and fuel switching appliances and heating systems in underserved sectors and climate-impacted communities. Benefits include lower energy bills and reduced energy burden for households in communities of color, improving health, and job creation where work is most needed. Projects could be designed to provide opportunities for LMI households to participate in owning a share of facilities, thus leveraging public and private dollars to stimulate increased economic activity, employment, and wealth creation. And of course, the use of near-term dollars funded through the economic stimulus program could lead to on-going GHG emissions reduction in these communities.

The Accelerator could play a role in tackling these challenges in several big and small ways, such as:

- Providing funding through state or local green banks, to generate partners with local service providers, lenders and investors and to renovate buildings and invest in local energy projects. On their end, the service providers could use on-bill financing, shared savings approaches, and other instruments to lend or invest in these local markets. Although the financing would be locally disbursed and the projects would be locally sourced and implemented with local workforces, the Accelerator could establish standardized financial instruments across the state and local green banks to offer in their communities, with the scale of these portfolios of projects becoming attractive for securitization opportunities by private lenders and investors. Thus the Accelerator’s ability to bring significant financial resources generated with stimulus dollars to a wide variety of communities, while also attracting and leveraging private financial resources.
- Providing direct or supplemental financing to service providers, local utilities, project developers, and communities to help underwrite their own investment and installation of rooftop and community solar projects, with or without an energy storage component, reducing financing costs and other barriers, and expanding the market for such lending by commercial banks and/or investors.

- Supporting community-based training of EE/DER installers and contractors, supporting the development of local businesses to support rectification of the energy inequities in LMI communities. Providing funds to local green banks to lend to service providers in these communities, Accelerator funds could be used to vastly expand energy information and expertise in LMI communities, through creation and proliferation of community-based informational and training resources to educate residents on funding and other programmatic opportunities, and provide links to lenders, contractors, utilities, and government energy agencies.

With a focus on LMI communities, the Accelerator could provide an immediate injection of dollars to generate economic activity, decrease residents' energy costs (and thereby increase income available to spend locally), create contractor/installation jobs, improve energy awareness, and advance energy cost and impact equality. Importantly, the majority of this support could be in the form of creative financing tools tailored to the communities, and integrating the availability of utility and government support, the revenue generation potential of renewable output (i.e., renewable energy credits), and the interest of commercial lenders.

B. “Smart surfacing” to reduce urban heat, lower energy bills, mitigate heat-related public health impacts, and avoid GHG emissions

The prevalence of dark surfaces and lack of vegetation in urban areas means that residents are already disproportionately affected by the increasing magnitude, intensity and frequency of high temperatures in cities, an impact that will be amplified by continued increases in temperatures and rising populations in urban areas.

Urban populations are feeling the effects of climate change. One example is the presence of “heat islands” of cities, which are created by the prevalence of dark surfaces (dark rooftops, pavement, buildings) and the lack of vegetation to absorb heat and pollution, and provide shade. The impact is significant: currently, dark surfaces make affected parts of cities almost ten degrees (F) warmer on average than other urban areas, with the highest impacts felt in the most densely populated (and often low-income) inner-city neighborhoods.⁷⁹

Heat islands can degrade the health and comfort of those that work and live in cities. Summer heat waves increase deaths and hospitalization, particularly for those with pre-existing respiratory (e.g., asthma) and other conditions and the elderly. The impacts are likely even greater on low-income residents whose dwellings are not (or are poorly) air conditioned, and who likely reside in neighborhoods with less vegetation and more dark surface area.

Urban areas already represent a majority of the earth's population, and death and hospitalizations tied to summer heat waves have been increasing with the changing climate. From a climate and population perspective, the impact of urban heat islands is trending in a bad direction, as (1) the magnitude of the impact increases with accelerating warming, and (2) populations are rising in urban areas - by 2030 global urban area is expected to increase to nearly triple the area of urban area in 2000.

⁷⁹ Jim Morrison, “Can We Turn Down the Temperature on Urban Heat Islands?” *Yale Environment360*, September 12, 2019, at <https://e360.yale.edu/features/can-we-turn-down-the-temperature-on-urban-heat-islands>.

Urban areas are also a source of the majority of GHG emissions due to the concentration of traffic, buildings, and energy-consuming industrial activity, and thus potentially a productive focus of GHG emission reductions. Investment in urban areas may thus provide outsized benefits from investments that increase economic activity and employment, and do so in areas with the greatest concentration of LMI residents.

The green Accelerator could provide financing assistance to expand the opportunities to lighten and thereby reduce dark surfaces and add vegetation in urban areas, dropping urban GHG emissions significantly, and providing benefits in the form of increased comfort and reduced morbidity and sickness in urban populations.

Accelerator investments in urban areas could spur economic activity in urban communities while countering the climate and public health impacts of dark surfaces. Potential investments to counter urban heat island impacts are routinely challenged by a lack of access to capital, a stream of potential benefits (e.g., building energy savings) that is stretched out over time and sometimes benefits multiple households (e.g., multiple tenants in multi-family buildings), making it hard to organize the projects and investments. Also, there is often the need to navigate a complicated set of jurisdictional or permitting requirements (e.g., urban tree planting).

The Accelerator could begin to tackle these challenges in several ways, including at least the following:

- The Accelerator could fund projects that allows landlords, building owners, and other project developers to gain access to direct or supplemental financing. These projects could involve resurfacing building roofs to include lighter colors, installation of solar panels, and/or planting of vegetation. Doing so would allow for an expansion of available contractors, and could expand the market for lending to building owners by commercial banks and/or investors for smart service applications.
- Accelerator funding could be used to create information resources (e.g., state/city-based contacts, contractors, service providers) to match potential targets for smart surface investments and intermediaries to consolidate and implement the work. It could establish a network of city contacts and procedures for projects in public spaces, with links to lenders, contractors, permitting agencies, and utilities and government energy agencies responsible for administration of subsidy programs.
- The Accelerator could help fund third parties to explain/educate and direct building owners to utility and government energy assistance programs, and speed up, support and/or amplify smart surface installations on apartments and commercial buildings.
- Accelerator funding could be used for community-based training of smart service application installers and contractors, supporting the development of local businesses in urban communities.

The Accelerator could support a coordinated and integrated approach to maximizing smart surface applications and installations across an entire urban community, bringing together lenders, building owners, city/state agencies, and contractors in the roofing/building, solar PV, and urban tree planting sectors. With a focus on urban communities, the Accelerator could provide an immediate injection of dollars in inner city neighborhoods to generate economic activity,

decrease residents' energy costs (and thereby increase income available to spend locally), create local jobs, reduce mortality and health impacts, lower GHG emissions, and make cities more livable.⁸⁰

C. Acceleration of transportation initiatives through financing electrification of public bus fleets

Electrification of the transportation sector has the potential to reinvigorate the domestic auto industry and generate significant air quality benefits across the country. Focusing increased and targeted financing of equipment switching on public bus fleets could accelerate the transition in a way that widely disperses the economic and health benefits associated with eliminating gasoline and GHG emissions from public transportation.

The transportation sector is the single largest contributor to U.S. GHG emissions, now that power sector emissions have declined over the past decade. It is widely expected that the next phase of achieving GHG reductions will lean heavily on moving the transportation sector away from fossil fuels through rapid commercialization of alternative-fuel transportation (such as electric vehicles (“EVs”) and hydrogen). Decarbonization of the transportation sector will be accompanied by both economic growth in the transportation sector (and supporting industries), and significant corollary reductions in other pollutants.

Many public policies are focused on electrification of vehicles, especially light-duty vehicles, and the deployment of EV charging infrastructure. States are actively developing programs and policies to accelerate the proliferation of vehicle charging stations, the uptake of electric vehicles (and home charging capabilities) for consumers, financial and tax incentives for the purchase of new vehicles, creative electricity rate structures to support integration of vehicle charging in the electric grid, and many other approaches.

Electrification of medium- and heavy-duty vehicles, and in particular commercial fleets, will also be needed to meet decarbonization targets. In many cases, it will be difficult to accomplish due to cost factors and other barriers to adoption, especially among fleet owners in public schools, public transportation districts, and other public sectors.

Public bus fleets present a unique opportunity for the use of Accelerator funds to accelerate vehicle electrification and spur domestic economic activity in the auto industry, in a way that promises to save money for municipalities, improves the riding experience as well as the conditions for communities whose neighborhoods are hosts of buses that run on fossil fuels. Electrifying such bus fleets can provide broadly distributed air quality benefits across states and municipalities.

There are over 65 thousand buses across the country, most of which operate on diesel fuel. Municipal transit buses and school buses are ideal candidates for heavy-duty vehicle electrification. They operate in cities and towns across the U.S. They often transport children, and people from low-income and other marginalized communities who are often more susceptible to damage from exposure to air pollutants. School buses they tend to operate for limited periods while being parked (and able to charge) for long periods of time in-between. Buses are often stationed together when not in operation, allowing for centralization of charging infrastructure.

⁸⁰ Smart Surfaces Coalition, <https://smartsurfacescoalition.org/intro>.

Financial assistance from the Accelerator could accelerate the electrification of municipal bus fleets, overcome cost barriers that would otherwise deter municipal uptake, provide demand for (potentially) domestic supply of new electrification technologies, and provide a pathway to rapid learning on charging technologies and approaches.

There are a number of barriers and challenges to rapid electrification of municipal bus fleets. Especially now in the pandemic and economic downturn, municipalities may lack access to cash and/or may be disinclined to make such investments given other demands on the municipality's budget. The local government may not have adequate knowledge or expertise to determine the upfront and continuing costs versus benefits of switching from diesel to electricity as the "fuel." Moreover, the municipalities may the resources, technical expertise, and personnel bandwidth to interact effectively with the local electric company to ensure reliable interconnection of charging infrastructure, and/or to negotiate favorable time-of-use electric rates to support reliable and low-cost charging cycles.

The Accelerator could begin to tackle these challenges in several ways, including at least the following:

- Accelerator investments could be used to overcome barriers to the financing of municipal fleet turnover, and investment in the associated municipal charging infrastructure. This financing assistance could address any initial funding or cash availability issues at cities and towns, and provide a sufficient level of external support for approval of the issuance of municipal bonds needed for the transition, while being targeted to levels needed to attract private investment. The scale and scope of the Accelerator's size could facilitate consolidated project development and aggregation, with potential savings on equipment and vehicle costs.
- The Accelerator could support the development of expertise to support municipal interactions with local electric transmission and distribution companies. This level of expert support could accelerate the process for interconnecting high-voltage charging infrastructure, help towns develop well-timed charging strategies, and negotiate with utilities for rates that allow the municipalities to take advantage of time of use rates and support demand response efforts.
- Accelerator funding for electrification of public bus fleets could be used to target investments consistent with other economic or social objectives, to ensure fairness in the dispersion of fleet electrification support, and to ensure assistance in lower-income communities.

The Accelerator could support a coordinated and integrated approach to accelerating the process of bus fleet electrification, and target domestic production of vehicles and/or materials and generate local economic benefits for installers/technicians. With support and expertise the Accelerator could overcome many of the administrative barriers to system integration and advantageous pricing. And investments and support could be targeted to ensure benefits accrue in urban and rural settings, and across municipalities that are geographically and economically diverse. This immediate use of Accelerator funding could increase the chances that domestic auto companies get a leg up on heavy duty electric vehicle development and manufacturing jobs.

V. Conclusion: The Accelerator's role in stimulating economic recovery and positioning the U.S. for an equitable clean energy transition

The Accelerator could play an important role as part of a federal economic stimulus and recovery package, with the ability to produce benefits in the form of economic growth and job creation, greenhouse gas emission reductions, public health benefits to communities of color and other environmental justice communities.

The Accelerator fits the economic-stimulus profile of being targeted, timely, temporary, and transformative, while also being opportunistic, simple, and strategically focused on the prize.

- **Targeted:** In the near term, the Accelerator would focus on getting money rapidly into the economy by supporting projects that implement mature clean-energy technologies. This could be done by the Accelerator quickly channeling funding to existing state and local green banks to lend to projects already in their queues, thus moving dollars into local economies and delivering jobs, economic activity, GHG emission reductions, and equitable outcomes. The Accelerator can also directly solicit and review project proposals that reduce pollution in disadvantaged and environmental-justice communities, create job and ownership opportunities for the local workforce and residents, and leverage private capital that would not otherwise be attracted to such projects. It can target projects with high GHG emissions reduction per dollar invested, and with other high payoff in terms of employment multipliers as well as equity outcomes.
- **Timely and opportunistic:** Legislative proposals to enact the Accelerator build on the lessons learned from the states' decade of experience in successfully setting up and operating green banks. That experience provides sound templates for how to invest in good projects with positive financial outcomes, which can inform how the non-profit Accelerator can carry out its mandates and do so at greater scale. With interest rates currently so low, the federal government can afford to support an aggressive infusion of stimulus dollars into infrastructure, according to leading economic experts.
- **Temporary and Simple:** Federal action is streamlined, temporary and simple, because once Congress authorizes and provides initial funding for the Accelerator, the next and only subsequent federal action is for the President to nominate three members of the Accelerator's board and then for the Senate to confirm those nominations. Thereafter, the Accelerator's implementation moves into the non-profit sector.
- **Strategic and transformative:** In addition to providing near-term employment and economic stimulus, Congressional authorization and seed funding of the Accelerator could help keep the eye on the combined prize of economic recovery and growth, job creation, and an equitable transition to a low-carbon economy. There are opportunities for the Accelerator's use of public dollars to leverage significant private financing and investment in clean-energy projects in every state.

Appendix: Economic Multipliers for Decarbonization Technologies: State Studies (Hibbard and Darling, 2020)

Job Years and Economic Value Added from Clean Energy Investments for Selected States (a)								
State	Category of Investment	Initial Public Spend (\$ Billions)	Total Economic Impacts		Annual Savings (\$ Billions)			Total Savings
			Employment Impacts (job years)	Value Added Impacts (\$2020, Billions)	EE Savings (Residential + C&I)	EV Gasoline Savings	Solar Savings (Residential + C&I)	
Arizona	Energy Efficiency	\$3.8	1,019,665	\$171.6	\$10.8			
	Electric Vehicles	\$3.0	83,164	\$9.9		\$0.3		
	Grid Modernization	\$0.8	20,184	\$1.6				
	Storage	\$2.3	58,887	\$5.9				
	Transmission	\$0.8	11,733	\$1.6				
	Building Electrification	\$1.5	52,185	\$4.8				
	Renewable Generation - Wind	\$0.8	15,628	\$1.7				
	Renewable Generation - Solar	\$2.3	70,145	\$11.1			\$0.4	
	Total	\$15.0	1,331,591	\$208.1				\$11.4
California	Energy Efficiency	\$20.0	1,907,852	\$373.3	\$21.9			
	Electric Vehicles	\$20.0	476,364	\$80.1		\$1.6		
	Grid Modernization	\$5.0	107,625	\$11.6				
	Storage	\$10.0	379,200	\$46.2				
	Transmission	\$5.0	73,605	\$11.8				
	Building Electrification	\$10.0	322,000	\$40.5				
	Renewable Generation - Wind	\$10.0	195,125	\$26.3				
	Renewable Generation - Solar	\$20.0	663,178	\$137.0			\$5.1	
	Total	\$100.0	4,124,949	\$727.0				\$28.6
Colorado	Energy Efficiency	\$5.0	514,299	\$92.2	\$5.7			
	Electric Vehicles	\$5.0	135,080	\$16.0		\$0.5		
	Grid Modernization	\$1.3	30,641	\$2.7				
	Storage	\$2.5	56,910	\$7.1				
	Transmission	\$1.3	19,897	\$2.7				
	Building Electrification	\$2.5	57,950	\$6.0				
	Renewable Generation - Wind	\$2.5	52,675	\$5.8				
	Renewable Generation - Solar	\$5.0	157,908	\$24.1			\$0.8	
	Total	\$25.0	1,025,360	\$156.7				\$7.0
Florida	Energy Efficiency	\$11.3	462,556	\$59.1	\$2.6			
	Electric Vehicles	\$11.3	341,115	\$34.6		\$0.8		
	Grid Modernization	\$2.3	63,520	\$4.8				
	Storage	\$4.5	120,960	\$12.6				
	Transmission	\$2.3	37,934	\$4.8				
	Building Electrification	\$4.5	164,273	\$14.5				
	Renewable Generation - Solar	\$9.0	297,412	\$43.2			\$1.4	
	Total	\$45.0	1,487,769	\$173.6				\$4.9
	Illinois	Energy Efficiency	\$11.3	1,269,703	\$236.6	\$14.1		
Electric Vehicles		\$9.0	240,474	\$30.4		\$0.8		
Grid Modernization		\$2.3	54,253	\$5.0				
Storage		\$2.3	54,351	\$6.6				
Transmission		\$2.3	33,726	\$5.1				
Building Electrification		\$4.5	139,523	\$17.8				
Renewable Generation - Wind		\$4.5	88,318	\$11.4				
Renewable Generation - Solar		\$9.0	268,730	\$44.4			\$1.4	
Total		\$45.0	2,149,079	\$357.3				\$16.4

Sources:

[A] IMPLAN

[B] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy in Arizona*, report for Advanced Energy Economy (AEE), October 2020, available at: <https://info.aee.net/arizona-economic-impact-of-stimulus-investment-in-advanced-energy>.

[C] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy in California*, report for Advanced Energy Economy (AEE), September 2020, available at: <https://info.aee.net/economic-impact-of-stimulus-investment-in-advanced-energy-for-california>.

[D] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy in Colorado*, report for Advanced Energy Economy (AEE), October 2020, available at: <https://info.aee.net/economic-impact-of-stimulus-investment-in-advanced-energy-for-colorado>.

[E] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy in Florida*, report for Advanced Energy Economy (AEE), October 2020, available at: <https://info.aee.net/economic-impact-of-stimulus-investment-in-advanced-energy-for-florida>.

[F] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy in Illinois*, report for Advanced Energy Economy (AEE), October 2020, available at: <https://info.aee.net/en/economic-impact-of-stimulus-investment-in-advanced-energy-for-illinois>.

Notes:

[1] Initial public spend is calculated based on each state's reported total of ARRA funds as a percentage of total ARRA state-aid funds (~\$330B) and the percentage was applied to our assumed stimulus total of \$1 trillion.

[2] Total economic effects include the direct, indirect, and induced effects of increased economic activity associated with an investment category.

[3] Job years refers to total short-term (1 year) plus longer-term (3 year) employment impacts.

[4] State savings calculated using state-reported total funds received from the national \$330 billion American Recovery and Reinvestment Act (ARRA) state and local-aid stimulus package. State percentages of ARRA funds are applied to an anticipated \$1 trillion dollar state-aid package.

[5] Total consumer savings reflect a recurring annual consumer savings (through 10 years), adjusted for inflation.

Job Years and Economic Value Added from Clean Energy Investments for Selected States (b)								
State	Category of Investment	Initial Public Spend (\$ Billions)	Total Economic Impacts		Annual Savings (\$ Billions)			
			Employment Impacts (job years)	Value Added Impacts (\$2020, Billions)	EE Savings (Residential + C&I)	EV Gasoline Savings	Solar Savings (Residential + C&I)	Total Savings
Michigan	Energy Efficiency	\$6.0	908,369	\$156.0	\$9.9			
	Electric Vehicles	\$7.5	181,452	\$36.0		\$0.8		
	Grid Modernization	\$1.5	40,322	\$3.1				
	Storage	\$1.5	38,052	\$4.0				
	Transmission	\$1.5	24,268	\$3.1				
	Building Electrification	\$3.0	96,675	\$11.0				
	Renewable Generation - Wind	\$3.0	64,120	\$6.7				
	Renewable Generation - Solar	\$6.0	209,035	\$30.7			\$1.1	
	Total	\$30.0	1,562,294	\$250.6				\$11.9
Minnesota	Energy Efficiency	\$3.8	468,461	\$79.1	\$4.8			
	Electric Vehicles	\$3.0	85,164	\$9.8		\$0.3		
	Grid Modernization	\$0.8	19,252	\$1.6				
	Storage	\$0.8	19,314	\$1.9				
	Transmission	\$0.8	11,491	\$1.5				
	Building Electrification	\$1.5	49,785	\$5.6				
	Renewable Generation - Wind	\$1.5	24,386	\$2.7				
	Renewable Generation - Solar	\$3.0	98,814	\$15.3			\$0.5	
	Total	\$15.0	776,667	\$117.4				\$5.5
Nevada	Energy Efficiency	\$2.5	210,002	\$37.9	\$2.4			
	Electric Vehicles	\$2.0	47,949	\$6.1		\$0.2		
	Grid Modernization	\$0.5	11,891	\$0.9				
	Storage	\$1.5	34,866	\$3.5				
	Transmission	\$0.5	6,689	\$1.0				
	Building Electrification	\$1.0	29,355	\$2.9				
	Renewable Generation - Wind	\$0.5	9,014	\$1.1				
	Renewable Generation - Solar	\$1.5	38,981	\$6.2			\$0.2	
	Total	\$10.0	388,747	\$59.5				\$2.8
Pennsylvania	Energy Efficiency	\$12.5	1,623,740	\$286.6	\$17.6			
	Electric Vehicles	\$10.0	259,390	\$31.8		\$0.9		
	Grid Modernization	\$2.5	60,984	\$5.2				
	Storage	\$2.5	62,040	\$6.7				
	Transmission	\$2.5	38,574	\$5.5				
	Building Electrification	\$5.0	160,600	\$17.2				
	Renewable Generation - Wind	\$5.0	102,331	\$11.8				
	Renewable Generation - Solar	\$10.0	302,898	\$50.6			\$1.7	
	Total	\$50.0	2,610,556	\$415.3				\$20.2
Texas	Energy Efficiency	\$13.8	1,116,768	\$208.1	\$12.0			
	Electric Vehicles	\$11.0	310,991	\$36.9		\$1.1		
	Grid Modernization	\$2.8	68,613	\$6.0				
	Storage	\$2.8	74,250	\$7.7				
	Transmission	\$2.8	46,307	\$6.4				
	Building Electrification	\$5.5	189,393	\$20.0				
	Renewable Generation - Wind	\$5.5	117,072	\$13.8				
	Renewable Generation - Solar	\$11.0	316,337	\$51.3			\$1.5	
	Total	\$55.0	2,239,730	\$350.1				\$14.5

Sources:
 [A] IMPLAN Modeling Methodology.
 [B] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy*, report for the Michigan Energy Innovation Business Council (Michigan EIBC), October 2020, available at: <https://mieibc.org/wp-content/uploads/2020/10/20.10.20-MI-stim-report-layout.pdf>.
 [C] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Clean Energy*, report for Clean Energy Economy Minnesota (CEEM), October 2020, available at: https://cleanenergyecononymn.org/sites/default/files/202012/ceem_aeei_mn_econ_stim.pdf.
 [D] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy in Nevada*, report for Advanced Energy Economy (AEE), October 2020, available at: <https://info.aee.net/economic-impact-of-stimulus-investment-in-advanced-energy-for-nevada>.
 [E] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy in Pennsylvania*, report for Advanced Energy Economy (AEE), October 2020, available at: <https://info.aee.net/economic-impact-of-stimulus-investment-in-advanced-energy-for-pennsylvania>.
 [F] Paul Hibbard and Pavel Darling, *Economic Impact of Stimulus Investment in Advanced Energy*, report for Texas Advanced Energy Business Alliance (TAEBA), October 2020, available at: https://www.texasadvancedenergy.org/hubfs/TAEBA%20Texas%20Economic%20Impact%20report_10.13.20.pdf.

Notes:
 [1] Initial public spend is calculated based on each state's reported total of ARRA funds as a percentage of total ARRA state-aid funds (~\$330B) and the percentage was applied to our assumed stimulus total of \$1 trillion.
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