Rewiring Communities:





A Plan to Accelerate Climate Action and Environmental Justice By Investing in Household Electrification at the Local Level

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Executive Summary

Climate change is rightly characterized as a global threat, but in many ways the key to addressing it lies in our local communities. Households, and the decisions they make, account for approximately 42 percent of energyrelated greenhouse gas emissions in the United States. Reaching people where they live requires more than just aspirational goals or even generous funding; it requires solutions that will speak to them "at the kitchen table" as well as coordinated strategies for driving results. It also means delivering benefits directly to those households most in need.

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No strategy presents greater opportunities on these fronts than electrification – i.e., replacing those household machines and appliances currently contributing to emissions with modern electric versions running on clean electricity. Not only can electric machines dramatically lower greenhouse gas emissions, but they are actually superior products for most homes, particularly as evidence mounts that the burning of fossil fuels in homes is a major contributor to, among other things, childhood asthma and other harmful conditions. Electrification also offers a unique opportunity for significant household energy bill savings and local job creation. Indeed, more than **65 million** American households would be "in the money" on their energy bills today, saving over \$27 billion a year in aggregate, if they were using modern electric appliances instead of space and water heaters powered by oil, propane, and electric resistance.

These savings would be realized in every region and every climate of the country. From hot rural areas like Guadalupe County, New Mexico (where over 67 percent of households would see lower energy bills, with 75 percent of them being LMI households⁷) to colder ones such as Marion County, West Virginia (78 percent and 53 percent, respectively). To growing urban centers in the sunbelt like Charlotte, North Carolina (where over 308,000 households out of 411,000 total in Mecklenburg County would realize savings, with 167,000 of them being LMI) and Anchorage, Alaska where over 34,000 households (18,000 of them LMI) would see the same. Across the country, the story is consistent: switching to modern electric equipment to meet household space and water heating needs is good for the climate, good

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7 Defined as households at or below 80 percent of annual median income (AMI) consistent with the methodology used by the U.S. Department of Housing and Urban Development.

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for jobs, and good for families, particularly those who need it the most. Indeed, of the over 65 million households nationwide that would be "in the money" from just these changes, over 36 million of them are at or below 80 percent of annual median income (AMI). For these low-to-moderate income (LMI) households, these savings will provide meaningful relief on bills that represent more than 8 percent of household income. Moreover, these are often the same families who live in the oldest homes with the least efficient heating systems, who experience the highest housing and energy cost burdens, have the highest exposure to lead and other health hazards, and who are more vulnerable to the impacts of climate change. Electrification presents a unique opportunity to help address these social and environmental justice issues in simultaneous and complementary ways.

Unlike other climate change approaches, no miracles or breakthrough inventions are needed to capture the benefits of electrification. Existing technology can do the job. What stands between us and a brighter future is not the desirability or feasibility of electrification, but rather historically higher up-front costs, disorganized markets, and, to date, the absence of comprehensive strategies coupled with the political will to make it happen.

Described below is a blueprint for driving household electrification where it can do the most immediate good. The program is called "Rewiring Communities" and it has the potential between now and 2030 to secure energy bill savings of up to **\$750** per year for nearly **12 million** American households (**75 percent** of which are LMI), while at the same time creating over **700,000** jobs and driving down household greenhouse gas emissions by nearly **40 million metric tons** a year. Approximately **90 percent** of all funds invested would directly benefit LMI households under the program.

To maximize impact, Rewiring Communities is designed to utilize the financial resources and operational flexibility of the proposed \$100 billion National Clean Energy and Sustainability Accelerator (the "Accelerator") and its affiliated network of green banks and financial partners across the country to leverage private capital. This partnership will support local communities in tackling the two primary challenges to electrification: 1) the higher upfront costs often associated with modern electric equipment; and 2) the need to organize local markets so that workers, contractors, distributors, banks, community groups, and others are all driving uptake and

implementation. Not only would households in participating communities receive direct financial support to go electric, but the communities at large would also receive technical and financial support to: 1) facilitate and oversee the recruitment, training, certification, and placement of local workers; 2) organize local markets using trusted community partners and distribution channels; and 3) streamline processes and regulatory requirements to minimize burdens and drive uptake. Communities will also be able to track progress, identify best practices, and use technical and other tools to optimize results.

Details of the Rewiring Communities plan, and the opportunities it presents, are laid out in the body of this report, but core principles include:

- The primary purpose of the program is to help LMI households and front line communities through household electrification. Not only are these the households most in need of housing and economic assistance, but they also represent the best opportunities for emissions reductions.
- The program should provide comprehensive financial support to make the costs of switching to electrified equipment affordable. Support should include both subsidized financing and, critically, direct, "off the top" assistance for LMI households to ensure that, at a minimum, the cost of electrified equipment is no higher than it would be for replacing existing equipment in kind and that no funds need to come "out of pocket" when switching.
- Participating households should realize energy bill reductions from the outset, inclusive of any financing costs.
- Working with the Clean Energy Accelerator, participating communities should engage local financial institutions and other sources of capital to catalyze meaningful participation by private capital.
- A trained workforce rooted in the community is an essential goal of Rewiring Communities. That requires dedicated training and placement programs to deliver maximum local job creation and robust capacity to do the work of electrification.
- Trusted community organizations and institutions should be actively included so as to maximize engagement and confidence.
- To streamline adoption, contractors, installers, and similar market participants should be empowered to bring together the necessary parts of the electrification "package" at the moment of decision, including equipment options, installation plans, rebates and other financial incentives, and other relevant aspects.

The Accelerator is an ideal partner for this program. It brings substantial financial firepower paired with the flexibility and targeting needed to coordinate meaningfully with communities around the country to implement customized plans for meeting local needs. The Accelerator is endorsed by President Biden, passed the House of Representatives twice in 2020, and enjoys bipartisan support in Congress in 2021. And, in alignment with the White House's broader push to address environmental justice, 40 percent of the investment must flow to disadvantaged communities.

As detailed below, the Rewiring Communities program, working through the Accelerator, presents a tremendous opportunity to make lasting progress in the battle against climate change while at the same time lifting up American households that have been suffering economically.

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The Electrification Opportunity

President Biden has consistently identified climate change as a top national priority. On his first day in office, the President re-committed the United States to the Paris Climate Agreement, which seeks to limit global average temperature rise to well below 2 degrees Celsius above pre-industrial levels, pursue efforts to limit that rise to 1.5 degrees, and achieve net-zero economy-wide emissions by 2050. More recently, the President hosted an international climate summit and on Earth Day 2021 committed the United States to halving overall emissions from 2005 levels by 2030.

These are ambitious goals. In 2019—the last "normal" year of U.S. economic activity —the United States emitted roughly 5,800 million metric tons of carbon.⁸ Meeting President Biden's goal of reducing that number to roughly 3,300 million metric tons by the end of this decade will require comprehensive and coordinated action across all sectors.⁹ By any measure, significant investments in electrification will be a key

⁸ See Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 to 2019, U.S. Environmental Protection Agency, 2021.

⁹ See <u>President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-</u> Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, The White House, 2021.

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component of success. Technically speaking, electrification is the replacement of machines currently powered by fossil fuels with functionally equivalent machines powered by clean electricity. As a practical matter, it means encouraging Americans to buy an EV rather than a gas car the next time they are in the market for wheels. It means incentives to install electric heat pumps rather than fossil-powered furnaces and hot water heaters when those machines stop working and to replace stoves when the time comes with induction cooktops. It also means aggressively installing rooftop solar and other clean energy sources. Electrification, in short, is a broad vision in which the main source of energy throughout the economy is electricity.

In climate terms, the promise of electrification lies in the fact that electricity can be generated without creating carbon emissions (through, for instance, solar panels, wind turbines, hydroelectric dams, and nuclear fission), which opens up the possibility of a carbon-free economy without dramatic changes in lifestyle. Commercially available, electricity-powered machines exist today to heat bedrooms, cook food, drive us around, and do pretty much everything fossil-based machines can do. Often, they do it better and without generating air pollution, carbon monoxide, and the rest. In other words, electrification offers a roadmap for decarbonization that does not require technological breakthroughs or miracle inventions for success.

While electrification's potential for advancing climate goals has long been understood, the additional benefits it brings to the table—including economic ones—tend to receive less attention. A small fraction of the energy in a gallon of gas actually helps propel your car, as approximately 70 percent is lost as heat in the internal combustion engine.¹⁰ By comparison, electric vehicles convert roughly 80 percent of electricity into motion.¹¹ This same dynamic holds across the board. Electric machines, particularly those using heat pump technology, are, all else equal, much more efficient and therefore require much less overall energy to produce similar outputs. Indeed, Rewiring America's analysis shows that the U.S. economy would require only about **half** of the overall energy it currently uses if it were fully

¹⁰ See Where the Energy Goes: Gasoline Vehicles, U.S. Department of Energy, 2020.

¹¹ See Where the Energy Goes: Electric Cars, U.S. Department of Energy, 2020.

electrified.¹² This offers the possibility for meaningful energy bill savings in addition to the significant health and climate benefits of moving off of fossil fuels.

Nowhere are these opportunities more profound than in American households, where decisions made collectively account for approximately 42 percent of all energy-related emissions.¹³ Upgrading just four core household functions—space heating, water heating, cooking, and laundry—with modern electric equipment would reduce economy-wide emissions by almost **180 million metric tons** a year, even with today's relatively "dirty" electric grid (See Figure 1). Using clean electricity, those emissions savings grow to nearly **400 million metric tons a year** (See Figure 2). The majority of these saved emissions would come from households at or below average median household income, giving rise to the opportunity to help historically disadvantaged communities and meaningfully reduce economy-wide carbon emissions through one policy initiative.

Electrification is sometimes conflated with more traditional energy "efficiency" measures. Some of those measures, such as better building insulation, are consistent with a clean, electrified future—the less energy you need to heat your house, the easier it is to decarbonize. But, some measures traditionally associated with "efficiency"— such as replacing an old "dirty" furnace with a new fossil version that happens to produce fewer emissions—are not. Even the most efficient fossil-fuel furnace will continue to emit carbon into the atmosphere every day it operates for the entirety of its product life, often around 15 years, making it that much harder to meet President Biden's goals of halving economy-wide emissions by 2030 and achieving net zero emissions by 2050. Electric heat pumps, on the other hand, produce zero direct emissions when operated correctly. And, to the extent emissions currently result from generating the electricity used to power those heat pumps, those emissions 1) are significantly less on average than the most efficient fossil-fuel alternatives, ¹⁴ and 2)

¹² See <u>Mobilizing for a Zero Carbon America: Jobs, Jobs, Jobs, and More Jobs, Rewiring America, 2020;</u> see also <u>Rewiring America: A Handbook for Winning the Climate Fight, Rewiring America, 2020</u>.

¹³ See <u>No Place Like Home: Fighting Climate Change (and Saving Money) by Electrifying America's</u> <u>Households, Rewiring America, 2020</u>.

¹⁴ See Net Emission Reductions from Electric Cars and Heat Pumps in 59 World Regions Over Time, Knobloch et al, Nature Sustainability, 2020, and Heat Pumps Slow Climate Change in Every Corner of the Country, Rachel Golden and Cara Bottorff, 2020.



Cumulative emissions reduction by household income (current grid)

400 Emission Reduction (MMT/year) 300 200 100 0 50% 100% 150% 200% 250% 300% Ω 350% household income target (relative to median)

Cumulative emissions reduction by household income (clean grid)

Figure 2: Replacing the same appliances serving the same four household functions with modern electric versions, as seen in Figure 1, on a clean grid more than doubles the cumulative annual emissions savings to nearly 400 MMT/year.

replacing appliances that serve four key household functions—space heating, water heating, cooking, and laundry-with modern electric versions amounts to nearly 180 MMT of emissions reductions per year across all income levels.

will continue to decline as the process of "greening the grid" marches on. Indeed, 76 percent of newly installed electricity generation capacity in the United States last year was renewable,¹⁵ and President Biden has pledged to make the U.S. power sector carbon-free by 2035. In other words, electric appliances are appreciating climate assets as their ability to reduce overall emissions will only increase over time. Figure 3, below, compares the amount of emissions saved per dollar spent for all four core household functions under three scenarios: 1) utilizing the most efficient Energy Star fossil fuel option; 2) utilizing modern electric equipment powered by today's grid; and 3) utilizing that same electric equipment with a clean grid. Across the board, electrification is the clear winner on both an absolute and per dollar spent basis.



Emissions saved per dollar spent for core household functions

Figure 3: Comparing four key household functions across three scenarios - 1) using the most efficient energy star rating appliances, 2) using modern electric versions of these appliances on the current grid, and 3) using modern electric versions of these appliances on a clean grid - makes clear that replacing these appliances with modern electric versions is the most cost-effective way to reduce emissions (MMT/B\$).

Moreover, the lion's share of these potential emissions reductions would occur in LMI households, as demonstrated in Figure 4. These are the same households that, generally speaking, have disproportionately experienced the deleterious health effects of burning fossil fuels. Decades of research has shown that gas stoves in

¹⁵ See <u>Preliminary Monthly Electric Generation Inventory, U.S. Energy Information Administration,</u> <u>2020</u>.

particular release toxic pollutants—at levels often times higher than federal outdoor pollutant standards—that can lead to serious negative health outcomes. These indoor air pollutants remain unregulated, leading to repeated long-term exposure, and, in turn, respiratory diseases, heart disease, and cancer. This exposure is often compounded for so-called fence line communities who also have long-term exposure to traditional pollutants, resulting in adverse health outcomes.¹⁶

Emissions reduction by household income (clean grid)



Clothes Drying Propane



Figure 4: The majority of emissions reduction potential can be realized by assisting households under the median income to upgrade appliances to modern electric versions.

¹⁶ A 2020 report by the Rocky Mountain Institute, the Sierra Club, Physicians for Social Responsibility, and Mothers Out Front summarized multiple studies that analyzed over forty years of empirical data regarding adverse health effects from the use of gas stoves. In short, the key findings point to elevated indoor pollution levels that can exceed outdoor air quality standards, as set by the EPA, due to gas stoves. These pollutants can lead to asthma and impacted brain development. These effects are particularly concentrated in children and in lower income households, presenting a lesser known environmental justice issue. Fortunately, electric stoves largely mitigate these effects, removing harmful pollutants throughout the entire home. See <u>Health Effects from Gas Stove Pollution, Rocky</u>. Mountain Institute, Physicians for Social Responsibility, Mothers Out Front, and Sierra Club, 2020 for more information; see also <u>A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy, Buonocore et al, 2021, finding gas combustion to be the second most deadly source of stationary air pollution from residential buildings in the United States in 2017.</u>

Given the scope and scale of the climate and environmental justice crises we face, these benefits would be enough on their own to justify a broad national commitment to household electrification. But the opportunity goes well beyond that. **Electrifying households would also save Americans significant amounts of money and generate enormous job opportunities.** With the right mix of policy support, including the elimination of existing policies tilted in favor of fossil fuels, the average American household could save hundreds, if not thousands, of dollars a year on energy costs by going electric.¹⁷ For instance, even with existing fossil fuel subsidies, the cost of delivering heat is significantly cheaper using electric heat pumps than it is using electric resistance, propane, or fuel oil, and is even cheaper than using natural gas in many localities, depending on prices and climate.



Space heating costs by fuel, US Avg

(\$/kWh of delivered heat)

Figure 5: Space heating costs by fuel, in dollars per kWh of delivered heat, using average U.S. energy prices. Electric heat pumps are significantly less expensive to operate than electric resistance, propane, and fuel oil.

Water heating costs by fuel, US Avg (\$/kWh of delivered heat)



Figure 6: Water heating costs by fuel, in dollars per kWh of delivered heat, using average U.S. energy prices. Electric heat pumps are significantly less expensive to operate than electric resistance, propane, and fuel oil.

17 See <u>No Place Like Home: Fighting Climate Change (and Saving Money) by Electrifying America's</u> <u>Households, Rewiring America, 2020</u>. Electric Heat Pump

Electric Resistance Natural Gas

Electric Heat Pump + \$1.5/W Solar

Propane Fuel Oil Indeed, based on data from the U.S. Census Bureau's American Housing Survey (AHS) and American Community Survey (ACS), 65 million households currently using fuel oil, propane, or electric resistance appliances for space and water heating could save over \$27 billion a year on their energy bills if they used electric heat pumps instead. And, as shown in Map 1 below, these households span all states and all regions of the country.¹⁸



% Household Savings

20% 40% 60% 80%

Map 1: An analysis by Rewiring America that shows on a county basis the energy cost savings associated with upgrading to heat pump technology for households currently using fuel oil, propane, or electric resistance for their heating needs. Data courtesy of the U.S. Census Bureau American Housing Survey. For an interactive view of the map, please visit <u>https://map.rewiringamerica.org</u>.

¹⁸ While not the focus of the current proposal, it is worth noting that these energy bill savings would be more widespread and larger if, in addition to using heat pumps for space and water heating, households also installed rooftop solar, switched to electric vehicles, and adopted other electrification measures. See <u>No Place Like Home: Fighting Climate Change (and Saving Money) by Electrifying America's Households, Rewiring America, 2020.</u>

Furthermore, over half of these households, roughly 36 million, are LMI households according to the U.S. Department of Housing and Urban Development (HUD) definition. These households stand to save \$15 billion a year on their energy bills and are likewise distributed across the country, as shown in Map 2 below.

A Focus on Jobs

President Biden has been clear that for him the transition to clean energy is about economic opportunity as much as it is about emissions reduction. Manufacturing and installing hundreds of millions of electric machines—and generating the electricity needed to power them—will create millions of jobs. As the President said in his opening remarks at the Virtual Leaders on Climate Summit: "Within our climate



Map 2: Rewiring America's analysis also looked at the potential energy cost savings delivered specifically to low-to-medium income (LMI) households for the same upgrades. Importantly, LMI households who stand to save money on energy bills immediately upon electrification represent over half of all the households who would see savings right away. For an interactive view of the map, please visit <u>https://map.rewiringamerica</u>. orq.

14% 28% 42% 56%

response lies an extraordinary engine of job creation and economic opportunity ready to be fired up." ¹⁹

Household electrification presents a prime opportunity for job creation of this sort. One analysis, for instance, found that an aggressive national commitment to economywide decarbonization could create up to 25 million jobs over the next 15 years, with 5 million sustained through mid-century.²⁰ Of these, nearly 1.3 million would be directly attributable to residential electrification, and another 1.8 million jobs would arise from the energy bill savings realized by households through electrification.

Put simply, the opportunities associated with electrification are tangible and significant, but it is essential that we take aggressive action now to capture them. The life-cycle of household appliances is long - in some cases up to 20 years. **Every time a gas furnace breaks and is not replaced with an electric heat pump, that home loses the chance to be all electric for another two decades.** All the while, emissions continue pouring into the atmosphere. Every month we wait, the action required becomes steeper and costlier.

The Road Ahead

Achieving widespread household electrification is not without its obstacles, however. For one thing, the upfront costs of electric machines tend to be higher than those of their fossil counterparts. Going electric may also require an upgrade to the house's breaker box (sometimes referred to as the load center or fuse box) to accommodate the additional electric load. Installation of the new equipment, and disposal of an old fossil system, could add still more expense to the process of going electric. All told, the costs of upgrading a home's space and water heating to heat pump technology could cost between \$10,000 - \$15,000, and up to \$6,000 more than simply replacing an old fossil fuel system with a newer model. Absent assistance, many Americans simply cannot afford these kinds of upfront costs, even though, for most, going electric would ultimately lead to meaningful savings.

¹⁹ See <u>Remarks by President Biden at the Virtual Leaders Summit on Climate Opening Session, The White House, 2020</u>.

²⁰ See Mobilizing for a Zero Carbon America: Jobs, Jobs, Jobs, and More Jobs, Rewiring America, 2020.

Electrification faces other headwinds as well—most notably how decisions around replacing relevant equipment are typically made. Few people spend much time thinking about the heating equipment in their basements. That is probably as it should be, but it comes at a cost. Typical homeowners are not going to take the time to learn about the benefits of electrification on a cold January night when the furnace fails. Nor are they likely to wait for the electrician to come to the house to upgrade the breaker box before they can once again take a hot shower. Moreover, whom they call in these circumstances matters too. Contractors and energy equipment companies have been installing fossil machines for years. It is what they know. And, because there is always a new fossil-powered model that is more efficient than last year's model, the gravitational pull towards replacing an old fossil fuel machine with a new one can be difficult to overcome.

This is unfortunate. Not only is electrification the only currently viable strategy for eliminating carbon emissions from American households, it is, in the end, also the most cost-effective one, as demonstrated above. Electrification carries with it significant health benefits and job-creation opportunities as well. Because decisions are made at the individual household level, however, where capital constraints and market headwinds can get in the way of optimal decisions, the climate and economic benefits of electrification too often go unrealized. Nor should homeowners be expected to be experts on what is "best" from a climate and/or social cost perspective. They are just trying to heat the house, after all.

That is why strategic policy support needs to be comprehensive and flexible. Comprehensive, because no single tool or action is going to be effective in enabling households to choose electrification as a smart, practical decision; flexible, because each community is different—costs, benefits, and housing types all differ from place to place, as does the organized capacity in each community to deliver the appliances, installation, expertise, and assistance that households will need.

"Rewiring Communities" is designed with these ideas in mind. The program seeks to identify a set of communities across the United States likely to most benefit from a comprehensive electrification effort and to empower them to make it a reality. If enacted, the program would provide financial and technical assistance to communities to: 1) make the upfront costs of electrification affordable for their residents; and 2) streamline the process by engaging relevant community members—from local

workers to zoning boards to utilities to retailers and financial institutions—in a coordinated fashion. The program would make a direct impact in these targeted communities and also identify best practices for use more broadly as part of a national effort to drive household electrification. Key program principles include:

- The primary purpose of the program is to help LMI households and front line communities through household electrification. Not only are these the households most in need of housing and economic assistance, but they also represent the best opportunities for emissions reductions.
- The program should provide comprehensive financial support to make the costs of switching to electrified equipment affordable. Support should include both subsidized financing and, critically, direct, "off the top" assistance for LMI households to ensure that, at a minimum, the cost of electrified equipment is no higher than it would be for replacing existing equipment in kind and that no funds need to come "out of pocket" when switching.
- Participating households should realize energy bill reductions from the outset, inclusive of any financing costs.
- Working with the Clean Energy Accelerator, participating communities should engage local financial institutions and other sources of capital to catalyze meaningful participation by private capital.
- A trained workforce rooted in the community is an essential goal of Rewiring Communities. That requires dedicated training and placement programs to deliver maximum local job creation and robust capacity to do the work of electrification.
- Trusted community organizations and institutions should be actively included so as to maximize engagement and confidence.
- To streamline adoption, contractors, installers, and similar market participants should be empowered to bring together the necessary parts of the electrification "package" at the moment of decision, including equipment options, installation plans, rebates and other financial incentives, and other relevant aspects.

The potential impact of the Rewiring Communities program is enormous. Our analysis indicates that a nationwide program which, on a net basis, deploys approximately \$80 billion in public funds into community household electrification of space and water heating between now and 2030 would result in immediate monthly energy bill savings for approximately 11.8 million American households, with 8.9 million of those (or approximately 75 percent) being LMI households. Average savings

from these upgrades alone would total nearly \$425 a year per household, with allin savings for LMI households of over \$750 a year when compared to the costs of replacing, financing, and operating old technologies on an in-kind basis. Ninety percent of funds deployed would go to benefit LMI households. With the right implementation, the program could also leverage over \$86 billion in private capital to help serve these communities.

Moreover, the framework includes approximately \$8.1 billion in funding for market organization and workforce training and placement. Together, these measures—focused solely on upgrading the space and water heating functions in participating households—would create an estimated 705,000 new direct and indirect jobs. They would also reduce greenhouse gas emissions from the housing sector by nearly 40 million metric tons per year.²¹

The basic takeaway is clear: with sufficient policy and financial support, not only can we slash household greenhouse gas emissions, but millions of households could see lower energy bills from Day One, generating significant opportunities for job creation at the local level in the process.

Accelerating Progress

Rewiring Communities is about providing the full range of necessary support to households and communities to ensure successful electrification. That is why the program has been designed to partner with the Accelerator, a proposed national "green bank" modeled on successful green banks already operating at the state and local levels in the U.S., as well as in other countries. Green banks are mission-driven public or nonprofit finance entities that use public funds to mobilize private investment and rapidly accelerate investment in the deployment of clean energy solutions. They use a range of innovative financing mechanisms to overcome financial, market, and

²¹ For purposes of this illustrative analysis, it was assumed that each LMI household received a onetime grant, either directly from program funds or through other means, to cover the projected average difference between the cost of new heat-pump technology (and related household infrastructure upgrades) and the replacement cost of existing equipment. They were also assumed to receive interest-free financing for the projected balance through support from the Accelerator. Non-LMI homes were assumed to have access to subsidized financing of 2.9% for such costs, but were not assumed to receive any form of grant assistance.

business model barriers to open up new market and investment opportunities. This, in turn, creates jobs, sparks new businesses, and increases private investment. And, because green banks are market-based tools, they deliver solutions that lower energy costs as well.

The collective impact of green banks is more economic activity, healthier homes and communities, and greenhouse gas emissions reductions. State and local green banks across the U.S. have proven this model, driving \$7 billion of total investment, with three-quarters of that investment coming from private investment partners.²² In fact, in 2020, despite economic uncertainty due to Covid-19, green banks had their largest year of investment to date, driving nearly \$2 billion just in that year.

The Accelerator is a \$100 billion national green bank proposed by Congress with bipartisan co-sponsors, passed twice by the House of Representatives in 2020, and endorsed by President Biden as part of his American Jobs Plan in March 2021. In 2009, then-Congressman Chris Van Hollen introduced the first version of the Green Bank Act, which Congressmen John Dingell and Jay Inslee subsequently introduced as an amendment to the Waxman-Markey cap and trade bill, renamed the Clean Energy and Deployment Administration. It was the only bipartisan measure added to that bill, with 51 votes for and 6 against in the House Energy and Commerce Committee. However, no energy bill reached the Senate floor that year.

Since then, state and local leaders have picked up, implemented, and advanced the idea. Today, there are 21 state and local green banks in 15 states and the District of Columbia. And 22 more states are actively developing or exploring green banks of their own. These 37 states account for 85 percent of all electricity sales in the United States.

²² See <u>Green Banks in the United States: 2021 U.S. Green Bank Annual Industry Report With Data</u> from Calendar Year 2020, Coalition for Green Capital and American Green Bank Consortium, 2021.

²³ See Fact Sheet: The American Jobs Plan, The White House, 2021.



Map 3: Green banks are growing at both a local and state level. Among U.S. states, 15 and the District of Columbia have existing green banks with an additional 22 are taking action to create or explore having one of their own. See <u>Green Banks in the United States: 2021 U.S. Green Bank Annual Industry Report With</u> Data from Calendar Year 2020, Coalition for Green Capital and the American Green Bank Consortium, 2021 for more information.

In parallel to this state-level expansion, Congress continued to advance the idea of a national green bank to expand and capitalize a national network of state green banks. In the 116th Congress, Senators Ed Markey and Chris Van Hollen introduced the National Climate Bank Act (S. 2057), co-sponsored by Senators Schatz and Blumenthal as well as then-Senator, now Vice President, Kamala Harris. Representative Debbie Dingell introduced the companion bill in the House (H.R. 5416) that accumulated 10 co-sponsors, which subsequently passed the House twice.

In the 117th Congress, Senators Markey and Van Hollen re-introduced the bill, the National Climate Bank Act of 2021 (S. 283), with Senators Blumenthal, Heinrich, Schatz, and Stabenow signed on as co-sponsors. The bill will deposit \$100 billion as capital into the nonprofit corporation, which the House of Representatives chose to call the Clean Energy and Sustainability Accelerator when it passed this legislation last year. This is the same entity included in the President's American Jobs Plan.

The House counterpart in this session of Congress is The Clean Energy and Sustainability Accelerator Act (H.R. 806), introduced by lead sponsor Rep. Debbie Dingell on February 4, 2021. This bipartisan bill also capitalizes the Accelerator with \$100 billion, and currently has 11 co-sponsors. The policy is endorsed by organizations and networks like the National Academies of Sciences, Third Way, the Center for Climate and Energy Solutions, and the Equitable and Just National Climate Platform. There is strong momentum behind this policy, and it is poised for enactment as part of the broader push for new infrastructure investments.

The legislation defines the Accelerator's multi-faceted mission as mobilizing private investment into seven specific sectors to create jobs, deliver benefits to consumers and reduce greenhouse emissions. Those sectors are:

- Renewable power generation;
- Building efficiency and electrification;
- Clean transportation;
- Industrial decarbonization;
- Grid infrastructure;
- Reforestation and sustainable agriculture; and
- Climate-resilient infrastructure.

How the Accelerator Works

The Accelerator will operate financially like any other nonprofit loan fund, using an initial deposit of equity-like capital from Congress to do three things—pay for initial start-up operating costs, finance clean energy projects, and serve as the reserve against which the Accelerator raises further capital by issuing debt (without the full faith and credit of the U.S. government). The Accelerator will have wide flexibility to use a range of financial tools. This includes long-term debt, subordinated debt, loan loss reserves, and loan guarantees, as well as more innovative commercial arrangements in which funds are provided for projects in exchange for delivering certain climate, economic or social justice outcomes.

The Accelerator's key investment considerations are:

- Greenhouse gas emissions reductions;
- Job creation;
- Savings and benefits delivered to end-users; and
- Economic and social benefits directed to disadvantaged communities.

Beyond these objectives, the Accelerator has a specific mandate that 40 percent of the investment caused by Accelerator deployment must be located in disadvantaged communities. This includes, for example, communities suffering high energy burdens, or communities with the highest rates of childhood asthma, or energy communities suffering economic damage due to the clean energy transition—all focus areas of the Rewiring Communities program. Indeed, a history of disinvestment in many communities that members of these communities face, including health risks and unequal energy burdens. This focus on disadvantaged communities builds on the existing track-record of state and local green banks creating innovative products with the express purpose of increasing access and increasing penetration of the clean energy technology market in traditionally underserved communities, especially low-income and minority communities.



Avg. Energy Burden (% income)

1%	2%	3%	4%	5%

Map 4: The average energy burden as a percentage of household income per the Department of Energy's Office of Energy Efficiency and Renewable Energy Low-Income Energy Affordability Data (LEAD) tool. The map uses data from the U.S. Census Bureau's American Community Survey 2018 Public Use Microdata Samples.

Asthma attacks per 10,000 children



Map 5: The Clean Air Task Force's 2016 report, Gasping for Breath: An Analysis of the Health Effects from Ozone Pollution from the Oil and Gas Industry, identified that the asthma attack risk was highest for children who lived in counties near oil and gas pollution sources.





Map 6: The <u>2021 Initial Report to the President on Empowering Workers Through Revitalizing Energy</u> <u>Communities</u> by the Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization mapped regions with concentrated fossil energy employment, per the Bureau of Labor Statistics, that were most vulnerable to job loss. State and local green banks have already shown the importance of local institutions delivering tailored finance solutions to meet local needs for low-income and underserved populations. For example, the Florida Solar and Energy Loan Fund, SELF, is a Florida-based green bank that is unique because it is the only certified Community Development Finance Institutions (CDFI) green bank. This means it is nearly solely focused on serving low-income and low-credit populations. SELF offers financial solutions tailored for the needs of low-income and unbanked households. This includes low-interest rate and long-term financing for comprehensive home upgrades meant to lower high electricity bills caused by nearly year-round air conditioning. And importantly, the financing covers the cost of roof upgrades, which are essential to both hurricane resilience and rooftop solar installation. The net result is that overall household expenses are reduced, even including the loan repayment, because the increased home resilience lowers insurance premiums.

Low-Income Household Electrification through the Accelerator

A green bank model, expanded nationally through the Accelerator, is an ideal vehicle for delivering household electrification for families in low-income and disadvantaged communities. Solutions must be tailored to local community needs and conditions. These are needs that traditional underwriting or financing structures will likely not be able to meet. Success will also require the flexibility to bring in grants and subsidies as well as a high level of coordination among contractors, program administrators, and installers to produce a seamless, low-stress experience for the household. The Accelerator is also able to coordinate and bring to the table other available federal, state, and local housing upgrade resources. Lastly, a winning approach must include investment and support for new business job creation in a local community so there is enough installation capacity to meaningfully penetrate the market opportunity. That is precisely what the Rewiring Communities program, in partnership with the Accelerator, is designed to do.

The Rewiring Communities Program

The core mission of Rewiring Communities is to leverage the resources and flexibility of the Accelerator to drive coordinated local action to bring electrification to those communities (and the households within them) that are best positioned to realize its benefits. The idea is to go beyond simply providing consumers with financial incentives, but to make electrification affordable and painless for household decisionmakers "at the kitchen table." Upon launch, the project would immediately commence a pilot program (the "Pilot") aimed at approximately 60 communities, both rural and urban, in all regions of the country where meaningful opportunities for household savings exist, particularly with respect to LMI households. The goal would be to work with these communities to drive results and establish best practices. Initial analysis suggests that a \$10 billion Pilot could reach over 1.3 million households—of which over 1 million would be LMI—and produce yearly savings, inclusive of energy bill savings and financing cost savings, of up to \$750 for LMI participants relative to non-electrification options. Over 90 percent of invested funds would benefit LMI households, generating approximately 79,000 direct and indirect jobs, and reducing emissions in those communities by an estimated 4.3 million metric tons annually.¹⁴

Each community—at both the Pilot stage and beyond—would develop a proposed Rewiring Plan that lays out that community's electrification strategy and funding request. While the specifics will differ by community, relevant factors include:

- The potential for electrification in that community, including for lower income families;
- A roadmap for driving adoption, including identifying an accountable lead entity;
- Anticipated uptake and household savings rates, again identifying opportunities for lower income households;
- Workforce training, placement, and transition plans;
- Initiatives to streamline regulatory and compliance requirements to drive down cost and other burdens to maximize uptake;
- A system for tracking and measuring outcomes and distributions of benefits to ensure consistency with program goals and mechanisms for adjusting program elements as needed to meet community needs;
- The roles and contributions of community partners, such as governmental, private sector, labor groups, utilities, contractor/distributors, housing and economic development groups, community organizations; and
- The intended use of requested resources.

Communities would be selected for participation in the program based on overall prospects for success in delivering benefits, with attention to factors such as: 1) how compelling their outcomes are likely to be in terms of number of households helped, quantity and quality of benefits to be delivered, and cost-effectiveness; and 2) likelihood of successful execution, including evidence of local support, strength of partnerships, and effective governance and management. Support levels could also be adjusted to address variations in heating demand, electricity rates, and other factors in various areas across the country. The program would take into account macro factors such as participation from all regions of the country and from different types of communities (urban, rural, suburban, etc.) as well as diversity with respect to energy profile and housing circumstances.

PROGRAM SUPPORT

Support under the Program will necessarily depend on the specific needs and circumstances of participating communities. It is expected generally, however, to fall into four categories:

Category 1: Direct Assistance to Households

Direct assistance refers to direct grants and rebates to households to help them overcome the typically higher upfront costs of these critical electric appliances. To be most effective, this assistance needs to be available to households at the point of transaction-meaning that they need to result in immediate cost reductions from the retailer, distributor, and/or contractor "off the top." Asking households—particularly LMI households—to go out of pocket and take a leap of faith that they will get money back later on is a surefire way to dampen participation.

Direct assistance measures should also be designed at a minimum to bring the cost of electric appliances to parity with their fossil fuel counterparts. So, for instance,

²⁴ As with the illustrative nationwide model discussed earlier, this analysis assumes that participating LMI households would receive a one-time grant from program funds or through other means to cover the projected difference on average between the cost of new heat-pump technology (and related household infrastructure upgrades) and the replacement cost of existing equipment. It also assumes those households would receive interest-free financing for the projected balance. Non-LMI homes are assumed to have access to subsidized financing of 2.9% for such costs, but no other assistance.

if it would cost the average household in a particular community 25 percent more to purchase and install an electric heat pump than it would to replace the existing furnace with another fossil machine, the grant program for that community should at least bring those two numbers into parity such that there would be no additional out-of-pocket costs to the average household for "going electric."

Moreover, because the benefits of electrification to LMI households are especially compelling, increased direct assistance to these families may make sense in particular circumstances. These are the households that are most regressively affected by energy costs and that have disproportionately suffered the health and other effects of fossil fuels. They are also households for whom financing and other means of addressing capital projects of this sort are often not readily available. Helping them more directly electrify will have multiple beneficial effects at both the household and societal levels.

Category 2: Accelerating Finance

While direct assistance will help bring heat pumps into cost parity with alternatives, driving uptake will still require making easy, cost-effective financing available in many instances. Replacing household equipment—fossil or electric—is expensive and, absent additional help, many cash-strapped families may choose to stick it out with old, dirty machines well beyond when they should be replaced. Financing can help households realize energy-bill savings on Day One, rather than having to "spend now to save later."

As with "Direct Assistance," success here will entail making appropriate finance available (through the contractor, distributor, or other intermediary) at the "point of transaction." Likewise, because the benefits of electrification to LMI households are particularly compelling, the nature of the financing assistance should be matched to household circumstances.

The nation's expanding network of green banks is especially well-positioned to spearhead these efforts. In addition to providing capital and streamlining processes, green banks can help forge partnerships with contractors and distributors, facilitate cooperation with local governments around potential PACE or Community Choice Aggregation strategies, promote the availability of on-bill financing and/or recovery, partner with local CDFIs and other community credit providers, including conventional banks, mission-aligned specialty finance entities, and others.

Category 3: Delivering the Jobs/Empowering the Workforce

Electrification presents the opportunity for enormous job creation. Delivering these jobs to local communities will require, among other things, a sufficiently capable entity in each community to oversee the recruitment, training, certification, and placement of local workers as well as funding for these efforts. It will also require effective partnerships with entities best-positioned to ensure success—labor unions and their training organizations, local economic development entities, community-based organizations connected to the local residents, just-transition groups, contractors and installers who know what skills are required, and equipment suppliers who organize certification on their product lines. Measures to ensure that, to the extent practicable, job and business creation stays in the communities most affected will also be critical.

Category 4: Enhancing Capacity in Frontline Communities

The existing market for replacing and upgrading household equipment is fragmented, hindering uptake and limiting benefits. A key element of overall success will be identifying effective local entities (enhanced by effective partnerships) capable of and accountable for ensuring that "the parts work together." In particular, it means identifying and empowering trusted community resources to:

- Provide households with the most understandable, suitable, and sensible proposals across available programs;
- Provide necessary assistance and advice to families, both on technical matters and in navigating administrative processes;
- Assure quality work;
- Track performance and ensuring that benefits are truly delivered where they are intended to go; and
- Initiate local (and state) policies that reduce costs and boost electrification, such as streamlined regulatory requirements, optimized codes and standards, modernized utility rate and operating practices (including on-bill finance and recovery), and the like.

ADDITIONAL CONSIDERATIONS

Other measures beyond these core components may be appropriate for particular communities as well. For example, depending on the building stock, it may make sense for some communities to include in their Rewiring programs weatherization initiatives and/or health and safety upgrades to maximize the environmental and economic benefits of going electric and/or other work to make certain households "electrification ready." For some of these initiatives, additional federal or state support may be available (for instance, through the U.S. Department of Energy's Weatherization Assistance Program (WAP)).

The Rewiring Communities program can also advance local efforts by utilizing data and analytics to develop tools and other resources to assist with program design and execution. For example, in addition to more traditional methods like conferences, publications, and other information sharing, the program could develop software tools and cell phone applications to help communities and consumers:

- Track program metrics (funds disbursed, installations verified, jobs placed, benefits delivered);
- Enable customers to get the best value and energy, comfort, and health benefits from installations, and to plan for the most sensible future replacements upgrades;
- Target the right solution package to each potential customer, with well-informed predictions about resulting benefits; and
- Streamline the administrative process and minimize complexity and friction for families and service providers.

STANDING ON SHOULDERS

Rewiring Communities connects significant resources to local strategies to unlock the climate and economic benefits of electrification. And, while specific Rewiring programs will be geared to the needs of their communities, there are meaningful— and inspiring—lessons to be learned from entities already operating in this space. A few include:

Elevate Energy

Elevate, which operates mostly in greater Chicago, Madison, and Detroit, connects building owners and managers to building energy solutions that save money and preserve affordable housing. Elevate is community-focused and ensures effective access and quality of work through partnerships and technical assistance to deliver benefits, especially to front-line communities. In 2020, Elevate retrofitted more than 500 buildings, deployed 8.5 GWh of solar for LMI households, achieved \$6.5 million in bill savings, and graduated and placed 42 new workers from training programs.

Elevate Energy works by, among other things:

- Optimizing building codes, both existing and new;
- Directing incentives and mandates to key decision moments, such as appliance replacement;
- Developing flexible financing;
- Engaging communities through trusted and effective entities and developing partnerships to do the work—including with utilities, housing agencies, WAP contractors, and community-based organizations; and
- Identifying community members for training and job placement.

BlocPower

BlocPower works to retrofit buildings in underserved communities in order to decrease energy consumption and financial strain, ensuring that the economic and health benefits of clean energy are realized. BlocPower partners with city, state, and Federal governments, utilities, tech companies, corporations, nonprofits, and financial institutions to take on these issues.

Examples of BlocPower programs include "Green the Bronx" that reduces asthma and fossil fuel use in 1000 buildings in the Bronx, "Green Brooklyn" that greens 500 multifamily buildings in Brooklyn, and partnerships with religious organizations, including Metro IAF (an interfaith coalition) in Baltimore, Cincinnati, downstate New York, Washington DC, and Virginia. Each of these initiatives include an intentional focus on local impact, through hiring construction managers, local firms/start-ups, and local community members to install the energy retrofits. BlocPower works by, among other things:

- Engaging with community leaders and institutions to identify buildings (from houses of worship to small businesses to residences) with high energy use in financially underserved and environmentally burdened communities;
- Developing financially and technically sound solutions to reduce energy consumption and spend;
- Organizing funding and finance rooted in energy bill savings resulting from retrofits; and
- Creating jobs through a focus on rigorous training and placement, and on the development of the ecosystem of local business and service providers.

BlocPower principally works in greater New York City, Atlanta, Baltimore, Milwaukee, Oakland, and Philadelphia.

The Connecticut Green Bank

The Connecticut Green Bank is a state agency, established to deploy public funds to scale-up and mobilize private capital investment in the green economy of Connecticut and to strengthen Connecticut's communities, especially its most vulnerable.

The Connecticut Green Bank deploys a comprehensive and integrated suite of incentives and finance offerings, including rebates and grants, for investments across solar, energy efficiency, and electrification. Financing programs take the form of loans or similar instruments that anticipate repayment and enable the "recycling" and mobilization of capital for further mission-aligned deployment.

Among its various initiatives, two partnerships are especially noteworthy. First, "Solar for All" is a partnership between the Connecticut Green Bank and PosiGen to bring solar and energy efficiency to underserved communities across the state. The Connecticut Green Bank developed an innovative solar finance lease product combined with an energy savings agreement that would specifically be offered to low-income and/or low-credit households. The product used non-traditional underwriting criteria, looking at utility-bill payment history rather than credit score. It offers homeowners a no-money-down, no-credit-required solar lease and energy efficiency upgrades to reduce the burden of Connecticut's high energy costs. PosiGen then took on the role of reaching lower-income households, with a community-

driven campaign. The result has been higher adoption of rooftop solar and energy upgrades for low-income families, producing savings of several hundred dollars per month on energy bills in a state with some of the highest power costs in the country.

Second, in partnership with the Kresge Foundation, the Connecticut Green Bank in 2018 formed a nonprofit organization called Inclusive Prosperity Capital (IPC) to attract mission-oriented investors in underserved clean energy market segments (e.g., LMI single and multifamily properties) of the green economy.

A Case Study: Atlanta

What might a Rewiring Communities program look like on the ground? Consider Fulton County, Georgia, home to the City of Atlanta, a prime candidate for participation. There are approximately 411,000 households in Fulton County, with a little over 195,000 of them within the definition of LMI. Of those 411,000 total households, almost 75 percent (or 303,000 in total) would immediately save a total of \$99 million a year on their energy bills if they switched to heat pumps for space and/or water heating. Of those, 160,300 LMI households—over 80 percent of all LMI households in the county—would realize total annual energy bill savings of \$52 million a year, just for switching out these two household functions.

As in most communities around the country, though, households in Atlanta looking to electrify face obstacles. For one thing, replacing existing equipment with electric heat pumps would cost the average household around \$12,000 in total, or almost \$2,500 more than it would cost to replace that same equipment in kind. To the extent that a house also needed to upgrade its breaker box to accommodate the new electricity load, that could add up to another \$4,000 on top. Most families simply do not have that much excess cash to spend. That's why the type of financial support the Accelerator can provide is critical.

The other challenge is organizational. There is no "one-stop shopping" available for families looking to go electric and few contractors are familiar with heat pumps and/or confident in recommending them. Georgia Power offers a Home Energy Improvement Program, but participation rates remain low, and in many instances families face regulatory and compliance requirements that hinder adoption.

REWIRING COMMUNITIES

Fortunately, Atlanta has a number of trusted community organizations and potential partners that, with support and coordination, could streamline processes and drive uptake. For instance, the Partnership for Southern Equity, a racial equity organization, convenes the Just Energy Circle (JEC). Utilized as a framework for mobilizing advocacy around energy equity issues, the JEC represents an ecosystem of neighborhood leaders, frontline communities, subject-matter experts, faith-based and civil rights groups, youth leaders, and academia organizing together to engage marginalized communities around the benefits and burdens of electricity production and consumption in Georgia. PSE and the JEC also anchor the City of Atlanta's Clean Energy Advisory Board, focused on advancing a 100% Clean Energy implementation plan rooted in equity.Atlanta's Mayor's office and representatives from Georgia Power, Atlanta's utility, sit on the Clean Energy Advisory Board as well. PSE also works closely with labor groups through partners such as the Georgia Coalition for the People's Agenda. They are working with the Atlanta Housing Authority, in coordination with the Solar Energy Loan Fund, to bring financing tools to Atlanta's LMI population.

Rewiring Communities is designed to bring together both the direct financial support families in places like Atlanta need and organizational and convening resources to let trusted community grounds like PSE and JEC organize and drive uptake. A successful Rewiring Communities program will not only identify a meaningful number of potentially "in the money" households, but will incorporate stakeholders, like those already at work in Atlanta, in a coordinated and strategic fashion.

Putting it all Together

Combatting climate change is arguably the defining challenge of our time. That does not mean, however, that addressing it has to come at the expense of other important social goals, such as putting money back in American pockets, improving the health of America's children, and creating job opportunities. A national commitment to household electrification offers the chance to do all of these things in significant ways, with those who have historically suffered the most reaping the lion's share of the benefits.

Turning that opportunity into a reality will require both meaningful investment and a strategic approach to organize and optimize a fragmented and diffuse market. By engaging local communities and utilizing the resources and flexibility of the Accelerator, the Rewiring Communities program is designed to do just that. It is also intended to lay the groundwork for widespread electrification across the country through demonstrating proof of concept, identifying best practices, and building the tools that will accelerate progress. And, while some may consider the level of necessary investment a potential obstacle to action, the reality is that, as with all things worth doing, the cost of inaction is far greater.

ABOUT US



The Coalition for Green Capital (CGC) works to halt climate change by accelerating investment in clean energy solutions. CGC achieves this by advocating for, creating and implementing green bank finance institutions. Green banks use public funds to mobilize private investment in clean power and decarbonization technologies. For over a decade, CGC has led the green bank movement, working at the federal, state and local level in the U.S. and in countries around the world. https://coalitionforgreencapital.com



Rewiring America Rewiring America is a growing nonprofit, working to launch a movement that electrifies everything, starting with our 121 million households. We are motivated by the fact that 90 percent of all emissions in the U.S. are energy related and 42 percent of those energy emissions come from the decisions we make in our homes: how we heat our air and water, cook our food, and dry our clothes, and what kind of cars we drive. Through accurate, accessible, and actionable data and storytelling tools that power smart, inclusive advocacy and market-transforming partnerships, Rewiring America aims to achieve national emissions goals, improve our health, lower monthly bills, and create millions of clean energy jobs. Join us at https://www.rewiringamerica.org and @rewiringamerica.