

Electrify My Government

How a federal government-wide electrification campaign will meet our emissions goals

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About Rewiring America

Rewiring America is the leading electrification nonprofit working to electrify our homes, businesses and communities.

Table of Contents

Executive Summary	04	⚡ Action 8	36
Introduction	07	Encourage electrification through supply chain and reporting requirements	
<hr/>			
⚡ Action 1	09	⚡ Action 9	40
Electrify federal buildings and vehicle fleets		Grow and train the electric workforce	
<hr/>			
⚡ Action 2	13	Appendix A	43
Incorporate electrification into federal home retrofit programs		Agency by Agency Recommendations	
⚡ Action 3	17	Appendix B	54
Electrify public and assisted housing units		Department of Defense Recommendations	
⚡ Action 4	21	Appendix C	55
Fund only all-electric new construction and disaster relief		Purchasing Power & Scale in Federal Buildings	
⚡ Action 5	24	Appendix D	56
Package every federally guaranteed mortgage with a loan for electrification		Resources for All-Electric Retrofits of Commercial Buildings	
⚡ Action 6	28	Appendix E	57
Electrify federally funded schools and businesses		Methodology	
⚡ Action 7	32		
Implement aggressive standards for appliances, buildings & vehicles			

Executive Summary

The Inflation Reduction Act (IRA) is the largest climate bill in U.S. history. It will get the U.S. much closer to our climate goals, reducing greenhouse gas pollution by one billion metric tons from current levels.

But there remains a 500 million metric ton gap between what the IRA can achieve and President Biden's net-zero-aligned target of reducing U.S. greenhouse gas pollution 50 to 52 percent below 2005 levels by 2030. **The federal government has significant leverage to help close this gap.**

In this report, we show that a federal government-wide electrification campaign can close the gap between the IRA and net zero by at least two-thirds. This campaign is two-fold: it must educate every American on the electrification benefits available to them through the IRA, and it must direct existing government programs and resources toward electrification.

First, the success of the IRA depends on educating every American about their new federally provided electric bank account—the amount of money

available to them as rebates, tax incentives and low-cost financing to purchase and install emissions-free home heating and cooling, household appliances, electric vehicles and chargers, solar energy, and battery storage. Many of the programs within the IRA scale with a community's ambition, and have the potential to outperform Congressional Budget Office uptake estimates. The IRA could provide up to \$858 billion in residential electrification benefits. The federal government must provide the education and outreach necessary for the IRA to meet its full electric potential.

Second, a federal electrification campaign should include transforming the market through electrifying federally owned buildings and vehicles, and improving existing federal programs to accelerate electrification across the U.S. economy.



In this report, Rewiring America, the nation's leading nonprofit focused on electrifying everything in our communities, details nine specific actions that the government can take to accelerate electrification, all within the current authority of federal agencies:

In order to execute against this strategy, we recommend that President Biden name a National Electrification Advisor, marshaling the convening and aligning power of the White House to:

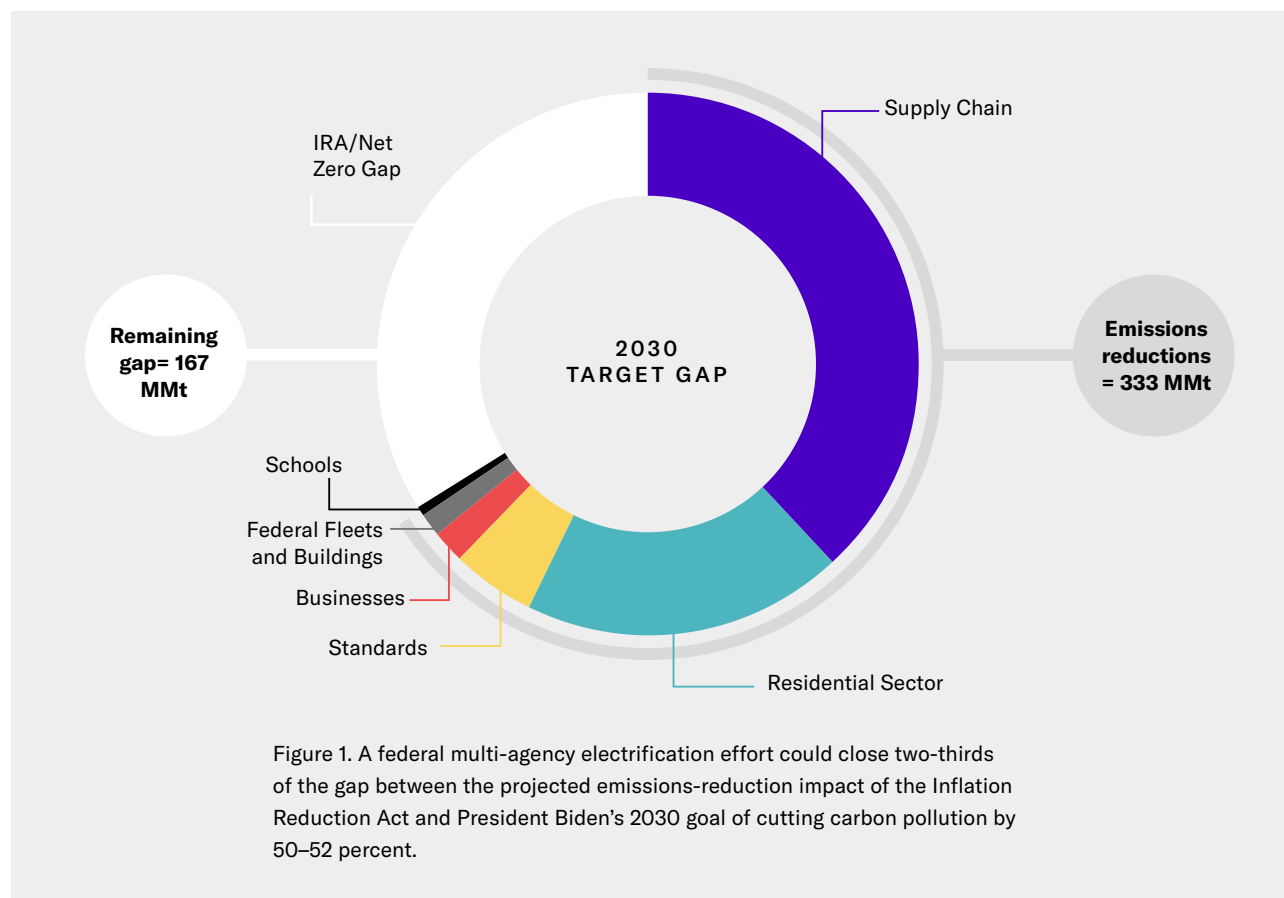
1

Successfully facilitate the education of the American people on their “electric bank accounts” via the IRA.

2

Relentlessly coordinate the interagency, government-wide approach outlined below that will get us much closer to our climate goals.

Together, these efforts will allow the U.S. to cut an additional 333 million metric tons of carbon pollution by 2030, narrowing the gap to meeting the President’s goal to 167 million metric tons (Figure 1). If local and state governments follow the example set by this government-wide electrification campaign, the gap between the Inflation Reduction Act and net-zero could be closed completely.



Introduction

The federal government is the largest single landowner, vehicle fleet owner and purchaser in the nation.

In every community in the U.S., the federal government owns and operates buildings and vehicles—U.S. Postal Service delivery trucks, federal court-houses, and military bases—and helps American people—underwriting their mortgages, funding public housing and housing retrofits and supporting schools and small businesses. This represents immense power, and immense responsibility, to act on the climate crisis.

Recognizing this power, President Biden’s Executive Order 14008 promised that the government would “organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy.” We join a chorus of organizations calling on the federal government to fulfill this promise.¹ Further, we call on the federal government to put electrification at the center of a government-wide approach to decarbonization—as electrifying everything will create jobs, clean up our air, save people money and fight the climate crisis.

A federal multi-agency electrification campaign must include two key components: maximizing the uptake of the appliance and vehicle incentives, or the “electric potential” of the Inflation Reduction Act

(IRA), and mobilizing existing federal programs and resources to support electrification. We recommend that this campaign be coordinated by a National Electrification Advisor at the White House.

First, the government must ensure that information about the IRA reaches every American household or residential property owner who could possibly benefit. The IRA contains \$858 billion in potential residential electrification benefits—but only if all eligible households know how to access those dollars. In partnership with civic, cultural and private sector leaders, the federal government should undertake a massive education and outreach campaign to tell every American about their new electric bank account so that the uptake of IRA incentives far exceeds projections. These are policies that Americans overwhelmingly support; they just need to know that they are available and how to access them.

Second, the government must mobilize existing programs and resources to support electrification. In this report, we focus on nine specific actions that the federal government can take to accelerate electrification. Many of these actions involve direct outreach to American households through home

¹This includes studies from the Information Technology and Innovation Foundation and the Center on Global Energy Policy on overhauling the energy system, from RMI and Resources for the Future on decarbonizing federal buildings, from McKinsey and Atlas Public Policy on federal vehicles, and from the World Economic Forum and Sierra Club cleaning up the government supply chain.

retrofit programs, public housing and mortgages, and these overlap with an education campaign. Other actions—such as strengthening appliance and vehicle standards, and rapidly electrifying federal buildings and fleets—go beyond the IRA to achieve additional carbon pollution reductions.

Our modeling provides evidence that a federal

multi-agency electrification effort can close two-thirds of the gap between the Inflation Reduction Act and federal net-zero targets while driving down the costs of electrification for everyone. The remaining one-third of the gap—170 million metric tons—is a much narrower one for state and local governments to fill with additional electrification efforts that follow the lead of the federal government.



WHY ELECTRIFICATION?

Nearly half of energy-related carbon pollution in the U.S. comes from directly burning fossil fuels in our buildings and vehicles, not just burning coal or fossil gas in power plants to make electricity. Fortunately, we already know how to make clean, cheap electricity from renewable sources like the sun and the wind. To run our entire economy on this clean electricity and stop burning fossil fuels, **we need to electrify everything**. Electrification means replacing fossil appliances with clean, efficient electric alternatives: swapping gas-powered furnaces for electric heat pumps, gas stoves for induction stoves and gas-powered water heaters for heat pump water heaters. **As we electrify, and as our electricity gets cleaner, we get closer to net-zero and to stopping the climate crisis.**

Action 1



Electrify federal buildings and vehicle fleets

IMPACT

The federal government alone emits over 40 million metric tons of greenhouse gasses each year—equal to almost 1 percent of the 5.5 billion metric tons emitted across the U.S. economy. The federal government is also the single largest energy consumer in the nation, using more energy than any large corporation.² Half of federal greenhouse gas pollution comes from direct combustion of fossil fuels in buildings and vehicles—the “mini fossil fuel plants” that operate in homes, businesses, cars, and trucks across the country.

With access to low-cost capital, a large and varied building portfolio and vehicle fleet, and the ability to drive down costs with procurement at scale, the federal government is well-positioned to jump-start decarbonization in the U.S. by electrifying its own operations. Our modeling shows that electrification of buildings and vehicles would allow the government to reach net-zero direct carbon pollution by 2050. Without federal electrification, net zero is out of reach.

DIRECT EMISSIONS

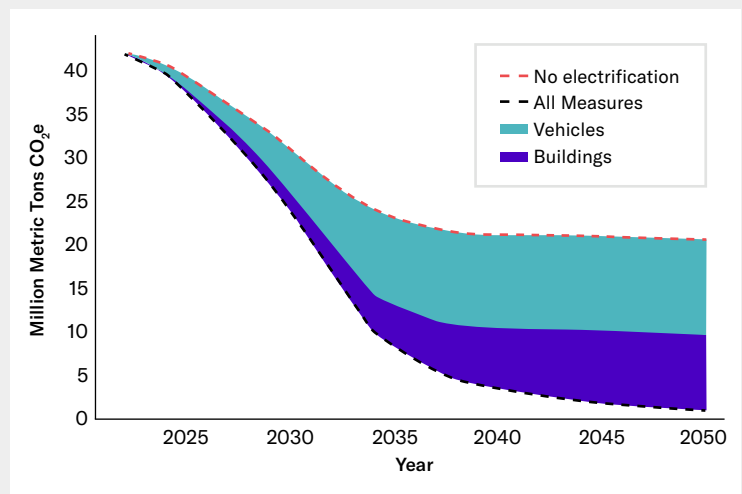


Figure 2. Modeled carbon pollution from federal buildings & vehicles with and without electrification of end uses. Electrification reduces carbon pollution by 7 MMT in 2030, and 19 MMT in 2050. We modeled the potential impact of reaching zero-emissions vehicles by 2035, in line with the more aggressive target that we propose, and zero-emissions buildings by 2045, in line with the target in Executive Order 14057.

² For comparison, [Walmart's greenhouse gas emissions](#) and [Amazon's greenhouse gas emissions](#) are each around 15 million metric tons, about one third of the federal total.

In December 2021, the federal government pledged in Executive Order 14057³ to achieve net-zero buildings by 2045 and 100 percent zero-emissions vehicle acquisitions by 2035. If federal agencies electrified their own buildings and vehicles following the targets that we propose, they could reduce U.S. greenhouse gas pollution by 7 million metric tons in 2030—equivalent to taking over 1 million cars off the road (Figure 2). This action alone would eliminate 1 percent of the gap between the carbon pollution reductions of the Inflation Reduction Act and the President’s net-zero-aligned target.

RECOMMENDATIONS

Match the U.S. Army’s goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035

[COUNCIL ON ENVIRONMENTAL QUALITY (CEQ), GENERAL SERVICES ADMINISTRATION (GSA), ALL]

The federal government operates the largest vehicle fleet in the U.S., with over 650,000 vehicles.⁴ As of 2021, less than 1 percent of the federal fleet (a mere 3,000 vehicles) is electric. More than 8 percent of California’s state vehicle fleet is electric; the federal government can and must do better.

Executive Order 14057 targets 100 percent acquisition of zero-emission vehicles by 2035, and 100 percent acquisition of zero-emission light duty vehicles by 2027. But the Army Climate Strategy has an even more ambitious goal, targeting a zero-emissions non-tactical vehicle fleet by 2035, and a zero-emissions light duty fleet by 2027. The federal government should extend the Army’s commitment to all federal vehicles, and should follow the Army’s lead in requiring acquisition of “all-electric [vehicles] first, hybrids when electric solutions are not commercially available, and conventional gas vehicles by exception only.”

Meeting federal carbon pollution goals will require federal agencies to purchase 30,000 zero-emissions

FEDERAL VEHICLE INVENTORY

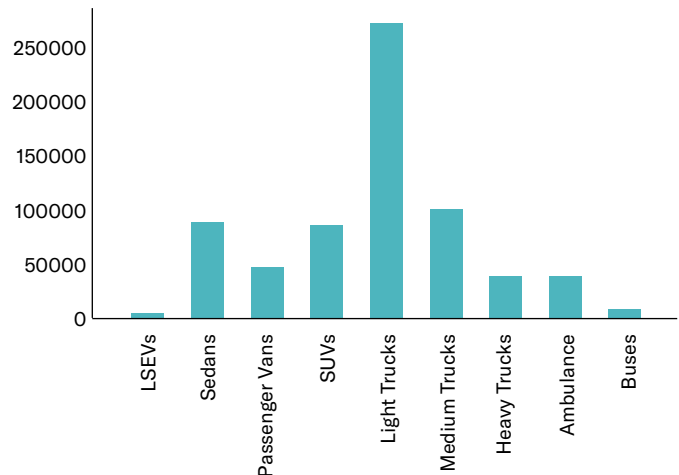


Figure 3. Federal vehicle inventory across all agencies. LSEV = low-speed electric vehicle (e.g. an electric golf cart)

VEHICLE INVENTORY

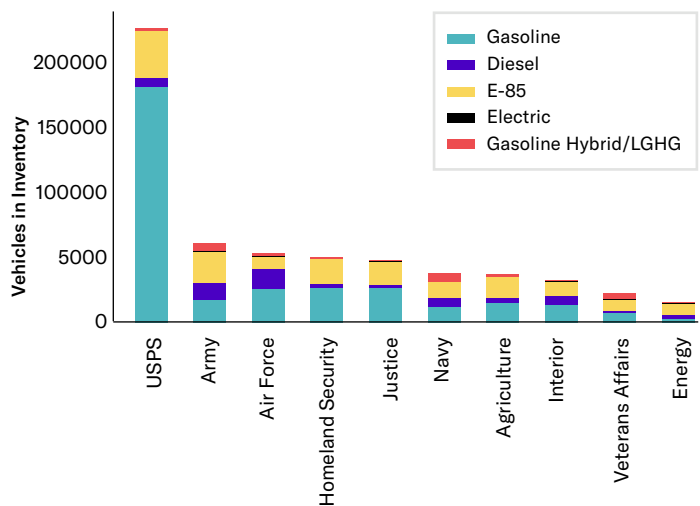


Figure 4. Vehicles in the federal fleet, by fuel type and by agency.

vehicles each year—adding ten times more zero-emissions vehicles each year than are currently in the federal fleet. There is no room for further delay. All new vehicles should be electric where electric options exist.

Electrification of the federal vehicle fleet will require electric alternatives across a spectrum of vehicle types, from sedans to buses (Figure 3). The majority are light-duty trucks, mostly U.S. Postal Service

³ Biden released Executive Order 14057 and an accompanying Federal Sustainability Plan in December 2021.

⁴ For comparison, Amazon has 400,000 drivers across the entire world.

(USPS) delivery vehicles (Figure 4). USPS recently released a plan to purchase 165,000 delivery vehicles—nearly enough to replace its entire fleet. Only 40 percent are slated to be electric; USPS should increase this to 100 percent. The average age of a USPS delivery vehicle is 22 years, so purchasing fossil gas vehicles locks in pollution for decades.

Lead the way on all-electric retrofits of commercial buildings (CEQ, GSA, ALL)

With more than 320,000 buildings totaling over three billion square feet of floor space, the federal government is the single largest landowner in the U.S.⁵ Electrification of end uses, particularly space and water heating, will be key to reaching the Executive Order 14057 target of net-zero emissions buildings by 2045.

The federal government owns or leases 5 percent of the 6 million total commercial buildings in the United States, so any action it takes will have significant implications for the commercial building sector writ large. Civilian agencies alone control 115,000 of the 5 million space heating machines that must be replaced with clean, efficient, electric alternatives (Appendix C). There are not many examples of all-electric commercial building retrofits in the U.S. today, so this presents a perfect opportunity for federal innovation and leadership.

In December 2022, the federal government released a Federal Building Performance Standard as previously required by Executive Order 14057, which “requires agencies to cut energy use and electrify equipment and appliances to achieve zero scope 1 emissions in 30 percent of their buildings by square footage by 2030.” The Department of Energy (DOE) concurrently proposed a rulemaking that will “require equipment and appliance electrification in new Federal buildings as well as Federal buildings undertaking major renovations.” We applaud these efforts as an impactful start to the federal government’s efforts to lead the way on electrification.

We recommend that all federal agencies follow a process for electrifying their building portfolio to be determined by the Director for Federal Facility

ENERGY USE IN BUILDINGS

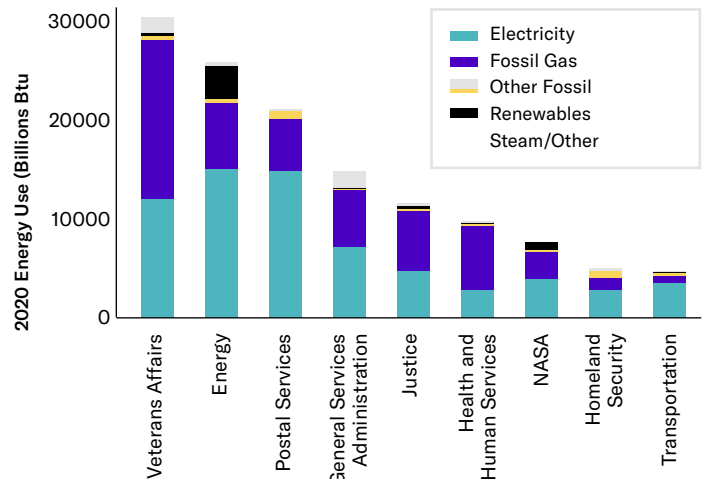


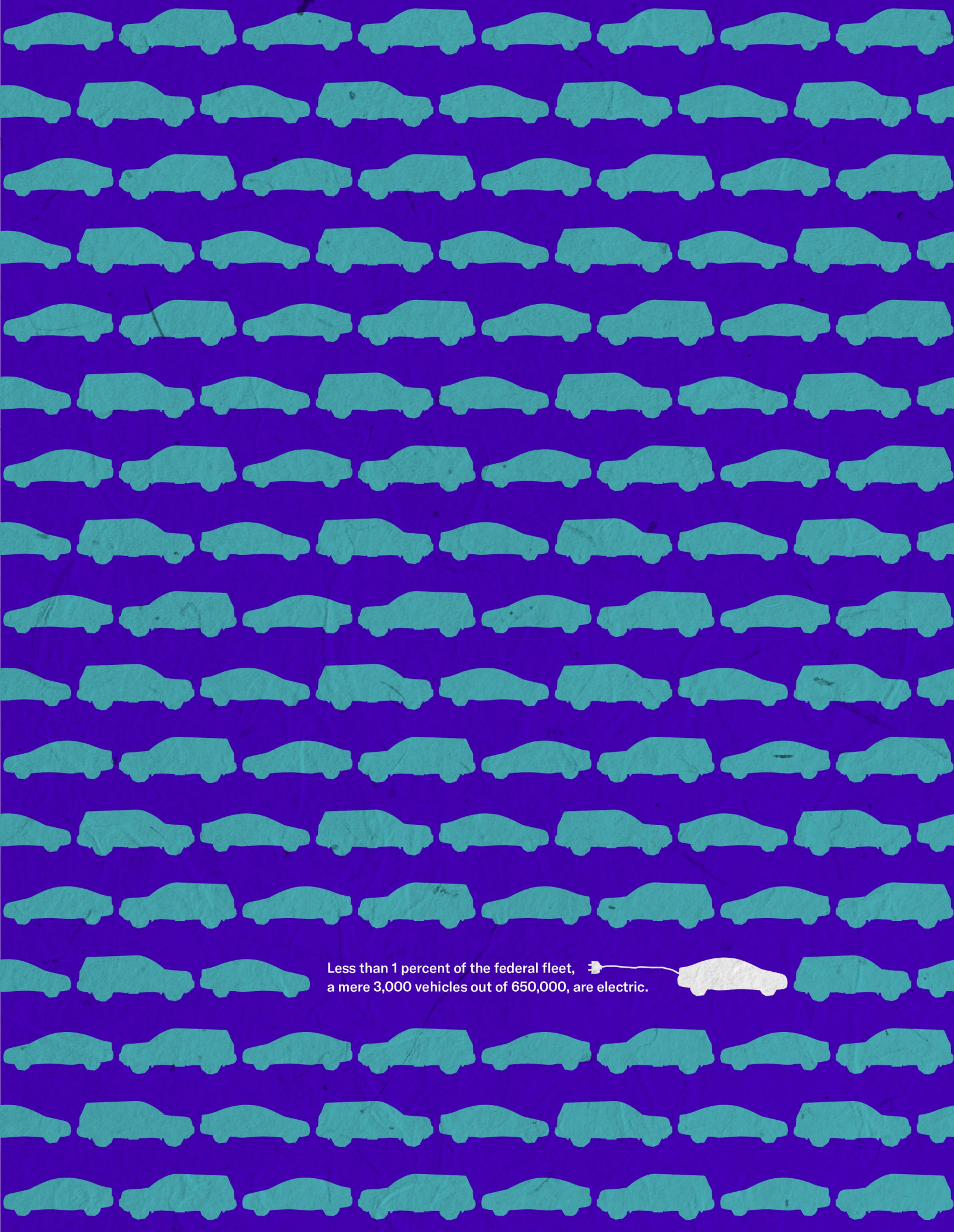
Figure 5. Energy use in federal buildings, by fuel type and by agency. The Department of Defense is excluded from this plot since its energy use far exceeds that of other agencies.


Decarbonization at CEQ. This process should include gathering portfolio-level building data, then making a plan to electrify each building when the HVAC equipment reaches end-of-life or during the next planned renovation. Resources for electrifying commercial buildings are included in Appendix D.

The federal government also leases a large portion of its office space. The federal government should lean into its leadership in the commercial buildings sector and make an aggressive commitment to only lease fully electrified buildings starting in 2030. This would have a catalytic effect on the commercial building sector overall, as many federal offices are in multi-tenant buildings. It would also provide momentum for companies across the country to follow suit, catalyzing market transformation in leased commercial buildings.

The two agencies with the highest energy use in buildings are the Department of Veterans Affairs (VA)—which owns a number of energy-intensive hospitals—and the Department of Energy (DOE)—which owns a number of national labs and data centers (Figure 5). We discuss specific recommendations for these agencies and others in the agency-specific tear sheets in Appendix A. We include a set of tailored recommendations for the Department of Defense (DoD) in Appendix B, as it uses the most energy of any agency.

⁵The building square footage alone—not including the land owned by the federal government—sums up to an area about two-thirds the size of Rhode Island.



Less than 1 percent of the federal fleet,  a mere 3,000 vehicles out of 650,000, are electric.

Action 2



Incorporate electrification into federal home retrofit programs

IMPACT

The federal government reaches close to 250,000 homes each year through home retrofit programs such as the Weatherization Assistance Program (WAP) and the Low Income Home Energy Assistance Program (LIHEAP). These programs provide a path to direct engagement with households around health and energy, so they represent an ideal channel for the government to communicate the benefits of electrification.

Retrofit programs are primarily targeted at low-income households who disproportionately experience high utility bills, poor air quality and increased vulnerability to extreme weather events. Two-thirds of low-income households have high energy burdens, meaning they spend more than 6 percent of their income on utility bills. Low-income communities are also exposed to higher levels of PM2.5 and other air pollutants, which can lead to adverse health outcomes. And low-income communities have less access to air conditioning, a disparity that is becoming more pressing as the climate crisis increases the frequency and severity of heat waves. All of these issues are

further exacerbated in Indigenous, Black and brown communities due to systemic disinvestment and environmental racism.

Electrification can mitigate all of these risks. When homes are weatherized and retrofitted with high-efficiency electric heat pumps, heat pump hot water heaters, induction stoves and other appliances, utility bills can be reduced. Unlike fossil fuel appliances including gas stoves, electric appliances do not emit dangerous pollutants inside the home. Heat pumps also provide both heating and cooling, so replacing a gas furnace with a heat pump in a home that does not currently have air conditioning delivers significant improvements to a household's comfort, health and resilience.

To reverse historic patterns of disinvestment and increasing income inequality, the federal government should first focus its electrification efforts on low-income communities and communities of color. The electrification rebates for low- and moderate-income households in the IRA will make this possible, and the federal government should ensure that those rebates are funneled

toward communities that need them most by coupling them with home retrofit programs.

If every federally funded home retrofit were coupled with electrification, **2 million low-income homes could be electrified between now and 2030**—equaling one percent of the U.S. housing stock. This would reduce carbon pollution by 3 million metric tons, making a meaningful dent in the 100 million metric ton gap between the Inflation Reduction Act and net zero, and improving the lives of millions of Americans (Figure 6).

RECOMMENDATIONS

Require fossil fuel appliances to be replaced with electric alternatives at end-of-life

[DOE, ENVIRONMENTAL PROTECTION AGENCY (EPA), HEALTH AND HUMAN SERVICES (HHS), INTERIOR, AGRICULTURE (USDA), HOUSING AND URBAN DEVELOPMENT (HUD)]

There are over a dozen retrofit programs across federal agencies that collectively reach more than 250,000 homes across the country each year. In all of these programs, any fossil fuel appliances that are replaced during a retrofit (furnaces, boilers, water heaters, stoves and dryers) should be replaced with electric alternatives. Federal agencies can tap into the electrification rebates in the IRA to fund electrification for low- and moderate-income households at the time of retrofit.

DOE's Weatherization Assistance Program (WAP) provides formula grants to states for weatherization of low-income homes to help reduce energy burdens and increase access to affordable energy. DOE's State Energy Program and Energy Efficiency Revolving Loan Fund, both broader programs, also received additional funding through the IRA.

HHS runs the Low Income Home Energy Assistance Program (LIHEAP), which provides assistance to low-income households to manage costs associated

RESIDENTIAL SECTOR EMISSIONS (LOW-INCOME HHs)

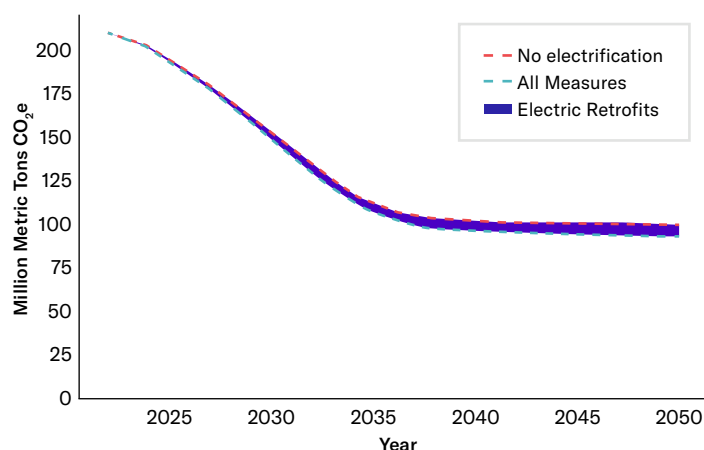


Figure 6. Coupling federal home retrofit programs with electrification reduces carbon pollution by 3 MMT in 2030, and 5 MMT in 2050. We model the potential impact if every home that receives a home retrofit electrifies (250,000 homes a year across all programs).

with home energy bills, weatherization and energy-related minor home repairs. Recent guidance includes installing air-source heat pumps that provide both heating and cooling among the ways that LIHEAP can be used to address extreme heat.

The Department of the Interior's Bureau of Indian Affairs (BIA) runs a Housing Improvement Program (HIP) to help low-income members of Native American Tribes living on Tribal lands repair or rehabilitate their homes. HIP can provide funds to improve the health and safety of a home, or to make sure a home is up to code. This program—as well as the other programs through the BIA mentioned in this report—should be expanded to benefit Indigenous communities as well as Tribes so that benefits can be extended to Native people who do not live on Tribal lands (e.g., Alaskan Native Villages).

USDA runs several home retrofit programs, including the Section 504 Single Family Home Very Low Income Repair Program, the Multi Family Housing Preservation & Revitalization Program, and the Energy Efficiency and Conservation Loan Program through its Rural Development mission area. Encouragingly, USDA's 2023 Congressional Budget Justification recommends that these retrofit programs be “targeted

to projects that improve energy or water efficiency, implement green features, including clean energy generation or **building electrification**, electric car charging station installations, or address climate resilience of properties” (emphasis ours).

HUD administers a variety of programs that can be used to support the rehabilitation of affordable housing, including the HOME program, Community Development Block Grant and Choice Neighborhoods Grant programs. HUD also administers programs through its Office of Lead Hazard Control and Healthy Homes, including the Lead Hazard Control program and the Aging in Place program. The 203(k) Rehabilitation Mortgage Insurance program can be used to help low-income homeowners repair or rehabilitate their single-family homes.

EPA manages the ENERGY STAR Home Upgrade (ESHU), a new initiative designed to increase awareness of efficient, electric products and provide a flexible framework for programs to leverage the brand recognition of ENERGY STAR. ESHU offers a mechanism around which programs can bundle incentives and a mechanism for addressing energy inequity in existing homes by defining an electrification bundle backed by the credibility of ENERGY STAR.

Following the lead of USDA, HUD and EPA, all agencies should specify that their retrofit programs can be used for home electrification. Evergreen Action’s National Roadmap for Clean Buildings outlines three steps for tailoring the Weatherization Assistance Program to electrification—replacing “fuel switching” with electrification, designating electric appliances as a health and safety benefit and modernizing the savings-to-investment ratio (SIR). Analogous steps exist for other retrofit programs. Electrical panel upgrades should also be included as an allowable cost for households that are replacing fossil fuel equipment with electric alternatives.

Require home retrofit auditors to develop an electrification plan for every household

(DOE, EPA, HHS, HUD, USDA)

Energy burden retrofit programs, such as DOE’s WAP program, HHS’ LIHEAP program and the USDA’s Energy Efficiency and Conservation Loan Program typically involve an energy audit. HUD’s health and safety programs, such as the Lead Hazard Control program and the Aging in Place program, typically involve a health and safety audit. Every audit provides an opportunity for a contractor to develop an electrification plan for the household. This plan should specify the order of operations for replacing equipment (e.g., which appliance is closest to end-of-life), necessary preparatory steps for electrification (e.g., upgrading electrical circuits), and recommended electric appliances, so that the household is prepared to electrify when the old appliances break. One model for this comes from the ENERGY STAR Home Upgrade program. The ESHU Declaration sheet provides a homeowner with a record of their electrification plan and recognition that they have completed or are on the path to complete an ENERGY STAR Home Upgrade. This helps ensure that homeowners have proper documentation and recognition of the improvements they have made in their home for tax or home resale purposes.

Assess indoor air pollution and associated health and safety risks from fossil fuel appliances

(HUD, INTERIOR)

HUD’s health and safety programs, as well as BIA’s HIP, are designed to eliminate acute threats to occupant health and safety in residential buildings, and typically involve an environmental assessment that identifies ways to improve the health and safety of the home. This audit can include remediating lead hazards as well as removing trip and fall hazards, but does not typically include assessments of pollution from fossil fuel appliances. To encourage electrification, these programs should assess indoor air pollution and associated health and safety risks from fossil fuel appliances and should require the installation of zero-emission electric appliances such as heat pumps and induction stoves.

Electrofitting
two million
homes
would
reduce
carbon
pollution
by three
million
metric tons.



Action 3



Electrify public & assisted housing units

IMPACT

More than 10 million Americans receive housing assistance from the federal government through programs such as public housing and rental assistance. If affordable housing is not prioritized for electrification, vulnerable communities will be left out of the health benefits and utility bill savings that can accrue from electrification and will be left to pay the rising costs of maintaining aging gas infrastructure as those costs are distributed among fewer customers. A recent report on decarbonizing affordable housing in Los Angeles suggests centering affordable housing in these efforts efforts: “Due to the complexity of the affordable housing sector, starting with and centering affordable housing will more easily include everyone.”

The federal government should center its public and assisted housing units in a government-wide approach to electrification, and provide sufficient funding to decarbonize while preserving affordability. The IRA—particularly the electrification rebates

and HUD’s Green & Resilient Retrofit Program—will help to jump-start this process.

HUD’s programs provide housing assistance to 10.2 million Americans in 4.4 million U.S. households. If the federal government were to electrify all public and assisted housing units between now and 2030, it would lead to a 6 million metric ton reduction in carbon pollution (Figure 7). 480,000 households a year and 3.8 million households total would be electrified by 2030.

We recognize that the lack of investment by Congress is one of the primary contributors to the current substandard conditions of public and, to a lesser extent, publicly assisted housing. Thus, while Congress may be needed in order for HUD to acquire the resources to holistically electrify its portfolio, HUD should utilize every tool in its toolbox, including our recommendations below, to take as much action as is possible without Congressional support.

RECOMMENDATIONS

Upgrade public housing with beneficial electrification (HUD)

The 4.4 million U.S. households in public and supported housing include 900,000 households who live in public housing, which is owned and managed by local public housing agencies but funded by the federal government through the Public Housing Capital Fund and the Public Housing Operating Fund.

A recent petition from 22 housing, public health, environmental justice, energy, and climate organizations, led by the Public Health Law Center and including Rewiring America, called on HUD to upgrade public housing with beneficial electrification. This petition calls on HUD to:

- (1)** revive the Green Physical Needs Assessment (“Green PNA”) rule requiring public housing authorities (“PHAs”) to generate forward-looking planning documents that identify modifications necessary to prepare for and mitigate against climate-related health risks; **(2)** implement an in-kind replacement ban on fossil-fuel-fired appliances in some HUD-assisted properties; **(3)** update physical condition standards to reflect the significant public health risks posed by indoor combustion of fossil fuels, as well as by extreme temperature exposure; **(4)** revise utility allowances to save residents’ money by accounting for increased electrification, weatherization, and energy efficiency efforts; **(5)** require that PHAs assist residents in reducing in-home health hazards and to advocate for residents throughout the planning process; **(6)** revise several of HUD’s grant programs to support beneficial electrification and climate-preparedness; and **(7)** edit the guidance for the Rental Assistance Demonstration (“RAD”) to ensure climate-related risks are addressed in converted properties as well.

RESIDENTIAL SECTOR EMISSIONS (LOW-INCOME HHs)

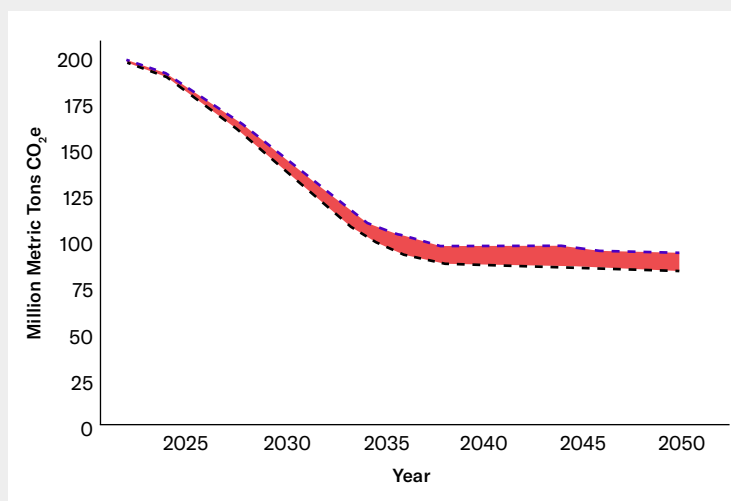


Figure 7. Electrifying all public and assisted housing units reduces carbon pollution by 6 MMT in 2030, and 10 MMT in 2050. We model the potential impact of every public & assisted unit that uses fossil fuels electrifying between now and 2030.

We echo the petition’s recommendations here, and further encourage HUD to extend a similar rulemaking that places publicly assisted housing units on a path towards electrification.

Electrify all public and assisted housing units and address deferred maintenance, as funding allows (HUD)

Alongside public housing, 1.2 million households also utilize Section 8 Project-Based Rental Assistance, which enables multifamily building owners to enter into a contract with HUD to provide affordable housing, and 2.3 million households receive Housing Choice Vouchers to seek their own housing accommodations through the private rental housing market.

Housing affordability programs provide critical support to millions of Americans, but are chronically underfunded. Millions of Americans who are unable to afford housing do not receive sufficient housing assistance, and even those households that do receive benefits often face poor living conditions because of deferred maintenance resulting from inadequate Congressional funding.

The IRA provides substantial funding to electrify HUD housing units through the Green and Resilient Retrofit Program (GRRP) and the High-Efficiency Electric Home Rebate program (HEEHR). In particular, the GRRP allocated \$1 billion for HUD to implement decarbonization retrofits in existing multifamily properties, which is estimated to reach 40,000 households.⁶ HUD should leverage its own funding through the GRRP and partner with DOE, among other agencies, to simultaneously and comprehensively electrify public and publicly assisted housing units and address the substandard conditions resulting from decades of deferred maintenance. HUD can also take advantage of technical assistance from DOE's Multifamily Better Buildings Challenge to electrify multi-family buildings.

Document fossil fuel appliances during inspection and map out a schedule of replacement at end-of-life (HUD)

Every public and public-assisted housing unit supported by HUD programs is required to undergo periodic inspections to ensure it meets a housing quality standard, usually every one to three years. HUD should document the presence and age of fossil fuel appliances as a component of the inspection process, which would help the agency perform a baseline assessment to determine how many of these units are using fossil fuel appliances. HUD should then map out a schedule for replacement of aging fossil fuel appliances at the end of their useful life.

HUD should also proactively perform electrical panel, circuit, and wiring upgrades to facilitate replacement of a fossil fuel machine with an electric alternative at the end of the fossil fuel machine's useful life. This would likely require additional funding from Congress. Any upgrades to publicly assisted housing

should include a commitment to maintain a period of affordability, such as a rent covenant whereby a landlord agrees not to raise rent as a condition of receiving federal funding.

Require new construction to be all-electric (HUD)

Some HUD programs already require new construction to meet ENERGY STAR New Home or green building standards, including the Choice Neighborhoods and Community Development Block Grants programs discussed in Action #2. The Rental Assistance Demonstration program encourages voluntary adoption of these green building standards. HUD should standardize these new construction requirements across its programs, and consider upgrading standards to meet EPA's ENERGY STAR Certified NextGen Home and Apartment standards. The President's New Building Codes Initiative, released in June 2022, recommends that HUD "seek to require above-code green and resilient construction standards in HUD-assisted housing wherever feasible, especially in competitive funding announcements." In addition, HUD should require all-electric new construction, which is more affordable than building homes with fossil fuel infrastructure.

List fossil fuel appliance pollution as a health threat (HUD)

HUD should list fossil fuel appliance pollution as an immediate health threat. This would require HUD to prioritize remediation of the hazard. HUD has already banned smoking inside federally assisted housing units and common areas for health reasons, and recent research indicates gas stoves can produce negative health impacts similar to those from secondhand smoke.

⁶ HUD requested \$250 million for a Green & Resilient Retrofit Program in their 2023 Congressional Budget Justification and estimated it would reach 10,000 households, so we estimate that a \$1 billion program will reach 40,000 households.

Today



If the federal government were to electrify all public and assisted housing units



between now and 2030



it would lead to a six million metric ton reduction in carbon pollution.



480,000 households a year would be electrified and 3.8 million households total by 2030.



2030

Action 4



Fund only all-electric new construction and disaster relief

IMPACT

FEMA receives nearly 1 million applications for individual assistance after disasters every year. This number will likely and unfortunately rise in the coming years, as climate change increases the frequency and severity of natural disasters like wildfires and hurricanes. The U.S. has already seen an increase in billion-dollar disasters, which is attributable to the climate crisis. Disaster relief—and related new construction and repairs—represent a significant opportunity for the executive branch to advance building electrification.

We should rebuild after disasters in the most cost-effective, climate-friendly and resilient way possible by building back all-electric. For new construction, electrification is a no-brainer: all-electric homes are cheaper to build since they do not require expensive gas infrastructure. All-electric homes also emit less carbon than fossil fuel-powered homes. As the grid becomes more and more carbon-free, electric appliances are appreciating climate assets, generating less and less carbon pollution each year that they are in use.

FEMA places strong emphasis on building back in a way that is resilient to future disasters. As FEMA knows, electrification “can provide grid resilience, mitigate disturbances caused by natural disasters and allow for faster system response and recovery.” When combined with on-site generation, on-site storage, microgrids and islanding capacity, electrification will lead to a much greater degree of resilience to grid outages and related disasters than the current fossil fuel infrastructure affords.

FEMA receives 870,000 individual assistance applications, 5,000 public assistance applications, and 5,000 hazard mitigation assistance applications per year. If the federal government committed FEMA to only funding all-electric new construction when rebuilding after a disaster, it could lead to a 14 million metric ton reduction in carbon pollution by 2030 (Figure 8). Though we largely focus on FEMA in our modeling and recommendations here, we encourage other agencies with disaster relief programs (e.g., HUD) to develop similar policies such as only funding all-electric rebuilding after disasters.

RECOMMENDATIONS

Fund only all-electric new appliances when rebuilding after a disaster

[HOMELAND SECURITY (DHS), FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)]

Although multiple FEMA programs can be leveraged to advance electrification, the potential impact is dominated by one program: the Individuals and Households Program (IHP). As part of IHP, FEMA may provide financial assistance to repair or replace an owner-occupied primary residence that has been damaged or destroyed as a result of a presidentially declared disaster. As the Individual Assistance Program and Policy Guide (IAPPG) makes clear, Home Repair Assistance is intended to make the damaged home safe, sanitary, or functional, with “damage to critical utilities that support the overall function of the home (e.g., furnace, water heater)” explicitly included as an eligible expense. Home Replacement Assistance similarly covers HVAC systems.

In accordance with U.S. climate commitments, any furnaces and water heaters that FEMA replaces should be all-electric, and FEMA should only fund all-electric new construction. FEMA can follow its own precedent for this requirement as it already requires certain standards to be met when home repair/replacement occurs in Special Flood Hazard Areas. Additionally, under the President’s New Building Codes Initiative, released in June 2022, FEMA will require new construction to abide by current building codes in its programs.

An all-electric replacement policy should extend beyond IHP to include FEMA’s Public Assistance Program and Hazard Mitigation Grant Program. Both of these programs—as well as the

RESIDENTIAL SECTOR EMISSIONS

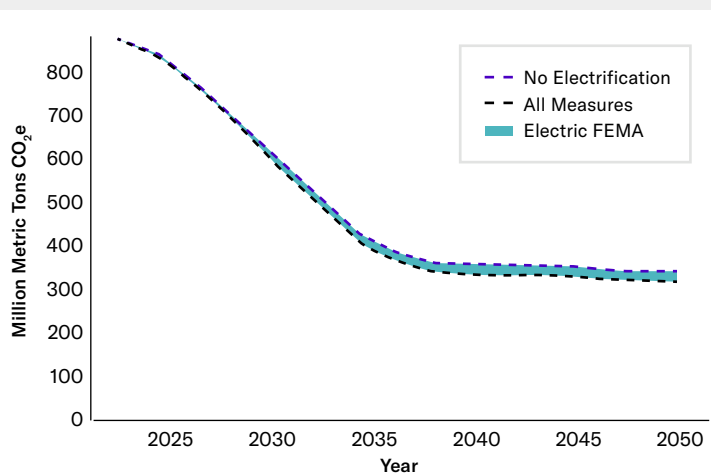


Figure 8. Only funding all-electric rebuilding after disasters reduces carbon pollution by 14 MMT in 2030, and 22 MMT in 2050. We modeled the potential impact if all 880,000 homes that FEMA reaches per year were electrified following a disaster.

Building Resilient Infrastructure and Communities (BRIC) program and FEMA broadly—have the explicit goal of hazard mitigation, which electrification is proven to advance. For precedent, FEMA can look to Colorado’s Rebuilding Better project—which features electrification as a primary resilience strategy in the wake of the Marshall fire—and to its own inclusion of the Bronzeville Microgrid Project in its portfolio of model mitigation projects.

Hazard mitigation should inform not just FEMA’s Home Repair and Replacement Assistance but all federal infrastructure spending. FEMA is uniquely positioned to advance electrification as a hazard mitigation strategy, and should start by requiring that its disaster assistance be used only for HVAC systems that are all-electric.

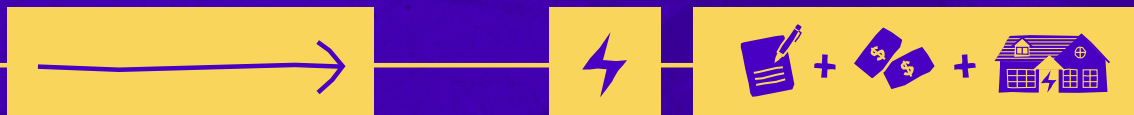
Rebuild

Rewire

Resilience

If the federal government committed FEMA to only funding all-electric new construction when rebuilding after a disaster it could lead to a **14 million metric ton reduction in carbon pollution** by 2030.

Action 5



Package every federally guaranteed mortgage with a loan for electrification

IMPACT

The federal government touches at least two-thirds of homes in the U.S. by backing home mortgages through Fannie Mae, Freddie Mac and Ginnie Mae.

This represents a massive lever to accelerate residential building retrofits, and contributes the largest pollution cuts of any action we modeled.

The federal government should use its access to low-cost financing and influence in national mortgage markets to electrify all homes financed by federally guaranteed home mortgages.

The federal government can educate every American about their “electric bank account,” as Rewiring America likes to call them—particularly the tax credits for heat pumps and other electric appliances available through the IRA. This can happen at the point of purchase or when refinancing a home with a federally guaranteed mortgage.

If the federal government packaged every federally backed mortgage through Fannie Mae, Freddie Mac and Ginnie Mae with a loan for electrification, it could lead to a 72 million metric ton reduction in

carbon pollution by 2030 (Figure 9)—the largest emissions cut the federal government could achieve in a single action.

RECOMMENDATIONS

Streamline and scale up green mortgage products

[FEDERAL HOUSING FINANCE ADMINISTRATION (FHFA), HUD, USDA, INTERIOR, VA]

The two Government-Sponsored Enterprises (GSEs), Fannie Mae and Freddie Mac, buy mortgages from lenders and package them into mortgage-backed securities that can be sold to investors. The FHFA has been the conservator of the GSEs since 2008, and is responsible for their supervision and regulation. Ginnie Mae guarantees mortgages insured by government agencies, which are usually targeted at specific low-income and disadvantaged communities. This includes the Federal Housing Administration (FHA) through HUD, the Section 502 Single Family Housing Guaranteed Loan Program through USDA, the Section 515/538 Multi Family Housing Loan Program through USDA, the Indian Loan Guarantee and Insurance Program and the VA Home Loan Program.

Fannie Mae, Freddie Mac and Ginnie Mae offer “green mortgage” products, which allow a homeowner to finance energy efficiency, renewable energy, or electrification improvements as part of their home mortgage. These include Fannie Mae’s Homestyle Energy, Freddie Mac’s GreenCHOICE program, and FHA’s Energy Efficient Mortgage program. As the clean energy nonprofit RMI has recommended, the federal government should streamline and scale up existing single-family green mortgage products, similar to what has been done with multifamily products. The federal government should also specifically advertise the use of these green mortgage products for electrification, and should clearly promote the benefits and potential utility bill savings to homeowners. The websites for these green mortgage products currently have good resources on energy efficiency, but do not mention electrification.

Package every federally guaranteed home mortgage with a loan for electrification

(FHFA, HUD, USDA, INTERIOR, VA)

Fannie Mae, Freddie Mac and Ginnie Mae should go further by packaging every federally guaranteed home mortgage with a loan for electrification, by default, when a fossil fuel home is purchased or refinanced. This could be done in multiple steps, and could first include underwriting the electrification readiness (electrical panels, wiring, and outlets) of every home in the U.S. as part of the mortgage, to be completed within six months of purchase. The federal government should then allow clean, electric appliances to be underwritten as part of the mortgage to remove the barrier of high upfront costs.

Undertake targeted electrification of homes with high energy burden

(FHFA, HUD, USDA, INTERIOR, VA)

The GSEs and Ginnie Mae should proactively target the electrification of highly energy-burdened

RESIDENTIAL SECTOR EMISSIONS

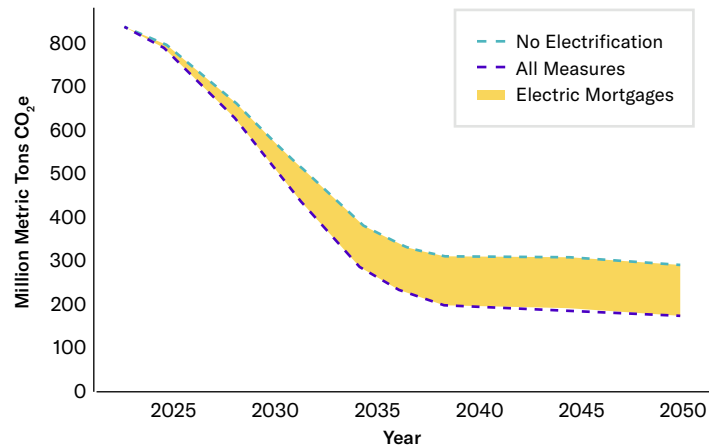


Figure 9. Packaging every federally backed mortgage with a loan for electrification reduces carbon pollution by 72 MMT in 2030, and 113 MMT in 2050. We modeled this potential impact assuming 80 percent of federally backed mortgages, or 4 million single family homes, electrify each year until 2030, amounting to 32 million homes total.

households to protect the government from mortgage delinquency risks due to high energy bills. This would involve first identifying highly energy-burdened homes in their portfolio, and then developing specific outreach strategies to reach those households. These agencies should connect energy-burdened households to the electrification rebates available to them through the IRA, coupled with additional financing and incentives, including the green mortgage products described above. The GSEs and Ginnie Mae should then pay for electrification if the cost outlays are outweighed by the value of lower delinquency rates due to reduced energy burden. In accelerating the electrification of highly energy-burdened homes with government-backed mortgages, the federal government will be protecting the underlying value of its securities, as it will drive down the likelihood of delinquency and default.

Electrify federally owned homes

(FHFA, HUD, USDA, INTERIOR, VA)

Many aspiring homeowners are unable to meet their mortgage payment obligations and end up in foreclosure, at which point the federal government acquires the property and becomes the sole owner. Most properties acquired by the federal government are resold on the market as-is, and buyers cover the cost of any necessary repairs. The energy infrastructure present in the building, which often includes fossil fuel appliances, is passed on to the new buyer and thus continues to perpetuate fossil fuel pollution. Additionally, many buyers of foreclosed homes will make immediate upgrades, which without inducements or education could mean the installation of new fossil fuel appliances with shelf lives of a couple decades or longer. The federal government can change course and electrify these buildings during its period of ownership. This would require Fannie Mae, Freddie Mac, and Ginnie Mae to hire a network of contractors across the country to identify opportunities to evaluate these homes, perform the necessary electrification upgrades, and simultaneously identify and address other health and safety hazards.

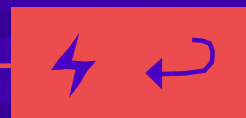
Electrify my mortgage

federally
guaranteed
home



Packaging every federally backed mortgage with a loan for electrification reduces carbon pollution by 72 MMT in 2030, and 113 MMT in 2050.

Action 6



Electrify federally funded schools & businesses

IMPACT

Though the federal government's largest impact on the commercial sector will likely be through its own building portfolio, it also provides funds for schools and businesses across the country.

Encouraging the electrification of schools is a particularly impactful action because it has a multiplicative effect: as students learn about the benefits of electrification, they bring their knowledge home to their families and communities. Fossil fuel appliances have significant health impacts on children, exacerbating respiratory conditions like asthma. The federal government funds 70,000 primary and secondary schools and over 3,200 higher education institutions each year. If all federally funded primary and secondary schools and all federally funded higher education institutions electrified between now and 2030, it could lead to a three million metric ton reduction in carbon pollution (Figure 10).

The federal government also funds over 100,000 businesses each year through USDA and SBA

EMISSIONS FROM SCHOOLS

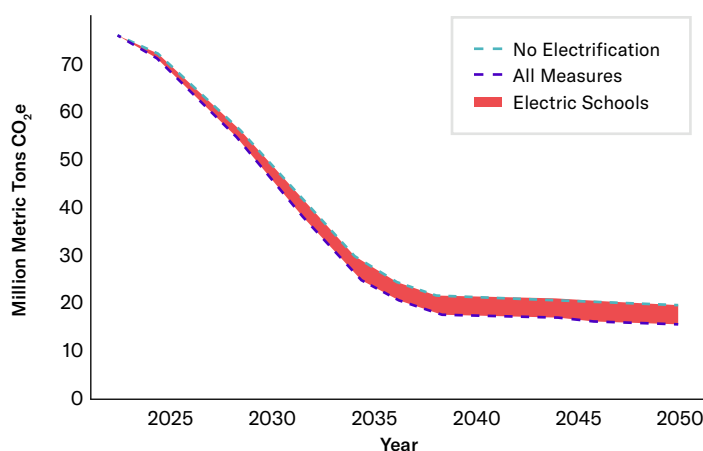


Figure 10. Electrifying all federally funded schools reduces carbon pollution by 3 MMT in 2030, and 4 MMT in 2050. We modeled the potential impact of school electrification by assuming that all federally funded schools (primary, secondary, and higher education) electrify between now and 2030, equaling 11,950 schools per year.

grants. The federal government can encourage businesses to electrify through these grant programs, as well as the supply chain actions in Action #8. If all

federal business grants and loans were coupled with electrification requirements or incentives, it could lead to an 11 million metric ton reduction in carbon pollution (Figure 11).

RECOMMENDATIONS

Provide technical assistance and resources on school electrification [EDUCATION, DOE, EPA, INTERIOR, TRANSPORTATION (DOT)]

The Title I program aims to close academic achievement gaps by funding schools that serve a high proportion of economically disadvantaged students. 70,000 of the 98,000 primary and secondary schools in the U.S. receive Title I funding. Title I funding cannot currently be used for capital improvements. In the absence of a change in law that allows Title I funds to be used for capital improvements, the Department of Education should deliver guidance and technical assistance to Title I schools on school electrification. Resources specific to school electrification should be added to the White House School Infrastructure Toolkit.

In Tribal schools, the Bureau of Indian Education Funding for Schools Construction & Maintenance can be used to replace and repair school facilities and address deferred maintenance needs. The Department of Education should work with the Department of the Interior and Indigenous-led financial institutions to deliver technical assistance on the use of these funds for electrification in Tribal schools.

The Department of Education and the U.S. Green Building Council maintain the Green Strides Resource Hub, which provides tools for greening schools. Specific and accessible resources on school electrification should be added to this resource hub, such as Rewiring America's Electrify Everything in Your School Handbook.

The new Joint Office of Energy and Transportation coordinates efforts between DOT and DOE to electrify

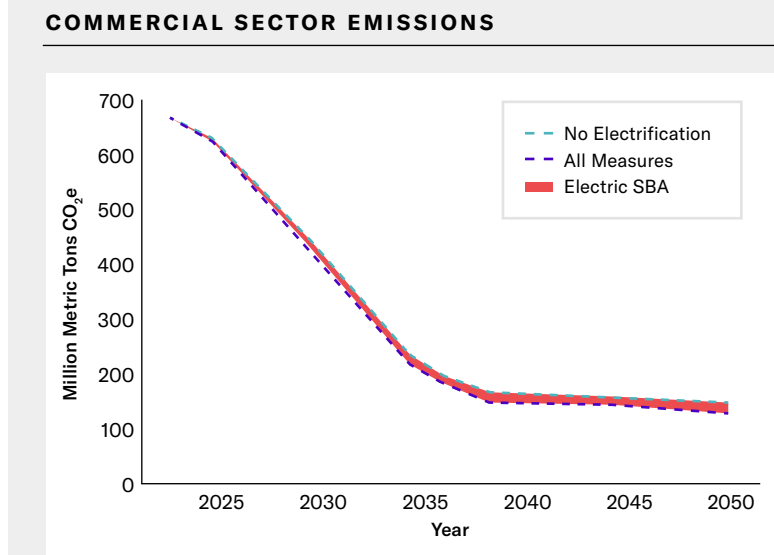


Figure 11. Incentivizing electrification in SBA and USDA business grants reduces carbon pollution by 11 MMT in 2030, and 18 MMT in 2050. We modeled this potential impact by assuming that all 100,000 businesses that receive federal funding each year electrify.

transportation. The Joint Office is currently focused on offering technical assistance to states and potential funding recipients of the National Electric Vehicle Infrastructure Program, the Federal Transit Administration's Low and No Emission Vehicle Program, and EPA's Clean School Bus Program. While the Joint Office does not have the authority to set standards, it is a first-of-its-kind interagency effort to leverage expertise in electric vehicle charging, fueling infrastructure, transit and school buses to jump-start the transition to electric vehicles.

Release guidance on the use of one-time funding streams for school electrification (EDUCATION, DOE, EPA)

One-time funding authorizations comprise the main source of infrastructure funding for primary and secondary schools, such as the American Rescue Plan Elementary and Secondary School Emergency Relief Funds (ARP ESSER). The Infrastructure Investment and Jobs Act (IIJA) also includes funds for schools, including the Clean School Bus Program through the EPA and Grants for Energy Efficiency and Renewable Energy Improvements at Public School Facilities, administered through DOE and the State Energy Programs.

The DOE should release guidance specifically encouraging electrification or electrification planning as a use of the IIJA Energy Efficiency Grants. The Clean School Bus Program should also encourage the use of funds specifically for electric buses, not low-emissions or compressed gas alternatives.

Use the Green Ribbon Schools Program to award schools for electrification (EDUCATION)

The Green Ribbon Schools Program, administered by the Department of Education, highlights and recognizes schools that exhibit best practices in school sustainability. Electrification should be included as a requirement of the Green Ribbon Schools program, or as a specific award category.

Allow state and local governments to issue bonds for school electrification projects

[(INTERNAL REVENUE SERVICE (IRS))]

Many state and local governments finance public projects, including schools, by issuing government bonds. This exempts state and local governments from paying federal income tax on the interest on the bonds, which allows bonds to be issued at lower rates, thus increasing access to capital for public projects. The electrification of our nation's schools can be facilitated by allowing state and local governments to issue bonds for school electrification projects. The IRS should issue guidance that explicitly names school electrification projects as an allowable use of tax-exempt bonds.

Include electrification of facilities as a criterion for selecting awardees of research infrastructure grants [(NATIONAL SCIENCE FOUNDATION (NSF), NATIONAL INSTITUTES OF HEALTH (NIH), EDUCATION)]

Multiple programs support infrastructure improvements at higher education institutions, particularly Historically Black Colleges and Universities (HBCUs), Tribal Colleges and Universities (TCUs), and Minority Serving Institutions. These programs include Title

III Aid for Institutional Development, HBCU Capital Financing and the Fund for Improvement of Postsecondary Institution. The federal government should require all new higher education infrastructure projects to be all-electric.

Research grants through the National Science Foundation or the National Institutes of Health can also be used to support research facilities and infrastructure. The federal government should include electrification of facilities as a criterion for selecting research infrastructure grant awardees (e.g., NSF and NIH grants), particularly when new research facilities are being built. Based on experience from the DOE's Net-Zero Labs Pilot, the government should provide technical assistance to higher education institutions on electrification of research facilities.

Include electrification as a criterion for selecting winners of competitive business grants or loans [(SMALL BUSINESS ADMINISTRATION (SBA), USDA)]

The SBA issues grants and loans, including micro-loans, to small businesses. These can be used for equipment and infrastructure. The SBA issued 61,000 loans in 2021, totaling \$44 billion.

USDA also issues grants and loans to farmers and other rural businesses, through programs including the Farm Loan Programs and the Business & Industry Guaranteed Loan Program. The Rural Energy for America Program specifically provides loans and grants for renewable energy or energy efficiency improvements.

The SBA and USDA should include electrification as a criterion for selecting winners of competitive grants and loans. USDA could also create a pilot program for funding electric farm equipment, similar to what CARB has done in California. Finally, USDA could encourage Rural Energy for America Program grants and loans to be used for electrification, and provide technical assistance to applicants.



If all federally funded primary and secondary schools and all federally funded higher education institutions electrified between now and 2030, it could lead to a **three million metric ton reduction in carbon pollution.**

Action 7



Implement aggressive standards for appliances, buildings & vehicles

IMPACT

The federal government influences almost every appliance and vehicle sold in the United States through mandatory appliance and vehicle standards. The ENERGY STAR labeling program, while not mandatory, is widely influential in both the residential and the commercial buildings sector. **Electric appliances are the only appliances that are truly clean and efficient—and federal standards and designations should reflect that.**

The broad impact of appliance standards has been modeled in detail by the Appliance Standards Awareness Project (ASAP). ASAP estimates that updated appliance efficiency standards alone could reduce carbon pollution by 26 million metric tons in 2030 under a low-carbon grid scenario (Figure 12).

RECOMMENDATIONS

Release a low-pollution standard for heating appliances (EPA)

In August 2022, the Sierra Club and 25 additional

climate and health organizations petitioned EPA to list heating appliances as a source category under the Clean Air Act and subsequently release updated pollution standards for nitrogen oxide (NO_x)—a pollutant that forms ozone and soot. As the petition makes clear, residential and commercial heating appliances “cause, or contribute significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare,” which justifies their inclusion as a source category under the Clean Air Act. EPA should then set a low-NO_x standard for heating appliances by 2025 and a zero-NO_x standard by 2030, based on zero-emission heat pump technology as the best system of emission reduction (BSER).

Remove fossil appliances from all ENERGY STAR designations (EPA)

EPA should leverage ENERGY STAR’s voluntary designations for high-performing appliances to guide the market toward electric appliances. EPA has already removed furnaces, boilers and gas dryers from the 2022 ENERGY STAR “Most Efficient” criteria and has taken steps to remove one-way central air conditioners from the Most Efficient designation

in 2023 in favor of two-way heat pumps. To further support electrification, the agency should remove fossil appliances (residential and commercial) from the base ENERGY STAR program as well.

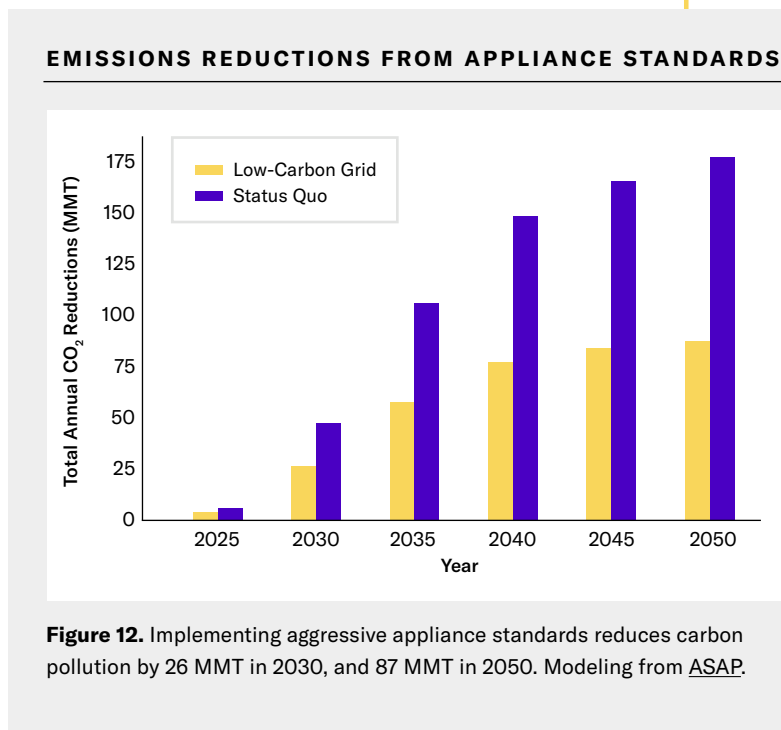
Increase the ambition of performance standards for fossil appliances (DOE)

DOE's Appliance & Equipment Standards Program sets mandatory standards for commercial and residential appliances. As Evergreen Action lays out in its [National Roadmap for Clean Buildings](#), DOE has the opportunity to advance 66 different appliance efficiency standards over the coming years—but it should prioritize the standards that maximize reductions in peak electricity demand, fossil fuel usage and utility bill costs. [DOE began this process in June 2022](#) by issuing a proposed rule to upgrade the efficiency of residential furnaces from 80 percent to 95 percent.

DOE could go even further to support electrification by requiring gas and electric appliances to meet equivalent energy performance standards, while continuing to make these standards more ambitious. As [ASAP has suggested](#), “While increasing standards for gas products may shift some consumers to electric choices as relative product prices change, the effect is indirect. Future standards could require electric and gas products to meet the same requirements, potentially creating pathways to phase down fossil fuel appliances.”

Advocate for electrification and electric readiness in building standards and codes (EPA, DOE)

ENERGY STAR maintains a series of designations for new construction and home retrofits, including [ENERGY STAR Home Upgrade](#), [ENERGY STAR NextGen Certified Homes and Apartments](#), [ENERGY STAR Commercial Buildings](#) and [ENERGY STAR New Home Construction](#). DOE maintains an analogous, but more stringent, standard for new construction called [Zero Energy Ready Homes](#), which is currently being updated. All of these standards should be



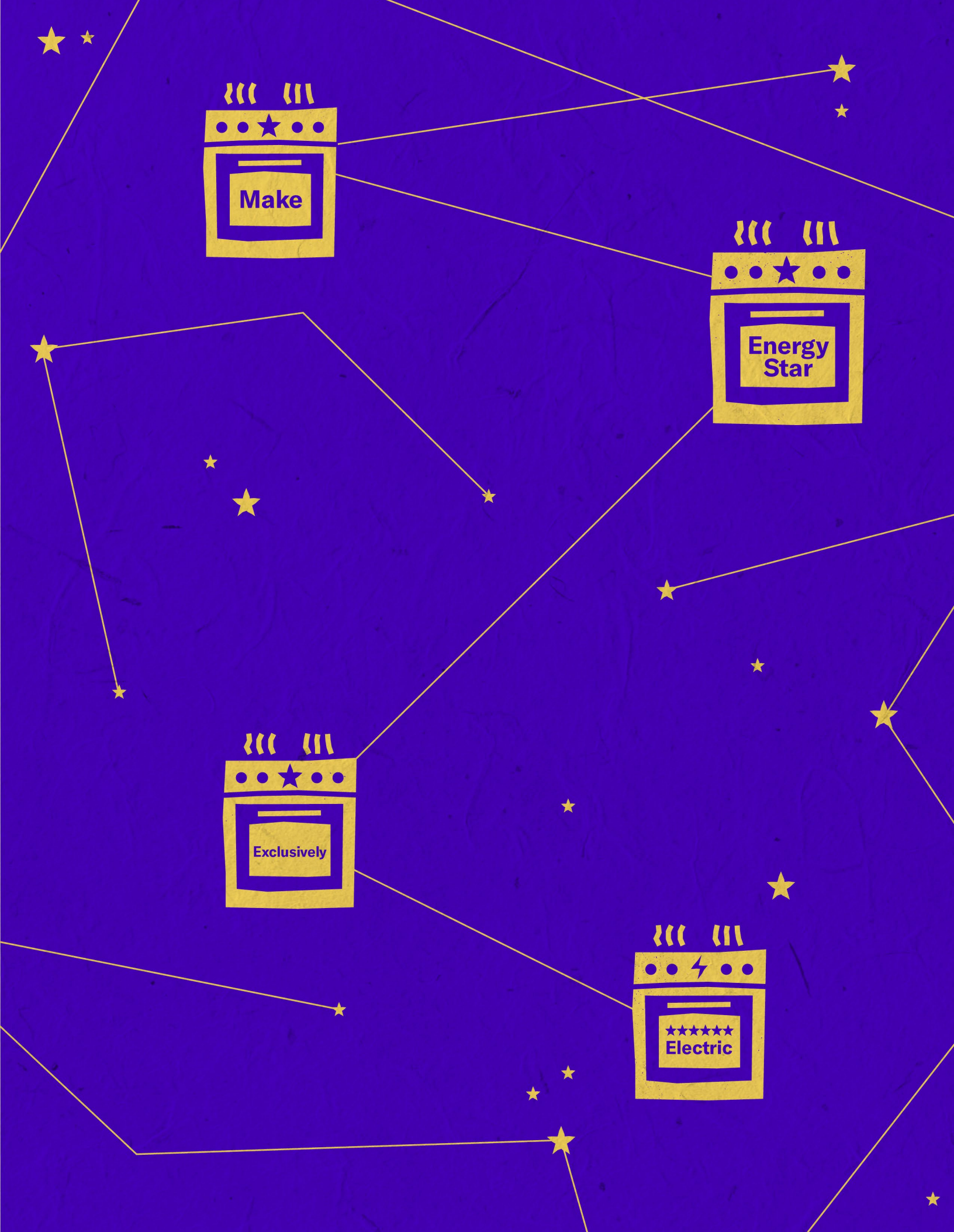
revised to require all-electric new construction. DOE also participates in the [code updating process](#) for the International Energy Conservation Code (IECC) code that governs the construction of new commercial buildings, and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) code that governs the construction of new residential buildings. DOE should advocate for the inclusion of electrification and electric readiness—including EV charger installation requirements—as it participates in the IECC and ASHRAE building code development process.

Follow California in phasing out the sales of internal combustion engine vehicles by 2035 (EPA, DOT)

The Department of Transportation creates [Corporate Average Fuel Economy \(CAFE\)](#) standards, which are fleet-wide fuel economy standards that each automaker must reach across its vehicle fleet. The EPA creates [greenhouse gas emissions standards](#) under the Clean Air Act. These two agencies work in concert to release [combined fuel economy and carbon pollution targets](#).

In August 2021, President Biden issued Executive Order 14037, “Strengthening American Leadership in Clean Cars and Trucks,” which called for EPA and DOT to issue new vehicle emissions standards by July 2024. This includes issuing fuel economy and emissions standards for light- and medium-duty vehicles that extend through 2030, and establishing fuel economy and emissions standards for medium- and heavy-duty vehicles that start in 2030. The Executive Order instructs the agencies to collaborate with states like California, and to adopt California’s standards where appropriate.

We applaud this effort for EPA and DOT to set ambitious standards far into the future to create a stable market signal for automakers. Following California, the federal government should go even further by phasing out the sales of internal combustion engine vehicles by 2035.



Action 8



Encourage electrification through supply chain & reporting requirements

IMPACT

The federal government is the largest single purchaser in the world, with annual purchasing power of more than \$630 billion. Achieving President Biden's climate goals requires that climate pollution is addressed throughout the supply chain. Supply chain emissions, often referred to as "Scope 3" emissions, can account for upwards of 90 percent of an organization's total emissions footprint. **With its extraordinary procurement power, the federal government must track and measure its Scope 3 emissions to reduce its carbon pollution.**

Programs that require carbon disclosure have seen great success elsewhere. Since 2013, firms listed and incorporated in the United Kingdom have been required to disclose their carbon pollution. In the five years following the introduction of disclosure, affected firms reduced their emissions by an average of 8 percent compared with similar European firms, without reducing their gross margins. Listed companies are estimated to account for 40 percent of global emissions. If the response of listed American companies is similar to their British counterparts,

and if their combined emissions mirror the global average, then we can expect disclosure requirements to reduce U.S. emissions by 3.2 percent with minimal economic impact (191 MMT of CO₂ compared to the 2020 baseline).

This action alone would close one-third of the gap in carbon pollution between the IRA and the President's 2030 target, although unlike the previous actions we have proposed, it does not strictly focus on electrification (Figure 13).

Here, disclosures should include toxic releases alongside greenhouse gas emissions to ensure that industry actors are not reducing the latter at the expense of greater toxic exposure to local communities—often disproportionately Black, brown, and Indigenous—and workers. This is consistent with the vision outlined by the administration to address harm to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.

The federal government could prompt even larger changes by going beyond disclosure and requiring actual reductions. According to the Federal Sustainability Plan, over 100,000 companies contract

directly with the federal government, and their total sales account for more than 35 percent of GDP. If we assume that procurement rules only apply to the large businesses that make up 76.5 percent of federal contracting, then new rules would plausibly affect firms worth 26.8 percent of GDP. If we conservatively suppose that only half of large contractors would comply, firms with sales worth 13.4 percent of GDP would be affected.

If contracting firms were required to commit to the same net-zero targets as the federal government, they would have to achieve net-zero emissions in their operations by 2050, with 60 percent reductions by 2030.

RECOMMENDATIONS

Require the disclosure of Scope 3 emissions through the SEC

(SECURITIES AND EXCHANGE COMMISSION)

The federal government, through SEC, has the authority to regulate the disclosure of Scope 3 emissions for publicly owned companies. This SEC authority comes from the agency's mission to protect investors by requiring the disclosure of information that can significantly impact a company's financial well-being. The climate crisis, as one of our society's existential threats, is affecting businesses and companies across the world.

In March 2022, the SEC issued a proposed rule that would require companies to disclose various climate-related risks as well as track and measure Scope 1 and 2 emissions. The proposed rule also requires companies to track and disclose Scope 3 emissions "if the Scope 3 emissions are material or if the registrant has a target or goal that includes Scope 3 emissions." The federal government, through the SEC, should require the disclosure of Scope 3 emissions as well, which would provide a more accurate picture of a company's emissions footprint and could lead to the electrification of supply chains.

SUPPLY CHAIN EMISSIONS REDUCTIONS

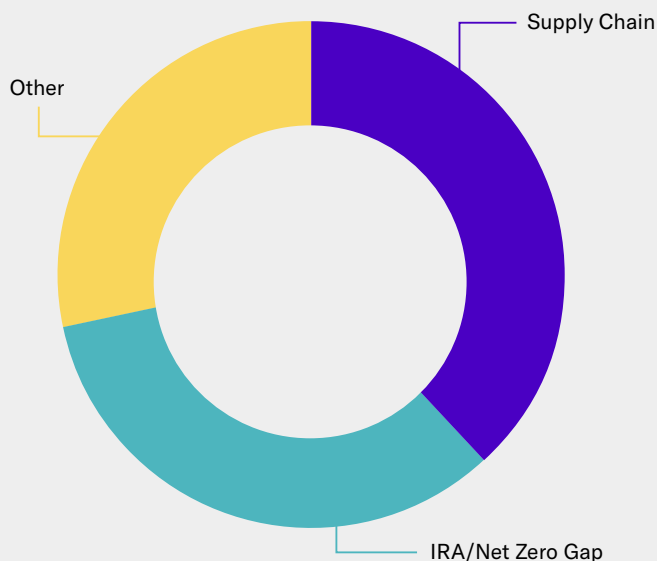


Figure 13. Requiring carbon disclosure for federal contractors could reduce carbon pollution by 191 MMT in 2030, based on the results from the United Kingdom.

Require all bidders for large federal contracts to commit to the same electrification targets as the federal government itself (GSA)

Another path towards electrifying the supply chain is to make federal procurement conditional on emissions disclosure and progress towards emissions reduction. Private firms lag public ones in making net-zero plans. Changing procurement policies allows the government to influence privately held suppliers and also expands options for influence beyond disclosure.

One of President Biden's first Executive Orders, EO 14008, directed the Federal Acquisition Regulatory (FAR) Council under GSA to consider carbon pollution in federal procurement. As of December 2022, FAR has released a draft rule that would supplement the SEC rule. This would "require major Federal suppliers to publicly disclose greenhouse gas emissions and climate-related financial risk and to set science-based reduction targets." The rules are currently in

the development stage; a full estimate of the cost should be forthcoming soon.

We can look to the United Kingdom for a potential model. From September 2021, the United Kingdom has required all bidders for contracts worth more than £5 million to commit to a 2050 net-zero target and to have a published carbon reduction plan. Net-zero considerations must be a factor in “most, if not all” contracts. These rules also require reporting of Scope 1, Scope 2, and some Scope 3 emissions like business travel, employee commuting, transportation and waste. As the United States considers its own procurement rules, we recommend going beyond simple disclosure standards, to requiring net-zero commitments in line with the government’s own reduction targets. Firms that fail to meet their own commitments should be deprioritized and eventually disqualified from bidding for federal contracts. Disclosures on toxic releases from industry should also guide parameters around the government’s approach to selecting suppliers in public projects.

The federal government has taken steps in this direction through its Buy Clean Initiative, including the recent announcement that the government will prioritize the purchase of low carbon construction materials. Requiring net-zero and electrification commitments across all federal purchasing would go even further. We recommend that the federal government require bidders for large federal contracts to commit to the same net-zero commitments as those we recommend for the federal government, including a 50 percent reduction in emissions from buildings by 2032, zero-emissions buildings by 2045 and a zero-emissions vehicle fleet by 2035.



The federal government is the largest single purchaser in the world,

with annual purchasing power of more than 630 billion dollars.

(that's a lot).

Action 9

Grow and train the electric workforce

IMPACT

With incentives from the IRA, investment from the IIJA, and actions taken by the federal government, the demand for electrification will increase. The availability of electrification contractors—especially electricians and heating, ventilation and air conditioning (HVAC) technicians—will become a major bottleneck preventing the United States from reaching our pollution reduction goals. **The federal government can mitigate this bottleneck by helping to grow and train the electrification workforce.**

In 2021, the [Bureau of Labor statistics](#) estimated the number of HVAC jobs at 394,000, with a job growth outlook for the next decade at 5 percent, which is on par with the average prediction for all occupations. The electrician workforce statistics closely mirror that of HVAC technicians, and there is a national shortage of 40,000–80,000 electricians. This is concerning, particularly given the anticipated increase in demand for electrification projects that require

building electrical upgrades. **To achieve our climate goals, the U.S. will need at least a million more electricians over the next decade.**⁷

A large portion of the existing workforce is focused on the installation of fossil fuel heating and cooling systems, for which only some skills are transferable to heat pump installations. To grow and train the electrical and HVAC workforce, a holistic approach is needed that combines: 1) skills development that prepares the current electrical and HVAC workforce for high-quality household and commercial electrification projects; and 2) recruiting and training a new, diverse group of workers in every state in the United States.

We did not model the carbon pollution reduction resulting from Action #9, but workforce development is a key enabling factor for the other eight actions described in this report. We project 45 million heat pumps being installed from the residential sector actions we recommend, which translates to hundreds of millions of skilled worker hours.

⁷ The Bureau of Labor Statistics projects [800,000 electrician job openings](#) over the next decade, and we estimate about [125,000 utility line worker job openings](#) over the decade. Meeting our residential electrification goals will require an additional 80,000 electricians (assuming 100 million houses electrified between now and 2040, and 30 hours of labor per house).

RECOMMENDATIONS

Offer electrification workforce training programs (LABOR, VA, SBA)

The Department of Labor offers workforce training programs through its Employment and Training Administration, which can include skills training grants, apprenticeship programs, and youth job placement programs. The VA's Veteran Readiness and Employment Program assists veterans in preparing for employment. Both the VA and the Department of Labor should offer specific electrification training programs for HVAC technicians and electricians.

Impactful electrical and HVAC workforce programs will include transparent requirements of trainees, paid training with wrap-around services offered, on-the-job/work-based learning incorporated, interim job opportunities and other career development support.

This Small Business Administration should continue to provide much needed training and support for electrification contractor firms—most of which are

small businesses—to help them access resources, enter federal contracts, and understand incentives.

Expand electrification-focused career and technical training at high schools and higher education institutions (EDUCATION)

The Department of Education Career and Technical Education program gives grants to states to support workforce development. An increase in funding was requested for this department in 2023 for a “career-connected high schools initiative” that will integrate the last two years of high school with career and technical training. Through this initiative and others, the Department of Education should incentivize high schools and higher education institutions to offer courses and certificate programs that prepare students to enter the electrification workforce. This should include a targeted focus on students from disadvantaged communities.

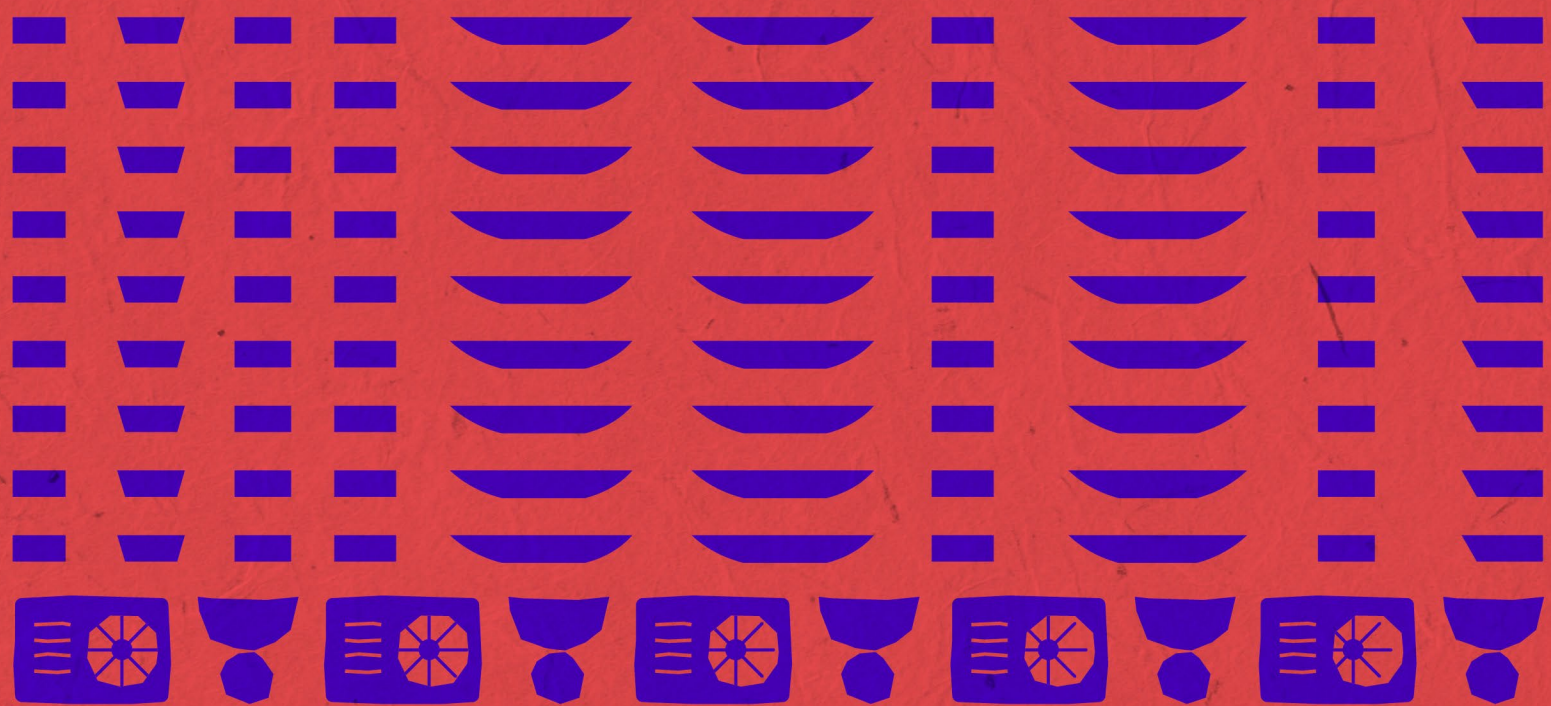
For 25 years, DOE's Solar Decathlon program has trained students to enter the clean energy and green buildings workforce, reaching over 25,000 students. This program can serve as a successful example for the Department of Education.



JOIN THE ELECTRICIAN

To achieve our climate goals the U.S. will need at least a million more electricians.

MISSION



Appendix A:

Agency by Agency Recommendations

DEPARTMENT OF AGRICULTURE

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #1: Electrify federal buildings and vehicle fleets	Match the Army's goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035	USDA has 37,000 vehicles in its fleet. Many of these are light-duty trucks, which could be electrified in a parallel effort to USPS.	<u>9</u>
	Lead the way on all-electric retrofits of commercial buildings	The Department of Agriculture's building portfolio (23,000 buildings total) consists of many small buildings spread widely across the country. These include Forest Service structures, agricultural research centers, and USDA service centers. These small buildings are often heated with systems similar to residential systems, making them excellent candidates for electrification.	<u>9</u>
Action #2: Incorporate electrification into federal home retrofit programs	Require fossil fuel appliances to be replaced with electric alternatives at end-of-life	Section 504 Single Family Home Very Low Income Repair Program, Multi Family Housing Preservation & Revitalization Program, Energy Efficiency and Conservation Loan Program	<u>13</u>
	Require home retrofit auditors to develop an electrification plan for a household	Section 504 Single Family Home Very Low Income Repair Program, Multi Family Housing Preservation & Revitalization Program, Energy Efficiency and Conservation Loan Program	<u>13</u>
Action #5: Package every federally guaranteed mortgage with a loan for electrification ↓	Streamline and scale up green mortgage products	Section 502 Single Family Housing Guaranteed Loan Program through USDA, Section 515/538 Multi Family Housing Loan Program	<u>24</u>
	Package every federally guaranteed home mortgage with a loan for electrification	Section 502 Single Family Housing Guaranteed Loan Program through USDA, Section 515/538 Multi Family Housing Loan Program	<u>24</u>
	Undertake targeted electrification of homes with high energy burden	Section 502 Single Family Housing Guaranteed Loan Program through USDA, Section 515/538 Multi Family Housing Loan Program	<u>24</u>

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #5: Package every federally guaranteed mortgage with a loan for electrification	Electrify federally owned homes	Section 502 Single Family Housing Guaranteed Loan Program through USDA, Section 515/538 Multi Family Housing Loan Program	<u>24</u>
Action #6: Electrify federally funded schools & businesses	Include electrification as a criterion for selecting winners of competitive business grants	Farm Loan Programs, Business & Industry Guaranteed Loan Program, Rural Energy for America Program	<u>28</u>

DEPARTMENT OF EDUCATION

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #6: Electrify federally funded schools & businesses	Provide technical assistance and resources on school electrification	Title I program, Green Strides Resource Hub	<u>28</u>
	Release guidance on the use of one-time funding streams for school electrification	ARP ESSER	<u>28</u>
	Use the Green Ribbon Schools Program to award schools for electrification	Green Ribbon Schools Program	<u>28</u>
	Include electrification of facilities as a criterion for selecting awardees of research infrastructure grants	Title III Aid for Institutional Development, HBCU Capital Financing, Fund for Improvement of Postsecondary Education	<u>28</u>
Action #9: Grow and train the electric workforce	Expand electrification-focused career and technical training at high schools and higher education institutions	Career & Technical Education Program	<u>40</u>

DEPARTMENT OF ENERGY

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #1: Electrify federal buildings and vehicle fleets	Match the Army's goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035	DOE has 15,000 vehicles in its fleet, many of which are medium-duty trucks. Procurement of all-electric medium-duty trucks could transform that sector of the vehicles market.	<u>9</u>
	Lead the way on all-electric retrofits of commercial buildings	DOE has 12,000 buildings in its portfolio. These include the National Labs, which are already targeting decarbonization through the <u>Net Zero Labs Pilot Initiative</u> .	<u>9</u>
Action #2: Incorporate electrification into federal home retrofit programs	Require fossil fuel appliances to be replaced with electric alternatives at end-of-life	Weatherization Assistance Program, State Energy Program, Energy Efficiency Revolving Loan Fund	<u>13</u>
	Require home retrofit auditors to develop an electrification plan for a household	Weatherization Assistance Program	<u>13</u>
Action #6 Electrify federally funded schools & businesses	Provide technical assistance and resources on school electrification	Joint Office of Energy & Transportation (National Electric Vehicle Infrastructure Program, Low and No Emission Vehicle Program, Clean School Bus Program)	<u>28</u>
	Release guidance on the use of one-time funding streams for school electrification	Grants for Energy Efficiency and Renewable Energy Improvements at Public School Facilities	<u>28</u>
Action #7: Implement aggressive standards for appliances, buildings & vehicles	Increase the ambition of performance standards for fossil appliances	Appliance & Equipment Standards Program	<u>32</u>
	Advocate for electrification & electric readiness in building standards and codes	Zero Energy Ready Homes, IECC/ASHRAE Code Updating Process	<u>32</u>

FEDERAL HOUSING FINANCE AGENCY

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #5: Package every federally guaranteed mortgage with a loan for electrification	Streamline and scale up green mortgage products	Fannie Mae's Homestyle Energy Program, Freddie Mac's GreenCHOICE Program	<u>24</u>
	Package every federally guaranteed home mortgage with a loan for electrification	Fannie Mae, Freddie Mac	<u>24</u>
	Undertake targeted electrification of homes with high energy burden	Fannie Mae, Freddie Mac	<u>24</u>
	Electrify federally owned homes	Fannie Mae, Freddie Mac	<u>24</u>

DEPARTMENT OF HEALTH & HUMAN SERVICES

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #1: Electrify federal buildings and vehicle fleets	Match the Army's goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035	HHS has 7,000 vehicles in its fleet. Many of these are sedans, which are an easy target for electrification.	<u>9</u>
	Lead the way on all-electric retrofits of commercial buildings	HHS has 2,500 buildings in its portfolio. Many of these are Indian Health Service buildings, which could serve as an example for electrification of health centers.	<u>9</u>
Action #2: Incorporate electrification into federal home retrofit programs	Require fossil fuel appliances to be replaced with electric alternatives at end-of-life	Low Income Home Energy Assistance Program (LIHEAP)	<u>13</u>
	Require home retrofit auditors to develop an electrification plan for a household	LIHEAP	<u>13</u>
	Assess indoor air pollution and associated health and safety risks from fossil fuel appliance	LIHEAP	<u>13</u>

DEPARTMENT OF HOMELAND SECURITY/FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #1: Electrify federal buildings and vehicle fleets	Match the Army's goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035	DHS has 50,000 vehicles in its fleet. Many of these are SUVs, for which electric alternatives are readily available.	<u>9</u>
	Lead the way on all-electric retrofits of commercial buildings	DHS has 3,000 buildings in its portfolio, many of which are land ports of entry. The IIJA <u>included \$3.4B</u> for GSA to modernize land ports of energy through major construction projects. Each of these modernization projects should include the electrification of space heating. As these are smaller buildings, electrification will likely involve simpler rooftop unit swap-outs rather than complex boiler retrofits.	<u>9</u>
Action #4: Fund only all-electric new construction and disaster relief	Fund only all-electric new appliances when rebuilding after a disaster	Individuals and Households Program, Public Assistance Program, Hazard Mitigation Grant Program, Building Resilient Infrastructure and Communities (BRIC)	<u>21</u>

DEPARTMENT OF HOUSING & URBAN DEVELOPMENT

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #2: Incorporate electrification into federal home retrofit programs	Require fossil fuel appliances to be replaced with electric alternatives at end-of-life	HOME program, Community Development Block Grant and Choice Neighborhoods Grant programs, Office of Lead Hazard Control and Healthy Homes programs (Lead Hazard Control, Aging in Place), 203(k) program	<u>13</u>
	Require home retrofit auditors to develop an electrification plan for a household	Office of Lead Hazard Control and Healthy Homes programs (Lead Hazard Control, Aging in Place)	<u>13</u>
Action #3: Electrify public & assisted housing units	Upgrade public housing with beneficial electrification	Public Housing Capital Fund, Public Housing Operating Fund	<u>17</u>
	Electrify all public and assisted housing units and address deferred maintenance, as funding allows	Section 8 Project-Based Rental Assistance, Housing Choice Vouchers, Green & Resilient Retrofit Program	<u>17</u>
	Document fossil fuel appliances during inspection and map out a schedule of replacement at end-of-life	Public Housing Capital Fund, Public Housing Operating Fund, Section 8 Project-Based Rental Assistance, Housing Choice Vouchers, Green & Resilient Retrofit Program	<u>17</u>
	Require new construction to be all-electric	Public Housing Capital Fund, Public Housing Operating Fund, Section 8 Project-Based Rental Assistance	<u>17</u>
	List fossil fuel appliance pollution as a health threat	Housing-Related Health and Safety Hazard Assessment	<u>17</u>
Action #5: Package every federally guaranteed mortgage with a loan for electrification	Streamline and scale up green mortgage products	Federal Housing Administration (FHA) Energy Efficient Mortgage Program	<u>24</u>
	Package every federally guaranteed home mortgage with a loan for electrification	FHA	<u>24</u>
	Undertake targeted electrification of homes with high energy burden	FHA	<u>24</u>
	Electrify federally owned homes	FHA	<u>24</u>

DEPARTMENT OF THE INTERIOR

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #1: Electrify federal buildings and vehicle fleets	Match the Army's goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035	The Department of the Interior has 32,000 vehicles in its fleet. Many of these are light-duty trucks, where electric alternatives are available.	<u>9</u>
	Lead the way on all-electric retrofits of commercial buildings	The Department of the Interior has 43,000 buildings in its portfolio. Over 90% of these are small buildings (<5,000 square feet), including buildings at national parks. These smaller buildings are much easier to electrify, since they generally use residential rather than commercial HVAC technologies.	<u>9</u>
Action #2: Incorporate electrification into federal home retrofit programs	Require fossil fuel appliances to be replaced with electric alternatives at end-of-life	Bureau of Indian Affairs Housing Improvement Program	<u>13</u>
	Assess indoor air pollution and associated health and safety risks from fossil fuel appliances	Bureau of Indian Affairs Housing Improvement Program	<u>13</u>
Action #5: Package every federally guaranteed mortgage with a loan for electrification	Streamline and scale up green mortgage products	Indian Loan Guarantee and Insurance Program	<u>24</u>
	Package every federally guaranteed home mortgage with a loan for electrification	Indian Loan Guarantee and Insurance Program	<u>24</u>
	Undertake targeted electrification of homes with high energy burden	Indian Loan Guarantee and Insurance Program	<u>24</u>
	Electrify federally owned homes	Indian Loan Guarantee and Insurance Program	<u>24</u>
Action #6: Electrify federally funded schools & businesses	Provide technical assistance and resources on school electrification	Bureau of Indian Education Funding for Schools Construction & Maintenance	<u>28</u>

ENVIRONMENTAL PROTECTION AGENCY

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #2: Incorporate electrification into federal home retrofit programs	Require fossil fuel appliances to be replaced with electric alternatives at end-of-life	ENERGY STAR Home Upgrade	<u>13</u>
	Require home retrofit auditors to develop an electrification plan for a household	ENERGY STAR Home Upgrade	<u>13</u>
Action #6: Electrify federally funded schools & businesses	Provide technical assistance and resources on school electrification	Clean School Bus Program	<u>28</u>
	Release guidance on the use of one-time funding streams for school electrification	Clean School Bus Program	<u>28</u>
Action #7: Implement aggressive standards for appliances, buildings & vehicles	Release a low-NOx standard for heating appliances	Clean Air Act	<u>32</u>
	Remove fossil appliances from all ENERGY STAR designations	ENERGY STAR	<u>32</u>
	Advocate for electrification & electric readiness in building standards and codes	ENERGY STAR Home Upgrade, ENERGY STAR NextGen Certified Homes and Apartments, ENERGY STAR Commercial Buildings, ENERGY STAR New Home Construction	<u>32</u>
	Follow California in phasing out the sales of internal combustion engine vehicles by 2035	Clean Air Act Greenhouse Gas Emissions Standards	<u>32</u>

DEPARTMENT OF TRANSPORTATION

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #1: Electrify federal buildings and vehicle fleets	Match the Army's goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035	The Department of Transportation has 6,000 vehicles in its fleet. Many of these are SUVs, for which electric alternatives are readily available.	<u>9</u>
	Lead the way on all-electric retrofits of commercial buildings	The Department of Transportation has 2,000 buildings in its portfolio. Many of these are buildings located at airports, which could inspire airport-wide electrification efforts.	<u>9</u>
Action #6: Electrify federally funded schools & businesses	Provide technical assistance and resources on school electrification	Joint Office of Energy & Transportation (National Electric Vehicle Infrastructure Program, Low and No Emission Vehicle Program, Clean School Bus Program)	<u>28</u>
Action #7: Implement aggressive standards for appliances, buildings & vehicles	Follow California in phasing out the sales of internal combustion engine vehicles by 2035	Corporate Average Fuel Economy (CAFE) Standards	<u>32</u>

DEPARTMENT OF VETERANS AFFAIRS

OVERARCHING RECOMMENDATION	SPECIFIC RECOMMENDATION	RELEVANT PROGRAMS	PAGE
Action #1: Electrify federal buildings and vehicle fleets	Match the Army's goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035	The VA has 22,000 vehicles in its fleet. Many of these are sedans, which are the most straightforward type of vehicle to electrify.	<u>9</u>
	Lead the way on all-electric retrofits of commercial buildings	The VA has 8,100 buildings in its portfolio. Many of these are energy-intensive outpatient healthcare facilities. The VA should work with HHS to lead efforts to decarbonize the healthcare buildings sector across the country.	<u>9</u>
Action #5: Package every federally guaranteed mortgage with a loan for electrification	Streamline and scale up green mortgage products	VA Home Loan Program	<u>24</u>
	Package every federally guaranteed home mortgage with a loan for electrification	VA Home Loan Program	<u>24</u>
	Undertake targeted electrification of homes with high energy burden	VA Home Loan Program	<u>24</u>
	Electrify federally owned homes	VA Home Loan Program	<u>24</u>
Action #9: Grow and train the electric workforce	Offer electrification workforce training programs	Veteran Readiness and Employment Program	<u>40</u>

OTHER AGENCIES

We only have one or two recommendations for the following offices, departments and agencies and compile them in the list below:

Council on Environmental Quality (CEQ): Lead the way on all-electric retrofits of commercial buildings (Action #1). We recommend that all federal agencies follow a process for electrifying their building portfolio to be determined by the Director for Federal Facility Decarbonization at the Council on Environmental Quality (CEQ). This process should include gathering portfolio-level building data, then making a plan to electrify each building when the HVAC equipment reaches end-of-life or during the next planned remodel.

Department of Justice (DOJ): Electrify federal buildings and vehicle fleets (Action #1). The Department of Justice owns a series of large, often recently constructed buildings, many of which are federal courthouses and prisons. With the intersecting crises of climate change and mass incarceration, the lack of air conditioning in prisons is an increasingly urgent social and environmental justice issue. Though solving both of these crises is the long-term goal, adding air conditioning to prisons where it does not currently exist can be a means of harm reduction. Replacing current heating systems with heat pumps provides air conditioning “for free.” The Department of Justice should make a plan to install heat pumps in all federal prisons, and should not install any more one-way air conditioners.

Department of Labor: Offer electrification workforce training programs (Action #8).

Federal Acquisition Regulatory Council (FAR Council): Require all bidders for large federal contracts to commit to the same electrification targets

as the federal government itself (Action #8).

General Services Administration (GSA): Electrify federal buildings and vehicle fleets (Action #1). GSA owns many of the buildings and vehicles owned and leased by federal agencies. As such, we recommend that GSA lead the federal government in electrification. GSA should gather portfolio-level building and vehicle fleet data, then make a plan to electrify each HVAC system and vehicle at end-of-life at the latest.

Internal Revenue Service (IRS): Allow state and local governments to issue bonds for school electrification projects (Action #6).

National Science Foundation (NSF), National Institutes of Health (NIH): Include electrification of facilities as a criterion for selecting awardees of research infrastructure grants (Action #6).

Securities and Exchange Commission (SEC): Require the disclosure of Scope 3 emissions through the SEC (Action #8).

Small Business Administration (SBA): Include electrification as a criterion for selecting winners of competitive business grants (Action #6); Offer electrification workforce training programs (Action #9)

United States Postal Service (USPS): Match the Army’s goal to achieve a zero-emissions fleet by 2035, not just zero-emissions acquisition by 2035 (Action #1). USPS recently released a plan to purchase 165,000 delivery vehicles—nearly enough to replace its entire fleet. Only 40 percent are slated to be electric; USPS should increase this to 100 percent. The average age of a USPS delivery vehicle is 22 years, so purchasing fossil gas vehicles locks in pollution for decades.

Appendix B:

Department of Defense Recommendations

As the single largest greenhouse gas emitter in the federal government, the DoD is crucial to any public sector electrification effort. There are six key areas where the DoD can advance electrification and national security at the same time: energy generation, installation energy use, vehicle electrification, procurement reform, infrastructure development and research support.

Energy generation: In line with the Army Climate Strategy, DoD facilities should secure 100 percent of their power from zero-emissions sources by 2030. The DoD also has the scale necessary to build its own clean energy: installations should have enough generation capacity to support half its missions by 2030 and all missions by 2040.

Benchmarking energy use: The current federal sustainability plan benchmarks emissions reductions relative to their 2005 level. But military emissions were anomalously high in 2005 due to simultaneous wars in Iraq and Afghanistan. The military should aim to reduce emissions relative to their 2022 levels instead, though still aiming at 50 percent reductions by 2032 and net zero by 2045. Expanding the Energy Resilience and Conservation Investment Program would help achieve this goal.

Vehicle electrification: All of DoD's light-duty non-tactical vehicles should be zero-emissions vehicles by 2027, and all the DoD's non-tactical vehicles should be zero-emissions vehicles by 2035. This is aligned with the goals in the Army Climate Strategy, but goes beyond Executive Order 14507,

which only required that new acquisitions be electric by these dates. Where existing models do not support military needs, DoD should partner with manufacturers to plan new models, which could expand the range available for civilian uses as well.

Procurement: Ninety-five percent of revenue in the defense and security industries comes from government. DoD accounts for more than 60 percent of federal procurement. This gives the DoD massive leverage. By 2025, all bidders for DoD contracts above \$10 million should have their emissions and net-zero plans included in proposal evaluation. By 2035, all bidders who have not made progress towards net-zero should risk losing their right to bid altogether.

Infrastructure development: A nationally integrated electrical grid is important to national security, providing resilience in the face of malign actors, extreme weather, and renewable intermittency. Just as the Interstate Highway Program was motivated in part by the security value of a nationally integrated transit network, today's DoD should help develop an Energy Interstate to allow power to flow freely across the country. Invoking eminent domain where necessary should help keep costs down and make the grid more secure.

Research support: The DoD is a key provider of research and development funding. All DoD research funding agencies should integrate electrification into their missions as a priority.

Appendix C: Purchasing Power & Scale in Federal Buildings

Rewiring America has shown that transitioning the economy to clean, efficient, electric machines will require replacing 1 billion machines in homes and 40 million machines in businesses. In businesses, this includes replacing 5 million space heating machines with heat pumps. We estimate that civilian agencies within the federal government own or operate 115,000 of those 5 million space heating machines.

We estimated the number of federal buildings using different space heating system types, including packaged units, boilers, and furnaces of different fuel types. By number of buildings, natural gas packaged units are most common in the federal building stock (Figure C1). By square footage, both natural gas packaged units and natural gas boilers are most common, since natural gas boilers are used to heat large buildings (Figure C2).

SPACE HEATING MACHINES

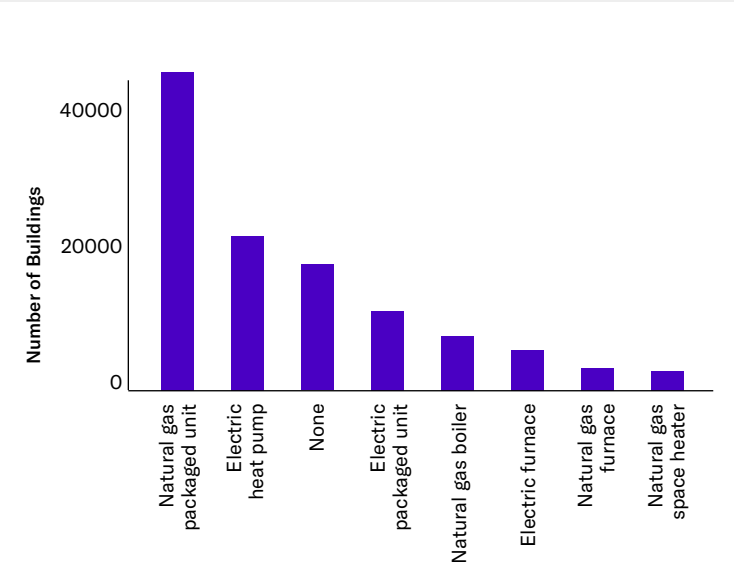


Figure C1. Space heating machines in federal buildings, by number of buildings.

SPACE HEATING MACHINES

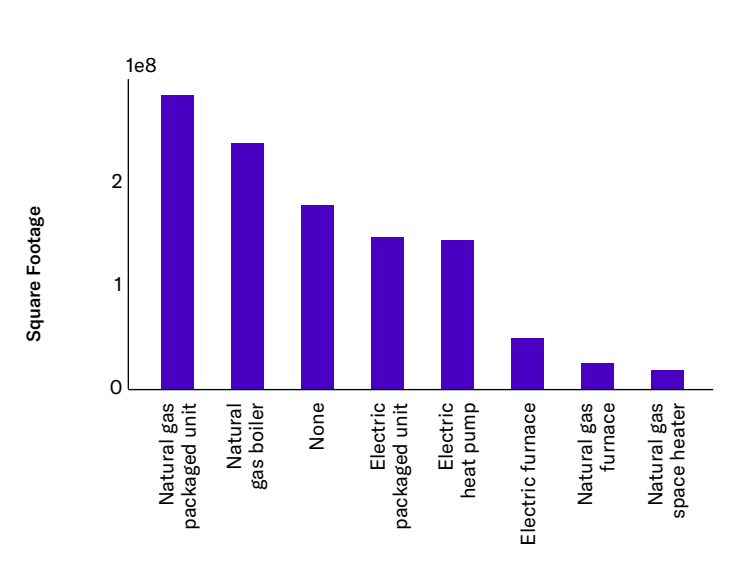


Figure C2. Space heating machines in federal buildings, by square footage of buildings

Appendix D:

Resources for All-Electric Retrofits of Commercial Buildings

1. [Redwood Energy's Pocket Guide to All-Electric Retrofits of Commercial Buildings](#)
2. [Decarbonizing HVAC and Water Heating in Commercial Buildings](#)
3. [Going All-Electric in Large-Scale Systems](#)
4. [Low Carbon Technologies: Strategies for Different Building Types](#)
5. [Electrifying Space Heating in Existing Commercial Buildings: Opportunities and Challenges](#)
6. [Boiler Retrofits and Decarbonization in Existing Buildings: HVAC Designer Interviews](#)
7. [The Empire Building Challenge Knowledge Base](#)
8. [The Economics of Electrifying Buildings: Medium-Size Commercial Retrofits](#)
9. Rewiring America Case Studies Database (forthcoming)
10. Rewiring America Demand Electric Toolkit (forthcoming)

Appendix E: Methodology

For all estimates of emissions reductions we present in this paper, we first calculate the business-as-usual emissions from each sector using the current energy use by fuel type. For emissions reductions attributable to our recommendations, we assume a constant rate of electrification year over year until the target end date. Each year, we subtract from fossil energy use and add to electric energy use, assuming a heat pump energy efficiency gain of 3 (e.g., heat pump COP of 2.7, fossil fuel furnace efficiency of 90%) and electric vehicle energy efficiency gain of 3 relative to an internal combustion engine vehicle. We project the national electric grid emissions into the future using the “95% clean by 2035” scenario in NREL’s Cambium tool.

For all sectors, we ensure that our modeled emissions reductions do not exceed the residual emissions that are projected in year 2030 following implementation of the Inflation Reduction Act, based upon the most recent emissions models from Princeton University’s REPEAT Project.

Furthermore, we do not model the costs of any of our recommendations, nor do we constrain our modeling assumptions to current budget levels for individual programs. Many of the programs we

highlight are not currently funded at levels that would allow for maximum emissions reductions, and we advocate for funding increases for many of the essential programs mentioned here, such as HUD public housing and home retrofit programs.

Federal Buildings & Vehicles

We use data from the Federal Energy Management Program to calculate the energy use in federal buildings and vehicles, by fuel type. We assume all vehicles will be electric by 2035 and all buildings will be electric by 2045, so fossil fuel use of each fuel type decreases linearly to zero by those target years. Electricity use increases proportional to the decrease in fossil fuel use (fossil fuel use divided by the COP or EV efficiency gain).

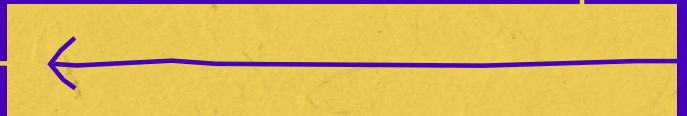
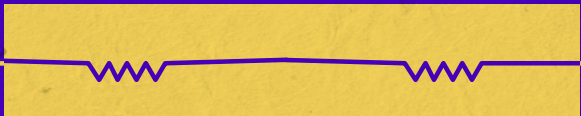
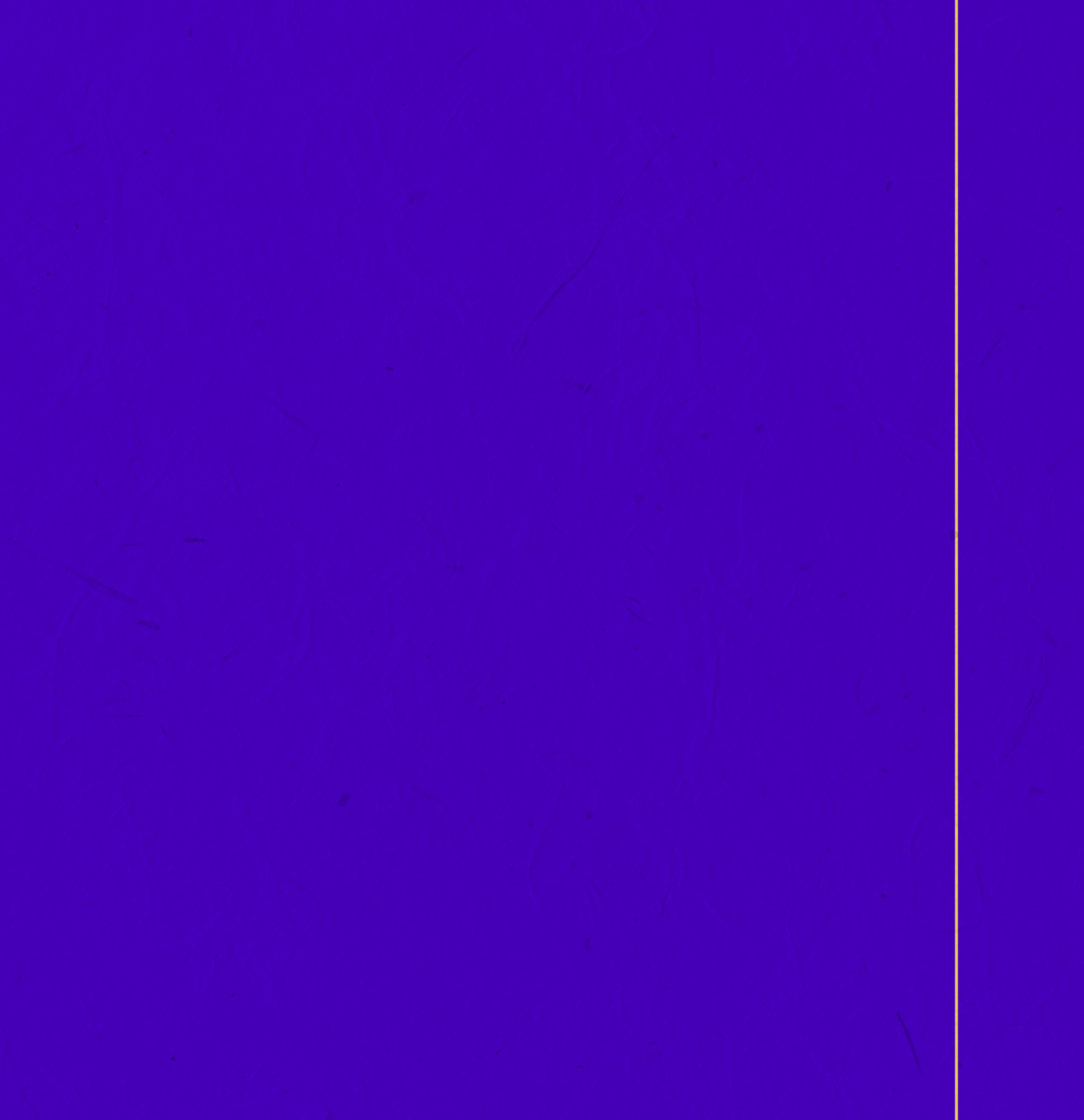
Residential Sector

We use data from the Residential Energy Consumption Survey to calculate the national average household energy use. For each action, we calculate this average for a different subset of the households in the U.S. We base our rate of electrification on the current number of households served by each program. Our assumptions are listed in the table below:

ACTION	SUBSET	HOMES ELECTRIFIED PER YEAR	HOMES ELECTRIFIED BY 2030
Action #2 (Retrofits)	Households making less than \$40,000/year using fossil fuels	250,000 (WAP: 70,000; LIHEAP: 50,000; HOME: 60,000; CDBGs: 50,000, Other: 20,000)	2 million
Action #3 (HUD)	Households making less than \$40,000/year using fossil fuels	480,000	3.8 million
Action #4 (FEMA)	All households using fossil fuels	880,000 (IHP: 870,000, Other: 10,000)	7 million
Action #5 (Mortgages)	Single-family homes using fossil fuels	4 million	32 million
TOTAL		5.6 million	45 million

Other Sectors

We use the [Commercial Buildings Energy Consumption Survey](#) to model emissions reductions from electrification of schools and businesses. We assume 11,950 schools and 100,000 businesses electrify each year.



REWIRING
AMERICA

Rewiring America is the leading electrification nonprofit,
working to electrify our homes, businesses and communities.