The Honorable Kathy Castor
Chairwoman
Select Committee on the Climate Crisis
U.S. House of Representatives
Washington, DC 20515

The Honorable Garret Graves
Ranking Member
Select Committee on the Climate Crisis
U.S. House of Representatives
Washington, DC 20515

November 22, 2019

Re: Response to Request for Information (RFI)

Dear Chairwoman Castor and Ranking Member Graves:

Thank you for the opportunity to submit comments in response to the Sept. 5, 2019, request for information to inform the Select Committee's policy recommendations for addressing climate change.

Founded in 1977, the Alliance to Save Energy is a nonprofit, bipartisan coalition of business, government, environmental, and consumer leaders committed to using energy more productively to achieve economic growth, a cleaner environment and greater energy security, affordability and reliability. For over four decades, the Alliance has been the premier voice for energy efficiency policy and thought leadership.

Energy efficiency is our most powerful solution to climate change

Energy efficiency represents an extraordinary and often underestimated opportunity to reduce carbon emissions while simultaneously stimulating economic activity and lowering consumer energy bills. Studies consistently find that energy efficiency is the fastest, cheapest, and most effective solution we have for mitigating climate change: The International Energy Agency estimates that efficiency alone can account for 44% of greenhouse gas emissions reductions needed to reach international climate goals.[1] In the U.S., efficiency can get the country halfway to its climate goals.[2]

Energy efficiency is also one of the largest drivers of job creation in the energy economy, and by far the largest in the clean energy sector. According to the U.S. Energy and Employment Report (USEER), the efficiency sector supports more than 2.3 million U.S. jobs. That's more than 10 times the number of jobs as the U.S. coal industry and five times that of the U.S. wind and solar industries combined. Seventy percent of efficiency jobs are in construction and manufacturing – retrofitting homes and buildings and manufacturing high-efficiency building components such as air conditioners, windows and insulation.

Energy efficiency is proven. We have made tremendous energy efficiency progress in recent decades. Without the gains in energy efficiency made over the past four decades, the U.S.

[1] International Energy Agency (IEA). Energy Efficiency 2018. Available at: https://www.iea.org/efficiency2018/
[2] American Council for an Energy-Efficient Economy (ACEEE). *Halfway There: Energy Efficiency Can Cut Energy Use and Greenhouse Gas Emissions in Half by 2050*. September 18, 2019. Available at: https://aceee.org/research-report/u1907

economy would require at least 60% more energy than we currently use to achieve the same productivity, and consumers and businesses would be spending $800 billion more per year on energy, stifling investment and economic growth.[3]

The opportunities ahead are even greater. With investment and smart policy, we can continue this progress while strengthening U.S. productivity and competitiveness. Innovation and technology advancements in areas such as artificial intelligence, materials science and advanced building systems create vast new potential for improving efficiency across the economy.

However, while momentum for addressing climate change appears to be growing on both sides of the aisle, U.S. carbon emissions, energy intensity and productivity are headed in the wrong direction according to recent indicators, including:

- Primary U.S. energy intensity – measuring economic output per energy consumed – worsened for the first time in more than 25 years, rising 0.6% according to the Department of Energy's Energy Information Administration (EIA);[4]
- Energy-related carbon emission rose by 2.7% to 5,130 million metric tons of CO2 equivalent, according to EIA;[5]
- Total U.S. energy consumption hit an all-time high in 2018, using more than 101 quadrillion British thermal units (Btu), an increase of 3.4% over 2017, according to EIA;[6] and
- The federal government reported decreased efficiency of 1.7% in federal facilities, according to the White House Council on Environmental Quality (CEQ).[7]

Putting off action on climate will be costly, perhaps astronomically so.[8] To meet even modest climate goals, we must immediately reverse these trends and begin making significant gains in energy efficiency and productivity. Improved energy efficiency should be the foundation of our nation's climate policy strategy. As you search for bipartisan solutions, we urge you to seize this opportunity by prioritizing energy efficiency, including through infrastructure and transportation investments, tax incentives, public-private partnerships, research funding, or other initiatives.

What policies should Congress adopt to decarbonize the following sectors consistent with meeting or exceeding net-zero emissions by mid-century? Where possible, please provide analytical support that demonstrates that the recommended policies achieve the goal.

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[3] ACEEE. *Energy Efficiency in the United States: 35 Years and Counting*. 2015. Available at: https://aceee.org/research-report/e1502

[4] U.S. Energy Information Administration (EIA). *U.S. Energy-Related Carbon Dioxide Emissions, 2018*. November 2019. Available at: https://www.eia.gov/environment/emissions/carbon/pdf/2018_co2analysis.pdf

[5] EIA, *Ibid*

[6] EIA. *Monthly Energy Review*. October 2019. Available at: https://www.eia.gov/totalenergy/data/monthly/pdf/sec1_3.pdf

[7] White House Council on Environmental Quality (CEQ). Federal Government-Wide Performance Data, Fiscal Year 2018. Facility Energy Use. Available at: https://www.sustainability.gov/government_data.html#btu

[8] Dietz, S., *et al*. *The Economics of 1.5 C Climate Change*. Annual Review of Environment and Resources. September 5, 2018. Available at: https://www.annualreviews.org/doi/pdf/10.1146/annurev-environ-102017-025817; See also: Executive Office of the President. *The Cost of Delaying Action to Stem Climate*. July 2014. Available at: https://scholar.harvard.edu/files/stock/files/cost_of_delaying_action.pdf

Transportation

The transportation sector is responsible for 28% of U.S. energy consumption and 29% of U.S. GHG emissions, with 92% of energy use derived from petroleum products.[9] The sector is also diverse, with different vehicles and uses ranging from urban and rural personal transportation to freight and logistics, providing a range of critically important opportunities to reduce carbon emissions.

Steady, predictable increases in Corporate Average Fuel Economy (CAFE) standards are the cornerstone for reducing greenhouse gas emission from the transportation sector. Fuel economy improvements to cars and light trucks since 1975 have saved U.S. drivers more than 1.5 trillion gallons of gasoline and about $4 trillion in fuel costs – saving enough gasoline to power all the cars and lights trucks in the U.S. for more than 10 years.[10] The household cost savings are significant: At $2.65 per gallon, for example, a car that gets 35 miles per gallon will save $850 per year in fuel costs versus one that gets 20 miles per gallon. It is imperative that we continue strengthening these standards to drive the market and stimulate innovation toward greater efficiency.

At the same time, there are many other opportunities to reduce energy waste in transportation, including the deployment of new technologies such as electric vehicles, facilitation of more efficient transportation options such as mass transit and ride sharing, and system-wide opportunities to better use infrastructure, such as smart technologies that reduce congestion and extend the lifetime of roads. The Alliance in 2018 convened a high-level commission, the 50x50 Transportation Commission, with representatives from automakers, utilities, technology companies and others with a goal of reducing energy consumption in the sector 50% by 2050. In June the commission released a policy platform for modernizing transportation infrastructure to achieve more efficient, sustainable, and accessible mobility.[11]

As the FAST Act reauthorization approaches, we urge Congress to use this as an opportunity to consider the full array of energy-efficiency tools and technologies in new and existing programs. Congress should ensure key grant programs have resources and flexibility to support energy efficiency by increasing and extending funding for programs such as the Better Utilizing Investments to Leverage Development (BUILD) grant and the Surface Transportation Block grant. Through the BUILD grant, Congress can promote energy efficiency by establishing a specific grant that targets energy efficiency as a key objective, such as through increased energy productivity, reduced vehicle miles traveled, and higher-occupancy travel. Another key program prime for an increase in funding is the Congestion Mitigation and Air Quality Improvement (CMAQ) grant program, which emphasizes alternative fuel corridors and infrastructure.

One of the most important areas in transportation ripe for investment is electrified transportation,

[9] EIA (2018), Use of Energy Explained. Available at: https://www.eia.gov/energyexplained/use-of-energy/transportation.php
[10] Baker Jr., H. Center for Public Policy. *A Trillion Gallons of Gasoline*. August 2017. Available at: http://bakercenter.utk.edu/wp-content/uploads/2017/08/OnPoint-5-2017.pdf
[11] Alliance to Save Energy. *50x50: Reinventing U.S. Mobility*. June 2019. Available at: https://ase.org/recommendations

which is significantly more efficient than diesel or gasoline-fueled transportation. Targeted tax credits and grant programs can break down the barriers to greater deployments of battery electric vehicles and public Electric Vehicle Supply Equipment (EVSE) or charging stations. The Alternative Fuel Vehicle Refueling Property Credit (Section 30C) aids businesses and homeowners with the cost of installing advanced vehicle fueling infrastructure. Permanent extension of this credit, changing the definition of caps, and making the credit refundable are cost-effective ways to improve access to electrified transportation. Additionally, establishing a standalone program to provide greater incentive to invest in charging and fueling equipment for electric vehicles, along the National Highway System, in local communities, and in National Parks can promote adaptation of these emissions-reducing technologies. Of course, to utilize these charging networks, Congress should also support the deployment of electric vehicles, including through adjustment of the Section 30D Plug-In Electric Vehicle Tax Credit. This credit is a critical enabler of EV markets until they reach viability. Congress can also take steps to reinstate the Alternative Fuels Tax Credit and amend the credit to include electricity as an alternative fuel.

As a microcosm of the complex logistics and multi-modal needs of the full transportation system, ports and airports must have the flexibility to leverage funding, including through the Airport Improvement Program (AIP) and incentives to modernize port infrastructure, to improve capacity and safety while sharply reducing carbon emissions. Congress should include energy efficiency projects in AIP eligibility requirements, including projects to purchase electric maintenance vehicles or equipment to provide gate power, heating and air-conditioning to airport terminals, and other similar projects. Port modernization, including electrification, should be considered where federal funds are allocated and included in transportation and infrastructure discussions.

Public transportation systems are one of the most efficient technologies to move people and goods to their destinations, and the federal transit program in its entirety needs to be augmented to support more and better public transportation choices by increasing the rate of authorization and to include an intent to shift to more energy-efficient modes of travel and establish a foundation for energy-efficient land use. Specific recommendations include increasing funding for programs such as the Urbanized Area Formula program, the Section 5337 State of Good Repair Program, Section 5339 Bus and Bus Facilities program and Competitive Grants, and the Low or No Emissions Grant program. Congress should also lower the barriers to the Low and No Emission Grant program, which provides funding to state and local government authorities for the purchase or lease of zero-emission/low-emission transit buses and acquisition, construction, and leasing of required supporting facilities. The Capital Investment Grants program is a key partner in the goal of efficiently moving people and goods from point A to point B through investments in transit, including heavy rail, commuter rail, light rail, streetcars, and bus rapid transit.

Access to financing is key to leveraging limited resources to the maximum extent, including through the underutilized Transportation Infrastructure Finance and Innovation Act (TIFIA). TIFIA credit assistance can be used to help finance a broad selection of transportation-related infrastructure. While TIFIA has historically received robust funding, it has undergone significant reductions under the FAST Act. On average, TIFIA's budget authority is a fraction of the total loan amount, only about 7% of the face value of the loan. In simple dollar terms, $1 of TIFIA

program funds can support a loan of approximately $14 and result in infrastructure investment of up to $40. Improvements to the application process and additional funding for technical assistance would improve the program and provide the flexibility to support a variety of project sizes and types. Another financing option is to expand the resources for private activity bonds (PABs) and amend eligibility to ensure uses for energy efficiency. The current list of projects eligible to be financed by PABs is broad, but technically excludes projects that do not also have federal assistance under Title 23, many of which are elements of high-efficiency transportation.

A new approach to infrastructure investment could also come in the form of a National Green Infrastructure Bank, which would provide the necessary structure to expand the deployment of clean and resilient technologies, including energy, transportation, water, and other infrastructure. The general framework would allow the Green Infrastructure Bank to leverage public funding for projects such as electrification, energy efficiency, renewable energy and alternatively fueled vehicle infrastructure, and promote opportunities to competitive growth in the sector.

Industry

Industry accounts for 22% of greenhouse gas emissions, making it another important target for emissions reduction. Importantly, increasing efficiency can also play a significant role in improving productivity and competitiveness in the sector.

Industrial emissions are due to heat and process reactions. Heavy industries such as steel, petrochemicals and cement require extreme temperatures and thermal energy, making decarbonization challenging. Energy efficiency has also been a challenge due to the heterogeneity of the sector combined with proprietary processes in highly competitive business environment.

The Alliance supports strengthening and expanding research, development, demonstration and deployment efforts and public-private partnerships under programs such as the Advanced Manufacturing Office and Better Buildings Better Plants. This includes initiatives such as the CHP Technical Assistance Partnerships, Industrial Assessment Centers, and DOE's work around ISO 50001 Ready and Superior Energy Performance 50001.

The Alliance also supports expanded, consistent tax incentives for combined heat and power and making waste heat to power technologies eligible under the Sec. 48 investment tax credit. Finally, the Alliance encourages the committee to explore other innovative financing and incentive proposals that could encourage manufacturing efficiency, particularly at small- and medium-sized facilities.

Buildings

Homes and buildings – which account for about 40% of our energy use and 36% of emissions – will be in use for decades to come, with enormous implications for U.S. energy consumption and emissions. Any effort to reduce carbon emissions must focus heavily on this sector. Particularly critical is addressing the existing building stock. Older homes and buildings are often the most wasteful and account for the lion's share of emissions.

Congress and the federal government have numerous tools available to improve building efficiency, including passing tax credits or other financial incentives encouraging efficiency upgrades; strengthening minimum efficiency standards for energy intensive appliances and equipment; supporting the adoption and implementation of stronger building energy codes; increasing investments for weatherization assistance helping low-income households improve efficiency; and leading by example by aggressively improving the efficiency of the federal government, the largest energy user in the country.

Low-cost decarbonization opportunities exist across the commercial and residential buildings sectors, particularly through the implementation of federal appliance and equipment energy conservation standards and model building energy codes. By requiring minimum efficiency performance, these codes and standards give the market a clear, predictable pathway to improving efficiency while sharply reducing energy consumption and energy costs. These programs are administered by DOE but undergo significant stakeholder processes, including cost-effectiveness tests, thorough evaluation, measurement, and verification procedures, and increasingly rely on real-world performance requirements or third-party certification to ensure realized savings align with estimates. Appliance standards and building energy codes should be consistent, transparent, and increasingly stringent. DOE estimates that existing appliance standards, which cover about 90% of home energy use and 60% of commercial building energy use, will create cumulative energy savings of nearly 142 quads and would result in a $2 trillion cumulative utility bill savings to consumers and businesses through 2030.[12]

The latest model building energy codes – including the International Energy Conservation Code (IECC) for residential buildings and ASHRAE 90.1 standards for commercial buildings – deliver 30% more efficiency than codes of just a decade ago,[13] which will result in more than $5 billion in annual savings for U.S. homes and businesses from, for example, improved thermal envelopes and high-efficiency heating and cooling equipment and lighting fixtures. Just as important, the experiences of states and communities demonstrate that more efficient buildings are key to enhancing energy system resilience in the face of extreme weather events. According to Architecture 2030, reaching net zero carbon emissions from buildings will require an efficiency gain of 70-80% above the 2006 IECC by 2050. To achieve this, codes must increase efficiency by roughly 3% each cycle.[14]

Moving forward, Congress should ensure that DOE sets clear, forward-looking goals for energy reductions for each code development cycle, so that net zero energy buildings cost-effectively reach scale by 2030, and net zero carbon emissions can be reasonably achieved through performance-based metrics as digitization becomes more ubiquitous and data more available.[15]

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[12] DOE. Fact Sheet: Saving Energy and Money with Appliance and Equipment Standards in the United States. January 2017. Available at: https://www.energy.gov/sites/prod/files/2017/01/f34/Appliance%20and%20Equipment%20Standards%20Fact%20Sheet-011917_0.pdf

[13] Pacific Northwest National Laboratory (LBNL). Impacts of Model Building energy Codes. October 2016. Available at: https://www.energycodes.gov/sites/default/files/documents/Impacts_Of_Model_Energy_Codes.pdf

[14] International Code Council (ICC). Building Safety Journal. *Zero Energy Buildings in Context with Today's Codes*. April 15, 2019. Available at: https://www.iccsafe.org/building-safety-journal/bsj-technical/zero-energy-buildings-in-context-with-todays-codes/

[15] ICC, *Ibid*.

Also, Congress should consider tying federal grant awards to states, local governments, and tribes, to adopt and enforce modern building energy codes (at least 2015). The bipartisan Disaster Recovery Reform Act (DRRA) of 2018 provided an incentive model that should be considered in the awarding of federal funds, tying the award of pre- and post-disaster mitigation grants to the planned adoption and implementation of the most recently published model energy codes, with a percentage earmarked for the development of the workforce required to enforce those critical codes.[16]

A major gap in buildings efficiency policy is the absence of tax incentives. While the federal government encourages nearly every mainstream form of energy generation with tax incentives – and has done so for decades – there are currently no widely available incentives for energy efficiency in the U.S. tax code. This is a glaring and costly omission. Opportunities for encouraging high-efficiency homes and buildings could lock in decades of energy and cost savings. Likewise, long-term, meaningful incentives for high-efficiency air conditioning, water heaters, lighting systems, and other equipment are proven to stimulate markets, save consumers money, and sharply reduce emissions. Just as we encourage the development of renewable or nuclear power generation, Congress should move quickly to implement long-term, predictable tax incentives for new and existing homes and buildings that effectively encourage builders, building owners (including landlords) and homeowners for making efficiency improvements.

Many of the above policies are important not just for reducing carbon emissions but for improving access to affordable housing by addressing the outsized energy burden faced by lower-income families, who spend a far larger share of their income paying energy bills. EIA reports that one in three households struggles to pay its monthly energy bill, and 20% face decisions whether to "heat or eat."[17] This energy burden results in families closing off rooms or sections of their homes to limit heating demand or even foregoing medical treatments and medications or other necessities to make ends meet.

Well-known barriers exist that discourage efficiency improvements. Whether through buying a high-efficiency home appliance or retrofitting a commercial building – efficiency upgrades almost always pay for themselves over time through lower energy costs, but they also require up-front capital investment. Further, there are unique challenges in areas such as rental markets, such as the split-incentive. Currently, a landlord has little incentive to invest in higher-efficiency appliances, windows, insulation, heating, and cooling systems so long as the tenant is responsible for paying the utility bill, while the tenant has little incentive to purchase equipment that will remain with the building owner at the end of occupancy. This results in investments based on first-cost considerations which are shortsighted and lead to tenants being saddled with inefficient housing and higher energy bills. This squeeze on consumers' wallets adds to the shortage of affordable housing. Cost savings from improved home efficiency results in decreased rates of

[16] Public Law 115-254, Division D, Sec. 1234(a).
[17] EIA. Today in Energy: *One in Three U.S. Households Faces a Challenge in Meeting Energy Needs*. September 19, 2018. Available at: https://www.eia.gov/todayinenergy/detail.php?id=37072

default in mortgages for the homeowner, and in reduced rates of vacancy and turnover for landlords.[18] [19]

In addition to the above recommendations such as codes and standards that protect consumers from higher energy costs, the Alliance supports significantly increased investment in federal assistance such as the Weatherization Assistance Program that helps low-income households overcome first-cost hurdles and weatherize their homes to lower energy bills. This program has been highly effective, retrofitting about 35,000 low-income homes each year, but there are widespread waiting lists for services across the country.

Finally, as with the transportation sector, innovation and technology are creating new opportunities for savings in the buildings sector that can play a significant role in achieving efficiency and decarbonizing the economy.[20] In addition to encouraging traditional efficiency solutions such as improved building envelopes and equipment, tremendous opportunities are emerging through systems-oriented practices and technologies such as integrated design, active-energy management, internet of things, grid integration, and artificial intelligence. Congress should support legislation now to encourage and accelerate the adoption of these "smart building" technologies.

Building energy use involves both direct and indirect emissions. Direct emissions are those that attend combustion of fossil fuels in end-uses such as heating air or water, while indirect emissions arise from generation of electricity. While the nation's regional energy grids are incrementally decarbonizing due to a mix of market factors, state policy mechanisms, and increased penetration of renewables, it remains generally more cost-effective to use fewer electrons or hydrocarbons to meet the same level of performance, comfort, or service.

Also, while peak-targeting demand-side resources such as energy efficiency can increasingly be bid into wholesale power markets and into resource planning dockets as an alternative to generation, transmission, and distribution, efficiency adds downward pressure on prices for all consumers at all hours by taming scarcity—an effect known as Demand-Reduction Induced Price Effect (DRIPE).[21] As research into demand flexibility and demand side resources grows, these effects are further understood and time- and locational values of energy efficiency programs are more quantifiable in regulatory forums, rate setting, and utility investment decisions.[22] Increasing load flexibility by increasing the penetration of sensors and controls technologies, smart meters, programmable and connected thermostats, with complementary time-of-use

[18] Institute for Market Transformation (IMT). *Home Energy Efficiency and Mortgage Risks*. March 2013. Available at: https://www.imt.org/wp-content/uploads/2018/02/IMT_UNC_HomeEEMortgageRisksfinal.pdf
[19] Lawrence Berkeley National Laboratory (LBNL). *Impact of Energy Factors on Default Risk in Commercial Mortgages*. Updated December 3, 2018. Available at: https://buildings.lbl.gov/sites/default/files/mortgage-default-risk-and-energy_12-3-18.pdf
[20] U.S. Environmental Protection Agency (EPA). *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2017.* April 2019. Available at: https://www.epa.gov/sites/production/files/2019-04/documents/us-ghg-inventory-2019-main-text.pdf
[21] Regulatory Assistance Project (RAP). *The Value of Demand Reduction Induced Price Effect (DRIPE).* March 18, 2015. Available at: https://www.raponline.org/wp-content/uploads/2016/05/efg-ri-dripewebinarslidedeck-2015-mar-18-revised.pdf
[22] LBNL. Electricity Markets and Policy Group. Publications: *Time- and Locational-Sensitive Value.* Available at: https://emp.lbl.gov/projects/time-value-efficiency

pricing and aggregated demand response with rewards for peak shedding, shifting, and shaping may prove to integrate variable generation at far lower cost than straight resource standards or mandates.

What policies should Congress adopt to ensure that the United States is a leader in innovative manufacturing clean technologies; creating new, family-sustaining jobs in these sectors; and supporting workers during the decarbonization transition?

Please see Innovation section below.

Carbon Pricing: What role should carbon pricing play in any national climate action plan to meet or exceed net zero by mid-century, while also minimizing impacts to low- and middle-income families, creating family-sustaining jobs, and advancing environmental justice? Where possible, please provide analytical support to show that the recommended policies achieve these goals.

The Alliance believes that a well-designed carbon price with appropriate complementary policies has the potential to drive significant energy efficiency gains across the U.S. economy, and we are engaged in conversations with stakeholders about how such a pricing mechanism could be best structured.

There are several considerations. First, carbon pricing has often been referenced as an opportunity to replace other clean energy market incentives and policies. While this may be true for certain market incentives, regulatory policies that drive energy efficiency, such as building codes, appliance standards, and fuel economy standards may incentivize energy efficiency more than carbon pricing. This is especially true when the investment choices and costs are not necessarily controlled by consumers (e.g. employees in commercial buildings) or the price signal is dwarfed by other costs, diluting its utility as a market driver (e.g. such as in the case of passenger vehicles, where the cost of vehicle insurance and financing is often much larger than fuel costs).

Additionally, supplementary investments and programs will continue to be needed where market gaps exist. This is particularly true, for example, in rental housing markets under which landlords have little incentive to make efficiency upgrades when tenants are paying electric bills. Without addressing this, renters – and particularly lower-income renters – could be negatively affected by a carbon tax without recourse to pursue greater efficiency. We also must recognize that many energy efficiency improvements require up-front investments that – while they often pay for themselves over time through energy cost savings – are an initial obstacle for lower- and middle-income residents. Any carbon pricing mechanism should ensure that these households are empowered with tools to overcome those hurdles. This could be achieved through broadly expanded weatherization assistance or other financing mechanisms. In these cases, energy efficiency policies, programs, and targeted support should be preserved as key complements to carbon pricing strategies.

Finally, for the pricing mechanism to effectively drive efficiency gains, it is important that the price be set at a level that effectively influences behavior and that consumers and businesses have tools available to better understand their energy consumption and are empowered to take

steps to reduce that consumption. Utility consumers, for example, are better equipped to respond to carbon pricing with clear, real-time price signals allowing them to capitalize on savings where available. Similarly, public-private partnerships and research, development and deployment around the latest efficiency technologies enable manufacturers and other energy-intensive industries to significantly improve efficiency and productivity.

Innovation: Where should Congress focus an innovation agenda for climate solutions? Please identify specific areas for federal investment and, where possible, recommend the scale of investment needed to achieve results in research, development and deployment.

Energy efficiency programs administered by the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) and other federal agencies are key to promoting innovation, returning benefits and savings to American homeowners, consumers, and businesses many times greater than the public's investment. In fact, taxpayer investment of $12 billion in EERE has resulted in an estimated net economic benefit of $230 billion, and an overall annual return on investment of over 20%.[23] Without increased funding and continued strong support for early-, mid-, and later-stage research, development, demonstration, and deployment (RDD&D), the United States would be at a significant disadvantage and lose its place as a global leader in developing and implementing innovative technologies.

The Advanced Manufacturing Office (AMO) under EERE enables the research, development, demonstration, and deployment of industrial energy efficiency and advanced manufacturing technologies that will keep U.S. companies competitive in international markets and support jobs in local communities. AMO is primarily structured through three subprograms: R&D Projects, which focus on high-impact manufacturing technology and process challenges; R&D Consortia, which promotes public-private partnerships; and Technical Partnerships, which provides support for the adoption of the new and innovative technologies.

DOE's 2018 AMO wrap up report illustrates some of the successes of AMO, with projects in conjunction with other DOE programs such as the national laboratories, as well as outside organizations and educational institutions, among other entities.[24] In 2018, for example, AMO awarded funding for the creation of a masters-level traineeship program to facilitate workforce development in advanced materials and process technologies.

Another notable 2018 project is between DOE and the National Association of Manufacturers (NAM). This collaboration on the Sustainability in Manufacturing Partnership, administered through Better Plants, carries on the core mission of Better Plants to assist manufacturers in improving energy productivity through adoption of energy efficient technologies. According to DOE, the manufacturing sector spends over $200 billion annually on energy costs. Through its Better Plants partnership, most participating manufacturers pledge to reduce their energy use by 25% within 10 years. An example of success under Better Plants is of a large carpet

[23] DOE. About the Office of Energy Efficiency and Renewable Energy. Available at: https://www.energy.gov/eere/about-office-energy-efficiency-and-renewable-energy
[24] DOE. Advanced Manufacturing Office 2018 Wrap Up. December 19, 2018. Available at: https://www.energy.gov/eere/amo/articles/advanced-manufacturing-office-2018-wrap

manufacturer and floor covering provider that made the 10-year pledge and ultimately hit its reduction goal early, improving its energy intensity by 33% across the board.

The Building Technologies Office (BTO), another EERE program, develops innovative, cost-effective technologies, tools, and solutions that help U.S. homeowners, consumers and businesses achieve peak energy efficiency performance in their buildings across all sectors of the economy. Building account for over 40% of the nation's total energy and BTO's goal is to reduce energy use by 30% by 2030.[25] Of note in the innovation space is BTO's Emerging Technologies program, which includes the following: HVAC, water heating, and appliances; building energy modeling; windows and building envelope; sensors and controls; solid-state lighting; and building-to-grid integration. According to DOE, cutting the energy use of U.S. buildings by 20% would result in $80 billion in savings annually, while promoting job growth and energy security, innovative home and building designs, and implementing transformative new technologies.[26]

Additionally, through the DOE's Better Buildings Initiative, public and private partners have saved over $8 billion and more than 8 million tons of CO2. Better Buildings spans over 900 organizations, and supports implementation of high-impact field validations to support R&D into building systems optimization and technology solutions and its Technology Campaign has resulted in savings of nearly $200 million last year alone from interior lighting improvements, HVAC rooftop unit replacements and retrofits, and through energy management systems by analyzing cutting-edge technologies and sharing them in the marketplace.

Clear direction should also be provided to DOE and EERE to obligate and expend funds consistent with Congressional intent and in a timely manner. Both the House and Senate have consistently provided clear report language that directs DOE to distribute funds in a timely manner and not prioritize early-stage research and development at the expense of later-stage deployment and demonstration activities. Congress should also take steps to ensure the ongoing reduction in staffing and hiring within EERE, which impedes the proper execution of vital energy efficiency funding and research opportunities. By continuing strong Congressional support through the appropriations process, these programs will foster innovative practices in American manufacturing and building technologies, improving U.S global competitiveness, promote job and economic growth, and ensure the nation's energy security.

Another program receiving broad Congressional support is the Advanced Research Projects Agency–Energy (ARPA-E), a federal agency within DOE charged with helping the U.S. compete and prosper in development of cutting-edge technology. Since 2009, ARPA-E has supported the R&D of more than 800 energy technology projects with roughly $2 billion in funding.[27] To date, 346 of those projects have received patents, 145 have attracted over $2.9

[25] DOE. Building Technologies Office Multi-Year Program Plan: Fiscal Years 2016-2020. February 2016. Available at: https://www.energy.gov/sites/prod/files/2016/02/f29/BTO%20Multi-Year%20Program%20Plan%20-%20Final.pdf
[26] DOE. About the Building Technologies Office. Available at: https://www.energy.gov/eere/buildings/about-building-technologies-office
[27] Alliance to Save Energy. Blog to Save Energy: *Lawmakers from Both Parties Join to Support Funding of Advanced Energy Research*. October 17, 2019. Available at: https://www.ase.org/blog/lawmakers-both-parties-join-support-funding-advanced-energy-research

billion in private sector follow-on funding, and 76 have led to the formation of companies. Efficiency is a major focus area for ARPA-E, and recent projects include Syracuse University's Micro-Environmental Control System and Otherlab's Adaptive Apparel for Personalized Thermal Comfort.[28] Despite the successes of ARPA-E and resounding Congressional support, the current administration has tried to eliminate funding in each of its yearly budget requests.[29] With the U.S. already in danger of falling behind other global leaders in the energy innovation race, the preservation of and support for ARPA-E research and development funding is critical.

Lastly, ENERGY STAR, a voluntary partnership program jointly administered by DOE and the U.S. Environmental Protection Agency (EPA), helps businesses, state and local governments, nonprofit organizations, institutions of higher education, homeowners, and consumers save money by investing in energy efficiency. It includes ENERGY STAR Buildings and Plants, Home Performance with ENERGY STAR for existing homes and certified new homes, and ENERGY STAR for Small Business, and ENERGY STAR labeled products. ENERGY STAR saved consumers over $30 billion in 2017 alone. Additionally, since 1992 the program has helped save nearly 4 trillion kilowatt-hours of electricity and over 3 billion metric tons of greenhouse gas reductions.[30] ENERGY STAR accomplishes several highly desirable goals at once: It helps consumers reduce high energy bills, promotes economic growth by stimulating investment in new technology, reduces pollution through cost-effective measures, and helps ensure the reliability of our electricity system by reducing peak demand. We urge Congress to reject a transition to a "fee-based" model and provide increased, dedicated, line item funding for the continued operation of the ENERGY STAR program. Program standards should also be updated based on market penetration levels to ensure ENERGY STAR remains meaningful and impactful in reducing energy usage.

How can Congress incentivize more public-private partnerships and encourage more private investment in clean energy innovation?

The federal government represents the largest energy consumer in the nation, spending upwards of $6 billion annually on its utility bill. With a portfolio of more than 350,000 buildings, federal agencies also represent the single-greatest test bed for innovative grid modernization demonstrations and deployment activities. The federal government can show leadership by addressing critical buildings and energy infrastructure through mandated annual goals for federal agencies to enter into public-private partnerships (P3s) including energy savings performance contracts (ESPCs) and utility energy service contracts (UESCs) that leverage private-sector capital to implement resilience-enhancing and energy and water conservation measures in public buildings to reduce GHGs. These performance contracting goals should be paired with complementary, forward-looking energy and water reduction targets for agencies.

For example, DOE has identified more than $8 billion in energy and water conservation measures (ECMs and WCMs) through audits at roughly 23% of covered federal facilities, representing just

[28] Advanced Research Projects Agency-Energy (ARPA-E). *ARPA-E Impacts: A Sample of Project Outcomes, Volume III.* May 7, 2018. Available at: https://arpa-e.energy.gov/?q=publications/arpa-e-impacts-sample-project-outcomes-volume-iii
[29] Alliance to Save Energy. *FY2020 Federal Energy Efficiency Programs—Presidential Budget Request.* Available at: https://www.ase.org/sites/ase.org/files/resources/Media%20browser/ee_funding_chart_fy20_budget_request.pdf
[30] ENERGY STAR. ENERGY STAR Overview. Available at: https://www.energystar.gov/about

38% of relevant floorspace. Implementing these measures alone would be a cost-effective yet substantial down-payment on a climate-friendly infrastructure plan that starts by addressing the more than $150 billion federal maintenance backlog.[31] If done through ESPCs and UESCs, the reduced energy and water consumption and emissions savings would result in greater resilience for mission-critical facilities and result in an estimated taxpayer savings of up to $819 million annually—with no upfront taxpayer money necessary.[32] [33]

ESPCs and UESCs are performance-based P3s in which the private-sector partner invests its capital, borrowed at market rate, into renovations that install energy and water conservation measures into public buildings, thereby saving money otherwise spent on the energy bill. The private partner, in return for providing the capital, claims a share of the (statutorily mandated)[34] monthly energy savings, placing the financial risk on the private partner to achieve these savings through installation, and often operation and maintenance, of upgraded and modernized equipment. ESPCs and UESCs require no upfront appropriations, which have been at best irregular in recent years, and further, are scored by the Congressional Budget Office (CBO) as a cost-saving measure that can offset for budget purposes.[35] ECMs are life-cycle cost effective measures that include efficiency and conservation, cogeneration, renewable energy sources, improved operations and maintenance efficiencies, or retrofits.[36] Agencies should coordinate with the Federal Energy Management Program to identify portfolio-level opportunities to achieve deep energy retrofits through ESPC and UESC procurement. Forward-looking annual goals for performance contracts would improve the planning timeline for agencies, who are today often limited by the irregular appropriations process.

The Alliance recommends requiring increased use of ESPCs and UESCs for appropriate, cost-saving projects at federal facilities – including for energy and water savings, grid modernization, enhanced reliability and resilience due to decreased energy demand and modern equipment including microgrids, CHP, energy storage, and demand flexibility enabled by sensor and controls technologies.

Unlike many of the policy recommendations the Committee is likely to receive, this can happen starting now. Senate bill S. 1857, the Federal Energy and Water Management Performance Act, introduced by Senators Lisa Murkowski (R-Alaska) and Joe Manchin (D-W.Va.) represents an actionable opportunity to launch a significant round of private-sector investment into federal public buildings. House bill H.R. 3079, introduced by Reps. Peter Welch (D-Vt.) and Adam

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[31] DOE. *Federal Agency Use of Energy Savings Performance Contracting Has a Banner Year for Private Investment—Agencies Look to Achieve More Resilience.* November 16, 2018. Available at: https://www.energy.gov/eere/femp/articles/federal-agency-use-energy-savings-performance-contracting-has-banner-year-private

[32] DOE. *Annual Report to Congress: Federal Energy Management for Fiscal Year 2015.* Available at: https://www.energy.gov/sites/prod/files/2018/01/f46/fy15_annual_report.pdf

[33] Federal Energy Management Program (FEMP). EISA 432 Compliance Tracking System. Comprehensive Evaluation Findings. As of November 18, 2019. Available at: https://ctsedwweb.ee.doe.gov/CTSDataAnalysis/Reports/PublicAgencyReport_ComprehensiveEvaluationFindings.aspx

[34] 42 U.S.C. 8287

[35] Congressional Research Service (CRS). *Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs).* November 23, 2018. Available at: https://fas.org/sgp/crs/misc/R45411.pdf

[36] See: 42 U.S.C. 8287c, with reference to 42 U.S.C. 8259

Kinzinger (R-Ill.), would require agencies to implement all ECMs and WCMs identified through energy audits, with a further requirement that half be addressed via ESPCs and UESCs.

Agriculture: What policies should Congress adopt to reduce carbon pollution and other greenhouse gas emissions and maximize carbon storage in agriculture?

Energy consumption is deeply embedded throughout the farm economy. The U.S. agricultural industry consumes approximately 1.7 quads of energy annually, equivalent to the energy consumption of more than 40 million homes, and accounts for 9% of U.S. greenhouse gas emissions. Of this, 60% is direct energy consumption from machinery and equipment, lighting, heating and other sources, and 40% is consumed indirectly by using fertilizers, pesticides, water and livestock feed as well as the processing and distribution of products – adding up to almost half of a farm's overall expenses. As outlined below, U.S. agriculture policy has come to recognize the importance of programs aimed at helping the agriculture industry and rural communities implement effective solutions to their energy challenges.

Among the important provisions in the Farm Bill, the Energy Title is key to enhancing energy efficiency in agriculture and throughout rural communities, particularly through the Rural Energy for America Program (REAP), which supports renewable and energy efficiency improvements through grants and loans to implement systems and improvements, and to conduct energy audits. The Conservation Title and the Environmental Quality Incentives Program (EQIP) provides financial technical assistance for the planning and implementation of conservation practices across all resources. The Agricultural Management Assistance (AMA) Program also provides technical and financial assistance to producers for priorities that include improving water management or irrigation structure. The Rural Title authorizes the Savings Program that funds loans to help rural families and businesses implement energy efficiency, including the Value-Added Agricultural Product Grants that can be used for producing and marketing a value-added agricultural product, including those made with efficient technology. Research programs are also key, providing a bridge between farmers and land grant universities to innovative farming practices and technologies to reduce energy costs. Lastly, the Specialty Block Grant Program and Specialty Crop Research Initiative both provide funding opportunities to energy competitiveness and address the needs of the horticultural and specialty crop industry, including by increasing sustainability and productivity.

Protecting and expanding funding for efficiency programs, spreading information across the community, improving access to programs, and implementing projects that can utilize funds are key to advancing energy efficiency across rural America.

Resilience and Adaptation: What policies should Congress adopt to help communities become more resilient in response to climate change? The Select Committee welcomes all ideas on resilience and adaptation but requests comments on three specific questions:

What adjustments to federal disaster policies should Congress consider to reduce the risks and costs of extreme weather and other effects of climate change that can no longer be avoided?

Congress should be both swift and fiscally responsible when responding to disasters and emergencies. Over the past 40 years, energy efficiency has reduced the nation's need for electricity while stimulating economic growth. Today, the U.S. squeezes more than twice the

gross domestic product out of each drop of energy consumed than it did in 1980. While that decoupling helps keep energy affordable, it also reduces the need for generation plants, transmission lines and power substations nationwide. According to the Rhodium Group, transmission and distribution (T&D) failures, largely due to extreme weather, accounted for 96% of power disruptions from 2012-2016.[37] Fewer "twigs and twine" means fewer pieces to replace after an extreme weather event; it also means less stuff breaks.

Buildings designed with energy efficiency in mind also help communities survive during and rebound more quickly after extreme events. A high-performance thermal envelope can maintain livable conditions for far longer periods, helping occupants maintain health and comfort during a power outage in hot or cold climates. Energy efficiency technologies like advanced metering, sensors and controls help grid operators identify outages in real time, allowing for faster response and restoration of power. Combined heat and power (CHP, cogeneration) systems and microgrids can island buildings or campuses and provide heating and cooling during widespread outages as well, providing resilient locations to house displaced community members or to stage recovery efforts.

In the U.S., the cost and frequency of extreme weather events are both on increasing trend lines. The National Oceanic and Atmospheric Administration (NOAA) reports that the U.S. has experienced 254 weather events and climate disasters that has exceeded a cost of $1.7 trillion since 1980, with increasing cost and frequency in recent years. So far in 2019, the U.S. has been hit with 10 significant weather events. Over the past five years (2014-2018), the average is 12.6 billion-dollar events, compared to an average of 6.3 since 1980.[38] A National Institute of Building Sciences (NIBS) study, which analyzed 23 years of grants made by the Federal Emergency Management Agency (FEMA), Economic Development Administration (EDA), and the Department of Housing and Urban Development (HUD), found that for every federal dollar ($1) invested in mitigation grants, there was a resultant return of $6 of economic activity. NIBS also reported an $11 national benefit for every federal dollar spent designing structures to exceed 2018 code.[39] These results clearly show the value of strategic planning and complementary investment in building codes.

The Alliance recommends that this Committee pursue an overarching policy guideline tying federal funds to states to the adoption of updated building codes including energy aspects as well as structural and safety requirements. Language should refer to the most recently published IECC codes and ASHRAE standards for the most achievable, lowest-cost emissions reductions.

How can Congress better identify and reduce climate risks for front-line communities, including ensuring that low and moderate-income populations and communities that suffer from racial discrimination can effectively grapple with climate change?

Please see above answers under Buildings section.

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[37] Rhodium Group. *The Real Electricity Crisis*. October 3, 2017. Available at: https://rhg.com/research/the-real-electricity-reliability-crisis-doe-nopr/

[38] National Oceanic and Atmospheric Administration (NOAA). Billion-Dollar Weather and Climate Disasters: Overview. Available at: https://www.ncdc.noaa.gov/billions/

[39] National Institute of Building Sciences (NIBS). *Natural Hazard Mitigation Saves: 2018 Interim Report*. Available at: https://cdn.ymaws.com/www.nibs.org/resource/resmgr/mmc/NIBS_MSv2-2018_Interim-Repor.pdf

What standards and codes should Congress consider for the built environment to ensure federally-supported buildings and infrastructure are built to withstand the current and projected effects of climate change?

Please see above answers under Buildings section.

International: The climate crisis requires a global response. U.S. leadership is critical for successful global solutions. What policies should Congress adopt to support international action on the climate crisis?

U.S. leadership and full participation in international collaborations and treaties aimed at climate mitigation are critical for the success of these global efforts, because: 1) A U.S. commitment to reducing our own emissions provides the moral authority for influencing other countries to make commitments and take action to meet them; and 2) participation in international collaborations provides a mechanism for the U.S. to share technology and policy guidance with countries that have fewer resources. Congress should support the re-entry of the U.S. into the UNFCCC Paris Agreement, and the development and adoption of ambitious but achievable greenhouse gas emissions reductions targets within the U.S. Nationally Determined Contribution (NDC). Congress also should support the adoption of domestic policies required to meet these targets.

In addition, Congress should adopt policies in support of U.S. membership, participation, and financial contributions to international collaborative initiatives designed to speed the implementation of energy efficiency and clean energy programs. Examples include support for the new Energy Efficiency Hub in Paris, and programs spearheaded by the Clean Energy Ministerial and Sustainable Energy For All.

Conclusion

The U.S. has come a long way in using energy more productively in recent decades, and it should continue to take a global leadership position. The opportunities ahead are even greater than our past gains, and we are eager to work with you to advance energy efficiency throughout the U.S. economy to address the climate crisis.

Thank you again for the opportunity to submit comments on this important matter. Please don't hesitate to contact Alliance Vice President Ben Evans at bevans@ase.org with any questions.

Sincerely,

Alliance to Save Energy