ENERGY EFFICIENCY: A KEY COMPONENT OF MODERNIZED AMERICAN INFRASTRUCTURE THAT SAVES TAXPAYERS MONEY

Infrastructure is more than roads and bridges – it's our utility grid, water and wastewater facilities, public buildings, ports and other structures. These facilities use enormous amounts of energy, and a nationwide infrastructure initiative presents an opportunity to "get it right" and save consumers and taxpayers decades of wasted energy costs. In some cases, infrastructure projects can "pay for themselves" through public-private partnerships and innovative financing. Incorporating energy efficiency can also provide a host of additional benefits, such as improving reliability and resilience by stabilizing demand on the power grid, creating well-paying jobs, and reducing emissions. Perhaps most importantly, it will accelerate U.S. productivity in an increasingly competitive global economy. Congress and the administration can capitalize on these benefits in infrastructure legislation in several ways, including by:

- Adding requirements to build to updated energy codes and include high-efficiency equipment.
- Applying life-cycle cost-effectiveness analysis to all appropriate projects to ensure the project plan is developed considering costs incurred over the project lifetime, not just up-front costs.
- Accounting for energy efficiency cost savings as part of the non-federal revenue share leveraged by federal spending.
- Expanding opportunities for public-private partnerships, including performance contracting, which leverages savings from improved efficiency to finance infrastructure projects.

INFRASTRUCTURE OPPORTUNITIES

Building Infrastructure

Buildings account for roughly 40 percent of U.S. primary energy use and 76 percent of electricity use. As we invest in rebuilding, we should ensure these structures meet the highest standards for efficiency. The latest model building energy codes – requiring better insulation and more efficient lighting, for example – deliver savings of more than 30 percent compared with a decade ago. This results in more than $5 billion in annual savings for U.S. homes and businesses. In addition, programs like ENERGY STAR help to ensure that building components such as HVAC equipment are highly efficient. And finally, separate building components can be increasingly managed as a connected system, enabling energy efficiency opportunities across the board. As a result, building energy consumption – and demand on the grid – are more manageable than ever.

While investments in these technologies require up-front costs, many financial tools are available. For example, the federal government can ramp up public-private partnerships through performance contracting, in which private contractors conduct efficiency upgrades that are paid for with revenues from future guaranteed energy savings. This mechanism, which is estimated to have a market potential of up to $333 billion, presents no up-front capital costs to taxpayers, and can be deployed at the federal, state and local level. Complementary policies, such as expanding qualified opportunities for Private Activity Bonds, can also improve the efficiency of a wide variety of facilities including schools, government buildings, hospitals and universities. Infrastructure legislation should incentivize these tools.

Grid Modernization

The nation's power grid is rapidly evolving into its next-generation form as innovations in metering, connectivity, energy efficiency, distributed renewable energy and storage transform the way we produce and consume electricity. This transition presents opportunities to enhance grid efficiencies, smooth peak costs, deploy a greater diversity of energy resources, and respond more quickly to outages. However, it also

presents utilities with new challenges to recover their costs effectively and satisfy the increasingly complex demands of consumers. Achieving the benefits of a more modernized, efficient grid while weathering the challenges of higher demands will be driven in large part by the deployment of advanced metering infrastructure, which is inconsistently deployed throughout the United States. Studies have estimated that the cost of modern grid upgrades is $476 billion (from 2011-2018), but could yield up to 2 trillion in returns; meanwhile, DOE estimates that power outages cost Americans approximately 150 billion per year.

Water and Wastewater Infrastructure

Water systems are frequently overlooked as significant energy consumers, but the pumping, treatment, collection, and discharge of water and wastewater is energy-intensive. The average community water system can account for up to 40 percent of a municipality's total energy bill. And each year, the nation's drinking and wastewater systems spend around $4 billion on 187.4 million MWh of electricity to move and treat their water supply, accounting for approximately 4 percent of the nation's total annual energy consumption. And in some areas, the share is dramatically higher. In California, for example, water-related energy consumption accounts for nearly 19 percent of electricity demand. Deploying energy-efficient and well-synchronized components in water systems can cut down on these energy demands while enhancing water efficiency, as leaked water means both energy and water resources are wasted. Each year, up to 20 percent of treated water (2 trillion gallons) is wasted through leakage and the rupture of 240,000 underground mains, most of which are more than 50 years old, and will require more than $1 trillion of investment over the next 25 years.

Transportation

Another sector experiencing a significant overhaul is transportation. The market for passenger electric vehicles (EV) is expanding quickly, with EVs projected to account for nearly 60 percent of new car sales by 2040. Given that EVs are estimated to be nearly twice as efficient (on a well-to-wheel basis) as an average conventional gasoline vehicle, this transition could have enormous impacts for reducing energy waste, mobility costs, and emissions across the sector. The proliferation of carsharing and carpooling businesses and their interaction with public transportation programs are also presenting new opportunities to optimize how we use our transportation infrastructure, reducing traffic congestion and air pollution, while making mobility more affordable and accessible.

Municipal infrastructure should take these fast-moving trends into account in the design of roads, parking lots and access points. This includes incentivizing the establishment of public charging infrastructure for electric vehicles (in commercial buildings, transportation corridors, interstate highway system), and the installation of smart infrastructure in roads and cities (e.g. smart traffic lights, roadway sensors) that can reduce congestion in the short term while supporting the deployment of future technologies, such as automated vehicles. Planning for the future while investing in roads, buildings, and grid upgrades would introduce minor up-front costs, but enable enormous savings in the coming decades.

Energy Efficiency Jobs and Economic Impact

Energy efficiency already is one of the leading job creators in the entire energy sector, with a record 2.2 million jobs in 2016. That constitutes more than one-third of all energy-sector employment, estimated at 6.4 million. Notably, efficiency jobs support 21 percent of the nation's construction workforce, as well as nearly 10 percent of manufacturing jobs.