Setting the Climate Agenda for the Next President
Toward a More Effective Federal Clean Energy Toolkit

By Dan Reicher

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Setting the Climate Agenda for the Next President

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Abstract

The climate crisis requires a multifaceted response involving low-cost, low-carbon energy technologies, smart and aggressive public policies, and cheap and abundant financing. But today’s policy and finance tools are not up to the task of getting key energy technologies developed and deployed – rapidly, cost effectively and at scale. The next president will need to take a thorough inventory of the tools in the federal clean energy toolkit and the proposed new ones. The toolkit is a messy one – and in need of a major upgrade. It was assembled in a haphazard manner often based more on political expediency than long-term cost-effective impact. It lacks analysis about how each tool relates to the others, what new tools are needed and how they all might be better integrated, and ultimately more effective, in addressing climate change.

This paper briefly analyzes federal clean energy policy and finance tools. It first looks at an array of federal clean energy incentives related private sources of capital and the “big three” clean energy standards. It highlights two critical enabling technologies for renewable electricity – transmission and storage – and then provides a brief case study of federal incentives and standards for carbon capture and storage (CCS). Finally, it discusses the next president’s not-so-secret weapon – the federal government’s own energy footprint and related authorities and resources.

Current federal clean energy incentives, like grants, loan guarantees and tax credits, need to be tuned up while we also extend federally authorized tax-advantaged investment vehicles like master limited partnerships (MLPs) and real estate investment trusts (REITs) to renewables, efficiency, storage and beyond. Government support is essential, but the big money for clean energy – tens of trillions of dollars globally over the next few decades – will have to come from the private sector, particularly major long-term investors like pension funds, insurance companies, sovereign wealth funds, endowments and more. The next administration needs to build aggressively on work to date to help attract these investors to the clean energy table.

Beyond public and private capital, the big three clean energy standards – Environmental Protection Agency (EPA)’s Clean Power Plan (CPP), Corporate Average Fuel Economy (CAFE) rules for cars and light trucks, and the Department of Energy (DOE) efficiency standards for appliances and equipment – are key to progress on climate change. Each faces important opportunities – and challenges. At the same time, the two essential support mechanisms for renewable energy, transmission and storage, must address a host of issues from siting and cost allocation problems in building new power lines to the high cost of batteries and other electricity storage technologies.

One of the messiest parts of the federal clean energy tool kit involves CCS – a key technology for addressing carbon emissions from both the power and industrial sectors and critical to meeting the global 2 degree Centigrade climate target, according to the UN International Panel on Climate Change and the International Energy Agency. From grants, loan guarantees and tax credits to MLPs, Private Activity Bonds, price stabilization contracts and federal carbon emission standards, the federal approach to CCS – current and proposed – needs a major upgrade if we are going to get this climate technology deployed at large scale, and soon.

Finally, the U.S. government is the single largest energy user in the nation; it owns more than a quarter of all U.S. land, tens of thousands of miles of transmission lines, 400,000 nontactical vehicles and 350,000
buildings, and it has developed, hosted and purchased more renewable energy than any other single entity in the United States. As “CEO” of “USA Clean Energy Inc.,” the new president can do much to advance clean energy: demonstration and validation of new energy technologies at federal facilities, improved government procurement of renewable energy, expanded financing of federal facility efficiency retrofits, more effective federal permitting of clean energy projects, increased federal siting and financing of transmission lines and several other opportunities.
Setting the Climate Agenda for the Next President

Introduction

The next president will have an unprecedented challenge – and opportunity – in addressing climate change. Climate science is increasingly well-established, and many of the initial steps, if not all the details, that the U.S. will need to take to do its part in addressing the climate crisis have been defined in the Paris Agreement, EPA’s Clean Power Plan (CCP), federal fuel economy and efficiency standards, state requirements and beyond.

The opportunity to do good – and do well – in deploying clean energy in the United States and globally is vast. There are a number of differing estimates, but in rough terms global clean energy deployment will require tens of trillions of dollars of investment over the next several decades in order to have a reasonable likelihood of staying within the 2 degree Centigrade rise that scientists tell us will be required to avoid the worst effects of climate change.

A key challenge is achieving this kind of investment, largely from the private sector, at a time when annual global investment in clean energy is measured in the billions not trillions of dollars and global energy use grows. The good news is that the new president will have a host of tools to help drive this kind of spending and meet our climate imperative: cutting carbon emissions deeply, rapidly and cost effectively. In the energy sphere, the largest source of U.S. and global emissions, these tools are

- **Technology**: energy efficiency and renewable energy; nuclear power and natural gas; carbon capture and storage (CCS) for an array of power and industrial emitters; storage and transmission; fuel-efficient vehicles; low-carbon industrial operations and more
- **Policy**: at the international, national, state and local levels, building on government standards, incentives, procurement and beyond
- **Finance**: from early-stage venture capital to technology commercialization investments to project finance

These tools will be brought to bear in different ways along the three steps of the clean energy pathway: innovation, commercialization and deployment.

The next president will need to take a thorough inventory of all the current tools in the toolbox and the many proposed new ones. The toolbox today is a messy one. It was assembled in a haphazard manner often based more on political expediency than long-term cost-effective impact. It lacks adequate analysis about how each tool relates to the others, what new ones make sense, and how they all might be better integrated and ultimately more effective.

This paper takes a brief look at an array of federal clean energy incentives, private sources of capital, and the big three clean energy standards. It highlights two critical enabling technologies for renewable electricity – transmission and storage – and then provides a brief case study of federal incentives and standards for CCS. Finally, it discusses the next president’s not-so-secret weapon – the federal government’s own energy footprint and related resources and authorities.
1. Federal Incentives for Clean Energy

The federal government plays an important role in moving energy technologies from initial ideas to full-scale cost-competitive reality, from civilian nuclear power in the 1950s to advanced energy storage technologies today. There are an array of federal incentives, some involving direct federal spending and others built on indirect expenditures through the federal tax code. Each mechanism has a number of current issues, and there are broader questions about their interrelationships.

a. Federal Energy Research and Development (R&D) Funding

U.S. federal energy R&D funding, largely from the Department of Energy (DOE), supports work at universities, government labs and in the private sector across the full range of energy technologies. The new president’s biggest R&D imperative will be to meet the commitment made by President Obama at the December 2015 Paris climate talks to double U.S. energy R&D funding from $6.4 billion in 2016 to $12.8 billion by 2021. This is part of the Mission Innovation partnership, under which 20 nations announced their intent to double public clean energy R&D spending over the next five years. This kind of growth is a heavy lift in a Congress where even maintaining level funding has been a challenge. There are, however, some funding bright spots, such as ARPA-e, which has enjoyed strong bipartisan support since its launch in 2007. Overall, R&D has been the least controversial form of government support for clean energy. Congressional debate over federal funding tends to increase the closer to market the particular government incentive.

b. Federal Grants

Federal grants have been the workhorse of federal support for energy technology commercialization for decades, helping to move technologies from small-scale demonstrations to full-scale commercial deployment. The federal government, for example, funded much of the cost of early civilian nuclear reactors. In recent years, DOE has made significant grants in a range of areas including small modular reactors, CCS, offshore wind and storage. Grant funding was particularly strong following the 2009 stimulus bill but has fallen since.

The new administration should assess the track record and effectiveness of federal clean energy grants across the entire energy spectrum – nuclear, fossil, renewables, efficiency and beyond. The record is a mixed one across multiple administrations with a number of lessons learned involving issues like research focus areas, requests for proposal, cost share, evaluation, impacts and more. It is also important to assess the relative merits of grants versus other government policy tools to stimulate clean energy development and deployment. Taking a thoughtful and comprehensive look is particularly important with lower grant-funding levels following the wind-down of the federal stimulus program.

c. Federal Loan Guarantees

Federal loan guarantees, a government support mechanism administered by DOE’s Loan Programs Office (LPO), are designed to facilitate the commercialization and early deployment of advanced energy and vehicle technologies. The program supports energy and transportation technologies that are ready for commercial deployment but face challenges raising capital in the debt markets. It has been the subject of
significant controversy over the last few years, particularly with the bankruptcy of Solyndra, the recipient of a $535 million DOE loan guarantee. Behind all the media swirl and Capitol Hill hearings, however, several important facts have been lost, pointing to the success of the program in helping to commercialize key technologies as Congress intended.

First, loan guarantees have enjoyed bipartisan support extending back to President George W. Bush, who signed bills creating two of the key loan guarantee programs, for energy technology commercialization under Title XVII of the 2005 Energy Policy Act and advanced technology vehicle manufacturing (ATVM) under the 2007 Energy Independence Security Act. President Obama signed a third bill in 2009, the American Recovery and Reinvestment Act (the “stimulus bill”), that both funded the Title XVII and ATVM programs and authorized a new deployment-oriented loan guarantee program to stimulate job creation during the financial crisis.

Second, the DOE program has been a financial success. To date, the LPO has issued loan guarantees for 30 projects. The $32 billion portfolio of loans, loan guarantees and conditional commitments has been effectively managed by DOE with 98 percent of loans paying back and more than 90 percent of the $10 billion loan loss reserve Congress set aside currently available.

Third, while Solyndra gets much of the attention, the program has provided critical support to key clean energy and advanced vehicle projects at key moments. One example: A $465 million ATVM loan guarantee in 2010 backed Tesla’s purchase of an old General Motors auto assembly plant in Silicon Valley, helping to jumpstart this innovative new U.S. auto company on American soil. When the assembly plant was up and running, Tesla repaid its loan 10 years early. A second example: Prior to 2010, there were no utility-scale PV projects in the United States greater than 100 megawatts. LPO helped finance the first five utility-scale PV projects, and since then the private debt markets have taken over, financing many more.

Finally, while the LPO has used upward of half of the loan authority originally provided by Congress, the program currently has over $40 billion in remaining authority to fund innovative clean energy projects and advanced vehicle technology projects: $24 billion in loan authority for Title XVII projects and $16 billion for the ATVM program.

The new administration will need to focus on next steps for the loan guarantee program, building on the successful work currently underway at DOE’s LPO. While the likely trajectory is to spend down the remaining funds, Congress, working with a new president, might authorize additional LPO loan authority to advance critical energy and transportation technologies vital to both U.S. competitiveness and international climate commitments. President Obama proposed this approach in his FY2017 budget, including another $4 billion in new loan authority for advanced fossil, renewable energy and energy efficiency projects. Another option would be to transition existing loan authority from the LPO to an independent federal revolving fund. The LPO already has a successful program structure in place, including the needed staff and resources, to manage such a fund. This might be part of a larger independent federal entity with a broader set of tools, such as the Clean Energy Deployment Administration (CEDA), proposed by then Senate Energy Committee Chair Jeff Bingaman (D-NM), with bipartisan support.
d. Federal Tax Credits and Accelerated Depreciation

Federal tax credits and accelerated depreciation have been the key federal tools in incentivizing large-scale deployment of clean energy technologies. They are best known in the context of the Production Tax Credit (PTC) for wind and Investment Tax Credit (ITC) for solar, but credits have been available on and off for a number of technologies including CCS, geothermal, biomass and energy efficiency.

Accelerated depreciation receives less attention (and stimulates less controversy) but has provided a significant additional benefit to renewable energy projects through the Modified Accelerated Cost-Recovery System (MACRS). MACRS, first authorized in 1986 for certain technologies and since expanded, provides five- and seven-year accelerated depreciation schedules, depending on the particular clean energy technology. In addition, certain technologies qualify for a 50 percent bonus depreciation, allowing investors to deduct half of their qualifying investments in the first year and the remainder spread over the following four years. It was initially authorized under the Economic Stimulus Act of 2008 and extended most recently in 2015.

There are several matters that a new administration must address in the context of federal tax credits. First, while Congress recently extended the wind and solar tax credits, a number of other technologies seeking similar reauthorizations were left behind. This has thrown major uncertainty into the development of key projects deploying, for example, geothermal, biomass and energy efficiency.

Second, there are some key technologies that have not enjoyed the benefits of these incentives at all. Storage is principal among them. Bipartisan bills have been introduced in the current Congress that would create a storage tax credit and the Internal Revenue Service (IRS) is developing guidance that might allow the current solar tax credit to be extended to storage systems that are directly coupled with a specific solar project.

Third, a major problem with tax credits is that they have a very limited group of investors who can monetize them, i.e., large investors who have sufficient tax bills to use the tax credits and who have structured themselves as “tax equity” investors. This requirement for tax liability has sidelined many interested investors, such as tax-exempt pension funds, and millions of smaller investors who cannot meet the complicated terms required by tax equity. The small group of eligible investors, facing little competition, charge higher rates for their capital, causing real inefficiencies in tax credits as clean energy incentives. In the 2009 stimulus bill, the Congress authorized renewable energy developers to receive a cash grant in lieu of a tax credit, reducing the need for expensive and complicated tax equity. The authority expired in 2011, but there have been regular calls to reinstate it.

Finally, the tax credits for solar and wind will phase down over the next several years, with wind dropping to zero in 2021 and solar phasing down to 10 percent for commercial projects and zero for residential after 2023. Two key questions: Will a new administration push for a further reauthorization? Are there attractive alternatives? The next section briefly explores the second question.

e. Federal Tax-Advantaged Financing Mechanisms

In the mode of teaching old dogs new tricks, there has been a bipartisan effort over the last few years to open up long-standing Congressionally authorized investment vehicles to clean energy technologies. These
vehicles are attractive because they are tax-advantaged – either eliminating the double taxation of common corporate investment structures or providing a full exemption from federal taxation. As such, they provide lower-cost financing to project developers, particularly as compared with tax equity investment using tax credits. There are three tax-advantaged structures currently in the mix.

i. Master Limited Partnerships (MLPs)

The first tax-advantaged structure involves MLPs, authorized by Congress in 1981 and used to provide tax-advantaged financing primarily to U.S. oil and gas pipelines and related infrastructure, with roughly $500 billion worth of projects financed to date. MLPs are taxed as partnerships, but their ownership interests trade like corporate stock. As a result, they avoid the double taxation of corporate vehicles as the income of the partnership passes through directly to investors. At the same time, they enjoy the advantages of broad public stock issuance, thereby opening up energy investment opportunities for millions of U.S. retail investors. The MLP structure provides access to large amounts of low-cost capital for energy projects provided by a significant number of investors. However, MLPs, as currently authorized, do not extend to renewables, CCS, energy storage, efficiency and other clean energy technologies\(^1\) The MLP Parity Act, an identical bipartisan bill in the Senate (S.1656) and the House (H.R.2883), would open up this vehicle to these and other technologies.

ii. Real Estate Investment Trusts (REITs)

The second tax-advantaged structure involves REITs. REITs, first authorized by Congress in 1960, have cost-effectively raised capital on public markets for commercial real estate, hospitals, hotels, natural gas pipelines, electricity distribution lines, cell towers and billboards. They boast a market capitalization of more than $900 billion. Like MLPs, REITs avoid the double taxation of corporate vehicles and enjoy the advantages of public stock issuance, allowing smaller individual investors to invest in large diversified portfolios of income-producing properties.

A pending 2014 Treasury Department rulemaking would expand REIT eligibility to solar and potentially other renewables without the need for Congressional action. Access to the REIT structure could help renewable energy projects significantly reduce their financing costs and help move solar energy closer to grid parity and, ultimately, subsidy independence. In its current form, however, the proposed rule covers a limited segment of solar assets and, as a result, would not effectively support this growth industry. The Treasury Department received a number of comments in response to the proposed rulemaking that would improve its scope and implementation.

As the ITC and PTC phase down, both REITs and MLPs could phase in to provide a true level playing field via these tax-advantaged structures, open to the vast majority of energy projects and providing lower-cost financing than often available today.

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iii. Private Activity Bonds (PABs)

The third tax-advantaged vehicle involves Private Activity Bonds (PABs). PABs were used in the 1970s and 1980s to finance tens of billions of dollars’ worth of U.S. projects, capturing air pollutants like particulates and sulfur dioxide and deploying an array of then advanced technologies. Like municipal bonds, PABs are exempt from federal tax and support a public benefit, but they are used by private not public entities, (e.g., investor-owned utilities). However, the authority for PAB-financed air pollution control projects ended in tax legislation in 1986. A pending Senate bill introduced by Senators Bennet (D-CO) and Portman (R-OH) – The Carbon Capture Improvement Act (S. 2305) – would reinstate this authority for CCS projects. It would provide access to long-term, low-cost fixed-rate debt that has often been unavailable in developing U.S. CCS projects.

2. Private Sector Investment

Regardless of what form government support for clean energy assumes – through direct appropriations or indirect tax expenditures – vastly increasing private-sector investment is essential to deployment at scale. Following the end of stimulus funding, direct federal spending on clean energy innovation, commercialization and deployment in the United States currently amounts to less than $10 billion annually (not including spending to power federal buildings and vehicles). Indirect spending – primarily through tax credits and accelerated depreciation rates – weighs in at a little over $7 billion annually. Globally, the Green Climate Fund, the centerpiece of long-term clean energy financing under the UN Framework Convention on Climate Change has announced commitments totaling $10.3 billion to date from governments around the world, with $3 billion pledged by the United States.

In stark contrast, estimates of overall global energy spending required to address climate change are orders of a higher magnitude. In 2014, the International Energy Agency (IEA) projected that meeting the world’s growing energy needs will require more than $48 trillion in investment over the period to 2035. Under this scenario, IEA projects that spending on energy efficiency, renewable energy and nuclear power will total $15 trillion over two decades. But the IEA stresses that the investments projected in this scenario fall "well short of reaching climate stabilization goals, as today's policies and market signals are not strong enough to switch investment to low-carbon sources and energy efficiency at the necessary scale and speed." To stay within 2 degrees C, the IEA says that “consistent policy signals and innovative financing vehicles will be essential to see investment in low-carbon energy supply rise to almost $900 billion and spending on energy efficiency to exceed $1 trillion per year by 2035, double the respective amounts seen in 2035 in the main scenario.” And these amounts do not include the additional trillions needed to build out an adequate electricity transmission and distribution system to support clean energy deployment.

The good news is that there are vast sources of existing capital that can be harnessed to dramatically increase private investment in clean energy. These include pension funds, insurance companies, sovereign wealth funds, university endowments, family offices and more. Rough estimates place the current

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3 Ibid., 14.
4 Ibid.
combined investable capital of these long-term investors (LTIs) at more than $100 trillion – an overall magnitude that aligns with the trillions that will be needed over the next few decades to build a low-carbon global energy system. Despite this scale of opportunity, little LTI investment has found its way to clean energy through third-party managed funds, direct investments in companies and projects or public market vehicles.

There are a number of barriers. First, clean energy tends to be a long-term and capital-intensive undertaking to move a single energy technology from lab to full-scale cost-competitive deployment, with time frames often measured in decades and capital requirements in the billions of dollars. Along the way, entrepreneurs and investors face what has come to be known as the “Valley of Death,” where promising energy technologies founder between the lab and full-scale deployment. The clean energy space is a complicated and risky one where entire investment sectors – like cleantech venture capital over the last decade – can stumble.

Second, once a technology has reached a point of commercial maturity, capital flows remain problematic. In the case of power generation, the product is essentially a commercial commodity – electricity – that can be generated from many energy sources. While technological, financial and regulatory innovations have helped drive down prices for wind, solar and other renewables over the last decade, they still cannot compete fully with traditional sources like natural gas and coal in many places. Additionally, critical enabling technologies, like storage, remain costly or, in the case of transmission, difficult to develop. These kinds of challenges are particularly problematic where emitters are not required to “internalize” the societal costs of carbon at an adequate level to address the costs of climate change. And even energy efficiency, our lowest-cost zero carbon resource, faces long-standing market and behavioral challenges finding significant uptake in the market.

Third, in the developing world where steeply rising energy consumption in the coming decades will require the vast proportion of clean energy investment to be made, domestic financing is generally scarce. Foreign investors, meanwhile, are often skittish about the various risks involved in investing in infrastructure projects and selling power to utilities that may not be able to honor the long-term contracts necessary to recover their high up-front investments. India, which committed to a massive scale-up of wind and solar in the Paris Agreement, faces many issues in this regard.5

Despite these challenges, LTIs are beginning to take a serious look at clean energy investing. Private equity firms and sovereign wealth funds that typically have focused on traditional fossil-oriented investments, if they invested in energy at all, are beginning to explore clean energy, largely through funds but also through some direct investments in companies and projects. Family offices, some of which have experience in environmental and energy-related investing, have banded together to build expertise and, in some cases, pursue joint investments. And insurance companies, some of which are already exposed to climate-related claims, are increasingly looking at investments that can mitigate climate disruptions and improve their bottom lines. As public market vehicles – MLPs, REITs, PABs, YieldCos – develop for clean energy, these may become attractive to LTIs.

But much more needs to be done to accelerate the speed and magnitude of LTI investment. There are a few recent bright spots. The Breakthrough Energy Coalition, led by Bill Gates, has brought 28 wealthy investors from 10 countries together to create an investment vehicle focused on early-stage energy innovation. In 2015, the White House launched the Clean Energy Investment Initiative to catalyze expanded private-sector investment in climate change solutions. Shortly thereafter, DOE launched the Clean Energy Investment Center to expand access to the department’s expertise and analytical capabilities to advance private investment in clean energy technologies. And in 2015, Stanford University helped launch the Aligned Intermediary, an investment advisory group created to help LTIs accelerate and increase the flow of private for-profit capital into climate infrastructure projects and companies in the areas of clean energy, water infrastructure and waste.6

The next president should take significant additional steps to help expand LTI investment in clean energy. The next few years will determine whether these investors—who are holding the purse strings to trillions of dollars—will see reasonable risk and attractive returns in the massive scale-up of clean energy globally and put their capital to work at an unprecedented scale.

3. The Big Three Federal Standards for Clean Energy

Driving both public and private investment in U.S. clean energy are the big three federal clean energy standards: the CPP governing carbon emissions from power plants, Corporate Average Fuel Economy (CAFE) rules for cars and light trucks, and energy efficiency standards for residential, commercial and industrial appliances and equipment. Each set of standards plays an important role in accelerating the transition to lower-carbon energy technologies—particularly in the absence of a meaningful economy-wide price on carbon emission—but each faces issues the new administration will need to address.

a. Clean Power Plan

Under the CPP, the EPA has set carbon dioxide emissions performance rates for existing fossil-fueled power plants but allows a “beyond-the-fence-line” approach. That is, the state that administers the CPP program can pursue a mix of responses that will lower overall CO₂ emissions, e.g., energy efficiency, renewables, nuclear and CCS, plus the shutdown of particular plants. For new power plants, the EPA has essentially set a limit on CO₂ emissions that mirrors the emissions of new combined-cycle natural gas-fired power units, without CCS. Assuming it survives current legal challenges, the next administration will face a number of CPP implementation issues. In the category of clean energy deployment, several industries are pushing hard for a bigger and more certain seat at the CPP table.

Energy efficiency advocates believe the EPA needs to provide states with a model rule that offers a straightforward approach to incentivizing investments in a variety of energy conservation measures. In their view, allowing efficiency to be used for CPP compliance is not enough and instead the EPA needs to

provide states with regulatory certainty and a mechanism to help overcome existing market and regulatory barriers that hinder the adoption of low-cost energy-efficient technologies and practices.

The nuclear power industry believes the final CPP is an improvement over the draft version, particularly recognizing the contribution of new reactors, but has concerns that the “best system of emission reduction” (BSER) in the final rule does not incorporate the carbon-abatement value of existing nuclear power plants. These plants are the largest current source of U.S. carbon-free electricity, but a number are facing premature shutdown. The industry also has concerns that the final rule does not give credit for license extensions of these current reactors.

Advocates for transmission development believe the CPP does not adequately address the critical role of transmission and the need for upgrades to the grid as it drives a massive shift in electric generation resources to curb greenhouse gas emissions. Proponents of electricity storage have raised a similar issue, as storage is not among the measures making up BSER.

Finally, the CPP is currently restricted to the power sector, but Section 111 of the Clean Air Act, under which the CPP has been promulgated, provides the EPA with authority to regulate greenhouse gases from other sectors. As discussed below regarding CCS, major industrial operations – oil refining, cement, steel, glass-making, ceramics, petrochemicals, fertilizer, aluminum smelting, etc. – are a major contributor to U.S. carbon emissions and the next administration will need to look carefully at options to cut emissions from this sector.

b. Automobile Fuel Economy Standards

CAFE standards have driven significant improvements in U.S. light-duty vehicle efficiency since first enacted in 1975 following the Arab oil embargo. 2017 is a pivotal year for CAFE standards because of a required mid-course review agreed to by the federal government and the automobile industry when the latest CAFE requirements were set in 2012. In rough terms, the current standards require a doubling of fuel economy to 54.5 miles per gallon by 2025.

The key issue in the joint DOT and EPA mid-course evaluation is whether to maintain or change the current fuel economy standards for the second half of the compliance period for automobile model years 2022–2025. Auto fuel economy improvements figure prominently in the U.S. carbon reduction commitments in the Paris climate agreement, but at the same time the auto industry points to low fuel prices’ making it tougher to market fuel-efficient vehicles. Progress on fuel economy is essential to U.S. greenhouse gas (GHG) reductions and the mid-course decision will require rigorous standards. The determination regarding the standards will also need to be made promptly by the new administration given that DOT and EPA have already released a Technical Assessment Report providing updated information on the factors relevant to the decision.

The new administration will also need to consider the trajectory for light-duty fuel efficiency beyond 2025 – consistent with long-term objectives for the transportation sector. Finally, Phase 2 heavy-duty vehicle fuel economy rules, issued in August 2016, will deliver major fuel savings and GHG reductions for trucks and buses. If there are legal or legislative challenges to this rule, it will be important to resolve them quickly to allow the Phase 2 program to move forward.
c. Appliance Efficiency Standards

Federal appliance and equipment efficiency standards, set by Congress and the DOE since 1987, are the little engine that could when it comes to stimulating massive low-cost energy savings and carbon emission reductions. DOE estimates that existing efficiency standards completed through February 2016 will, on a cumulative basis between 1987 and 2030, save 132 quadrillion Btu (quads) of energy, save consumers nearly $2 trillion on their utility bills and reduce CO_2 emissions by more than 7 billion metric tons. For comparison, the entire U.S. economy uses about 100 quads per year. While not without occasional controversy, the standards have long enjoyed strong bipartisan support. Standards for many types of residential, commercial and industrial equipment have been regularly updated as one set of standards helps drive technology advances that undergird the next. In this context, it is important to understand that federal efficiency standard-setting is constrained by federal law. To issue a new or updated standard, the Secretary of Energy must determine that it is both technologically feasible and economically justified. While there is often debate over these criteria, they do ensure rigorous technical and financial analyses in the standard-setting program.

Building on this success, the next administration should take steps to deliver further savings from the standard-setting program. In an August 2016 report, the Appliance Standards Awareness Project and the American Council for an Energy Efficiency Economy calculated that efficiency standards, updated within the next eight years, could achieve cumulative nationwide savings of 70 quads of energy and 3.5 billion metric tons of CO_2 by 2050, while cutting consumer and business utility bills by $1.1 trillion. The organizations concluded that even greater savings may be achieved by improving data sources, test procedures and analysis techniques; increasing the way standards contribute to systems-level savings; and addressing products that are connected to the internet.

4. Two Essential Technologies for Renewables: Transmission and Storage

With the rapid expansion of renewable energy in the U.S., there has been increased focus on the two essential technologies for further growth: transmission and storage. Transmission is critical because resource-rich areas of generation tend to be located far from urban load centers, plus local variations in sun, wind and other renewables can be smoothed out with significant interregional transmission connections. Storage – using pumped hydro, batteries, thermal systems, compressed air, and beyond – is critical to dealing with the intermittency of solar and wind – both utility-scale and distributed. Storage shifts the use of electricity from when it is generated to when there is greater customer need and economic value – whether over an hour, day or month. Both these renewable energy enablers need significant and rapid attention by the next administration, Congress and the states and energy industry if we are to meet the commitments to clean energy made at the international, federal and state levels.

a. Transmission

The Paris Agreement, the federal CPP, and increasingly stringent state renewable portfolio standards are driving a massive transition to renewable energy. This transition will only be fully realized – with the critical carbon benefits – with a robust transmission system that can help ensure that electricity can be delivered in the most cost-effective, reliable and safe manner. Transmission development in the U.S. is inadequate today largely because of conflicts at the federal, regional and state levels. While significant transmission has been built during the Obama administration (over $10 billion per year invested recently versus approximately $4 billion per year previously), much more is needed to support the growth of renewable energy. The transmission imperative is particularly acute because development of new power lines often takes double or triple the time compared to new large-scale renewable energy generating capacity. The next president should take a number of steps to address the key challenges of transmission development: planning, cost allocation and siting.

i. Planning

A recent Brattle Group report argues for a more comprehensive and long-term approach to transmission planning. This anticipatory approach would include a scenario-based analysis that explicitly considers the uncertainties faced by the electricity industry and is used to evaluate a broad range of options and transmission benefits. Such an approach would expand beyond customary five- to 10-year planning horizons and the usual focus on electricity reliability to help address the next generation of electricity supplies and consumption in a more cost-effective manner. Planning like this must look at not only regional but also interregional service given the need for flows of renewable electricity between regions to address variations in solar, wind and other renewables.

Importantly, the Federal Energy Regulatory Commission (FERC) can improve regional and interregional transmission planning through Order 1000, a 2011 rule that reformed the commission’s electric transmission planning and cost allocation requirements. Success to date with FERC-led planning has been spotty, but the agency has recently geared up its efforts, including a recent proceeding that looked at various aspects of transmission planning with a specific focus on the lack of development of interregional transmission facilities and what steps the commission could take to facilitate such development. The DOE can also help facilitate regional and interregional planning through funding, technical assistance, studies, data and generally using its bully pulpit to support transmission development.

A key feature of Order 1000 is its requirement that transmission planning consider needs driven by public policy requirements established through state or federal law. FERC should ensure that key public policy requirements are addressed in regional and interregional transmission plans, e.g., the EPA’s CPP and state renewable portfolio standards. The CPP itself does not adequately address the critical role of transmission

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and the need for upgrades to the grid, as it drives a major shift in electric generation resources to curb greenhouse gas emissions.

DOE and FERC transmission planning should also be better coupled with the Department of the Interior’s development of federal renewable energy zones. There is a serious need to identify transmission routes and paths that align with renewable energy resources expected to be developed and prioritize permitting and agency coordination. Importantly, the new administration should also include transmission development prominently in any infrastructure initiatives.

ii. Cost Allocation

Transmission planning and cost allocation are intimately tied in FERC Order 1000. In Order 1000, FERC expressed concern that the traditional approach – relying heavily on individual transmission providers – had prevented the development of necessary new transmission facilities, including those integrating renewable generation that is distant from load centers. Order 1000 sets out a number of requirements for transmission cost allocation. Key among them are six cost allocation principles. Taken together these principles direct that a region should transparently allocate costs for transmission improvements according to a “beneficiary pays” approach. Importantly, Order 1000 also directs that the cost allocation method for new interregional transmission must also satisfy similar cost allocation principles. This concrete and transparent approach to regional and interregional cost allocation should help bring more certainty to renewable energy developers. In addition, this approach more accurately accounts for the various benefits of transmission expansion and upgrades: greater reliability, increased competition leading to lower prices, reduced congestion and compliance with public policy requirements.

The FERC took a major step in Order 1000 in resolving transmission cost allocation problems, but issues persist. The new administration should take stock of cost allocation issues in a broader review of U.S. transmission development. And FERC should be encouraged to do all it can to facilitate fair regional cost allocation agreements at the regional level and increasingly for critical interregional transmission capacity.

iii. Siting

Even with improved planning and cost allocation, siting and then permitting a transmission project is frequently the toughest part of developing new transmission capacity. Controversies over transmission siting have erupted regarding many transmission projects, for example the Rock Island Clean Line (from South Dakota to Chicago), the Plains and Eastern Clean Line (from the Plains states to the Southeast), the Northern Pass in New Hampshire (to carry Quebec hydro into New England) and the Great Northern transmission line (to bring Manitoba hydro to Minnesota).

In light of these and a number of other controversies, the next president should build on recent actions designed to improve transmission siting and permitting. President Obama recently signed the FAST/DRIVE Act (H.R. 22) that, in Subpart D (The Federal Permitting Improvement Act), aims to improve permitting for major infrastructure projects, including transmission. This authority should be used expeditiously to prioritize transmission permitting and build on the work of the Obama administration’s Interagency Rapid Response Team for Transmission. The next president should also support further legislative authority that would give FERC narrow “backstop” authority to approve and site new priority electric transmission lines.
in cases where local or state approval processes have been unsuccessful. Under 2015 legislation introduced by Senator Heinrichs (D-NM), FERC would have to first determine that the proposed regional project is in the public interest and advances key public policy goals. FERC would also be required to conduct a full public process, including that under the National Environmental Policy Act (NEPA) for the use of any federal lands. In this regard, NEPA review of clean energy transmission over federal lands should include the positive environmental benefits of the lines – e.g., supporting zero carbon electricity – when considering alternatives.

As discussed in Section 6, DOE also has another tool in the siting toolkit. The department’s Power Marketing Administrations (PMAs), e.g., Bonneville Power Administration (BPA) and Western Area Power Administration (WAPA), have significant existing resources and authority – a vast electricity transmission network as well as financing and eminent domain authority – to site and fund new transmission within the PMA's multistate regions.

Finally, transmission siting increasingly has a North American dimension. Recently, President Obama, Canada's Prime Minister Justin Trudeau and Mexico's President Enrique Peña Nieto made a commitment to generate half the power in their respective nations from clean energy by 2025. To get there, they agreed they’d need, among other initiatives, 5,000 miles of cross-border transmission lines. The next president, in following up on this broader commitment, will need to focus on this cross-border transmission capacity. As President Obama said at his meeting with the Canadian and Mexican leaders: “There may be some wonderful hydroelectric power that we'd like to get to the United States. The question is, are there enough transmission facilities for us to be able to buy it at a competitive price.”

b. Storage

Large-scale electricity storage, with the exception of pumped hydro, is relatively immature technologically, and the costs of a number of promising options are high. As a result, gas turbines often fill the gap when solar and wind are not available. It is important to emphasize that storage is needed at both utility scale (e.g., pumped hydro) and at distributed scale (e.g., behind-the-meter battery packs).

Key federal and state policies can stimulate the development and deployment of storage. The next president and the new Congress need to consider federal policy and finance tools to advance both utility-scale and distributed storage projects. These include grants, tax credits, loan guarantees, MLPs, REITs, Energy Savings Performance Contracts and other tools. In the near-term, the IRS is developing guidance on the extent to which energy storage integrated with a solar project can qualify for the 30 percent federal solar ITC. The IRS ruling will be limited in various respects and, in the face of this, bipartisan legislation was recently introduced in the House (H.R. 5350) that would extend the ITC to a range of distributed and utility-scale storage technologies. Bipartisan legislation (S. 1656 and H.R. 2883 discussed above) is also pending in the House and Senate that would open up MLPs to storage projects. Other federal policies include potential availability of R&D tax credits for early-stage storage companies, Department of Defense (DOD) and civilian agencies increasing the use of storage in grid resilience efforts, and increasing funding

for storage R&D in various DOE programs. With regard to the last, a recent bill (H.R. 5640), the Electricity Storage Innovation Act, would authorize $150 million annually for basic research into advanced batteries. It would, however, specifically prohibit spending funds for commercial application of energy technology and it does not authorize research regarding any other storage technology.

Beyond incentives, it is important to take account of wholesale rates and their potential impact on the deployment of storage. To this end, in April 2016, FERC initiated Docket No. AD16-20-000 to examine whether barriers exist to the participation of electric storage resources in the capacity, energy and ancillary service markets, potentially leading to unjust and unreasonable wholesale rates, and whether any tariff changes are warranted.

Storage is part of a larger package of options – efficiency, demand response, grid management, fast-firing gas turbines, broader regional electricity markets and faster dispatch – to deal with intermittent renewables. The next administration and the new Congress should consider the federal policy options, and associated investment vehicles, that can ensure smart and cost-effective integration of these approaches. The states also have a major role to play.

There is also an important dimension in the relationship between storage and transmission. The recent Brattle report makes an important point: The need for transmission does not necessarily decline with greater reliance on distributed renewables. Brattle looked at the European experience that demonstrated that the choice between centralized, utility-scale generation and distributed generation does not have a direct impact on transmission needs. Instead, in Europe at least, transmission needs have been driven mainly by the type and regional distribution of renewable generation resources on a European-wide level, rather than the choice between centralized and distributed generation within a given region. The U.S. is likely to see the same dynamic, particularly as we look to interregional flows of renewable electricity to smooth out local variations in renewable resources. We will need both distributed and utility-scale renewables and the associated enabling technologies – storage and transmission – to meet the carbon reduction imperative.

5. Case Study – Incentives and Standards for Carbon Capture and Storage

The good news is that there are an array of tools – federal grants, loans, incentives, standards and beyond – at the president’s disposal to drive clean energy innovation, commercialization and deployment. The not-so-good news is that the tool kit was assembled in a haphazard manner without enough consideration of how each tool relates to the others, what new ones are needed and how they all might be better integrated. The federal approach to CCS is an example of this approach. CCS scrubs carbon emissions from power plant and industrial exhausts and then pipes and stores (sequesters) them thousands of feet underground in geologic formations already proven capable of holding saline water or oil and gas for long periods of time. Increasingly, we are also developing innovative ways to utilize captured CO₂ in commercial products, including plastics, cement, chemicals and agricultural products. At the January 2016 World Economic Forum meeting in Davos, Switzerland, the Global CO₂ Initiative was launched to accelerate development of these innovative “CCUS” approaches.
a. Background on CCS

As an emission reduction approach, CCS has broad application across the energy spectrum, from coal, natural gas and biomass-fired powered plants to industrial operations like oil refineries, ethanol facilities, cement plants, natural gas processing operations and fertilizer production. The International Panel on Climate Change Fifth Assessment Synthesis Report concluded that CCS will be essential in keeping global temperature rise within 2 degrees Centigrade. Similarly, the IEA projects CCS's contributing one-sixth of total CO₂ emission reductions required in 2050 from the power sector as well as industrial operations (which themselves produce about one-fifth of global carbon emissions). This is a massive contribution built on the back of various CCS technologies that, while in operation in various industries, have generally not been deployed at the scale or cost required for meaningful climate-related carbon controls.

In past decades when faced with cutting emissions from power and industrial operations, the EPA has set specific pollution limits (e.g., for particulates, NOx, SOx and mercury) that must be met on a plant-by-plant basis. In contrast, and as discussed in Section 3, federal carbon controls for existing power plants allow for a broad array of options on a state-by-state basis – efficiency, renewables, CCS, nuclear and the shutdown of existing plants. For new plants, the EPA has essentially set a limit on carbon emissions that mirrors the current emissions of new combined-cycle natural gas-fired power units, without CCS. And for the most part, the EPA has not set carbon emission limits for large industrial GHG emitters. At the same time, state Renewable Portfolio Standards and Clean Energy Standards do not typically establish targets for CCS use.

Paradoxically, while the above-described U.S. federal carbon regulation has started with the power sector and has not yet expanded scope to the industrial sector, the evolution of CCS technology has marched in the opposite direction. CCS technologies have generally been used in industrial processes that demand the separation of CO₂ in order to make particular products rather than as a pollution control technique per se. As an example, raw natural gas is frequently contaminated with CO₂, and natural gas processing plants must capture CO₂ in order to meet gas pipeline specifications. For the most part, CO₂ capture for pollution control seeks to apply the same industrially derived CO₂ removal processes to new environments, such as the power sector. For instance, the carbon scrubbing system used at a CCS project under construction at a Texas coal plant owned by independent power producer NRG is similar to the solvent-based system used in natural gas processing plants.

However, as existing technology is applied to new industries, there are inevitable technical problems and financial challenges. Projects deploying CCS must take on extra capital costs and operating expenses to capture a pollutant for which there is currently no direct regulatory penalty or market price. The lone exception on the market side is the long-standing use of CO₂ for Enhanced Oil Recovery (EOR). For several decades, CO₂ has been pumped into old oil fields to enhance production. While this creates an economic use for CO₂, its value is tied to the price of oil, and with falling hydrocarbon markets, CO₂ prices have fallen as well. As a result, in most cases EOR revenues cannot cover the full capital and operating expenses of CCS.

b. Federal Support for CCS

In sum, CCS does not have the traditional regulatory requirements for control of CO₂ or a revenue model robust enough to pay for CCS. CCS deployment for power and industrial pollution control is instead looking to a mix of current and potential federal incentives and tax-advantaged financing mechanisms plus the
volatile market for CO₂ in EOR. The federal approach to date has been inadequate, with an array of tools on the books or proposed but no integrated approach that will really drive CCS to a point where private sector investment can take it to scale in both the power and industrial sectors.

These tools include

- Grants
- Investment Tax Credits
- Sequestration Tax Credits
- Loan Guarantees
- Master Limited Partnerships
- Private Activity Bonds
- Price Stabilization Contracts
- EPA Clean Power Plan

DOE grants have helped push some CCS demonstration projects over the finish line (e.g., at an oil refinery in Texas and an ethanol plant in Illinois), but they were largely creatures of stimulus funding. Federal funding is now more limited and several of the projects identified for federal funding have failed. In addition, FY2014 and FY2015 appropriations language limited use of these funds exclusively for coal-fired power plants.

There are current federal CCS tax credits designed to stimulate both projects that capture carbon dioxide (IRC Section 48A and 48B) and others that sequester it (IRC Section 45Q). However, these credits have proven problematic given limitations in terms of amount, scope and duration. A significantly improved approach to the current CO₂ sequestration tax credit is pending in bipartisan bills in the Senate and House; these bills would both increase the value of the credit and uncap the total credits available. However, it is not clear whether or when Congress might enact this incentive. Furthermore, neither bill provides an improved incentive for CO₂ capture, and both rely on the same problematic “tax equity” approach, discussed in Section 1, which severely limits eligible investors and drives up financing costs. Recent Obama administration budgets (FY2016 and FY2017) have proposed an alternative approach that would create a new set of more effective CCS incentives, but this approach has not been proposed in either the Senate or House.

As discussed in Section 1, CCS is also included in pending Senate and House bills to open up MLPs to financing clean energy projects but, while they enjoy strong bipartisan support, the bills have been stalled for several years. Also as discussed above, extending Private Activity Bond authority to CCS projects would provide an attractive incentive modeled on pollution capture projects financed using this mechanism in the 1970s and 1980s. But again, the fate of a bipartisan Senate bill is uncertain.

There is also discussion of creating a CO₂ sales revenue stabilization mechanism for CO₂ capture projects to address the volatility of CO₂ sales revenue for EOR. This approach could authorize DOE to enter into “price stabilization contracts,” also known as “Contracts for Differences.” The UK uses this type of contract to stabilize electricity price revenues for renewable energy projects that dispatch into the volatile UK power markets. A provision directing the U.S. DOE to study such a mechanism is included in the pending Senate energy bill.

Finally, as discussed above, industrial carbon emissions, as opposed to ones from the power sector, are not controlled in the U.S., with the exception of methane emissions in the oil and gas industry (but not oil refining). This is problematic because heavy industry in the U.S. represents a significant portion of U.S. GHG emissions and could result in overshooting carbon limits. One obvious step would be for the EPA to accelerate development of carbon emission standards and low-carbon feedstock requirements for U.S.
Some commitments under the Paris Agreement, and many key countries accept CCS as a compliance mechanism. Ten countries, including the United States and China have explicitly declared CCS as part of their commitments under the Paris Agreement, and many key countries accept CCS as a compliance mechanism.

6. The President’s Not-So-Secret Weapon: Federal Energy Management

The U.S. government is the single largest energy user in the nation; it owns more than a quarter of all U.S. land, tens of thousands of miles of transmission lines, 400,000 nontactical vehicles and 350,000 buildings, and in recent years it has developed, hosted and procured more renewable energy more than any other entity in the United States. The new president can do much to advance clean energy as “CEO” of “USA Clean Energy Inc.” There are a number of opportunities explored in detail in a forthcoming report by a task force of the Secretary of Energy Advisory Board to the Secretary of Energy (co-chaired by this author with former U.S. Representative Ellen Tauscher) that could both green up the federal government’s own energy use and accelerate the development and deployment of clean energy more broadly. Some brief examples from the upcoming report and one other idea follow:

a. The Federal Government as Technology Test Bed

The DOD and the General Services Administration (GSA) in recent years have used their many buildings and related power infrastructure to demonstrate and evaluate next generation energy technologies important to DOD’s defense mission and GSA’s function as the nation’s largest landlord. With 150 demonstrations completed or underway, these “technology test beds” – GSA’s Green Proving Ground and DOD’s Installation Energy Test Bed – have helped advance an array of energy technologies including microgrids, new building controls, condensing boilers and advanced chillers. The next president should build on this success. There are, however, two challenges. First, these programs are not well coordinated with the DOE’s energy technology programs, particularly those related to building technologies. The R&D “push” of DOE’s work must be better aligned with the demonstration and validation “pull” of the DOD and GSA test beds. Second, both test beds are oversubscribed and their already modest budgets are declining.
b. Cut the Federal Government’s Energy Bill

Congressional legislation and a series of executive orders going back decades have directed the federal government to cut its energy use and, in the process, reduce its energy bill, totaling more than $21 billion in 2015. The next president can accelerate progress to date by expanding investment in energy efficiency upgrades in federal buildings through direct appropriations as well as a compelling alternative – Energy Savings Performance Contracts (ESPCs). ESPCs are an arrangement under which a private third-party invests in an energy conservation measure in a federal building and is repaid over time from a portion of the resulting energy savings. ESPCs have become a major tool for federal agencies, are an important alternative to appropriated funds and enjoy strong bipartisan support. The White House and DOE need to resolve several outstanding issues concerning ESPC scope and implementation, quickly adopt new dollar-denominated goals for 2016–2018 and improve systems to track progress. The federal government can also help accelerate use of ESPCs in energy upgrades of state and local public buildings as well as private facilities.

c. Reduce the Federal Real Estate Footprint

The next administration should consider what may be the most compelling way to reduce the federal government’s energy footprint and that is by reducing its real estate footprint. There is an important opportunity to cut energy consumption through a modest decrease in the federal facility footprint – at both DOD and civilian facilities – a reduction that federal agencies themselves favor. Previous federal downsizing has demonstrated the direct and significant connection between cutting square footage and reducing energy use. Thus the DOD, between 1988 and 2001, cut its real estate footprint by 35 percent, and its facility energy consumption decreased by a corresponding 36 percent, saving billions of dollars in the process. The challenge is the reluctance of the U.S. Congress to authorize new cuts in federal facility space, especially at the DOD. Congress has turned down a series of administration requests since 2012 for authority to further downsize DOD facilities through the Base Realignment and Closure (BRAC) process. But additional BRAC authority is something a new administration and Congress might come to terms on in the interest of greater DOD efficiency and effectiveness – and the civilian side might be addressed at the same time as part of a comprehensive deal. Meanwhile, there are innovative ways to tackle the up-front cost of federal facility downsizing, including a “space-saving performance contract” analogous to an ESPC, as discussed above.

d. Improve Federal Procurement of Renewable Energy

The federal government is a major purchaser of renewable energy, but it could be doing a great deal more both to green up its own operations and accelerate cost reductions in clean energy technologies and to improve financing mechanisms more generally. The key mechanism by which federal agencies – and the private sector – procure renewables is a power purchase agreement (PPA), which allows a developer to finance an energy project in exchange for a federal agency’s long-term commitment to buy the power at an established price. Despite the benefits of PPAs and PPA-like mechanisms, agencies face major impediments to their use, including statutory limitations and the complexity of the federal procurement process. The DOD – with its aggressive goal to deploy 3 gigawatts of renewables – and civilian agencies have had a range of challenges using PPAs that have complicated and slowed federal procurement of renewable energy. For
example, under federal law, civilian agencies can typically only enter into PPAs with a maximum duration of 10 years, while power developers typically need commitments of at least 20 years in order to finance a project. The recent report to Secretary Moniz makes a set of recommendations aimed at removing such impediments to the use of PPAs and expanding the use of alternatives.

e. Increase the Role of the Power Marketing Administrations in Renewable Energy Deployment and Transmission Development

The PMAs – Bonneville Power Administration (BPA), Western Area Power Administration (WAPA), Southwestern Power Administration (SWPA) and Southeastern Power Administration (SEPA) – are an arm of DOE that markets electricity generated at federal hydropower facilities primarily to “preference customers,” municipally-owned electric utilities and rural electric cooperatives. There are multiple ways the next president could make greater use of the PMAs in advancing clean energy development while being mindful of the PMAs’ core obligations to their preference customers. The PMAs own tens of thousands of miles of transmission lines and have financing and eminent domain authority that could be used to both upgrade existing lines and build new ones – both essential to the large-scale and rapid build-out of U.S. renewables. The PMAs also have authority to purchase non-hydro power to supplement their hydroelectricity resources when necessary. Some of these purchases should come from other renewable resources, particularly as these technologies are increasingly cost competitive. Finally, the PMAs can also take more active roles in operational activities vital to clean energy and transmission: Regional Transmission Organizations, Energy Imbalance Markets, and, as discussed above, transmission planning under FERC Order 1000.

f. Address Barriers to Expanding Clean Energy Development on Federal Lands

There is extraordinary potential for renewable energy development on federal lands – making up more than one-quarter of all U.S. territory – but a number of issues, including a cumbersome permitting process and concerns about wildlife impacts, have limited the deployment of wind, solar and other renewables. The next administration, led by the Department of the Interior, needs to reduce uncertainty and delay surrounding the assessment of potential wildlife impacts, formulate a new and improved permitting approach for future energy development on federal lands and increase research on technology that can improve species conservation. The Obama administration has made good progress on this front, but there is much that needs to be done, particularly to ensure large-scale access to federal property for both utility-scale renewables and transmission development while being mindful of important conservation values.

g. Increase Federal Deployment of Alternative Fuel Vehicles

The U.S. government has the single largest vehicle fleet in the nation – currently some 400,000 nontactical vehicles. Three departments largely control the fleet: the General Services Administration (39 percent), the U.S. Postal Service (33 percent), and the Department of Defense (28 percent). The bad news is that multiple administrations have made little progress in greening up this fleet through the use of alternative fuels – including biofuels, electricity, natural gas and hydrogen – despite specific direction in an array of federal legislation and executive orders. As a result, although alternative fuel vehicle (AFV) acquisition rates have come close to meeting the requirements of the 1992 Energy Policy Act (which mandates that 75 percent of
new acquisitions be AFVs), actual alternative fuel use in federal fleets was only 3.9 percent of total fleet fuel consumption in 2015. Federal fleet access to biofuels for “flex-fuel” vehicles has been one challenge. The other challenge involves plug-in electric cars and trucks where federal procurement has been miniscule because agencies have largely focused on the higher first cost rather than the lower life-cycle costs typical of these vehicles. There are a number of steps the next president can take to address this failure. Among these are to ensure that the federal government does a better job of accounting for the full life-cycle cost of vehicle acquisitions, that it takes advantage of innovative financing mechanisms to cut the up-front cost of AFVs and that the U.S. Postal Service use its current need to replace its 180,000 light-duty vehicle fleet to maximize the deployment of AFVs.

h. Power the 100 Largest Non-Powered U.S. Dams

Hydropower is the largest source of U.S. renewable energy. There are presently more than 80,000 dams in the United States, of which only roughly 2,500 generate electricity. A 2012 DOE/Oak Ridge National Lab study identifies 54,000 existing dams in the United States that could supply 12 GW of hydropower, enough to power about 4.5 million U.S. homes.10 According to the Oak Ridge study, powering the top 100 Non-Powered Dams (NPD) in the U.S. could generate 8 GW. Eighty-one of the top 100 NPDs are owned by the United States Army Corps of Engineers (USACE). The next president should direct the USACE, in consultation with DOE and FERC, to explore power development of its large NPDs, including potential public/private partnerships to finance these projects. Any future analysis should take account of DOE’s recent Hydropower Vision that explores this opportunity in some depth but reduced the Oak Ridge estimate.

Conclusion

The next president takes office with an extensive but inadequate federal clean energy toolkit. A thorough inventory and upgrade is in order. An improved set of policy and finance tools, involving both the public and private sectors, will put the U.S. on a better path to develop and deploy critical clean energy technologies – rapidly, cost effectively and at scale. With that, our nation will be in a stronger position to confront the climate crisis at home and carry out its critical leadership role globally.