Center for American Progress

Identifying Hurdles to Renewable Electricity Transmission

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Introduction

The next administration will face an extensive list of simultaneous policy challenges, not least of which include an international financial crisis, two wars abroad, and the growing climate crisis. While President Barack Obama navigates which issues and policies to prioritize, an essential element of our nation's economic recovery must be investing in a clean energy economy in order to create jobs and spur economic growth and prosperity, while at the same time fighting global warming and addressing national security.

This report seeks to highlight the multiple challenges and opportunities for action to vastly increase our nation's renewable energy generation and connect this clean energy to the grid via advanced electrical transmission construction. Identifying the significant, but by no means insurmountable, obstacles to implementing this vision is the first step toward designing policy solutions that enable investments to not only significantly reduce our nation's global warming emissions but also to put us on a path to a clean energy future.

Our electricity grid is an integral but often overlooked element in the shift to a low-carbon economy. The current grid configuration cannot handle the growth in electricity demand expected over the next few decades unless we act quickly to modernize it. Grid modernization must be compatible with scaling up renewable energy generation, including the ability to incorporate intermittent renewable electricity generation, and carrying renewable power to city centers, which in many cases will require long-distance transmission. Additional important modernization efforts also include grid expansion, improved connectivity between different U.S. regions, increased efficiency of electricity transmission, improved security to ensure reliable supply of electricity, and adoption of smart grid technologies.

The electricity grid in the United States is often heralded as one of the world's first great technological achievements in modern history. The grid pioneered national access to electricity and spurred prosperity, and it now represents a central piece of economic

and societal infrastructure. But nearly a century after grid construction began, no major updates have occurred. In a recent publication, the Department of Energy frames the issue well: If Alexander Bell were to see his original invention—the telephone—today, he would be blown away by the progress of telecommunications. In stark contrast, not much has changed for electricity distribution and technologies since Thomas Edison's time.[1]

Currently, the United States derives only 2 to 3 percent of its electricity from renewable sources, excluding hydropower. A national Renewable Portfolio Standard, or RPS—which sets a target percentage of renewable energy generation by a certain year—would dramatically increase this percentage and can serve as an important step toward establishing a low-carbon economy and combating global warming. President-elect Obama has endorsed a national RPS of 10 percent by 2012 and 25 percent by 2025. In the absence of federal leadership, 27 states and the District of Columbia have established state-level RPS requirements,[2] and six additional states have explicit renewable electricity goals. Thus, about 70 percent of the U.S. population is currently under a renewable electricity mandate or goal.[3]

Reaching the target set by any type of renewable portfolio standard requires grid modernization and new transmission, yet how to proceed is a contentious and difficult policy challenge. A timely example is unfolding in Minnesota, where Xcel Energy and other regional utilities are working on a project called CapX 2020 to add more than 700 miles of new transmission in order to help meet the state RPS.[4] The project is encountering a variety of obstacles, which reveal the difficulty that scaling up renewable electricity production is likely to face.

Implementation hurdles to CapX 2020 and other projects include environmental, public, and political concerns, siting authority, permit approval procedures, and environmental impact assessments. We will explore these issues here and briefly discuss other challenges that must be addressed, such as a qualified workforce, grid access, and cost recovery for new construction.

Public opposition

Even though new construction of renewable energy facilities and transmission lines offers significant environmental benefits—including reducing greenhouse gas emissions—any new construction risks facing public opposition for aesthetic, economic, or environmental reasons. Typical objections include charges that new construction obstructs views, reduces property values, and could harm endangered species and habitats.

One project that faced widespread public opposition is the offshore wind farm called Cape Wind in Cape Cod, Massachusetts, in the Nantucket Sound. The project was first proposed in 2001 and its developer spent years fighting public claims that the farm would be a visual sore, negatively affect tourism to the region, and threaten birds, bottom-dwelling fish species, and boat navigation. This type of opposition is frequently called the not-

in-my-backyard syndrome, or NIMBY, which describes a common tendency for people to favor a project until it directly affects them. Six years after Cape Wind was proposed, in January 2008, the U.S. Minerals Management Service completed an environmental impact statement and approved the wind farm, concluding it would not have a significant, lasting effect on wildlife, tourism, or navigation.[5] Efforts must be made to both integrate the public's concern and expedite such decision-making processes.

The opportunities to modernize the grid and the added urgency to combat global warming highlight the need to act quickly. Involving constituents early in the decision-making process can help temper public opposition to renewable energy infrastructure. Working with different constituencies so that they understand the energy and global warming challenge and the employment and economic growth opportunities associated with clean energy infrastructure can generate greater support for these projects, too.

One successful case study is the western United States. Both the Western Governors' Association and individual states like Colorado have aggressively pursued initiatives to expand renewable energy capacity on the grid. This year the WGA launched the Western Renewable Energy Zones Project to expedite the development and delivery of clean and renewable energy, and last year Colorado passed legislation (SB 100) requiring utilities to identify renewable energy resources and plan transmission lines to harness those resources. To accomplish these projects, WGA and Colorado have embarked on thorough stakeholder processes to ensure that invested voices have the opportunity to be heard. As a result, the West is making notable progress toward constructing the necessary renewable energy transmission infrastructure. In contrast, Pennsylvania and surrounding Mid-Atlantic states have seen opposition erupt over a transmission corridor designation, mainly due to the lack of sufficient consultation with the public and with state and local authorities.

Siting authority

The Energy Policy Act of 2005 requires the Secretary of Energy to designate National Interest Electric Transmission Corridors, or NIETCs, in areas experiencing electricity transmission constraints or congestion. The law also grants the Federal Energy Regulatory Commission backstop eminent domain authority to grant permits for interstate transmission lines if a transmission developer is not able to site a line at the state level after a year or under certain other conditions, and the line is in an NIETC. Eminent domain authority allows the federal government to bypass or override state or local decisions on electricity transmission siting in the name of national interest, even when facing objections from states, localities, or private property owners. With this authority, the federal government has identified two NIETC corridors, one in the Southwest consisting of parts of Southern California and Western Arizona and the other in the Mid-Atlantic.

The Mid-Atlantic NIETC spans large parts of New York, Pennsylvania, Delaware, and Maryland, and has also drawn significant opposition.[6] In Pennsylvania, the NIETC encompasses 50 of the state's 67 counties, and includes historic sites, agricultural land, protected habitats, and national parks. During the public comment period, over 2,000 replies were submitted expressing concern over the corridor, and the extent of land incorporated caused Governor Ed Rendell to describe the designation "so broad as to be meaningless."[7] At least 14 senators representing Mid-Atlantic states are also opposed to the corridor. No fewer than three bills have been introduced in Congress to repeal or modify the federal government's eminent domain authority in response to the Mid-Atlantic NIETC's designation.[8]

These examples shed light on a hurdle to new transmission and generation: The conflict over federal versus state jurisdiction over new transmission projects and authority over siting decisions. Navigating this question is proving to be politically contentious and time-consuming. Another pending conflict is in the Southwest, where Southern California Edison has launched a pre-filing consultation process with FERC in an effort to build a new transmission line between Arizona and Southern California after failing to reach agreement about this new line with Arizona.

There is still much to be done to facilitate work between federal and state authorities to determine new transmission corridors. This is especially important in light of the increasing demand for new transmission to meet new electricity demand, stabilize the grid, and facilitate connecting renewable electricity to the grid.

Permit approval procedures

Another hurdle to siting renewable energy infrastructure is that permit criterion, application, and review processes are inconsistent across municipalities, counties, states, and the federal government. Efforts must be ramped up to develop an integrated strategy for working across jurisdictions and federal agencies to ensure swift and comprehensive review and permitting. A wind farm proposal, for example, could fall to any one of eight federal agencies,[9] but there is no streamlined process for coordinated action. Developing greater coordination across agencies and between state and federal government will be critical in order to reach ambitious goals for renewable energy penetration in our electrical supply.

In the three years since the Energy Policy Act of 2005 encouraged renewable energy development on federal land, the Bureau of Land Management has yet to approve a single concentrated solar or solar PV facility. Additionally, during the summer of 2008, the BLM attempted to entirely freeze solar applications on BLM-managed land until it could sort out its environmental assessment. However, the agency's attempted moratorium was met with fervent protest and the decision was reversed within months.

As another example, in October 2008, the Department of Interior announced it compiled a Programmatic Environmental Impact Statement for geothermal applications on federally owned or managed land; however, the Environmental Protection Agency has raised concerns about groundwater and air quality impacts regarding the PEIS.

The Energy Policy Act of 2005 requires coordinated effort by the secretaries of agriculture, commerce, defense, energy, and interior, in consultation with FERC, other governments, industries, and other interested parties to designate energy corridors for oil, gas, and hydrogen pipelines as well as electricity transmission and distribution facilities on federal lands, in part in an to attempt to reduce federal siting hurdles experienced by energy developers. Recently, the federal government designated the West-wide energy corridor, which stretches across 11 states and covers nearly 3 million acres. Western states that the corridor affects have made recent attempts to prioritize renewable energy generation and transmission, such as through the Western Renewable Energy Zones Project.

The West-wide designation has met with public opposition because of claims it should have given greater prioritization to renewable electricity, and that the involved federal agencies did not adequately consult regional or local entities before creating the energy corridors on protected federal lands, such as New Mexico's Sevilleta National Wildlife Refuge, Utah's Grand Staircase-Escalante National Monument, and Arches National Park. This experience makes it clear that there are many priorities to consider as we develop our nation's energy resources. While difficult choices between conflicting priorities will continue to arise, there will also be opportunities to address these challenges as efforts to scale up renewable energy proceed.

Environmental impact

One of the goals of new renewable energy infrastructure and supporting electrical grid investments to connect areas of high renewable energy potential to regions of the country with the greatest demand is to advance the environmental goal of reducing our nation's greenhouse gas emissions and to facilitate a shift to a low-carbon economy. The Center for American Progress has argued that federal permitting of new projects that require environmental impact statements under the National Environmental Policy Act should not only consider greenhouse gas emissions resulting from those projects, but also the projected impacts of global warming on these projects to ensure responsible spending of taxpayer dollars.[10] Thus, when weighed against high-carbon energy development projects, renewable projects should be accelerated given global warming considerations. Yet new construction and development invariably have environmental impacts, and environmental review is indispensable to understand a project's impact on natural habitats and wildlife, endangered species, water supply, water quality, and air quality. Decisions must be considered given regulation set by the Endangered Species Act and the Clean Water Act, among others.

Recently the Environmental Protection Agency warned that the evaluation drafted by the Interior Department—the PEIS mentioned above—does not adequately consider geothermal energy's effect on water quality. In the millions of acres identified by the DOI for geothermal development, there are 23 aquifers that people depend on for drinking water.[11] Before moving forward on a large scale, the EPA argues we need a concrete understanding of if and how much water supply could be depleted (particularly in the West).

Still, the environmental impact of renewable energy is estimated to be far less than that of fossil fuels, particularly in terms of water withdrawal and land disturbance. Renewable electricity-generating technologies are estimated to use tens of billions of gallons less water than thermoelectric power plants.[12] Coal mining is estimated to disrupt 400,000 hectares of U.S. land each year. In contrast, a Department of Energy scenario that sketches how to acquire 20 percent of our nation's electricity from wind power by 2030 suggests that wind farms would cause a one-time disruption of 100,000 to 250,000 hectares.[13] That is, if they cannot be sited on previously disturbed lands, such as "brownfield" sites. California has expressed a preference for siting new renewable energy generation on brownfield sites because reusing the land reduces environmental degradation, and the California Energy Commission wishes to see environmental criterion that weighs this benefit.[14]

Other hurdles

A qualified workforce, grid access, and the question of cost recovery are additional challenges to address.

Despite the political interest, enthusiasm, and necessity to revamp our energy and electricity infrastructure, we have not yet adequately invested in facilitating a ramped-up clean energy and transmission workforce, including engineers, manufacturers, and construction workers. A 2006 study by the National Renewable Energy Lab identified the shortage of skills and training as a leading non-technical barrier causing a bottleneck in the future growth of the renewable energy and energy-efficiency industries.[15] This growing skills shortage is occurring even as the American Public Power Association reports that half of current utility workers will retire within the next decade. Policymakers must work to remedy this shortfall through comprehensive low-carbon energy and workforce training programs.

We have the opportunity to create a truly national electricity grid that facilitates renewable energy access. Currently, we do not have one, large grid; we have three, separate regional grids called Interconnects—the Western Interconnect, the Eastern Interconnect, and the Texas Interconnect. The current capacity to transmit electricity across interconnects is very limited. Therefore the grid's current structure prohibits states with abundant solar or wind energy from transmitting large amounts of this power between interconnects, a technical barrier to transporting electricity to where it could be most needed.

Ensuring renewable energy access to transmission infrastructure—existing infrastructure as well as new transmission lines—is another imperative. Part of this challenge requires load integration between renewable and traditional sources. Because renewable electricity is an emerging market with fresh actors, certain energy providers have yet to prioritize renewable electricity and are in the process of learning the best techniques to integrate renewable energy, especially since it is often an intermittent source. Yet transmission lines are in high demand, and new transmission networks also need to be built out. As the example of the West-wide corridor illustrates, renewable energy still needs to emerge as a priority in planning stages so that it is not disadvantaged in terms of accessing transmission capacity.

Finally, utilities, developers, and policymakers have to decide how to distribute costs and create a plan to pay for renewable energy transmission infrastructure. Should electricity ratepayers who benefit see a slight increase in prices, or should a renewable energy-compatible overhaul be something that taxpayers help fund in the greater interest of their state, region, or nation? Here, too, we may need innovation and a national approach to problem solving.

Traditional strategies for rate recovery allocate the costs of new projects to those rate payers who benefit, but this regional allocation of costs may not be sufficient when the benefits of improved reliability and greater use of clean energy are benefits that accrue to the nation at large, or the scope of the benefits is much larger than any single utility or service area. In these cases, there may be strong reasons for a federal commitment to take on the costs of upgrading our electrical infrastructure to provide a truly national clean energy network. Regardless of the ultimate resolution of this question, it is a near certainty that innovative financing and policy tools will be important moving forward.

Conclusion

Our economy is in trouble, and a massive investment in clean energy must be part of the solution. We are in need of major investments to rejuvenate communities, create new markets and growing industries, and create jobs rebuilding our infrastructure. At the same time we also need to take significant steps to reduce our nation's greenhouse gas emissions.

America's electricity grid is a vulnerable intersection of our national security interests and our energy and economic security as well, yet it can be a tremendous source of inspiration for America's spirit of innovation, and a good way to invest in a more prosperous future. A clean energy economy is not only better for the environment, but it is also more modern, more efficient, safer, and enables tremendous cost savings for American workers and their employers. As the Obama administration sets its priorities, it must take a close look at new renewable electricity generation and the advanced transmission that will be required to take wind, solar, and geothermal to a national scale. As the administration lays new plans for infrastructure, government at all stages must be engaged in finding new solutions and new opportunities for collaboration to meet our shared national interest in building a green, prosperous, and vibrant low-carbon economy.

Endnotes

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9 This could include: the Federal Aviation Administration, the Bureau of Land Management, the Army Corps of Engineers, the Fish and Wildlife Services, the Minerals Management Service, the Department of Agriculture Forest Service, the Department of Defense, and/or the Department of Energy. The source is: Department of Energy Office of Energy Efficiency and Renewable Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply" (2008), available at http://www.20percentwind.org/20percent_wind_energy_report_05-11-08_wk.pdf.

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13 Department of Energy Office of Energy Efficiency and Renewable Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply.",

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15 R. Margolis and J. Zuboy, "Nontechnical Barriers to Solar Energy Use: Review of Recent Literature" (Golden, CO: National Renewable Energy Laboratory, 2006).

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Correction Statement: The original version of this article conflated eminent domain authority given to FERC to permit construction of new transmission lines in DOE-designated NIETC corridors with the multi-agency process to designate energy corridors to help facilitate energy development on federal lands. These are two different authorities granted under the 2005 Energy Policy Act, and both involve the designation of "corridors": one solely for electricity transmission (NIETC), and one for electricity transmission and distribution facilities as well as oil, gas, and hydrogen pipelines.