

Center for American Progress



Wired for Progress 2.0

Building a National Clean-Energy Smart Grid

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A Call to Action

Rebuilding America with Clean-Energy Infrastructure

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The Center for American Progress first published a major report last February on the urgent need to build a national clean-energy smart grid to power an innovative, low-carbon 21st-century economy that combats global warming and creates millions of good jobs. Titled “Wired for Progress 1.0,” our report—based on an extensive stakeholder outreach process undertaken in partnership with the United Nations Foundation’s Energy Future Coalition—detailed the reasons why we need to build this national clean-energy infrastructure quickly, and outlined key policy measures that must be undertaken in order to bring about this complex project. Those arguments and recommendations are included in this updated version of the report.

In just the few short weeks since that first release, much progress has already been made on Capitol Hill in advancing many of the recommendations contained in “Wired for Progress” into concrete legislative language, and in building political will to see these ideas passed quickly into law. As this debate moves forward, it is critical that the essential features of this proposal remain clear, and the basic outlines of a national compromise be preserved. This call to action in version 2.0 of the paper lays out those key elements that will determine the success of any national policy to rebuild our electricity grid to enable large quantities of renewable electricity to come on line, while improving the security, reliability, and affordability of our national energy system. Ensuring that the next energy bill includes effective strategies to build a clean-energy grid couldn’t be more central to economic recovery in the short term and broad-based environmental restoration and economic prosperity in decades to come.

Today, major transmission legislation is making its way through the Senate and House of Representatives and is likely to be included in a comprehensive package of energy and climate legislation. Senate Majority Leader Harry Reid (D-NV) introduced his “Clean Renewable Energy and Economic Development Act” in early March, and Sen. Jeff Bingaman (D-NM), Chairman of the Senate Committee on Energy and Natural Resources, has circulated draft text of a transmission siting bill and held a hearing on the subject. Meanwhile in the House of Representatives, the leadership has raised the importance of the grid for comprehensive energy policy with Speaker Nancy Pelosi (D-CA) and

Energy and Commerce Chairman Henry Waxman (D-CA) seriously considering options for including transmission as part of the House energy and climate bill. Rep. Jay Inslee (D-WA), who previously introduced legislation on renewable energy transmission credits, is also drafting legislation to speed development of clean electricity through the grid.

The growing political momentum in Congress around electricity transmission as a means of realizing America's potential to produce clean domestic renewable sources of energy makes it essential for all Americans to understand the key components of good national transmission grid policy. This is arcane stuff, without a doubt, but the policies necessary to build this modern grid will result in clean energy every citizen will use and appreciate for its quality, value, and widespread economic benefits. That's why we highlight these key features in this call to action first—even though some of the material is more fully detailed in the main report.

Here, we zero in on the key decisions facing Congress and the Obama administration in coming days and weeks as they take up the challenge of rebuilding America's clean-energy infrastructure in earnest. We focus on four major hurdles that must be cleared to build a national clean-energy smart grid:

- Planning
- Siting
- Cost allocation
- Ensuring the low-carbon “green” attributes of the electricity

We then examine three broader policy imperatives—grid intelligence, grid security, and job training and workforce development—that must also be part of this crucial modernization effort.

Interconnection-wide transmission planning

Federal law should provide for interconnection-wide planning of transmission networks to move renewable power from remote areas of our country to population centers, while ensuring the efficiency and reliability of the transmission grid. This planning must be a participatory and analytically robust process designed to engage all interested parties early and avoid later conflicts, minimize environmental impacts, and overcome the geographic and procedural limitations of current planning approaches. A strong planning process that provides a meaningful forum for engaging the critical concerns of states, communities, environmental advocates and other interested parties early, proactively, and in coordination, can lead to both more timely action and better outcomes on the ground. Key ingredients for success should include:

- **Ambitious transmission planning on an interconnection-wide basis.** Efforts such as the ongoing Western Renewable Energy Zone process and the Joint Coordinated System Planning effort in the East demonstrate that interconnection-wide planning can be done effectively, complementing rather than supplanting the existing utility and regional transmission organization, or RTO, transmission planning functions. Such broad-based planning will be enormously helpful in planning our nation's infrastructure around our tremendous renewable energy resources. Bringing clean energy on line is a national problem worthy of a national solution. Broad-based planning is essential to move beyond current fragmentation and barriers that exist today. The interconnection-wide plan also should identify and examine the potential of local resources, energy efficiency, and distributed generation of on-site renewable energy so these important solutions get fair consideration in long-term planning.
- **Interconnection-wide planning shouldn't hinder or duplicate ongoing planning efforts.** Interconnection-wide transmission planning must not duplicate or supplant efforts at a utility or RTO level, but rather should incorporate the output of that planning in evaluating what additional transmission resources are needed to optimize the grid from the broader interconnection-wide perspective. The new interconnection-wide planning process would also be limited to only extra-high voltage (345-plus kilovolts) transmission lines, and renewable feeder lines that need to connect renewable generation to these extra-high voltage grid facilities.
- **Clear roles and responsibilities for undertaking interconnection-wide planning.** Building on existing interconnection-wide planning entities—such as the Western Electricity Coordinating Council and groups working on the Joint Coordinated System Planning process—will allow this planning to proceed promptly. Thus, a statutory approach that directs the Federal Energy Regulatory Commission, or FERC, to specify criteria for the interconnection planning body and then allows applicants to seek certification would provide appropriate flexibility. This is much like the process used for the certification of the North American Electric Reliability Corporation, or NERC, to serve as the designated electricity reliability organization under the Federal Power Act. Alternatively, states could come together to form an interconnection planning body. This would have the advantage of allowing states collectively to undertake planning themselves, but may be more difficult and time-consuming to implement. Assuming state involvement may be best addressed by specifying that FERC's criteria for certifying planning entities should include assurance that the procedures used solicit robust input from the states. Either way, the interconnection-wide plan developed by the planning entity should be reviewed and approved by FERC, with opportunity for public comment and a deferential standard of review, in order to avoid any constitutional issues relating to delegation.

- **Clear mechanisms for funding planning activities.** To ensure that planning entities have sufficient resources to undertake the sophisticated analysis needed to support well-informed planning, and to guarantee the states do not face resource-related obstacles to participating in the planning process, a modest but broadly shared fee on electricity users could be levied.

Siting and project certification

Federal law should provide for consolidated federal certification and siting authority to expedite transmission projects identified in the interconnection-wide plans to serve urgently-needed renewable energy resources while ensuring the efficiency and reliability of the transmission grid. This federal review—to be conducted by FERC—should enable state agencies with local expertise to offer conditions relating to detailed “on-the-ground” routing choices and environmental or other impact mitigation requirements, and should require FERC to incorporate such state conditions except where it finds that a condition conflicts with the national interest in developing the projects identified in the plan. To make all this happen, Congress and the Obama administration should require:

- **Developers of projects identified in the interconnection-wide plans to seek certification and siting approval through a single proceeding at FERC in consultation with the affected states.** The policy on siting processes should allow for prompt, well-informed regulatory decisions, ensure that local economic interests are appropriately balanced with pressing national interests, and take advantage of each state’s expertise on the detailed siting and mitigation considerations relating to projects to be developed in their state. Experience with the existing Federal Power Act § 216 backstop-siting process does not suggest that current policies will provide for the prompt decisions that will be needed to meet the nation’s renewable energy goals. Yet a federal siting process like that used for natural gas pipelines under the Natural Gas Act—under which states are simply parties in the FERC proceeding—may not give sufficient attention to the expertise of states with respect to local conditions affected by transmission line development. A policy that consolidates this process in a single FERC proceeding, and gives each state a special status in offering certificate conditions relating to mitigation of project impacts in the state, strikes an appropriate balance.

Cost allocation

Federal law should provide a simple mechanism to pay for transmission investments and smart-grid transmission upgrades identified in these interconnection-wide plans, which would minimize the costs to individual consumers by allocating costs broadly among all ratepayers. Much like the interstate highway system, a national clean-energy smart grid will provide broad system benefits to the entire nation; no single state, region, or group of rate payers should bear the costs of providing this national benefit. This can be achieved by:

- **Ensuring that all ratepayers contribute to the cost of building out the interconnection-wide system.** The simplest initial cost allocation policy is to provide that costs of all projects identified in the planning process are distributed on a so-called load-ratio basis to all loads in the interconnection. The benefit of a simple test is that this avoids a protracted regulatory proceeding about more fine-tuned cost allocations. Moreover, the planning process would be designed to identify a set of projects that collectively benefit the interconnection and allow the integration of significant new renewable energy resources consistent with requirements from the renewable electricity standard, or RES, so that while not every project in the plan will benefit all ratepayers in the interconnection, the collection of projects identified will meet that test. Alternatively, the designated interconnection-wide planning entity could propose alternative cost allocations for projects identified in the plan. While potentially more precise, this could bog down the planning process into conflicts about cost allocation. The overall objective of cost allocation policy should ensure that uncertainty about cost recovery does not discourage investment, and that regulatory determinations about cost allocation do not delay the development of critical infrastructure.
- **Broad-based cost allocation.** The lines deemed essential in the interconnection-wide planning process should be eligible for broad-based cost recovery in the first instance. However, the ultimate users of these new transmission facilities will pay cost-based rates for that service with such rates designed to fully recoup the costs of the project once it is fully subscribed. Those rate revenues then would be credited back to those ratepayers to which costs had initially been allocated. Such cost allocation policy intends to provide an interim funding mechanism so that these critical transmission resources do not go unbuilt for lack of immediate customers.

"Green" conditions on new transmission

These new planning, siting, and cost-recovery processes for certain new transmission projects are intended to ensure that the projects will advance the policy goal of increasing reliance on low-carbon renewable energy resources, while minimizing the environmental disruptions caused by building and maintaining new grid infrastructure. Applying an appropriate greenhouse gas emissions standard, or other green conditions, to new power generators connecting to transmission facilities built with the benefit of these special cost recovery and siting provisions would serve to ensure that expanded grid construction results in clean-energy infrastructure development instead of the expansion of traditional high-carbon energy resources. Such an emissions-related restriction must not interfere with the operational reliability of the grid, and it must accommodate the need for dispatchable resources to balance variable renewable resources. Here's how this can be accomplished:

- **Provide assurance of low-carbon outcomes.** The planning process is designed to identify new transmission projects that will advance the nation's renewable energy and climate stewardship agendas by making adequate transmission resources available

to support massive new investments in renewable electricity generation. Yet without some provisions to ensure that clean-energy development will be the result, large new investment in transmission by relieving bottlenecks in traditional power generation could as a result actually increase carbon emissions. “Wired for Progress” proposes the use of a carbon-based interconnection standard for generation interconnecting to new renewable energy feeder lines built using these authorities. Another approach has been advanced by Majority Leader Reid who proposes in his legislation that 75 percent of the capacity on new transmission facilities would have to be made available to renewable energy. Assurance could also be achieved through regulation of electricity generation through a Renewable Energy Standard or the establishment of a carbon cap on electricity supply. In theory, it would be best to regulate environmental performance of new generation at the power plant level, not through controlling access to the grid. But because these new grid policies could directly lead to an increase in pollution resulting from power plants, some mechanism for assurance of low-carbon attributes is warranted as a part of any new transmission legislation. Such a policy, however, should recognize that renewable generation development may occur in tandem with new gas generation to address renewable intermittency concerns, and would likely require some new fossil-fired generation be developed on the lines. In addition, these restrictions could be designed to sunset once a sector-wide federal carbon cap was in place.

- **Distinguish between backbone grid investments and renewable energy feeder lines.**

It is true that in most situations it is not possible to control the source of the electricity flowing on a particular line at any given time, once new power plants are connected to the grid. But it is possible to ensure that new long-distance lines built as feeder lines actually are used by attaching new remote renewable facilities attaching into the backbone of the grid. Congress could restrict which generators are permitted to interconnect directly to these lines, or could create restrictions or preferences with respect to who owns the transmission capacity on these facilities. Any low-carbon or renewable energy provisions attached to new lines would be best applied to such new renewable energy feeder lines, not to broader grid enhancements. Such restrictions or preferences also run counter to nondiscrimination policies embedded in the Federal Power Act, which were designed to prevent unfair use of market power that comes from controlling access to transmission lines. This tension would need to be addressed in any policy.

Additional policy imperatives

In addition to these four priorities for any grid policy, comprehensive transmission legislation must also address three other key issues. These include incorporating smart information technology into the grid, improved grid physical security and cyber security, and investments in training and workforce development. These are unlikely to be contentious issues, but should nonetheless be given a prominent place in the legislative debate. Any clean-energy smart grid legislation must also invest in grid intelligence, security, and a well-trained workforce.

Grid intelligence: The smart grid

The natural complement to a robust interstate transmission network for renewable electricity is an intelligent “smart grid” distribution system that delivers electricity right to the plugs in consumers’ homes. The smart grid integrates digital information technology into regional and local electricity distribution networks, making the grid more reliable, resilient, and secure. The smart grid also accommodates distributed generation of renewable power, enables better demand management and energy-efficiency gains by consumers and businesses, and facilitates large-scale deployment of plug-in electric vehicles. The recently enacted American Recovery and Reinvestment Act invests \$4.5 billion to help deploy smart-grid technology through federal matching funds for private investments and support for research and development efforts. This investment constitutes a solid down payment, and it will lay the foundation for a nationwide smart grid build-out. Yet recovery funds are only the beginning of a larger investment effort and regulatory overhaul necessary to completely transform the distribution and consumption of electricity, capture energy efficiency, and ultimately empower customers to become small-scale generators themselves. Major transmission legislation is an appropriate vehicle by which to establish the broader investment and regulatory frameworks for deploying smart-grid technology across the nation.

Grid physical security and cyber security

Fortifying the nation’s electricity grid against physical or cyber attacks should be factored into the design of any national clean-energy smart grid. Hardening the grid to attack by terrorist groups should be a top priority and prime justification for additional investments. So too should using technology to better manage electricity flows and make a more adaptive and self-healing electricity grid that can respond to both natural and manmade disruptions. Issues of security must be addressed within any multistate planning process and in the technology and design choices made during implementation. The security of the national grid system can be directly enhanced through the implementation of many smart-grid features, and through improved monitoring and enhanced management and operations. Moreover, specific dedicated investments in improving the security and resilience of the grid may be justified, including in places burying lines, or choosing more costly technology than market conditions alone would otherwise indicate. These security enhancements may prove to be a public purpose worthy of additional direct federal investment or the creation of federal incentives to promote private investment in this area.

Workforce training and good jobs provisions

A well-trained, highly skilled workforce is vital to implementing a national clean-energy smart grid. Yet the skills shortage and the demographics of a “graying workforce” in the power sector are growing concerns within the industry. Overall, the number of trained workers ready to begin rebuilding transmission and distribution networks is well below the levels

needed to support a bold national effort. This shortage will necessitate an increased and sustained commitment to job training and workforce development. The American Recovery and Reinvestment Act provides a significant influx of near-term funds for green job training, with substantial new funds specifically dedicated to fund the Green Jobs Act to support training in smart grid installation and for the Workforce Investment Act to prepare workers for careers in energy efficiency and renewable energy. In addition, however, the establishment of funding vehicles and training mechanisms to ensure a pipeline of qualified grid workers over the long term should be included in any new transmission legislation.

Green jobs that build a low-carbon energy infrastructure have the potential to be good family-supporting jobs that grow the middle class—yet this outcome is not guaranteed. A policy framework to ensure that green jobs are good jobs should focus on increasing per-capita income, building career ladders and training opportunities, expanding domestic supply chains for new clean-energy technologies and services, protecting the ability to form unions and bargain collectively, and encouraging standards for family-supporting wages and benefits, local hiring, and job quality. Several important labor provisions can be applied to federally supported contracting as we build out a national grid, including the prevailing wage provision in the Davis-Bacon Act and local hiring provisions. In this way, through domestic investment, workforce development, and accountability to high standards, transmission legislation can ensure that clean energy means good jobs for working families. As the nation considers new electricity policy, smart incentives and forward-thinking regulations can position American workers and communities to compete and succeed in the coming low-carbon economy.

—Bracken Hendricks

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