Acadia Center

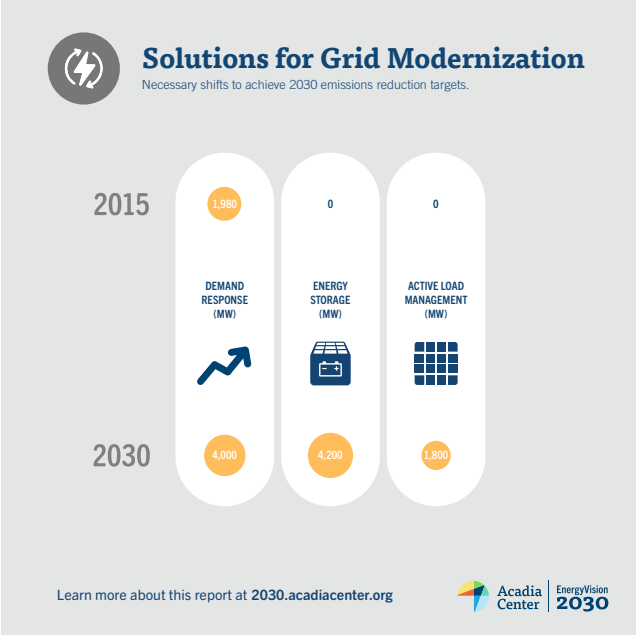
EnergyVision 2030

Grid Modernization

Companion Brief

Grid Modernization and Utility Reform

The Northeast states must create a modern energy grid that is dynamic and low carbon and delivers a fair, safe system that protects consumers and allows clean energy to flourish. The modern grid should incorporate investments in new technology and innovation and give consumers and communities greater control over energy costs. To transition to a modern system, states can update grid rules to incentivize utilities to achieve clean energy goals that benefit consumers. The figure below shows some of the shifts necessary to achieve 2030 emissions reduction targets.



Capabilities of a Modern, Low-Carbon Grid

The modern energy grid must be highly efficient and resilient, produce less pollution, and rely increasingly on distributed energy resources and sophisticated load management practices. Distributed energy resources (DER) include energy efficiency and demand response, distributed generation, energy storage, and electric vehicles. All will play a vital role in the modern energy grid. Increasingly, utilities will need to adapt planning processes and operations to facilitate, integrate, and manage more DER. Moreover, utilities must improve their day-to-day functions by increasing the penetration of DER, planning for non-wires alternatives, and facilitating greater participation.

Enabling Distributed Energy Resources

Utilities must facilitate smooth and timely DER integration and encourage the strategic deployment of DER to meet grid system needs. Targeted and efficient deployment of DER can relieve strain on highly constrained areas of the grid while reducing administrative and cost barriers for the use of clean energy. To facilitate deployment, utilities should provide information on hosting capacity (i.e., the ability of different parts of the grid to host DER without significant upgrades) to the public and streamline procedures for distributed generation interconnection.

Planning for Non-Wires Alternatives

To meet clean energy goals and reduce costs, utilities in the Northeast should use available clean energy technologies including energy efficiency to defer or avoid traditional infrastructure expenditures. Conventionally, utilities will invest in larger equipment to handle increased load if energy demand is expected to increase in a given area. Local DERs that defer or replace traditional infrastructure projects are known as non-wires alternatives (NWAs). As the energy grid becomes more dynamic and DER levels increase, some traditional projects can be deferred or canceled altogether and replaced with NWAs. NWAs can be more cost-effective than traditional infrastructure solutions. States should, therefore, prioritize NWAs above construction of new infrastructure.

Facilitating Consumer and Third Party Participation

The traditional energy grid system has been structured around one-way power flow from power plants traveling over transmission and distribution lines to homes and businesses. In the new system, power will flow in multiple directions with greater consumer engagement and third party participation. As the energy grid evolves and DERs become more prevalent, utilities will increasingly take on the role of coordinators of the energy market, rather than functioning purely as energy providers and infrastructure developers.

Utilities need to invest in systems and technologies that enable customers and new entities to participate in a networked and responsive grid. Specifically, utilities should upgrade and invest in communications and

metering systems, data analytics and data management systems for DERs, and grid operations technologies like voltage control and protective relays. As the grid moves to a networked model, metering and communication technologies will empower customers to make more informed decisions about energy usage, help policymakers make energy programs more effective, and enable utilities to more accurately (and in real-time) measure energy produced by distributed generation sources such as solar and wind. In addition, customers must have easy-to-understand bills and access to secure data exchange platforms to take greater control of their own energy consumption and production.

Flexible Non-Wires Resources in EnergyVision 2030

In addition to significantly increasing distributed generation, states can shift demand to avoid overbuilding the grid with a range of new resources. Optimization can supply energy according to user needs and when renewable generation is available. Demand response, active load management, and energy storage are three core methods for optimizing the grid.

Demand response (DR) measures reduce or shift energy consumption during periods of high demand on the grid. Traditionally, DR involves coordination between utilities and large customers. EnergyVision 2030 doubled the amount of traditional DR across the region to 4,000 MW.

Like DR, active load management (ALM) shifts demand patterns, but it is highly-automated. It allows large numbers of smaller customers to participate, often without a noticeable change in service. Smart or programmable technologies (e.g., thermostats, equipment, and appliances) make active load management possible. These technologies minimize a consumer's load during peak periods or shift a consumer's load when renewables are generating electricity. For example, a water heater can automatically preheat when renewable generation is available, drawing less power from fossil fuel sources. EnergyVision 2030 modeled 1,800 MW of new ALM in the region.

Batteries and other types of energy storage can store power when demand for energy is low and release it when demand is high. For example, storage can retain solar energy produced during midday and release it after the sun goes down. Electric vehicles have the potential to contribute to both active load management, through smart coordinated charging, and storage, by releasing power from their batteries to the grid when it is economical to do so. EnergyVision 2030 modeled 4,200 MW of new battery storage in the region, equivalent to the battery capacity of just 26,000 electric vehicles. DR, active load management, and storage technologies continue to improve, and today's technologies have already proven critical to optimizing energy consumption patterns. They improve the efficiency of our existing grid infrastructure and allow for increased levels of renewable generation.

Reforms to Achieve a Modern, Low-Carbon Grid

States should enact the following reforms to put the consumer at the center of a modern energy system that advances our climate, economic, and consumer goals.[1]

Planning for a Consumer-Focused Power Grid

The energy system is evolving rapidly as new technologies offer the promise of a clean, flexible, and consumer-centric grid. However, reforms in grid rules are needed if we are to move beyond the historic model of centralized power stations and large utility infrastructure. States should require transmission and distribution planners to adopt a new approach to grid planning that merges the traditional world of "poles and wires" with new technologies and modern strategies. Transmission and distribution planning processes should compare a wide range of traditional infrastructure solutions, new "utility-side" technologies, and local energy resources based on standard and level criteria, such as costs, benefits, risks, and public policy goals.

Aligning Regulatory Principles with Consumer and Environmental Goals

Traditionally, utilities earn money by making a regulated rate of return on approved capital investments. This system gives utilities incentives to build or upgrade traditional infrastructure projects. These outdated utility financial incentives[2] inhibit the transition to a clean energy future, increase consumer costs, and hinder investment in new technologies. While the region's energy needs can increasingly be met by local energy resources and smart energy management, utilities often earn far less—or nothing at all—by choosing lower-cost, clean energy solutions. Without changes to the way they are regulated and rewarded, utilities will continue to advocate for infrastructure[3] over local energy resources. Instead of earning revenue primarily for building new infrastructure, utilities should be rewarded for achieving energy efficiency and clean energy goals, minimizing the cost of the grid, and providing choices, opportunities, and control to consumers.

Utility regulators must adopt new rules that allow the utilities to recover costs and earn comparable returns on local energy solutions. The set of criteria that utility regulators traditionally use to make decisions about how to invest ratepayer dollars is narrow and must be updated to reflect the region's priorities including reducing the energy burden on consumers and addressing climate change.

Transitioning to Sustainable Rate Design

In many states, electricity bills for residential customers combine flat rates for electricity consumed and delivered (charged on a per kilowatt-hour basis) with a low fixed monthly charge. Traditionally, this structure has provided utilities a simple mechanism to recover the costs of the grid, while also promoting energy efficiency and protecting low-income customers. For customers with clean distributed generation, retail rate net metering has become a simple and popular method for compensation.

However, flat retail rates and retail rate net metering are inefficient in many respects. Current rate design practices often fail to provide customers with necessary economic signals and do not reflect the cost of capacity and grid infrastructure driven by peak electricity demand. In addition, customers with distributed generation, who still frequently rely on the grid for power, may be under-contributing to distribution system costs and public policy programs (e.g., renewable energy and low-income discounts). Comprehensive long-term rate reforms can align the way consumers pay for the power they use from the grid and how consumers get credited for power and services they provide to the grid. To benefit from these reforms, consumers must have technologies that enable them to be charged prices that vary over the course of the day and year as well as energy management tools to help respond to those price signals.

In the near term, states should:

Avoid reliance on fixed monthly charges and limit the customer charge to the cost of keeping a customer connected to the grid

Adopt time-of-use rates that provide better incentives to reduce peak electricity demand

Align net metering credit values with the value of the costs and benefits of distributed generation[4]

Consider instituting a "Distribution Reliability Charge"[5] to improve the recovery of distribution system costs if an alternative to higher customer charges is warranted[6]

References

1 Acadia Center's UtilityVision outlines a framework for a modern grid in detail: http://acadiacenter.org/document/utilityvision/

2 Learn more about skewed utility financial incentives in this handout: http://acadiacenter.org/document/incentives-for-change-why-utilities-continue-to-build-and-how-regulators-can-motivate-them-to-modernize/

3 Read more about the drivers behind high transmission costs here: http://acadiacenter.org/skyrocketing-transmission-costs-and-the-need-for-reform/

4 Detailed recommendations are included in Acadia Center's Next Generation Solar Framework: http://acadiacenter.org/document/nextgensolarframework/

5 Details on Acadia Center's proposed Distribution Reliability Charge can be found here: http://acadiacenter.org/document/distribution-reliability-charge-transitioning-to-sustainable-rate-design/

6 Detailed recommendations for near-term sustainable rate design reform can be found here: http://acadiacenter.org/document/sustainable-rate-design-near-term-consumer-friendly-reforms-for-a-clean-energy-future/

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