Modernizing the Grid and Empowering Consumers

Description:

The electric grid is a complex system of generation, transmission, and distribution. Increasingly, customer demand is being seen as a tool to help manage the grid. Aging infrastructure and emerging technologies are forcing the grid to modernize to keep pace with historic and emerging expectations. Grid modernization encompasses a broad range of actions intended to make the electrical system more resilient, interactive, and capable of meeting current and future demand.

The transition to a digital economy requires affordable, sustainable, and reliable electricity and creates challenges and opportunities for grid management. Emerging physical and cybersecurity threats and increased demand for faster outage response times require, at minimum, real-time incident tracking and response capabilities. Increased grid penetration of Distributed Energy Resources (DERs) such as renewable energy coupled with increasing adoption of energy efficiency, energy storage, microgrids, and other technologies will provide economic benefits, increase security, and ensure more reliable, resilient, and clean energy. Utility-scale renewable energy may require expanded transmission capabilities. As adoption of these innovations increases, so too will the need for modern grid technology to strengthen the grid, the implementation of which will require substantial planning and investment by states and utilities.

Discussion:

By allowing a two-way flow of information between the electric grid and grid operators and between utilities and their customers, new technologies enable utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities and to reduce their electric bills. By enabling better tracking and management of resources, emerging technologies improve system reliability and resiliency. These technologies also allow grid operators to incorporate central and distributed energy resources, energy storage technologies, and electric vehicles (EVs). This all assists in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency.

On the customer's side of the meter, dynamic pricing, advanced metering infrastructure (AMI), and other technologies allow a more dynamic exchange of information and electricity between a consumer and their electric provider. Grid modernization is associated with greater consumer choice by allowing customers to meet their energy priorities by producing and storing their own energy or through contracting for innovative clean energy services from different providers.

Grid modernization will require a suite of policy changes to support advancements in grid technologies, grid management, and utility regulation. While there is new federal funding available in the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA), discussed below, grid modernization is highly dependent on state action. Grid modernization strategies, while recognizing regional and inter-state diversity, should take a holistic view of the electric system and at a minimum, consider resource variability and requirements for interconnecting both remote, large-scale renewable electricity resources and distributed smaller scale resources like rooftop solar. The following points can be used to inform the development of a state's grid modernization strategy:

1. Establish a collaborative process, with clear goals, to develop a grid modernization strategy that will incorporate the viewpoints of utility customers, utility regulators, utilities, and other community and business interested parties.

2. States can require that utilities develop and propose a grid modernization plan to the public utilities commission within a specified timeframe. The plan should then be subject to a proceeding at the commission in which all interested parties can participate. Once a plan is approved by the public utilities commission, utilities would then be required to implement that plan within another specified timeframe. Strategies and/or plans should

outline a clear set of grid modernization goals and describe methods to measure, report, verify, and enforce progress towards those goals. Recovery mechanisms for the recovery of costs can be included as part of the plan. Further incentives through performance-based regulation could also be considered for utilities that meet grid modernization goals.

3. Grid modernization plans and strategies can incorporate analyses of the likely impacts of EVs on the grid. The Edison Electric Institute (EEI) projected in June 2022 that there will be 26.4 million EVs on U.S. roads by 2030. According to Bloomberg, the rate of EV uptake is likely to be encouraged by the consumer incentives included in the IRA, with the projected EV portion of the vehicle market increasing from the previously projected 43% to 52% by 2030 due to the passage of the law. EEI estimates that nearly 12.9 million chargers will be needed to support that EV expansion by 2030. Planning for increased adoption can ensure better management of the impact of EVs on grid operations. EVs also provide an additional revenue source for utilities that can offset decreases in sales due to energy efficiency and other customer-sided programs.

4. States can require that utilities' integrated resource or long-term plans include strategies to enhance cybersecurity, integrate distributed energy resources (including EVs and energy storage), increase smart meter deployment and demand response and/or demand-side management (DSM) programs, and measure and report on the results of these efforts. For states that are deregulated or do not have integrated resource planning, integrated distribution planning can be put in place to capture these same strategies.

5. The technologies associated with grid modernization generate a wealth of information about the grid itself and about customer behavior. State policy should include measures to protect this data but can also encourage the use of this information to facilitate additional improvements in grid management and customer service. To address this, policymakers can develop legislation or direct commissions to promulgate rules that clarify that the customer owns the energy data associated with customer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data possible. States could establish customer access to energy data through the Green Button Connect program, for example.

6. Utility regulation varies by state utility commission. Many commissions, however, still adhere to the regulatory principles developed when utility companies were vertically integrated, experiencing increases in load, and had the ability to capitalize on economies of scale for new generation. Even as there are more services offered to consumers by third parties, the regulatory protections that exist for utilities should be expanded through light regulation of new market entrants to ensure that customers are protected.

   Today, non-traditional energy resources, for example, customer-owned distributed generation, EVs, energy storage, and other emerging disruptive technologies are increasingly cost competitive with more traditional resources. This has not only led to shifting customer expectations but also to new market realities confronting energy providers. Considering this, many argue that the regulated utility industry needs a new set of principles that are more sophisticated, forward-planning, and incentive-based. To address this, states could implement alternative ratemaking mechanisms, adopt performance-based regulation, and/or work with utilities to develop new business models that support grid modernization.

7. State departments of workforce services or their equivalent can be directed to work with utilities and other affected parties to develop training programs for grid technicians and engineers. States may also choose to allocate funding to state schools to develop a curriculum designed to train and educate grid operators and other elements of the grid workforce in the design, operation, maintenance, construction, and repair of modern power grids and microgrids.

   As part of this process, states can provide incentives to employers to design roles that include ongoing skills development and continuous learning to help manage energy usage and keep pace with evolving roles. With new

grid technology and distributed energy systems coming online, a new generation of workers can be trained to meet evolving needs, which will keep jobs local and contribute to economic development.[1]

8. States can also explore opportunities associated with the IIJA and the IRA. The IIJA includes $11 billion for grants directed specifically at resiliency improvements to electric infrastructure (including grid hardening against severe weather and cybersecurity improvements), $2.5 billion for transmission development, and $3 billion for the Smart Grid Investment Grant Program. The IRA includes more than $12.7 billion in funding specifically for rural electrical system improvements, $2 billion for transmission facility financing, $765 million to facilitate the siting of interstate transmission lines, and $150 million to the Tribal Electrification Program.

Example State Programs:

- Connecticut PURA's Equitable Modern Grid Initiative: https://portal.ct.gov/PURA/Electric/Grid-Modernization/Grid-Modernization
- Massachusetts Grid Modernization: https://www.mass.gov/info-details/grid-modernization
- Michigan's MI Power Grid program: https://www.michigan.gov/mpsc/commission/workgroups/mi-power-grid
- New Mexico's Grid Modernization Grant Program: https://www.emnrd.nm.gov/ecmd/grid-modernization-grant-program/
- New York State Energy Research and Development Authority's (NYSERDA) Smart Grid Program: https://www.nyserda.ny.gov/All-Programs/smart-grid-program

More Information:

- Grid Deployment Office: The Grid and Transmission Program Conductor: https://www.energy.gov/gdo/grid-and-transmission-program-conductor
- GridWise Alliance Tools: https://gridwise.org/our-tools/
- GridWise Alliance and U.S. Department of Energy (DOE): Grid Modernization Index – Insights into a Transformation: https://gridwise.org/gmi-insights-into-a-grid-transformation/
- Interstate Renewable Energy Council (IREC): Grid Modernization: https://irecusa.org/regulatory-reform/grid-modernization/
- National Conference of States Legislatures: Modernizing the Electric Grid: State Role and Policy Options: https://www.ncsl.org/research/energy/modernizing-the-electric-grid-state-role-and-policy-options.aspx
- National Renewable Energy Laboratory (NREL): Grid Modernization: https://www.nrel.gov/grid/
- NC Clean Energy Technology Center's Quarterly 50 States of Grid Modernization Reports: https://nccleantech.ncsu.edu/?s=50+States+of+Grid+Modernization
- Potomac Law Group: Series: The Infrastructure, Investment & Jobs Act of 2021: What's in it for You?: https://www.potomaclaw.com/search?do_site_search=1&searchtext=The+Infrastructure+Investment+Jobs+Act+of+2021+What%27s+In+It+For+You&section[4]=4&search_type=2
- U.S. DOE, Office of Electricity: Grid Modernization and the Smart Grid: https://energy.gov/oe/activities/technology-development/grid-modernization-and-smart-grid
- U.S. DOE: Grid Modernization Initiative: https://www.energy.gov/gmi/grid-modernization-initiative

[1] For a discussion of specific workforce needs states might explore, see: GridWise Alliance and U.S. Department of Energy. 2020. "Grid Modernization Index Insights into a Transformation: Principles for the Next Decade of Progress."