

Grid Modernization

Description:

The [electric grid](#) is a complex system of generation, transmission, distribution, and demand. Not only is this infrastructure aging, but recent advances in technology are also forcing the electric industry to undergo a major shift in the manner in which electricity is produced, delivered, and used.

High quality and reliable electricity is required to support the transition to a digital economy. Emerging physical and cyber security threats, along with increased demand for faster outage response times, require, at minimum, real-time incident response capabilities. Increased grid penetration of renewable energy coupled with the adoption of [advanced metering](#), [energy storage](#), microgrid, and other technologies to modernize our electric system will provide economic benefits, increase security, and ensure more reliable, resilient, and clean electricity. However, this next level of innovation requires a large investment toward improving grid technology. The electric utility grid is one of the last components of our society to integrate robust digital data capabilities fully.

Discussion of the Policy:

New digital technologies have enabled utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers.

Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources. These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency. This can make the operational side of the utility more efficient.

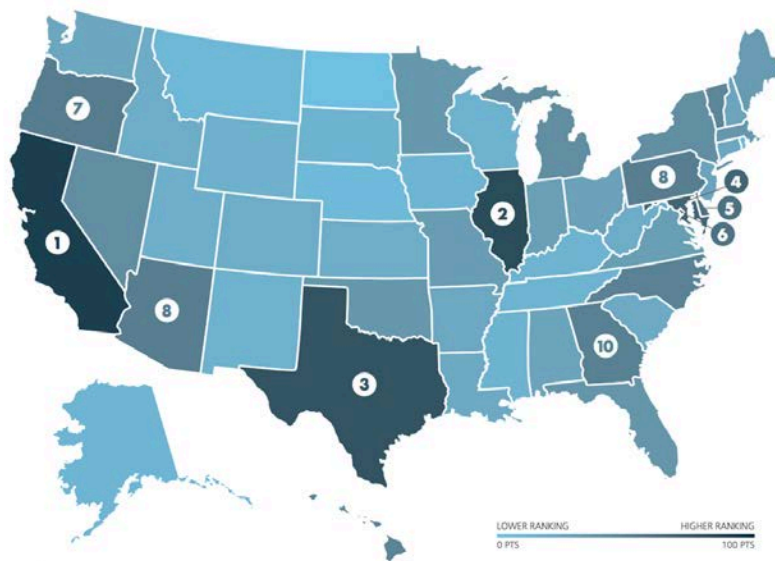
On the customer's side of the meter, advanced metering infrastructure, dynamic pricing, and other emerging technologies allow an exchange of information and electricity between a consumer and their electric provider. Grid modernization will be associated with greater consumer choice for customers by allowing them to meet their energy priorities through independent energy production or through innovative clean energy services from different providers.

Grid Modernization efforts compliment other policies such as those targeting demand response, [customer data management](#), smart metering infrastructure, [electric vehicles](#) and other technologies. Policy approaches around grid modernization should be seen as an umbrella to put in place a structure that supports and ties together these other policy initiatives.

Example State Programs:

State scores, as determined by the [2016 Grid Modernization Index \(GMI\)](#), for all 50 states and the District of Columbia are in the chart below.

OVERALL RESULTS



RANK	±	STATE	LEADERSHIP SCORE
1	1	California	87.8
2	1	Illinois	81.3
3	-2	Texas	77.0
4	1	Maryland	67.0
5	1	Delaware	60.0
6	2	Washington, DC	59.0
7	10	Oregon	53.3
8	1	Arizona	52.0
8	-4	Pennsylvania	52.0
10	3	Georgia	49.8
11	13	North Carolina	48.8
12	6	Hawaii	47.5
13	2	Vermont	47.3
14	-7	Nevada	41.8
15	-1	Michigan	41.5
16	7	New York	41.3
17	3	Florida	36.3
18	8	Minnesota	34.8
18	-6	Oklahoma	34.8
20	0	Massachusetts	34.5
21	-5	Maine	32.3
22	0	Missouri	31.0
23	-13	Virginia	29.5
24	5	Indiana	28.8
25	-6	Ohio	26.5
26	0	New Jersey	26.3
27	9	Alabama	25.5
28	11	New Hampshire	24.8
29	5	Washington	23.8
30	2	Arkansas	23.3
31	-6	Connecticut	22.8
32	14	Louisiana	21.5
33	-2	South Carolina	20.8
34	-2	Colorado	19.0
34	-23	Idaho	19.0
36	4	Kansas	18.8
37	7	West Virginia	18.5
38	-2	Utah	17.3
39	12	Wyoming	16.0
40	6	Wisconsin	15.0
41	4	New Mexico	14.8
42	-16	South Dakota	14.0
43	-2	Mississippi	13.8
44	-2	Kentucky	12.8
44	-9	Tennessee	12.8
46	-3	Iowa	12.3
47	-17	Alaska	12.0
48	-10	Montana	10.0
48	2	Rhode Island	10.0
50	-1	Nebraska	8.3
51	-3	North Dakota	3.3

- California's Smart Grid:
<http://www.cpuc.ca.gov/General.aspx?id=4693>
- Illinois's Smart Grid:
<http://smartpowerillinois.org/the-smart-grid/>
- Texas A&M Smart Grid Center:
<http://smartgridcenter.tamu.edu/sgc/web/>
- Hawaii State Energy Office, Grid Modernization:
<http://energy.hawaii.gov/renewable-energy/grid-modernization>
- Maryland's Smart Grid:
<http://www.psc.state.md.us/electricity/maryland-smart-grid/>

In January 2016, the U.S. Department of Energy (DOE) announced the release of the [Grid Modernization Multi-Year Program Plan](#). Part of the Department's comprehensive [Grid Modernization Initiative](#), the plan includes [up to \\$220 million dollars](#), over the course of three years and subject to appropriations, to fund grid modernization research and development by DOE's National Laboratories and other participants in the [Grid Modernization Lab Consortium \(GMLC\)](#). Created by Executive Order, the Obama Administration's [Quadrennial Energy Review's \(QER\)](#) second installment, "[Transforming the Nation's Electricity System](#)," was released January 6, 2017.

Key Components:

Grid modernization will not come about as a result of a single policy change. Rather, grid modernization requires a suite of state and federal policy changes to support change in grid technologies, grid

management, and regulation of utilities. Grid modernization strategies, while recognizing regional and inter-state diversity and avoiding one-size-fits-all plans, should also take a holistic view of the electric system. The following general best practices can be used to inform the development of a state's grid modernization strategy:

- Establish a collaborative process to recommend a strategy to the PUC that incorporates the viewpoints of utility customers, utilities regulators, utilities, and other stakeholders.
- States may decide to mandate a ten-year grid modernization plan to be proposed by utilities to the utilities commission within a specified timeframe. This mandate would include a requirement for implementation by utilities within a certain amount of time. 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.
- 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 should also encourage the use of this information to facilitate additional improvements to grid management and customer services.
- Grid modernization plans and strategies should incorporate consideration of the impacts of electric vehicles on the grid. Providing for electric vehicle charging rates and incentives can control the impact of these vehicles on grid operations.
- States should provide incentives or cost recovery mechanisms for utilities to meet grid modernization goals. States should also consider policies to update utility business models and utility regulation.

More Information:

- NC Clean Energy Technology Center: 50 States of Grid Modernization (August 2017):
https://nccleantech.ncsu.edu/wp-content/uploads/GridMod_Q22017_Final-1.pdf
- DOE: Grid Modernization and the Smart Grid:
<https://energy.gov/oe/activities/technology-development/grid-modernization-and-smart-grid>
- Utility Dive: How to get the most out of grid modernization, in 5 simple steps:
<http://www.utilitydive.com/news/how-to-get-the-most-out-of-grid-modernization-in-5-simple-steps/437900/>
- The Electric Power Research Institute: Grid Modernization Resources:
<http://www2.epri.com/Our-Work/Pages/Grid-Modernization.aspx>

For additional information on this topic, please review Chapter 2.4: Grid Modernization in the *Clean Energy Policy Guide for State Legislatures* available at:

<http://cnee.colostate.edu/cleanenergypolicyguide/>

This information is also available on the Clean Energy Legislative Academy Resources page at:

<http://cnee.colostate.edu/academyresources/>