



The GridWise Alliance, Inc.
Grid Infrastructure Principles¹ - June 2018

Top-level messages:

- 1. Any infrastructure package must include, or address, energy infrastructure.**
- 2. More specifically, as part of this effort, an infrastructure package must address grid modernization.**

Brief description: Grid modernization, or “smart grid,” i.e., the two-way flow of power, information, and communications, is a vital component of the electric system to facilitate management and optimization of the grid; meet changing consumer demands; incorporate distributed energy resources (DERs), such as electric vehicles, microgrids, solar, wind, and storage; and, ensure continued and increasing reliability, resilience, security, flexibility, and affordability.²

Summary of key grid-related elements recommended for an infrastructure package:

1. Cross-sectoral approaches to addressing critical infrastructure sectors;
2. Infrastructure planning;
3. Grid resilience;
4. Cybersecurity and physical security;
5. Transmission and distribution systems;
6. Electrification;
7. Telecommunications – spectrum and broadband issues;
8. Data and data privacy; and,
9. Other grid modernization provisions: Grid architecture, scenario modeling and analysis, voluntary model pathways, performance metrics, and technical assistance and training to states.³

GridWise also emphasizes the importance of: public-private partnerships; consumer engagement; and, the need for attention to avoiding unintended consequences.

¹ The GridWise Alliance consists of: electric utilities, information technology and communications equipment and service providers, Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs), National Laboratories, and academic institutions. GridWise’s RTO/ISO, Bonneville Power Administration (BPA), and National Laboratory members do not participate in advocacy activities.

² Grid modernization infrastructure could include (but is not limited to): sensors, controls, and software, other technologies, communications networks, as well as data analytics and hardware, such as transformers, poles, wires, and relays.

³ These provisions are contained in the bipartisan Senate energy bill, S. 1460, the Energy and Natural Resources Act, 115th Congress.

The GridWise Alliance's Grid Infrastructure Principles

1. Cross-Sectoral Approaches to Addressing Critical Infrastructure Sectors

Federal, state, and local governments should promote a holistic, integrative, and cross-sectoral approach to infrastructure development (along the lines of “Smart Cities”). Such an approach should include: relevant “smart” technologies, as well as data analytics. Digitization and communications are vital components of such an approach.

Examples of cross-sectoral approaches (or interconnectedness of various critical infrastructure sectors) include: the nexus between energy, communications, and information technology (IT); between energy and water; the growing nexus and interdependencies between transportation electrification, energy, communications, and IT (our cars essentially are “*computers on wheels*”⁴).

2. Infrastructure Planning

Congress should facilitate state, local, and private sector (where appropriate) near- and long-term planning efforts, including through federal technical assistance, sharing of best practices, and fostering public-private partnerships.⁵

Infrastructure planning also should take into account the following elements:

- **Grid modernization:** Federal, state, and local infrastructure planning and emergency preparedness and response efforts should include grid modernization considerations, including technologies, capabilities, and services, at the front end.

NOTE: The GridWise Alliance's Grid Modernization Index (GMI) ranks all 50 states on their progress in grid modernization operations, consumer engagement, and policies.

- **Cybersecurity and physical security:** Federal, state, and local infrastructure planning, policy, and regulatory efforts should incorporate cybersecurity and physical security measures proactively and at the front end of planning efforts. Voluntary public-private partnerships should continue, such as the existing Electric Subsector Coordinating Council (ESCC), as should ongoing federal efforts to mitigate cyber and physical threat exposure and other relevant industry efforts.
- **Electrification:** Federal, state, and local grid and other infrastructure planning processes should examine the appropriateness of transportation, port, and other types of electrification.
- **Consumer focus:** Federal, state, and local planning efforts should ensure at the front end as well as throughout relevant processes that electricity and grid modernization infrastructure measures account for consumers' needs and desires to manage their electricity usage and

⁴ Israeli Prime Minister Benjamin Netanyahu in an interview with CNN's Fareed Zakaria: “It's basically the confluence of big data, artificial intelligence and connectivity that's changing industries. Israel has a car industry within a matter of years. We make -- 85 percent of the value of a car is soon going to be software. And all the other stuff, you know, the body, the chassis, the tires, the engine, that's minuscule. So essentially cars are computers on wheels. Now we have a car industry, because there we compete.” Fareed Zakaria GPS, CNN, aired January 28, 2018, transcript available at: <http://edition.cnn.com/TRANSCRIPTS/1801/28/fzgps.01.html>.

⁵ The Senate bipartisan energy bill, S. 1460, the Energy and Natural Resources Act, 115th Congress, contains a provision that consists of federal technical assistance to states and sharing of best practices – as one example of the type of provision this could entail.

choices, to the extent feasible and appropriate. Such efforts also should consider different needs and desires across generations.

3. Grid Resilience

- Congress should change current law (beyond the changes that occurred in the 2018 Budget Deal that apply to prior natural disasters) to enable the rebuilding of damaged infrastructure in a “smarter,” more resilient manner in the wake of natural disasters.

NOTE: Current law requires replacing damaged infrastructure with “like” infrastructure (with some exceptions that enable rebuilding to current codes and standards).

- ***Increased Resilience through Transportation Planning:*** Congress should advance transportation system resilience by requiring federal and state emergency and disaster recovery fleets to include electric and other alternative fueled vehicles. Federal and state governments should encourage and facilitate the development of charging and fueling corridors supporting electric and other alternative fueled vehicles, as well as on-site charging for fleets, where practicable, to ensure continuity of operations and lower operating costs, and should facilitate private sector development of such infrastructure. (See also “*Electrification*” Section below.)
- ***Improved Community Resilience Through the Compilation and Sharing of Extreme Weather Event Data:*** Congress should require existing federal programs and data on weather trends, advances in forecasting, and resilience to be compiled and made available to communities. Congress should direct appropriate federal entities to engage with local communities and the private sector to identify risks facing communities and, where appropriate, craft federal responses. Such responses could include strategies to enable local weather agency flexibility that better serves localized needs and capitalizes on local community opportunities, and that enable development of policies that identify, prioritize, and guide federal investments to enhance resilience against future disasters.
- ***Natural Infrastructure:*** Congress should provide direction to state and local governments to consider and use natural infrastructure (e.g., wetlands) to protect populations and critical facilities and enhance resilience, where it makes sense to do so.

4. Cybersecurity and Physical Security

Cybersecurity policies should:

- Facilitate secure, relevant information-sharing between the government and the private sector, including technology providers who supply critical systems, and should facilitate coordination and cooperation;
- Ensure that information that private sector entities share with the government or that is appropriately collected by the government is used for the sole and express purpose(s) for which it was shared or collected;
- Enhance liability protections including privacy and civil liberty protections;
- Be flexible and should not duplicate existing applicable standards;
- Facilitate, not inhibit, innovation and should not harm electric system reliability; and,
- Be partnered with recovery mechanisms that ensure that the costs associated with meeting ever-changing cyber threats are promptly and equitably addressed.

5. Electric Transmission

- The Federal Energy Regulatory Commission (FERC) should update or streamline transmission permitting and siting requirements, while being mindful of protecting existing environmental laws (e.g., the National Environmental Policy Act (NEPA)).
- FERC should encourage more effective inter-regional transmission planning that began with FERC Order 1000.

6. Electrification

GridWise strongly recommends that Congress, federal agencies, and state and local decision makers contemplate electrification more broadly to include ports and other critical infrastructure. For instance, Congress should direct relevant federal agencies to require recipients of federal funding or competitive grants for upgrades at U.S. ports to incorporate port electrification and shore power to the greatest extent feasible.

With respect to electric vehicles (EVs):

- In the course of soliciting EV-related demonstration and pilot projects, the U.S. Department of Energy (DOE) should ensure that project participants share lessons learned among relevant stakeholders and leverage best practices, including quantifying the potential benefits of EVs to the grid (e.g., services, enhanced grid resilience).
- Congress should authorize DOT, in cooperation, as appropriate, with DOE, to conduct education and outreach regarding vehicle electrification, and to provide technical assistance, particularly for small- and medium-sized municipalities (e.g., to help them determine the best locations for charging infrastructure for electric cars and buses), and ensure funding exists to do so.
- The federal government should provide assistance to states to encourage them to work with new residential and commercial construction entities and property management firms to provide a portion of parking locations with the conduit and electrical system capacities to be “EV ready,” which significantly lowers the cost of adding charging stations later. Doing so will encourage EV charging in multi-unit dwellings and will thereby facilitate the growth of EV ownership.
- Relevant federal or state agencies should focus public investments in electrification on open access and interoperable systems.

Congress or federal, state, and local entities should pass a suite of policy measures and incentives to facilitate the deployment of EVs. These should take a holistic approach and should not disadvantage low-income consumers. These should include, but not be limited to, the following:

- Congress should require federal, state, and local government fleets to prioritize electric vehicles and other alternative vehicles for fleet purchases.
- Federal, state, or local governments should authorize EVs to use high-occupancy vehicle (HOV) lanes.
- Raise or remove the current phase out trigger of 200,000 electric vehicles sold per original equipment manufacturer (OEM) for vehicles that are eligible for plug-in electric drive vehicle tax incentive (credit); update expiration to a scale or cost-competitiveness metric.
- Congress or state legislative or regulatory entities should encourage faster-charging vehicle electrification infrastructure (e.g., through incentives, grants, or other means), including Level 2 (residential/work) charging infrastructure. To ensure that the siting and design of fast-charging infrastructure does not detract from system reliability, resilience, and security, utilities will need to play an integral role.

7. Telecommunications

Because of the interconnected and critical nature of the communications networks and electric system to our digital society, GridWise recommends the following.

Improved Coordination: To enhance coordination between FERC and the Federal Communications Commission (FCC), Congress should direct the FCC and FERC to meet on a regular basis to discuss issues of shared interest and jurisdiction. Congress should direct FERC and the FCC to enter into a Memorandum of Understanding (MOU) that would establish a format for these regular meetings. Greater coordination is especially important as utilities implement grid modernization and related communications technologies and become more involved in spectrum issues.

GridWise supports the following principles pertaining to spectrum allocation:

- **Spectrum Allocation – Access to 5G Wireless Spectrum:** The FCC should ensure utilities are able to access suitable spectrum. Doing so would be one of the most important things the U.S. could do to ensure utilities can provide safe, reliable, resilient, and secure power to consumers, enable digital infrastructure, and unleash big data.
- **Legislation Recognizing the Spectrum Needs of the Energy Industry:** Congress should consider passing legislation that supports utility access to spectrum and identifies potential spectrum bands that would be suitable for utility use. This spectrum should be made available for licensed use by utilities on either a dedicated or shared basis.
- **FCC Procedural Requirements:** The FCC should consider impacts on grid resilience as it decides spectrum allocation policies, such that the needs of critical infrastructure owners and operators are adequately weighted. Legislation encouraging or directing the FCC to do so might be helpful in this regard.

GridWise supports the following principles to help promote affordable, competitive, rural and remote broadband access:

- **Rural and Remote Broadband Access:** Congress should ensure federal funds facilitate rural broadband deployment by passing complementary forward-looking, market-competitive policies and, as appropriate, provide technical assistance. Utilizing a reverse auction system, communications providers would compete for grants by bidding, and the lowest bidder would win. This system would save taxpayers money, promote cost efficiency for providers and encourage innovation among competing bidders.
 - To help establish and maintain a level playing field among relevant stakeholders, neither federal nor state governments should subsidize marginal networks and services that are not “reasonably comparable” to the quality and price of broadband services in urban areas.
 - Congress should enact legislation that would clarify that utilities may use their existing rights-of-way for communications purposes. Doing so would promote broadband deployment by preventing class action law suits against utilities who offer broadband services.
 - Any federal or state regulatory barriers that might prohibit or discourage publicly-owned or cooperative utilities from providing broadband services should be eliminated through legislation or other means.
 - Congress and the FCC should promote the deployment of future-proof networks which provide robust, reliable and affordable broadband services nationwide.

- ***Pole Attachment Issues:*** As telecommunications firms deploy 5G wireless technologies on utility infrastructure, federal or state legislative or regulatory entities should facilitate the adoption of pole attachment rules that allow utilities to recover all of their fully-allocated costs, including the cost of the space on the pole that is occupied by the equipment as well as a pro-rata share of the rest of the cost of the pole -- not just the cost of the space on the pole that is occupied by the antenna. Due to the unique and varied characteristics of wireless attachments, and the significant associated safety and reliability issues, utilities also should be permitted to work with wireless providers to develop specifications and standards for wireless attachments on the poles – and they should not be subject to arbitrary timelines for processing applications.

8. Data and Data Privacy

Federal and state agencies should account for data privacy considerations, as relevant. Recognizing the potential challenges associated with protecting consumer data privacy, including but not necessarily limited to, developing systems and supplying data to groups wanting aggregated data, the costs of developing and providing aggregated data and protecting associated customer privacy should be allocated in a manner that is consistent with the values derived. Owners and providers of aggregated data should not be held liable for inappropriate or unauthorized use or unintended consequences of making the data available. Grid asset and operational data should be shared with market participants in a manner that is consistent with protecting grid safety, security, and reliability, as well as with protecting customer privacy.

Separately or as part of a larger infrastructure package:

- 9. Other grid modernization provisions: Grid architecture, scenario modeling and analysis, voluntary model pathways, performance metrics, and technical assistance and training to states.** (The latter would consist of providing assistance (including, for instance, sharing lessons learned and best practices) to manage the increasingly complex grid, incorporate DERs, and understand options for different business and regulatory models, and incorporate cyber and physical security measures/planning, as appropriate.)
 - The full Senate should take up and pass these provisions (included in the bipartisan Senate Energy Bill, S. 1460, the Energy and Natural Resources Act, in the 115th Congress) as a means toward advancing energy infrastructure.
 - The U.S. House of Representatives' Energy & Commerce Committee should introduce and pass counterpart legislation, which then should be passed by the full House.

The following elements are also important elements of an infrastructure package:

1. Public-Private Partnerships

As mentioned in some specific instances above, Congress and relevant federal and state agencies should foster public-private partnerships, as appropriate, to achieve the infrastructure goals stated herein.

2. Consumer Engagement

Congress should ensure a consumer-centric focus and customer engagement in infrastructure, particularly grid infrastructure, legislation.

3. Avoiding Unintended Consequences

It is important for federal, state, and local governments to avoid inadvertently creating barriers that could preclude ongoing – and perhaps yet unforeseen – innovation or innovative technologies.

- For example, FERC should ensure all technological options are reviewed and considered to enable and encourage HVDC as well as AC lines (but should not inadvertently limit or preclude particular technologies).
- As another example, synchrophasors have been a ground-breaking technology that have enabled visibility into broad-scale grid operations at all times. Data analytics and communications that stem from their advent are among the advances that were unforeseen when synchrophasors were first developed or deployed.

GridWise’s Additional Applicable “Guiding” Principles:

1. Federal and state policies and programs should promote innovative and flexible solutions to meet changing customer needs and maintain and enhance system reliability, security, resilience, and efficiency.
2. Local, state, and federal governments should not attempt to pick technology winners and losers. Policies should encourage entities to test new technologies to make sure they are “game ready” and meet *performance metrics*. *Demonstrations and pilots* also are needed to test, measure, and verify the benefits and costs of emerging technologies as well as the associated business models, regulatory models, rate design structures, and more.
3. Policies (e.g., incentives) pertaining to traditional capitalization practices and depreciation schedules should be revisited in light of new technologies being deployed as part of grid modernization (i.e., cloud-based computing, Advanced Distribution Management Systems (ADMS), distributed energy resources (DER) as a service, and more) to encourage cost-efficient investments and avoid misalignment of incentives.
4. Research and development (R&D) is an important component of the grid modernization progress, both in technological capability and in operational improvements. Utility investments in R&D can leverage scarce state and federal resources, and public-private partnerships also will help advance these objectives. Partnerships among utilities, vendors, universities, national labs and other stakeholders are critical to ensuring the prudent sharing of R&D-related data.

GridWise’s Applicable Higher-Level “Guiding” Principles:

1. The future electric grid should remain flexible and should continue to support key capabilities, such as enabling customer choice; integrating clean utility-scale and distributed energy resources; enhancing decision-making by customers, grid owners and operators, and other key stakeholders; and improving overall electric system safety, reliability, security, resilience, efficiency, sustainability, and affordability.
2. Changes to the electric system need to be supported by business model, rate structure, and regulatory reforms that enable utilities/electric service providers to own assets and provide services, and also enable third-party providers to offer services and to compete to ensure the safest, most reliable, resilient, and secure grid and to meet consumer demands.
3. As the grid is modernized, it should be optimized to maintain and enhance system reliability, resilience, security, and more, and should meet changing consumer demands. Different utilities and jurisdictions can achieve such ends by employing varying business models and regulatory strategies.
4. A modernized electric grid should create or enhance value by increasing its functionality, expanding and maximizing the benefits realized, and making this critical platform available to customers, service providers, and market participants to pursue their individual and collective goals.
5. Workforce development activities are necessary to meet the needs of a rapidly-changing electric grid. It is important to support and promote public, private, and partnership efforts pertaining to academic institutional, apprenticeship, remote, and other educational and workforce leadership efforts and programs to train and develop a skilled existing and future workforce that is sufficiently flexible to address the needs of the changing electric system and respond to extreme events.