Electricity Advisory Committee Recommendations for the 2020 Smart Grid System Report

Recommendations for the
U.S. Department of Energy

June 2019

EAC Recommendations for the 2020 Smart Grid System Report

Introduction

The U.S. Department of Energy (DOE) asked the Electricity Advisory Committee (EAC) to review the 2018 Smart Grid System Report (hereafter, the Report) and to provide recommendations to improve the 2020 Report. The EAC's recommendations are summarized across seven topics: *An Outlook for the Future Grid, Challenges and Opportunities, Standards, Tools and Technologies, Clarifying Jurisdiction, Workforce Development,* and *Adaptations for an Evolving Market*.

Approach

To generate these recommendations, EAC leadership invited its Smart Grid Subcommittee to review the 2018 Report and provide written comments. The feedback was then categorized and combined into the seven identified topics. The Subcommittee refined the feedback into the following recommendations, which were subsequently approved by a vote of EAC members during their June 2019 meeting.

Recommendations

An Outlook for the Future Grid

For the last century, the electric grid has been vital to the United States' status as the world's most prosperous nation. With advances in technology and changes in national environmental priorities, the nation needs a partnership of industry and government to ensure the preeminence of its electricity supply by committing to meet the challenges posed by these changes and the increasing need for this vital resource.

In the 2020 Report, DOE should therefore include an outlook for the electric grid. The outlook should define objectives and benefits of the future grid so it will continue to enable people and the economy, and serve as a global model for providing electricity that is reliable, secure, safe, affordable, and sustainable. DOE should also suggest a roadmap to achieve that outlook.

Challenges and Opportunities

DOE should identify those challenges where the solutions would have the greatest positive impact on the economy, resiliency, and security of the United States. DOE should describe how each solution would facilitate smart grid adoption nationwide and how to overcome potential barriers to the solution's implementation. For each of these challenges, DOE should identify which solutions are already successful in the U.S. market and which are expected to grow in penetration, providing their own monetization. In addition, DOE should identify disruptors that are likely to facilitate the greatest progress in building the future grid.

For solutions that DOE believes have high value but will require support to achieve, DOE should suggest actions to support development of those solutions and should estimate the probable impact of such solutions.

Standards

In the 2020 Report, DOE should identify the standards that can most benefit from improvement, in order of greatest potential impact to least potential impact on the pace of smart grid deployment. Conducting a gap assessment may aid in identifying these standards. DOE should also identify the areas where a lack of appropriate standards may be considered a barrier for future deployment of the smart grid.

The 2018 Report emphasized the need for "continued assessment by the federal government … [to] ensure that interoperability and cybersecurity standards evolve and are implemented at a pace sufficient to support needed technology deployment." The 2020 Report should recommend further development of industry standards governing operational practices, the manufacture of equipment, and technical codes, especially in relation to the interoperability and security of emerging communications technologies.

Tools and Technologies

In the 2020 Report, DOE should consider addressing several tools and technologies not mentioned, or only briefly mentioned, in the 2018 Report, including:

Operations and Markets

- Evolving technologies necessary for modernizing the grid, focusing on those that aid in more seamless integration of distribution and transmission operations and market solutions for optimal grid reliability and efficiency
- An update on next-generation energy management systems, focusing on the integration of data from phasor measurement units, smart meters, and other developing sensor infrastructures. DOE should also discuss alternatives to energy management, distribution management, and market management systems, as well as to other technological options.
- Tools addressing the complexities of coordinating traditional wholesale markets as well as the emerging transactional marketplace in order to maintain reliability and take advantage of potential financial benefits
- Tools enhancing the capabilities of distributed energy management systems, which coordinate the operation of distribution and transmission networks to optimize grid performance while taking full advantage of the capabilities of distributed energy resources (DERs)

Planning

- Examination of new technologies in the distribution, substation and transmission areas and, based on customer needs and choices, how to best deploy those technologies with current designs and equipment
- Next-generation probabilistic planning models and tools required to accurately optimize the collective available resources during system planning activities at the transmission and distribution levels

Design

- Technology platforms that take advantage of evolving computing capabilities, including for resiliency assessment, legacy system cataloguing, real-time visualization, and threat pattern analysis
- Big data analytics tools that can be applied across the value chain, including those that can identify externalities that affect the production and utilization of energy and related infrastructure

Cyber-Physical Security

- Tools and technologies that enhance cyber-physical security capabilities and identify vulnerabilities as they relate to supply chain concerns
- Tools for secure and cost-effective communications between customers, third-party sites, and utilities' operational systems

Clarifying Jurisdiction

In the 2020 Report, DOE should include a more in-depth examination of ambiguity between federal and state jurisdictions, especially related to DERs.

Workforce Development

DOE should provide insight into gaps in workforce development in the 2020 Report. This includes early stage (K–12) development, as well as opportunities to improve existing workforce skills in adaptation, innovation, and collaboration.

DOE should recommend specific efforts to stimulate interest in the physical sciences in general, and power systems specifically, not only in high school and college but as early as in elementary school. Efforts similar to the "Campus America" program in the 1980s and to the space-age emphasis on science in the 1960s should be considered. Too often, uninspired curriculum turns learning math and science into drudgery. Providing teachers training on how to reveal to students the joy and accomplishment of working in the sciences should also be emphasized. Success should be measured and only successful efforts should be continued.

Adaptions for an Evolving Market

DOE should more deeply examine the actions necessary to evolve electricity market structures alongside the smart grid. In the 2020 Report, DOE should consider:

- An examination of viable business models in light of changing customer behaviors, considering factors such as rate fatigue, grid parity, and revenue erosion
- New approaches to integrated planning and operation necessitated by DER penetration
- An examination of data governance and consumer protection as it relates to customer and system data, including responsibility for data applicable to grid optimization (e.g., smart inverters)
- Suggestions for operationalizing concepts outlined in the Report

- Correlation of smart grid investments to business drivers, including impacts on efficiency, reliability, and resiliency

Conclusion

For the 2020 Report, the EAC sees value in linking the strategic pillars guiding the Office of Electricity to the topics addressed in the report.

The EAC submits these recommendations to DOE's Office of Electricity for consideration in the 2020 Report.