



Staff Report on Electricity Markets and Reliability

A reliable and resilient electric grid is critical not only to our national and economic security, but also to the everyday lives of American families. With that in mind, Secretary Perry directed staff at the Department of Energy (DOE) to develop a report assessing the reliability and resilience of the electric grid and providing an overview of the evolution of electricity markets.

Key Findings:

- ✓ **Changing circumstances are challenging electricity markets.**
Four factors are placing additional pressures on wholesale electricity markets: a substantial shift in the economics of natural gas, regulations and mandates at the state and federal level, an increased in variable renewable energy (VRE), and low growth in electricity demand. Market designs may be inadequate given these challenges, and markets will need further study and reform to address services essential to grid reliability and resilience.
- ✓ **Markets recognize and provide for reliability, but must evolve to better address resilience.**
Energy and capacity markets presently provide for adequate levels of reliability. While reliability is important, recent disruptive events such as the Polar Vortex demonstrate the critical need for improved system resilience. Markets are only now beginning to recognize and compensate resilience-enhancing resource attributes, including fuel assurance. More work is needed in order to ensure a resilient grid.
- ✓ **A combination of market and policy forces have accelerated the closure of a significant number of traditional baseload power plants and may potentially harm grid reliability and resilience.**
The combination of the low marginal cost of newer natural gas power plants and VRE, low growth in electricity demand, and various regulations and mandates at the state and federal level have all led to economic challenges for plants that traditionally operate as baseload generation, particularly coal and nuclear facilities. Further, in recent years many coal plants have not been dispatched or operated on baseload, which runs counter to their original design and creates operational and economic challenges.

Ultimately, the continued closure of traditional baseload power plants calls for a comprehensive strategy for long-term reliability and resilience. States and regions are accepting increased risks that could affect the future affordability, reliability, and resilience of electricity delivery for consumers in their regions. Hydropower, nuclear, coal, and natural gas power plants provide essential reliability services (ERS) and fuel assurance critical to system resilience. A continual comprehensive regional and national review is needed to determine how a portfolio of domestic energy resources can be developed to ensure grid reliability and resilience.

Recommendations:

- 1) **Wholesale Markets:** FERC should expedite its efforts with states, RTO/ISOs, and other stakeholders to improve energy price formation in centrally-organized wholesale electricity markets.
- 2) **Valuation of essential reliability services:** Where feasible and within its statutory authority, FERC should study and make recommendations regarding efforts to require valuation of new and existing essential reliability services.
- 3) **Bulk power system resilience:** Together with NERC, FERC, and regional entities, DOE should support utility, grid operator, and consumer efforts to enhance system reliability and resilience.
- 4) **Grid R&D:** DOE should focus R&D efforts to enhance utility, grid operator, and consumer efforts to enhance system reliability and resilience.
- 5) **Electricity workforce development and transition assistance:** In partnership with other agencies and the private sector, DOE should facilitate programs and regional approaches for electricity sector workforce retainment and development.
- 6) **Energy dominance:** The Department should continue to make it a priority to carry out the Executive Order on Promoting Energy Independence and Economic Growth, which outlined an approach to promoting the clean and safe development of energy resources while at the same time minimizing regulatory barriers to energy production, economic growth and job creation.
- 7) **Infrastructure development:** The Department and related Federal and state agencies should accelerate—and reduce costs for—licensing, relicensing, and permitting of grid infrastructure such as nuclear, hydro, coal, and advanced generation technologies, as well as transmission.
- 8) **Electric-gas coordination:** Utilities and FERC should continue to work to increase coordination between the electric and natural gas industries to address potential reliability and resilience concerns.

** The completion of this report relied heavily on the research and institutional knowledge of DOE career and contractor employees across all relevant program offices (Office of Electricity Delivery and Energy Reliability, Energy Policy & Systems Analysis, Energy Efficiency and Renewable Energy, Fossil Energy, Nuclear Energy, and the Energy Information Administration) and the following National Laboratories: Lawrence Berkeley National Laboratory (LBNL); National Renewable Energy Laboratory (NREL); National Energy Technology Laboratory (NETL); Idaho National Laboratory (INL); Argonne National Laboratory (ANL); Sandia National Laboratories (SNL); and Pacific Northwest National Laboratory (PNNL).