

**Advanced Energy** encompasses a broad range of products and services that constitute the best available technologies for meeting energy needs today and tomorrow. Among these are **energy efficiency, energy storage, demand response, natural gas electric generation, solar, wind, electric vehicles, and smart grid**. Individually and collectively, these technologies are effective tools to improve electric system performance and enhance reliability and resilience. This means increasing long-term resource adequacy, maintaining resilience during extreme weather such as hurricanes, and improving energy management.

- ✓ **Energy storage helps manage fluctuating demand while providing key ancillary services** – Energy storage technologies meet an expansive list of grid needs. Storage technologies aid in load shaving or shifting, meeting behind-the-meter energy management needs; and providing rapid-response ancillary services in wholesale markets.<sup>1</sup>
- ✓ **Solar and wind power provide valuable grid services** – The perception that the grid has to adjust to the whims of the wind and the sun is outdated. The National Renewable Energy Laboratory (NREL) has found that wind power can provide important power system control services, often on timescales much faster than conventional generation.<sup>2</sup> NREL also determined that solar generation performs as well or better than the conventional generation in all categories of ancillary service.<sup>3</sup>
- ✓ **Demand response improves reliability during normal operations and increases resilience during extreme weather** – In addition to reducing peak demand and enabling fast responses to changes in demand or generation availability, demand response is a crucial tool to improve resilience in the face of extreme weather, such as hurricanes or the “Polar Vortex.”
- ✓ **Energy efficiency lowers and flattens the demand curve** – Energy efficiency helps all electricity customers by slowing increasing demand for electricity, which is important in Texas’ booming economy. Lower demand reduces the need for expensive capital investments in new energy infrastructure, which ultimately saves all customers money.
- ✓ **Advanced grid management technologies and services facilitate a more responsive, flexible electricity system** – A range of advanced energy technologies, including advanced metering infrastructure, load management technologies (including demand response, smart plug-in electric vehicle (PEV) charging, and energy efficiency), distribution automation, microgrids, and smart grid management technologies, can provide valuable grid services such as frequency regulation and ramping capabilities, contributing to resource adequacy and reliability.

**IN SUMMARY: ADVANCED ENERGY RESOURCES WORK TOGETHER TO PROVIDE AN ELECTRIC GRID THAT IS MORE SECURE, CLEAN, RELIABLE, AND AFFORDABLE.**

<sup>1</sup> <http://www.sandia.gov/ess/publications/SAND2013-5131.pdf>

<sup>2</sup> NREL. “Active Power Controls from Wind Power: Bridging the Gaps” (Jan. 2014) available online at <http://www.nrel.gov/docs/fy14osti/60574.pdf>.

<sup>3</sup> CAISO. “Using Renewables to Operate a Low-Carbon Grid: Demonstration of Advanced Reliability Services from a Utility-Scale Solar PV Planet.” (2017) available online at <https://www.caiso.com/Documents/UsingRenewablesToOperateLow-CarbonGrid.pdf>; NREL, *Demonstration of Essential Reliability Services by a 200-MW Solar Voltaic Power Plant* (March 2017), <https://www.nrel.gov/docs/fy17osti/67799.pdf>.