

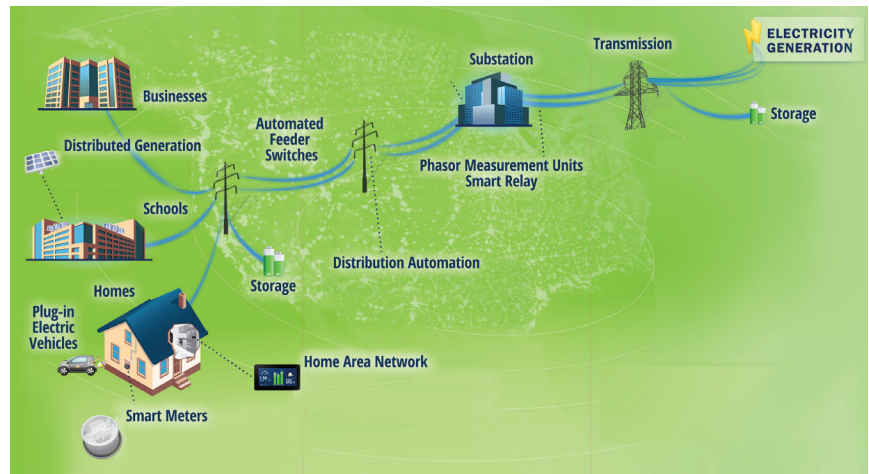
A Glimpse of the Future Grid through Recovery Act Funding

The power grid of the future is a platform that delivers reliable, affordable, and clean electricity to American consumers where they want it, when they want it, and how they want it. To jump start the modernization of our nation’s aging energy infrastructure, the American Recovery and Reinvestment Act invested \$4.5 billion in the electric sector —matched by private funding to reach a total of about \$9.5 billion— so that Americans could start experiencing the benefits of the future grid sooner.

Over the past five years, the Office of Electricity Delivery and Energy Reliability, which drives national efforts to modernize the electricity delivery system, enhance the security and reliability of America’s energy infrastructure, and facilitate recovery from disruptions to the energy supply, has successfully managed the more than 330 Recovery Act projects. Of the \$4.5 billion, \$3.4 billion was used to help industry accelerate the deployment of advanced technologies that are now keeping the lights on more reliably and efficiently and reducing costs. The smart grid is helping to prevent outages, reduce storm impacts, and restore service faster when outages occur. At the same time, consumers can now better manage their own energy consumption and save money because they have easier access to their own data. Utilities are also reaping major benefits, including a smaller environmental footprint, reduced peak loads, and lower operational costs.

The Recovery Act also provided funding for more than 50 smart grid workforce development projects that helped prepare the next generation of workers in the utility and electrical manufacturing industries and six projects that strengthened the capabilities for long-term analysis and planning in the three interconnections serving the lower 48 states. Funding also allowed states to hire new staff and retrain existing employees to ensure they can quickly and effectively review proposed electricity projects, supported the development of interoperability standards, and allowed 47 states, Washington DC, and 43 cities to develop energy assurance plans for natural disasters.

Highlights from six of the Recovery Act projects that are transforming the way that electricity is delivered to consumers across the country appear on the next page.



Technologies rolled out with Recovery Act funding included over 1,300 Phasor Measurement Units (PMUs) that keep the electric system more stable, over 16.6 million meters that give consumers better information and automatically report outages, smart relays that sense and recover from faults in the substation automatically, automated feeder switches that re-route power around problems, and storage batteries that store excess energy and make it available later to the grid to meet customer demand.

Overview of Recovery Act-Funded Programs

PROGRAMS	TOTAL OBLIGATIONS	AWARD RECIPIENTS
Smart Grid Investment Grant	\$3,482,831,000	99
Smart Grid Regional and Energy Storage Demonstration Projects	\$684,829,000	32
Workforce Development Program	\$100,000,000	52
Interconnection Transmission Planning	\$80,000,000	6
State Assistance for Recovery Act Related Electricity Policies	\$48,619,000	49
Enhancing State Energy Assurance	\$43,500,000	50
Enhancing Local Government Energy Assurance	\$8,024,000	43
Interoperability Standards and Framework	\$12,000,000	1
Program Direction ¹	\$27,812,000	--

¹ Program Direction supported administration and management of OE's Recovery funds.

Transforming the Nation's Electric Grid

Across America, the electric sector has put Recovery Act funds to work, improving the grid's reliability, resiliency, flexibility, and security so that consumers, businesses and communities have the power needed to drive their daily lives and the Nation's economy. Below are highlights from six of the more than 330 Recovery Act-funded projects successfully developed and managed by the Department of Energy's Office of Electricity Delivery and Energy Reliability.

Advancing the State of the Grid in

Tennessee: In a part of the country that's often affected by severe weather, the Electric Power Board of Chattanooga (EPB) made its distribution system more robust while improving operations with the deployment of smart grid technologies, allowing EPB to provide continued reliable electric service and respond more effectively to such events. EPB has estimated that the **increased reliability is worth roughly \$50 million a year** to Chattanooga area businesses and residents and that the number of **customer-minutes lost to power outages has decreased by 50 percent**.



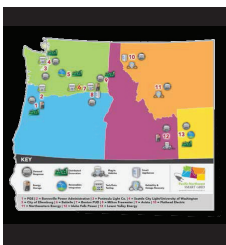
Smoothing Renewable Wind Energy in Texas and California: In 2013, a small Texas town was the site of the commissioning of North America's largest battery storage project at a wind farm to date. The Notrees project used storage to help stabilize the frequency of electricity provided to the Energy Reliability Council of Texas (ERCOT), which manages about 85 percent of the state's electric load. A year later, Southern California Edison constructed and installed equipment for a prototype 8 megawatt/32 megawatt-hour battery storage plant for wind integration in Tehachapi, CA – another one of the world's largest battery storage project systems. In both cases, energy storage is now moderating the intermittent nature of wind by **storing excess energy** and making it available later to the electric grid to meet customer demand – and, at the same time, moving consumers in Texas and California **closer to a clean energy future**.



Boosting Grid Reliability in Florida: Florida Power & Light Company (FPL) deployed advanced smart meters to over 3 million customers, along with distribution automation, an electricity pricing pilot, and advanced monitoring equipment for the utility's transmission system. From **improved electric service reliability** and power quality to **faster restoration of service**, greater visibility into system performance, and better predictive analysis, Florida residents are benefitting from the investment in Florida's future.



Moving Towards a More Reliable Clean Energy Future in the Pacific Northwest: The Pacific Northwest Smart Grid Demonstration Project, one of the nation's largest and most comprehensive smart grid demonstration projects, provided invaluable lessons learned for the entire nation. At the top of the list: many of the more than 50 technologies deployed across 5 states reduced energy use and improved reliability. One of the world's first transactive coordination systems, in which both supply and demand communicate and negotiate the cost and quantity of electrical energy that will be supplied and consumed, was successfully rolled out. The wealth of **high-resolution data** on the health of the grid that's now available promises to allow for real-time control of the grid, making for **more efficient, resilient, and secure delivery of electricity**.



Workforce Development: **More than 75,000 people nationwide received training and education** to help them prepare to become part of the next generation of workers needed to build, operate, and maintain the grid of the future, thanks to a range of training programs and educational curricula developed and offered by industry and academia. The more than 50 projects created a wide range of creative, practical curricula and training programs. They also raised more awareness nationwide of career opportunities in the power sector, helped displaced workers get back on their feet, retrained veterans for positions in the electric utility industry, and fostered and promoted strong relationships between academia and industry that are expected to be sustained.



Photo courtesy of EPB

Major Benefits to the Nation from the Recovery Act Investment

- Improvements in distribution system reliability by up to 50%
- Peak load reductions of more than 30%
- Reductions in operational costs of up to 50%
- Improved efficiency of distribution systems by almost 3%
- Faster restoration of service after weather events
- Automatic reporting of outages
- Automatic rerouting of electricity
- Consumers able to better manage their own consumption, saving money and electricity
- Reduced environmental emissions
- Improved awareness of the health of the grid from one moment to the next, allowing operators to be more responsive to changing conditions
- Integration of more renewables such as solar and wind onto the grid

These are just a few of the many examples of the benefits that the ARRA investment in grid modernization has produced. Prior to the investment, much of the electric grid had changed very little since Thomas Edison brought the first commercial power grid online at the end of the 19th century. Today, the nation's grid is now more reliable, resilient, flexible, efficient, and secure. To learn more, visit the Office of Electricity Delivery and Energy Reliability's [website](#) and [smartgrid.gov](#).