

Sandia and NJ TRANSIT Authority, Developing Resilient Power Grid



Through the memorandum of understanding between the Department of Energy (DOE), the New Jersey Transit Authority (NJ Transit), and the New Jersey Board of Public Utilities, Sandia National Labs is assisting NJ Transit in developing NJ TransitGrid: an electric microgrid that will include a large-scale gas-fired generation facility and distributed energy resources (photovoltaics [PV], energy storage, electric vehicles, combined heat and power [CHP]) to supply reliable power during storms or other times of significant power failure. The NJ TransitGrid was awarded \$410M from the Department of Transportation to develop a first-of-its-kind electric microgrid capable of supplying highly-reliable power.

The Problem

Because of New Jersey's location, the risk of power failure due to major storms and other disasters is much higher than in many other states. Additionally, NJ Transit recognizes the importance of addressing energy resilience because it is a major mode of transportation for New Jersey residents working in or traveling to New York City. Power interruptions in this area affects huge numbers of people, and a resilient power grid is becoming a necessity for both general transportation needs and to ensure public safety.

Superstorm Sandy, which devastated New Jersey's shoreline in 2009, highlighted the state's urgent need for an updated infrastructure, which includes how the transportation system depends on the power grid. The rebuilding efforts following Sandy have focused on creating a stronger, more resilient infrastructure, using funds from the federal government and cooperation between several entities, agencies, and jurisdictions.

The Sandia Solution

The US Department of Energy (DOE) has partnered with NJ Transit to create NJ TransitGrid, a first-of-

its-kind electrical microgrid that can supply highly reliable power during storms and other disasters.

Previous resilient-electricity developments have focused on military bases around the US. Sandia and DOE plan to replicate these advances within NJ Transit using several different energy sources. The significant sources of resilient energy being optimized for this project are:

- Renewable energy (distributed PV)
- Flexible gas-fired generation
- Demand response
- Energy storage
- Electric vehicles
- CHP

Resilient Energy

Sandia has already developed microgrid designs for more than 20 military bases throughout the United States. Its partnership with NJ Transit will use a measurable risk-assessment approach called the Energy Surety Design Methodology (ESDM), which was developed at Sandia. Dr. Abraham Ellis, Sandia's project lead for NJ TransitGrid, says this work is a natural application of ESDM to critical public infrastructure that requires enhanced resiliency.

The heart of this methodology is optimized utilization of distributed energy resources and smart-grid technologies, with consideration of physical and cyber security.

"The New Jersey TransitGrid microgrid project represents a highly significant success by deploying DOE developed technology into commercial applications. We are excited about moving this project forward and building upon the success of this project in other communities."

-Dan Ton, DOE/OE Acting Deputy Assistant Secretary for Power Systems Engineering

Market Impacts of the NJ TransitGrid:

- Reliable transportation on the Eastern Seaboard, a critical New York - New Jersey corridor during storms and other disasters using rail, bus and ferry
- Improved public safety
- Model for resilient electricity in other cities/markets

Key contributors to the NJ TransitGrid:

- Sandia National Laboratories
- New Jersey Board of Public Transportation
- NJ Transit Authority
- US Department of Energy

Relevant Press:

- Energy Department Partners with State of New Jersey to Study Ways to Improve the Reliability of New Jersey's Transit System in Aftermath of Superstorm Sandy (DOE)
- Governor Christie Announces NJ Transit to receive \$1.276 billion in resiliency funding (NJ Transit)

The ESDM has been successfully applied to military installations and has enormous potential value for civilian applications. The NJ Transit project provides an opportunity to apply the methodology to a much more complex infrastructure.

Real-World Practicality

One of the greatest successes of this project and partnership is bringing resilient energy to the forefront of discussions about improving infrastructure. For the first time in recent history, a smart microgrid is being designed for a large-scale transportation system, involving multiple states, jurisdictions, agencies, and complex legal issues.



The threats to public transportation and other public services due to both natural and man-made disasters are ever-present, and the NJ TransitGrid represents a real, achievable solution to preparing for these high-consequence events through resilient energy infrastructure.

Additionally, the size of this project has attracted the interest of other major cities and organizations, and its success may well mean similar projects in the future for other areas seeking to upgrade their power grids with resilient energy.

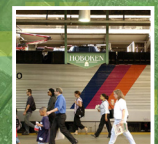
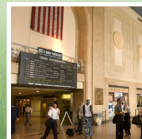
NJ TRANSITGRID



U.S. DEPARTMENT OF
ENERGY

The State of New Jersey and the U.S. Department of Energy Partner for a more Resilient Future

*Collaboration with Sandia National Laboratories to evaluate
Energy Surety Solutions for the New Jersey Public Transportation System*



For more information
please contact:
Dr. Abraham Ellis
E-mail: aellis@sandia.gov
Phone: (505) 844-7717
Website: energy.sandia.gov