

New York State's Smart Grid Efforts

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Who is NYSERDA?

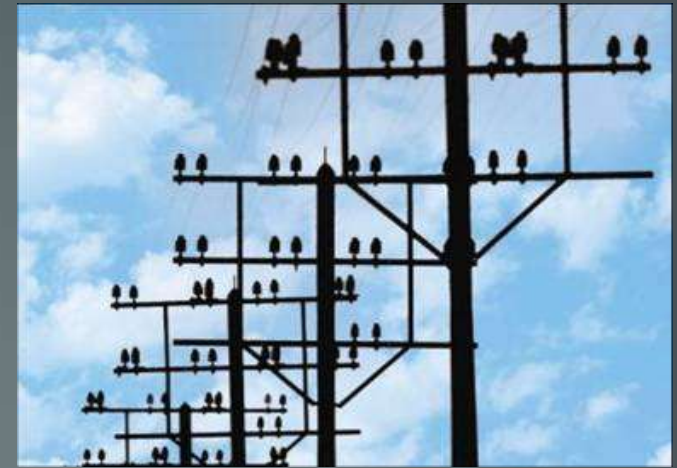
Public-Benefit Corporation - Established by the New York State Legislature

NYSERDA's focus on Energy and it's Environmental, Economic and Educational impacts on the state

Majority of Funding through System Benefits Charge



NY Electric Market



NYISO:

- 11,000 miles of circuits
- 300 Generators
- 34,800 MW peak
- New control center

Generation Mix:

- Nuclear (27%)
- Natural Gas (26%)
- Hydro (18%)
- Imported (16%)
- Coal (8%)
- Other (5%)

What is the Smarter Grid?

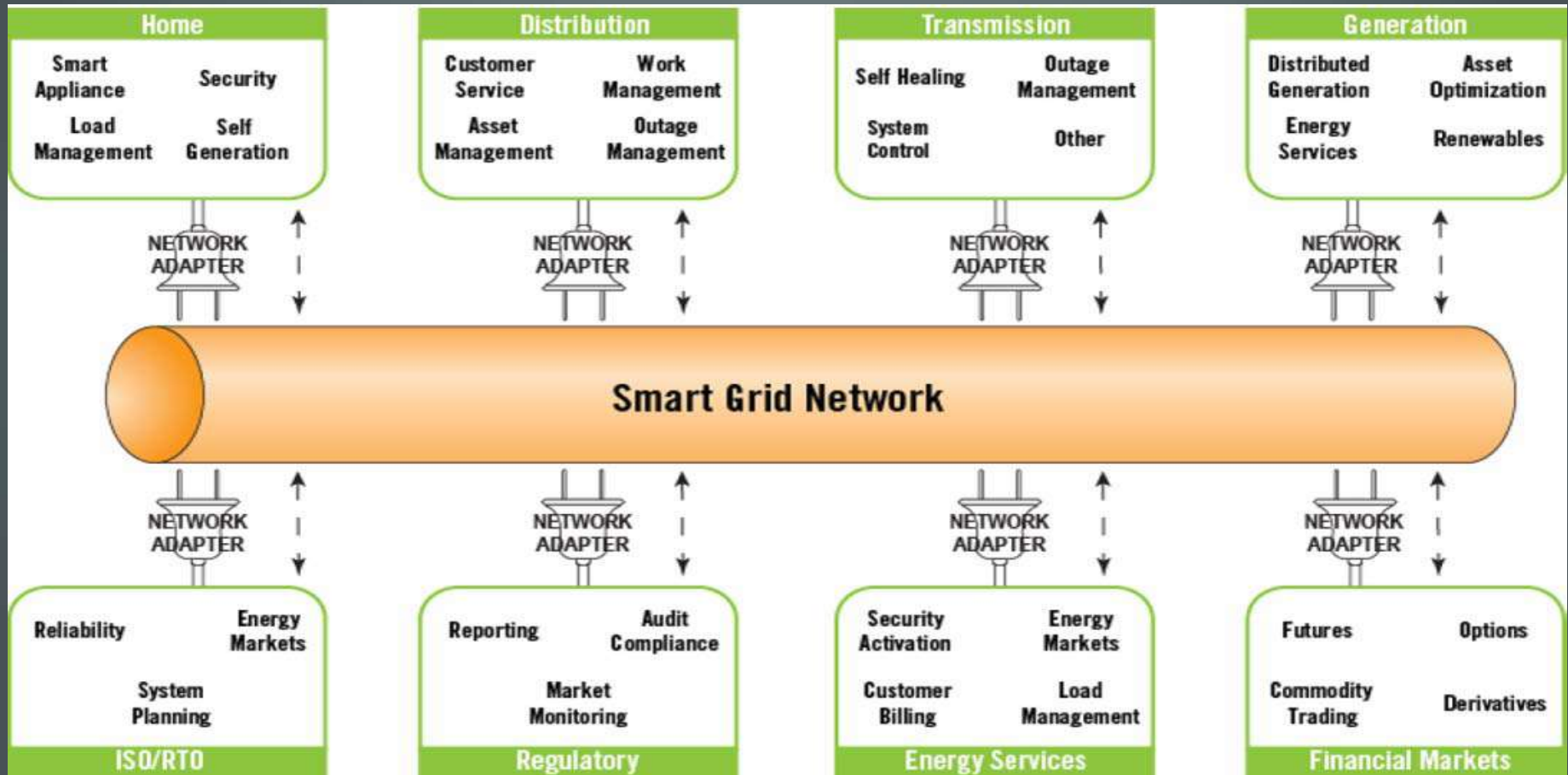
Applications of advanced sensing, communication and control technologies to produce and distribute electricity more effectively, efficiently, economically, reliably, and securely.

Functional Categories:

- Wide area situational awareness
- Transmission and distribution automation / management
- Energy storage
- Renewable energy integration / distributed energy resources
- Demand response
- Advanced metering infrastructure
- Electric transportation

Advanced communication infrastructure

Smart Grid - Enabler



NY Smart Grid History



2000: Deregulation of Electric Utilities

2006: Establishes T&D R&D program.

Issued three solicitation: 2007, 2008, & 2010

2009: NYS Smart Grid Consortium

NYBEST

NYS Energy Plan

Federal NY ARRA Projects

2011: Expanded Smart Grid program

NY ARRA Projects

Company	DOE Category	Project	Stimulus Funds	Total Cost
Consolidated Edison	SG Investment Grant	Distribution System Automation	\$136,170,899	\$272,341,798
NYISO	SG Investment Grant	PMU and Capacitors	\$37,382,908	\$75,710,735
LIPA	SG Regional Demonstration	Route 110 Smart Grid Pilot	\$12,496,047	\$25,293,735
NYPA	SG Regional Demonstration	Dynamic Thermal Rating	\$720,000	\$1,440,000
Consolidated Edison	SG Regional Demonstration	Secure Interoperable Smart Grid Pilot	\$45,388,291	\$92,388,217
Energy East	SG Energy Storage Demonstration	150 MW Compressed Air Energy Storage	\$29,561,142	\$125,006,103
			\$261,719,287	\$592,180,588

Beacon Power: \$43 million loan guarantee (Stephentown, NY)

AES: \$17 million (Johnson City, NY)

Premium Power: \$8 million (Syracuse, NY)

NYSERDA Research Projects

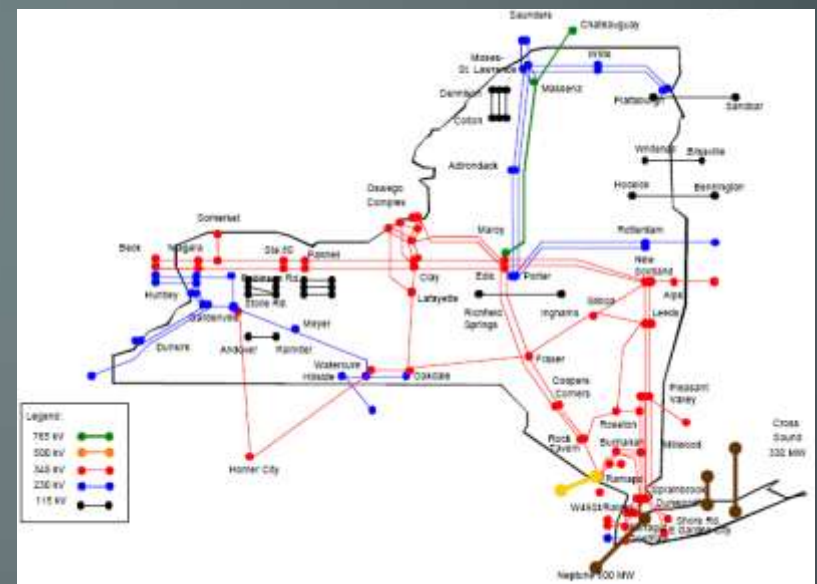
- 75 Smart Grid Projects
 - 30 T&D/ 40 energy storage & electric transportation
- Investment approaching \$40 million
 - \$15m T&D/ \$25m ES & ET
 - About 3:1 private-public leveraging
- NY Partners
 - 47 industry partners
 - 13 academic partners



Situational Awareness

Phasor measurement unit is a device that provides measurements of voltage and current waveforms and frequencies at sampling rates of 30 times per second. This data is then time stamped using the global positioning system clocks to synchronize this information.

- Presently 8 units installed in NY state
- Working on DOE Smart Grid initiative to install over 50 units



Energy Storage

FLYWHEELS

20 MW facility with 100 x faster ramp rate than conventional generation

High cyclic capability w/o degradation of storage capacity



Beacon Power Flywheel Facility, Stephentown, NY

Energy Storage

COMPRESSED AIR STORAGE (CAES)

150 MW facility 10 -12 hrs storage

Use salt cavern for storage reservoir



Energy Storage

BATTERY

20 MW facility utilizing lithium ion technology



AES Battery Facility, Johnson City, NY

Distributed Energy Resources

Supported 100 DG/CHP projects,
producing over 150 MW of electricity

Beneficial use of DG/CHP applications
in grid support

Encourage technology options such as
waste heat to energy and fuel cells



Opportunities / Challenges

- Beyond Reliability
 - Yearly downtime 90% - 876 hrs
 - 99% - 87.6hrs
 - 99.9% - 8.76 hrs
 - 99.99% - 0.876 hrs (50 min)
 - 99.999% - .0876 hrs (5 min)
- Need efficiency improvements
 - System, Operations, Maintenance, Capital
 - Focus on Distribution
 - Needs to have a payback

Opportunities / Challenges

- Energy Storage
Generation or T&D – who can own
- Integrating Renewable
1300 MW wind to grow to 6,000 - 7,000 MW
100 - 200 MW new PV
- Transportation
What technology wins
- Customer Enablement
What customer class and will AMI be worth it

Questions & Discussion

Thank you

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NYSERDA

Photo Courtesy of EPRI