



# Energy Smart Technologies Leadership Forum

## Keynote Speech

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*Generating More Than Electricity*

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**Chief Operating Officer**  
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# Drivers Behind Energy Smart Technologies

Economic development and environmental concerns are driving innovation in the energy sector today.

- About \$184 billion<sup>1</sup> of global economic recovery funding (including \$90 billion<sup>2</sup> in US stimulus) targeted “clean energy” projects
- EPA’s environmental regulations on greenhouse gas, mercury, coal ash, interstate emissions and water will redefine “best available control technology” and push new technology into the marketplace
- Recently proposed FERC rulemaking is pushing for build out of the transmission system to enable increased renewable generation on the grid
- Although largely stalled, proposed Federal climate change legislation continues to shake up the industry and influence decision-making

Notes: 1. “G-20 Clean Energy Factbook.” The Pew Charitable Trusts. 2010.

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2. “The Economic Impact of the American Recovery and Reinvestment Act of 2009.” Executive Office of the President Council of Economic Advisers.” January 2010.

# A Renewed Focus

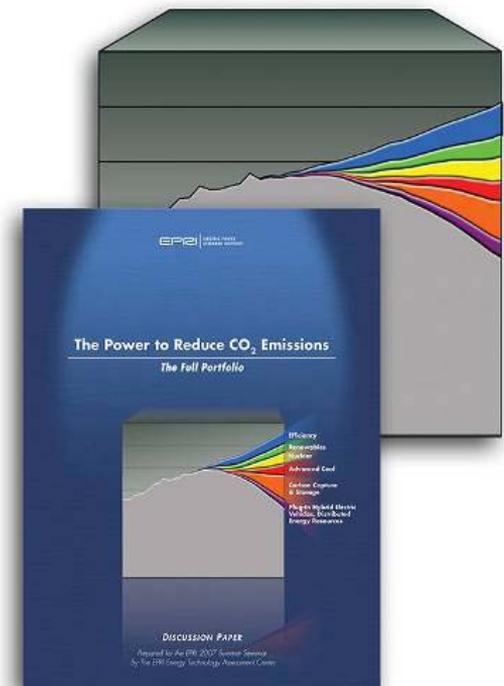
Recent public policy decisions have added a renewed focus to the New York Power Authority (NYPA) and the Electric Power Research Institute's (EPRI) efforts to demonstrate new energy technologies.

- NYPA is the nation's largest state-owned public power utility
  - Generates 20% of New York's electric power (with 75% from renewable hydropower resources)
  - Owns and operates 33% of New York's transmission system
  - Implemented over \$1.3 billion in energy efficiency projects with customers
- EPRI is an international, non-profit company performing RD&D in the electricity sector for the benefit of the public
  - Members represent 90% of the electricity generated and delivered in the US
  - Brings together experts to help address challenges in electricity, including reliability, efficiency, health, safety and the environment
  - Supports research in emerging technologies and conducts analysis to drive long-range plans

# Long-Term Planning

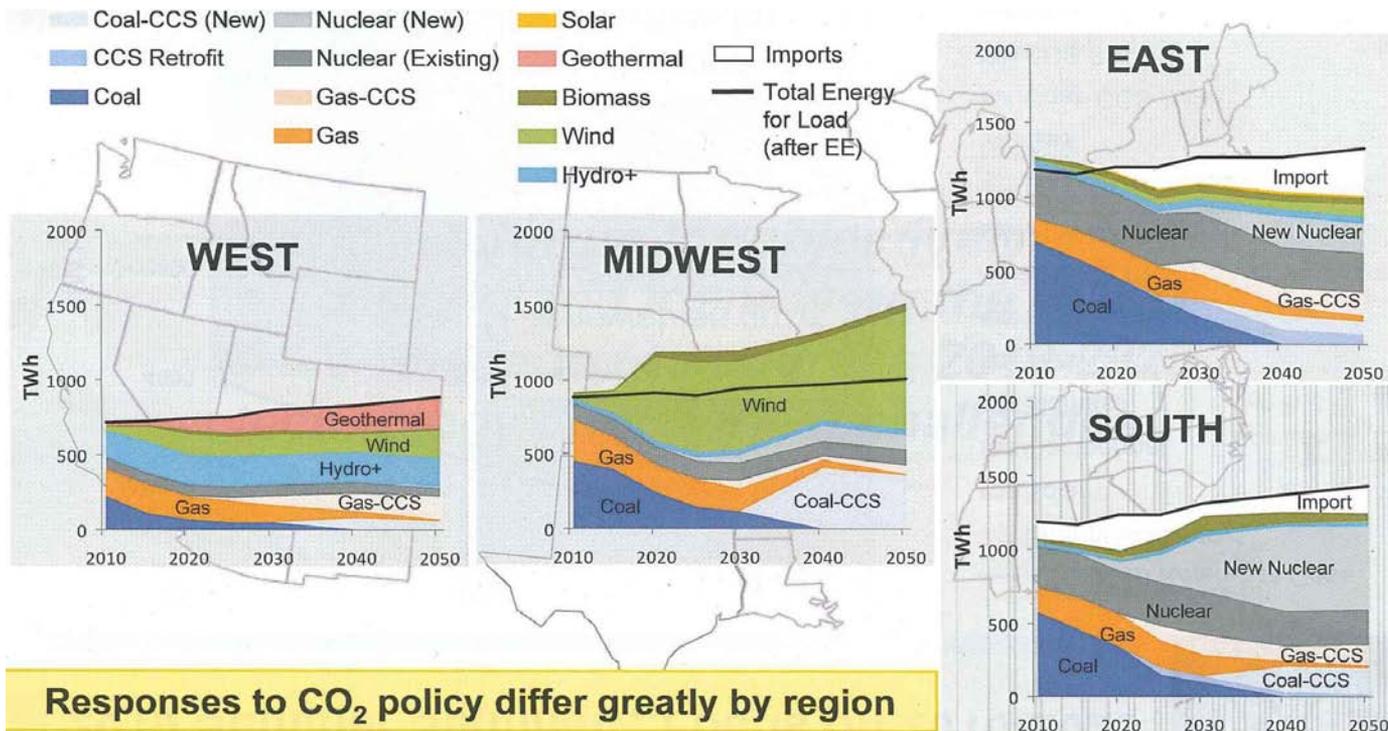
Utilities and policy makers must now factor in climate change concerns to appropriately drive investment decision-making and research.

- EPRI's 2007 PRISM/MERGE analysis provided a comprehensive assessment of potential CO<sub>2</sub> reductions in eight key electricity technology areas and then identified a cost-effective technology portfolio to achieve such reductions
- Determined that an "aggressive" push on new technologies could lower 2005-level carbon dioxide emissions from power plants by 41% in 2030



# Modeling the Clean Energy Future

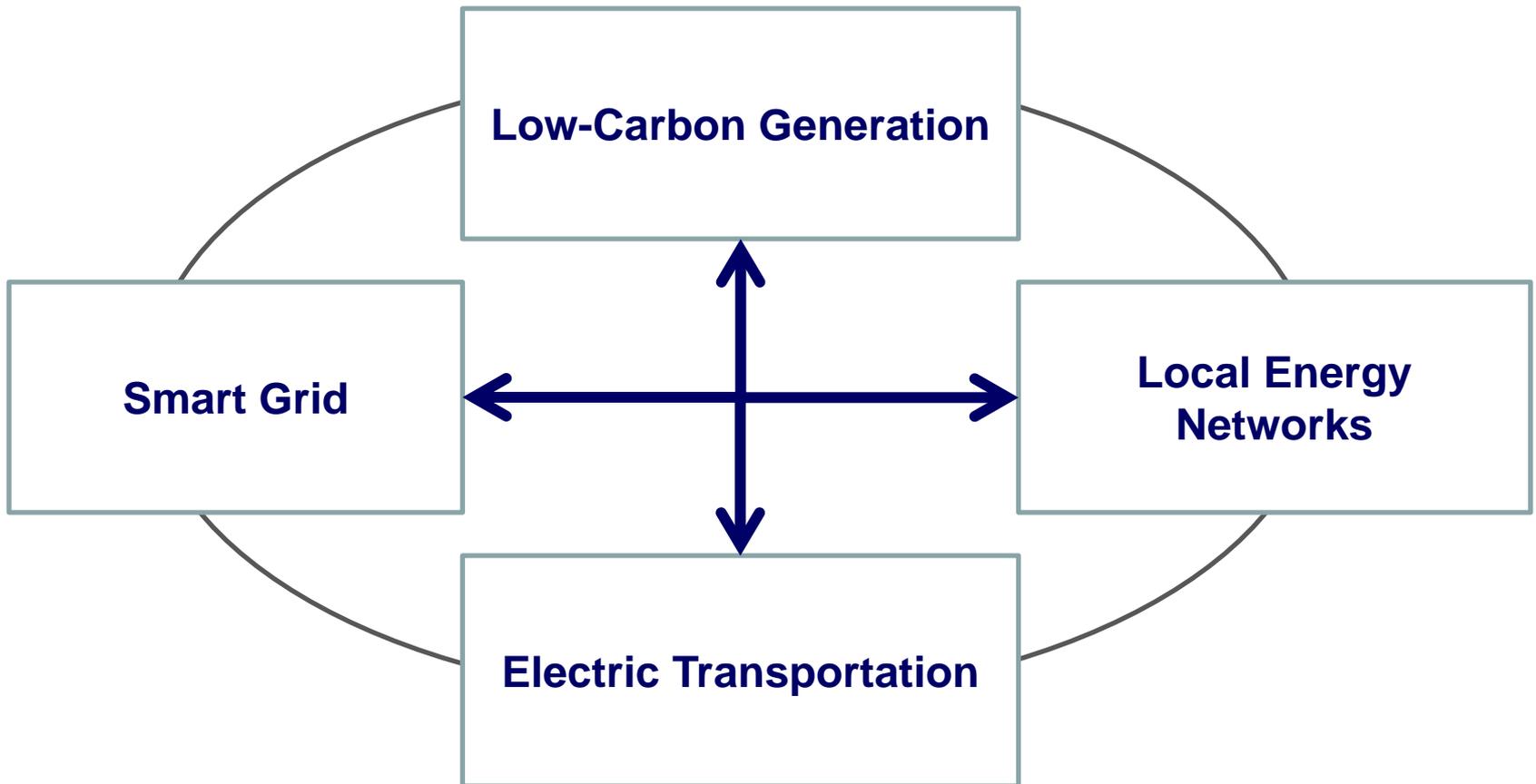
NYPA is participating in EPRI's PRISM 2.0, which will focus on regional differences, identify technology gaps, and support future integrated resource planning.



Source: EPRI 2010, used with permission.

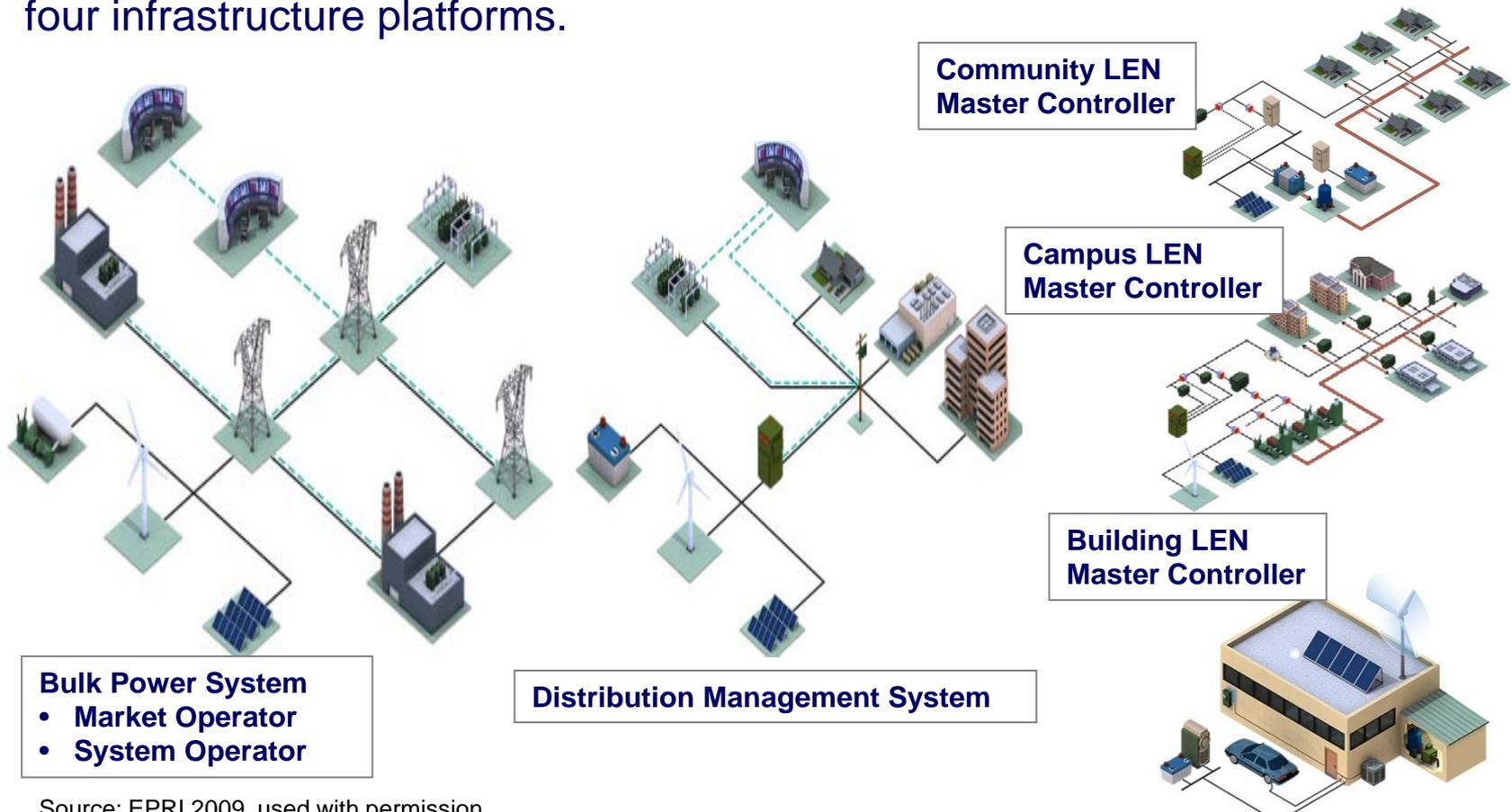
# Vision of an Energy Smart System

The future smart energy system will be built on four infrastructure platforms.



# Integrated Power Systems

The future smart power system will require multi-level control to integrate the four infrastructure platforms.

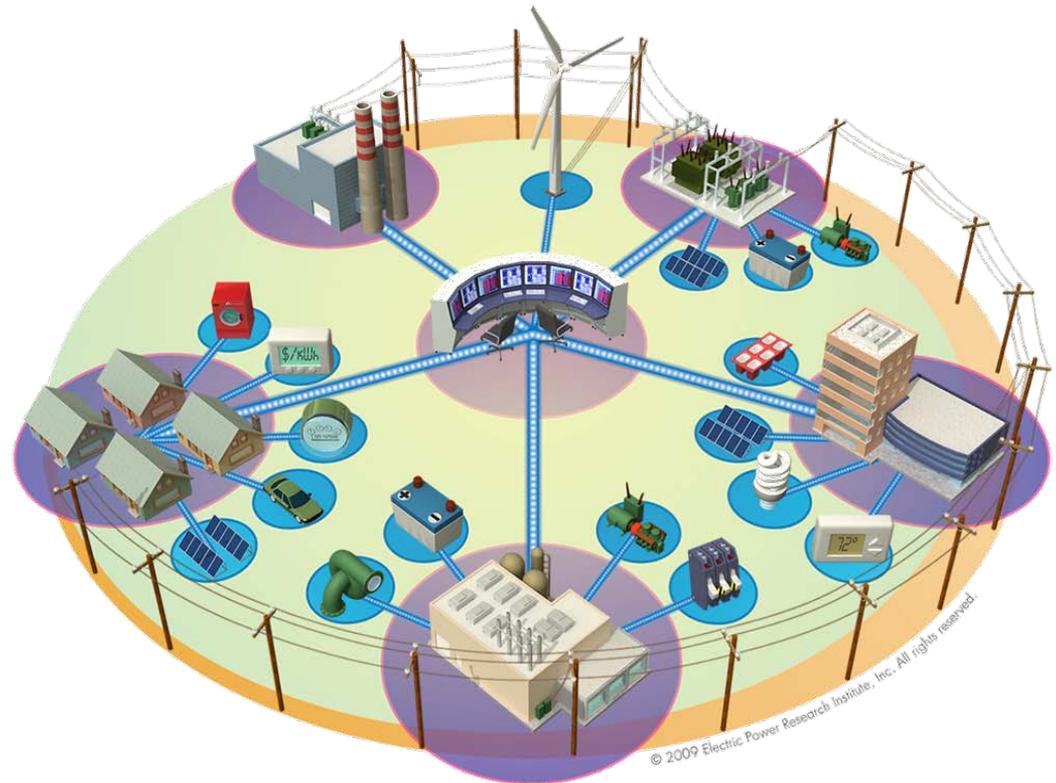


Source: EPRI 2009, used with permission.

# EPRI Smart Grid Demonstrations

EPRI's smart grid demonstrations focus on building "Virtual Power Plants", integrating distributed energy resources into system operations.

- Distributed energy resources include:
  - Distributed generation
  - Renewable generation
  - Demand response
  - Energy storage
- Smart networks will leverage information and communication technologies



Source: EPRI 2010, used with permission.

# EPRI's Smart Grid Collaborators

- Wisconsin Public Service
- Exelon (ComEd/PECO)
- Ameren
- KCP&L
- Southwest Power Pool
- Salt River Project
- Southern California Edison
- PNM Resources
- Entergy
- Hydro Québec
- Central Hudson Gas & Electric
- Con Edison
- FirstEnergy/JCP&L
- ESB Networks
- Electricité de France
- AEP
- Duke Energy
- TVA
- Southern Company

# Energy Smart Buildings

Technologies that improve end-use efficiency provide some of the best value by saving energy, reducing carbon, and lowering customer bills.

- Since 1990, NYPA has invested over \$1.3 billion in energy efficiency at over 3,300 public facilities
  - Demand and energy on the grid reduced annually by over 229 MW and 1,000 GWh
  - Avoiding over 820,000 tons of greenhouse gas emissions annually
  - Contributed over \$119 million in annual recurring customer savings statewide
- NYPA plans to invest an additional \$1.4 billion through 2015 to support Governor Paterson’s “45 x 15” clean energy goal and Mayor Bloomberg’s PlaNYC clean energy goals

# Distributed Generation

NYPA has helped several customers successfully finance, plan, and construct behind-the-meter renewable energy projects.

- Since 1993, NYPA has helped install 663.7 KW of solar PV and 2.85 MW of fuel cells at various public facilities, and additional projects are in development
- 100 MW Solar Initiative
  - NYPA is seeking public-private partnerships to develop a total of 100 MW of distributed solar generating capacity statewide at public facilities and schools
  - Bids are expected to be awarded in coming months and installations occur through 2014



Yonkers Wastewater Treatment Plant



Gun Hill Bus Depot, Bronx

# Smart Transmission

To maximize efficiency and operating flexibility, NYPA and EPRI have invested in smart transmission projects.

## Convertible Static Compensator

- Installed in the summer of 2004
- The world's most advanced power electronics based controller
- Provides voltage control and increases power flow from upstate and Western NY downstate by about 200 MW



# Smart Transmission

## Dynamic Thermal Circuit Ratings (DTCR)

- NYPA and EPRI were awarded \$720,000 to evaluate a suite of technologies that enable real-time monitoring of transmission thermal capacity ratings
- Project will test the merits of using DTCR for improved use of transmission by wind farms

## Phasor Measurement Units (PMU)

- The PMU network supports real-time monitoring of operating conditions and automated response to disturbances
  - NYPA and New York Transmission Owners are implementing the NYISO's stimulus-funded expansion of the PMU network
  - NYPA is collaborating with several stakeholders to improve collection, storage, and utilization of PMU data, and develop applications to analyze data



# Energy Storage

Integration of intermittent renewable resources will require innovative energy storage technologies to balance energy supply with demand.

- NYPA completed a \$135 million upgrade at its Blenheim-Gilboa Pump Storage Project, increasing installed capacity from 1040 to 1160 MW
- NYPA, EPRI, and other partners collaborated on a 1 MW, 6.5 MWh sodium sulfur battery energy storage system at a natural gas bus refueling station at Garden City on Long Island
- NYPA and EPRI are assessing feasibility for compressed air energy storage to enhance wind power integration
- NYPA and EPRI plan to deploy and demonstrate grid-scale lithium ion battery technology-based projects

# Electric Vehicles

NYPA is working closely with EPRI to develop and demonstrate new transportation technologies.

## Plug-in Hybrid Medium-Duty Vehicle Program

- EPRI coordinated this national program to procure 378 vehicles for 50 fleets
- USDOE awarded \$45.4 million in Federal stimulus funds for vehicle development and commercialization

## Solar Assisted Plug-in Vehicle Charging Project

- Solar covered parking canopy with vehicle charging
- EPRI is developing the system design in partnership with TVA and NYPA
- All system elements grid tied and scalable

## Utility-Automaker Plug-in Vehicle Programs

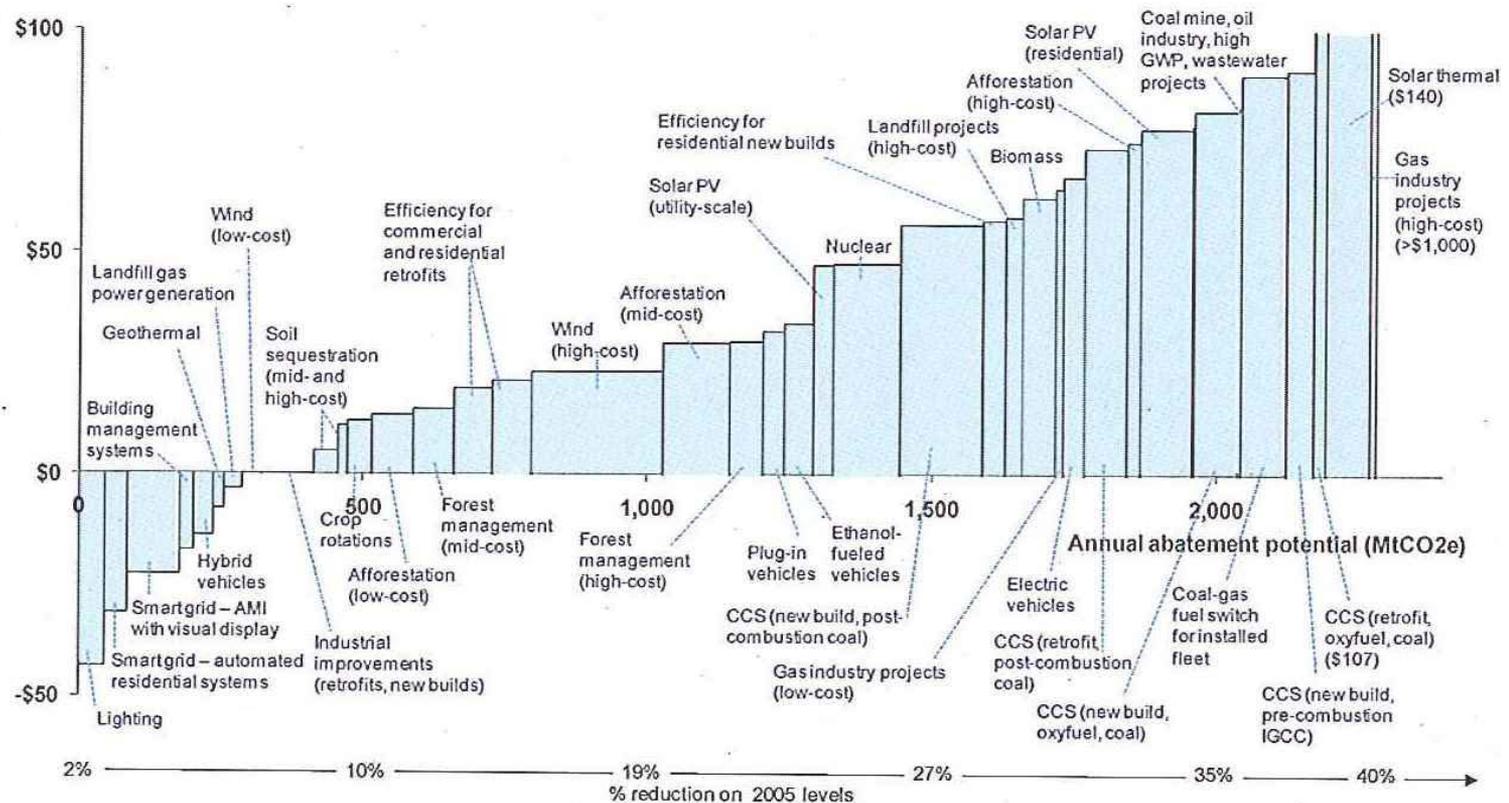
- EPRI-led utility-OEM partnerships for the development and testing of plug-in vehicles
- NYPA is participating in demonstration programs with Ford, GM and other vehicle manufacturers



# Energy Smart Technologies

Innovations in power delivery and efficient end use provide the best potential for cost-effective clean energy and climate change abatement.

2009 \$ / tCO<sub>2</sub>e



Source: Bloomberg New Energy Finance, 2010

# Questions?

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# Appendix

## Other NYPA Projects

# Off-Shore Wind Projects

## Great Lakes Offshore Wind Project

- NYPA issued an RFP in 2009 for 120 – 500 MW of offshore wind generating capacity in the New York State waters of Lake Erie and/or Ontario
- Five proposals are currently under review and preferred developer(s) will be selected in 2011

## Long Island & New York City Offshore Wind

- In partnership with LIPA and Con Edison, NYPA is evaluating development of 350 – 700 MW project 13 miles off shore in the Rockaways in the Atlantic Ocean
- Received 30 responses to RFI and NYPA is beginning the lease application process with the Federal government
- RFP is forthcoming; targeting an in-service date of 2016



# Transmission Investments

Connecting renewable energy to load centers will require investments in new and upgraded bulk transmission lines.

- NYPA is working with multiple partners on proposed transmission upgrades that would enable additional delivery of renewable energy from Canada and upstate New York to New York City



# Life Extension and Modernization

NYPA has invested significantly in improving the efficiency of its hydro facilities.

- NYPA has invested \$298 million at Niagara, \$135 million at Blenheim-Gilboa, and is implementing \$281 million in projects at St. Lawrence
  - Projects improve plant efficiency, increase pump capacity, reduce operations and maintenance requirements and increase reliability
- In June NYPA Trustees approved a \$460 million investment in NYPA's Lewiston Pump Generating Plant at Niagara

Niagara Power Project



St. Lawrence-Franklin D. Roosevelt Power Project



Blenheim-Gilboa Pumped Storage Project



# Astoria Energy

In 2011, NYPA expects to open a new plant in New York City, built via a public-private partnership structure.

- The 575 MW Astoria Energy II plant will be a state-of-the-art natural gas combined cycle power plant
- The plant is expected to lower wholesale prices in New York City and improve air quality by displacing older, less efficient generation

