NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION

**Land**
1. Create enough housing for our growing population
2. Ensure all New Yorkers have parks within a 10-minute walk
3. Clean up all contaminated land in New York City

**Water**
4. Develop water network back-up systems
5. Open 90% of our waterways and protect natural areas

**Transportation**
6. Improve travel times by adding transit capacity for millions
7. Achieve “State Of Good Repair” on our transportation system

**Energy**
8. Upgrade our energy infrastructure to provide clean energy

**Air**
9. Achieve the cleanest air of any big city in America

**Climate Change**
10. Reduce global warming emissions by 30%
NYC’s buildings account for 77% of NYC’s total energy consumption.
Buildings: Nearly 80% of NYC’s GHG Emissions

2007 Citywide CO₂e Emissions by Sector

Total = 61.5 MMT

Buildings = 77%
- Residential: 19%
- Commercial: 32%
- Industrial: 9%
- Institutional: 3%

Transportation = 22%
- Transit: 12%
- On-Road Vehicles: 24%

Other = 1%
- Methane: 1%
1. New York City Energy Code
2. Lighting Upgrades & Sub-metering
3. Benchmarking
4. Audits & Retro-commissioning
5. Green Workforce Development Training
6. Green Building Financing
Electric Industry Fundamentals

- Grid requires supply and demand to be in balance
- Grid operators have limited control over demand
- Grid reliability is maintained by anticipating and matching changes in demand with supply i.e. generation
- Grid operators require resources they can control, predict and measure
Traditional Demand Response

- Demand Response occurs when customers voluntarily reduce usage in response to high prices or when requested by the utility or the grid operator.

- Demand Response programs today:
  - Used during system emergencies and high load periods.
  - Primary participants are large commercial and industrial customers.
  - Response typically comes from emergency generators or equipment shutdowns.
Traditional Demand Response is an Underdeveloped Tool

- Does not support grid reliability to the extent possible
- Participation is limited to <100 hours a year
- Difficult for Grid operators to accurately predict, control or measure the amount of deliberate demand reduction from the grid
- Demand reductions are not integrated with clean generation solutions

Efficient and Sustainable Markets Require the Integration of Demand Reductions into Real-Time Grid Operations - Virtual Generation
The Nation Needs a Smart Grid

- National electric demand will increase annually by 1-2 percent
- We must reduce dependence on fossil-based generation
- The industry requires $1.3 trillion in infrastructure investment to keep up with demand (EEI)
- Active management of customer demand can reduce energy costs by as much as 20%

*Our electric power needs will be met by renewable and traditional generation on the grid and customer controlled demand and distributed generation - The Smart Grid*
The Smart Grid is the Game Changer

- Two-way communication makes customer-owned distributed generation and demand management available to the grid
- Customers are suppliers to the market
- Grid-based generation is coupled and optimized with customer generation and controllable demand to maintain balance
Virtual Generation

- Customer generation and demand management transformed into valuable energy assets
- Optimized load among prices, weather, DG, and supply purchases
- Expanded ability of energy management systems to produce demand reductions
- Predictable, controlled, measured, and auditable resources to be sold into markets
The Technology is Proven and Customer Ready – City is Working with Viridity on Pilot Project
Optimizing Customer Demand

- Precool Building (Low $)
- Traditional Demand Response Peak Shaving
- Real Time Demand Response - Control and Distributed Generation Optimization

Graph showing MW vs. Time with lines representing Baseline, Traditional DR, and Real Time DR.
Achieving Smart Grid Benefits Today

Customers

- Increase revenues from market participation
- Reduced payback period for energy investments
- Reduce supply expense through superior load management
- Minimized carbon footprint

RTO/Market Operator/Utility

- Two way information and dispatch of distributed resources
- Increased information, flexibility and security at distribution level

Renewable Generation

- Increase system value of renewable resources by integration with controllable demand (use embedded storage in load!)
- Achieve environmental objectives through improved utilization of clean energy!
Regulatory and Other Hurdles

- Utility and ISO/RTO programs
  - Price thresholds
  - Real time operation and prices
  - Payment of full market price
  - Measurement and verification
- State: PSC regulatory review
- Federal: Coordination among FERC, DOE, NIST (National Institute of Standards and Technology)
- Need hourly retail rate structures (coming to NYC for all customers over 500 KW in 2011)