Clean Energy Best Practices: Programs and Policies for Reducing Peak Demand

Sue Gander, USEPA

Ozone Transport Commission HEDD Meeting

Newark, NJ, January 11, 2007

Clean EnergyEnvironment
STATE PARTNERSHIP

EPA

Outline

- Recap of EPA OTC-Wide Modeling Results
- Peak Demand Drivers
- Clean Energy Program Best Practices
  - Example Results
  - Key Features
  - Implementation Issues
- Policy Considerations
- Conclusions
  - Clean energy offers cost-effective reductions through proven delivery models
  - Need to establish revenue streams
  - Calls for coordinated policy efforts

Why Clean Energy as an Option?

- Meaningful emission reductions
- Cumulative benefits over life of programs
- Cost effective
- Established policy mechanisms and technologies

TRUM Inputs: Efficiency, Demand Response, PV, Clean DG - 2010

2010 *Measures beginning in 2008*	**Low**	**Medium**	**High**
Energy Efficiency (EE)	1% cumulative reduction in load (1,083 MW at peak)	1.5% cumulative reduction in load (1,624 MW at peak)	2.0% cumulative reduction in load (2,166 MW at peak)
Demand Response (DR)	3% reduction at peak hours (3,216 MW at peak)	4% reduction at peak hours (4,266 MW at peak)	5% reduction at peak hours (5,306 MW at peak)
Solar PV, installed capacity	56 MW	112 MW	168 MW
Clean Distributed Generation (DG) in CHP mode, installed capacity	771 MW	1,884 MW	2,975 MW

EPA

TRUM Inputs: Efficiency, Demand Response, PV, Clean DG - 2015

2015 *Measures beginning in 2008*	**Low**	**Medium**	**High**
Energy Efficiency (EE)	3.5% cumulative reduction in load (3,958 MW at peak)	5.25% cumulative reduction in load (5,937 MW at peak)	7.0% cumulative reduction in load (7,917 MW at peak)
Demand Response (DR)	4% reduction at peak hours (4,365 MW at peak)	5.5% reduction at peak hours (5,894 MW at peak)	7% reduction at peak hours (7,362 MW at peak)
Solar PV, installed capacity	169 MW	339 MW	508 MW
Clean Distributed Generation (DG) in CHP mode, installed capacity	2,067 MW	4,617 MW	6,627 MW

EPA

Results: NOx Emissions in Entire Region (2010 and 2015)

Daily NOx reduced from ***All*** Units	Low	Medium	High
Tons	**29**	**46**	**64**
Percent of total	**-3.6%**	**-5.7%**	**-7.8%**

Daily NOx Decrease from Capped Units

LO	MED	HI
65	96	127

Daily NOx Increase from Back Up Generation

LO	MED	HI
42	55	68

Daily NOx reduced from ***All*** Units	Low	Medium	High
Tons	**94**	**136**	**167**
Percent of total	**-13.2%**	**-19.0%**	**-23.3%**

Daily NOx Decrease from Capped Units

LO	MED	HI
129	185	230

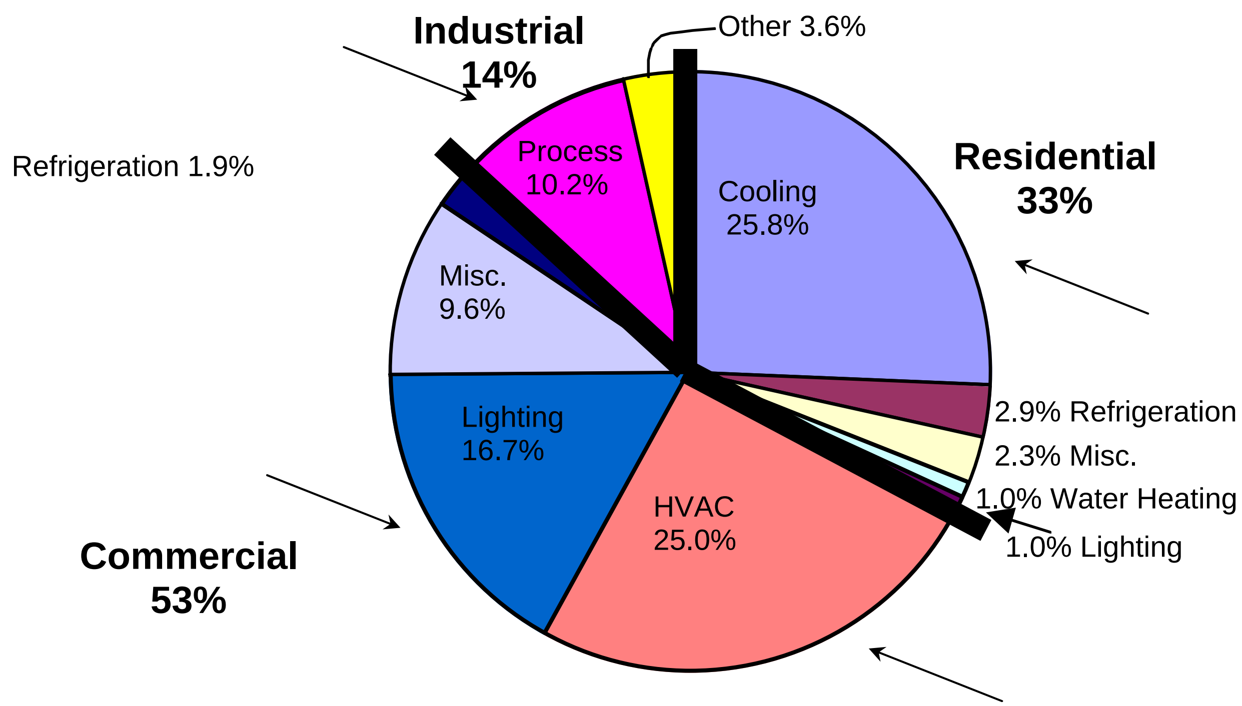
Daily NOx Increase from Back Up Generation

LO	MED	HI
43	57	72

EPA

Where to Look for Peak Demand Reduction Opportunities

Allocation of Peak Demand by Use -- New Jersey 1999



Source: Xenergy study for N.J. utilities.

Best Practice Clean Energy Programs

- Energy Efficiency
  - ENERGY STAR Qualified Homes*
  - Home Performance with ENERGY STAR*
  - ENERGY STAR HVAC Proper Installation*
  - Enhanced Commercial Building Energy Efficiency*
  - Cool Roofs
- Combined Heat and Power
  - Standby Rates*
  - Interconnection Standards
  - Congestion Requests for Proposals
- Solar Energy - PV Incentives*
- Demand Response
  - Time Based Rates and Incentive Programs*

*Highlighted in following slides

ENERGY STAR Qualified Homes

- Improves overall efficiency of new homes
- Each ENERGYSTAR qualified home 15-20% more efficient than code; reduces peak demand ~ 1kW
- 300,000 new homes in OTR in 2005
- Mature programs administered at $0.03-$0.04/kWh
- Calls for strong HERS network, educated builders and buyers

NY/NYSERDA:

- Developed strong HERS network
- Trained home builders
- Offered substantial rebates
- Implemented strong regional marketing
- Achieved 10% penetration in 5 years

TEXAS:

- 35-45 % penetration

LAS VEGAS:

- 60 % penetration

Home Performance with ENERGY STAR

- Improves overall efficiency of existing homes
- Saves up to 1.64 kW per home
- Existing savings in 20,000 homes save ~ $400 per year in energy costs
- Mature programs administered at $0.05/kWh

NYSERDA:

- 11,000 homes
- 8 million kWh savings
- 1 MW net annual on-peak savings

Austin Energy:

- 1,400 homes
- 3,000 kW peak demand savings

WI Focus on Energy:

- Average savings of 1000 kWh and 500 therms of natural gas per home

ENERGY STAR HVAC Proper Installation

- New approach to ensuring maximum benefit from A/C programs, especially as SEERs increase
- Improper sizing, refrigerant change, airflow and air duct leakage can reduce A/C efficiency 30%
- 5% A/C replaced yearly
- LIPA estimates 1364 kWh/year and 1.75 kW savings moving from 10.2 SEER to 15 SEER, properly installed

New Jersey Example (2005):

- PBF support for properly installed high-efficiency units
- 600 technicians trained
- 17,000 central A/C or heat pumps installed
- 15,000 MWh and 12.7 MW demand savings

EPA

Enhancing Commercial Building Efficiency

- Focuses on whole-building energy performance
- Can reduce energy use 30% through improved operations, maintenance and equipment upgrades
  - Retrocommissioning
  - Comprehensive retrofits
- Levelized cost of energy saved at $0.03-$0.04/kWh
- NYSERDA Example:
  - Retrocommissioning program – technical assistance and incentives -- reduces peak demand 5-7% in buildings with systematic operations & management improvements
- NSTAR Example:
  - Benchmarking initiative provides technical assistance to engage 65 building owners in comprehensive energy savings approach – rating motivates participation in incentive programs targeted at lighting, HVAC, etc.

EPA

Improved Standby Rates for CHP

- Standby rates can penalize CHP and RE through assumptions about availability
- States are evaluating how to ensure standby rates allow CHP, and RE, to compete on a level playing field while maintaining reliability and appropriate cost recovery for utilities
- Promotes cost-effective clean energy sources as an alternative to grid expansion.

NY Example:

- Cost-based rate design tied to size of facilities needed to meet customers maximum demand, varies with peak load
- A key consideration is for the rates to result in DG/CHP running when it is less expensive than purchasing power from the grid.
- Two options for existing DG to shift to new rates immediately or over 4 year phase in
- Environmentally beneficial DG or small CHP can stay on current rates, shift immediately, or phase in over 5 years

PV Incentives

- Solar peak coincident with high energy demand days makes it a good option for renewable energy strategy
- Access to funding for up-front capital is critical part of a successful program – could be via system benefit charge, tax rebates/incentives, market mechanisms or other sources
- Technical support is an important additional component

New Jersey example:

- 2008 state-wide goal of 90 MW solar
- Customer On-Site Renewable Energy (CORE) program offers rebates to residential and business customers
- $56 M paid to date for 800 projects, 12.5 MW of program-induced capacity
- Estimated 1.1 ton reduction NOx during 2005 ozone season
- Transitioning to a solar renewable energy rebate (SRECs) market-based program

Demand Response: Incentive Programs

- Focus on reducing consumption during system emergencies or times of high wholesale prices
- Existing DR programs can yield 3 to 7% reduction in peak load.
- Participants can reduce load by switching to backup generation or flexing load – which options are employed can have a big impact on net emissions

New York ISO Example:

- Capacity market program (SCR), demand bidding program (DADRP) and emergency demand response (EDR)
- 2003: 1,400 commercial, industrial, multi-family residential customers reduced peak load 700 MW
- 2006: EDR and SCR programs reduced peak demand 1,100 MW
- DADRP participants are not allowed to transfer loads onto on-site generation

EPA

BEST PRACTICES HANDOUTS PROVIDE ADDITIONAL INFORMATION & PROFILE OTHER PROGRAMS

Putting Programs into Practice: Policy Responses to Key Barriers

Clean Energy Barriers

- Market Barriers
  - Split Incentives
  - Transaction Costs
- Customer Barriers
  - Lack of Information
  - First Cost Barriers
- Public Policy Barriers
  - Utility Disincentives
- Planning Barriers
  - CE does not compete as a supply-side resource
- Program Barriers
  - Lack of information

Policy Responses

- Energy Planning Provisions *(CT, NY)*
- Energy Portfolio Standards *(CT, MA, NJ, NY, PA, RI)*
- Lead-by-Example Executive Orders *(NH, NJ, NY)*
- Tax Incentives *(MD, MA, NH, NJ, NY, RI, VT, VA)*
- Public Benefit Funds *(CT, MA, ME, NH, NJ, NY, RI, VT)*
- Utility Incentives for Demand Side Resources *(MA, NY)*
- Standby Rates *(NY)*
- Interconnection Standards *(CT, DE, MA, NJ, NY, PA)*

EPA

Energy Planning/Portfolio Provisions to Further Efficiency

Examples of State "Energy Efficiency as a Resource" Goals in OTC		
	Goal	Notes
CT - Renewable Portfolio Standard (Class III)	**4% of total load by 2010** and thereafter (program starts in 2007)	includes EE and CHP
NJ -- Public Benefit Program and **Energy Efficiency Resource Standard**	PBF: 1814 GWh total from 2005-08 EERS: **1% per year of total load** through 2016 (starting in 2005)	EERS goals not yet adopted, cited in conceptual draft
PA -- Alternative Energy Portfolio Standard (Tier 2)	**4.2% of total load from 2006-2010**; 6.2% from 2011-15; 10% in 2021 and thereafter	eligible sources include hydropower, waste coal generation, and municipal solid waste (these sources already account for 8%), plus EE
VT -- Efficiency Vermont and SPEED	**EV:1% of total load from 2006-2008;** SPEED: No net load growth.	Act 61 established the Sustainably Priced Energy Enterprise Development (SPEED) - no net load growth. Renewables and efficiency required to meet all new load growth.
New England Governor's Conference -- **Climate Change Action Plan**	By 2025, increase the amount of energy saved through conservation programs within the region by 20%	

EPA

PBF Programs Yielding Cost-Effective Reductions -- with More Possible

- $500 million in EE spending across OTC in 2004
- On average, .87% of revenue -- but leading programs at 1-2% of revenue -- still a gap to fill
- New England "Economic EE" potential estimated at 3,108 MW by 2013 -- enough to maintain peak demand at 2003 levels

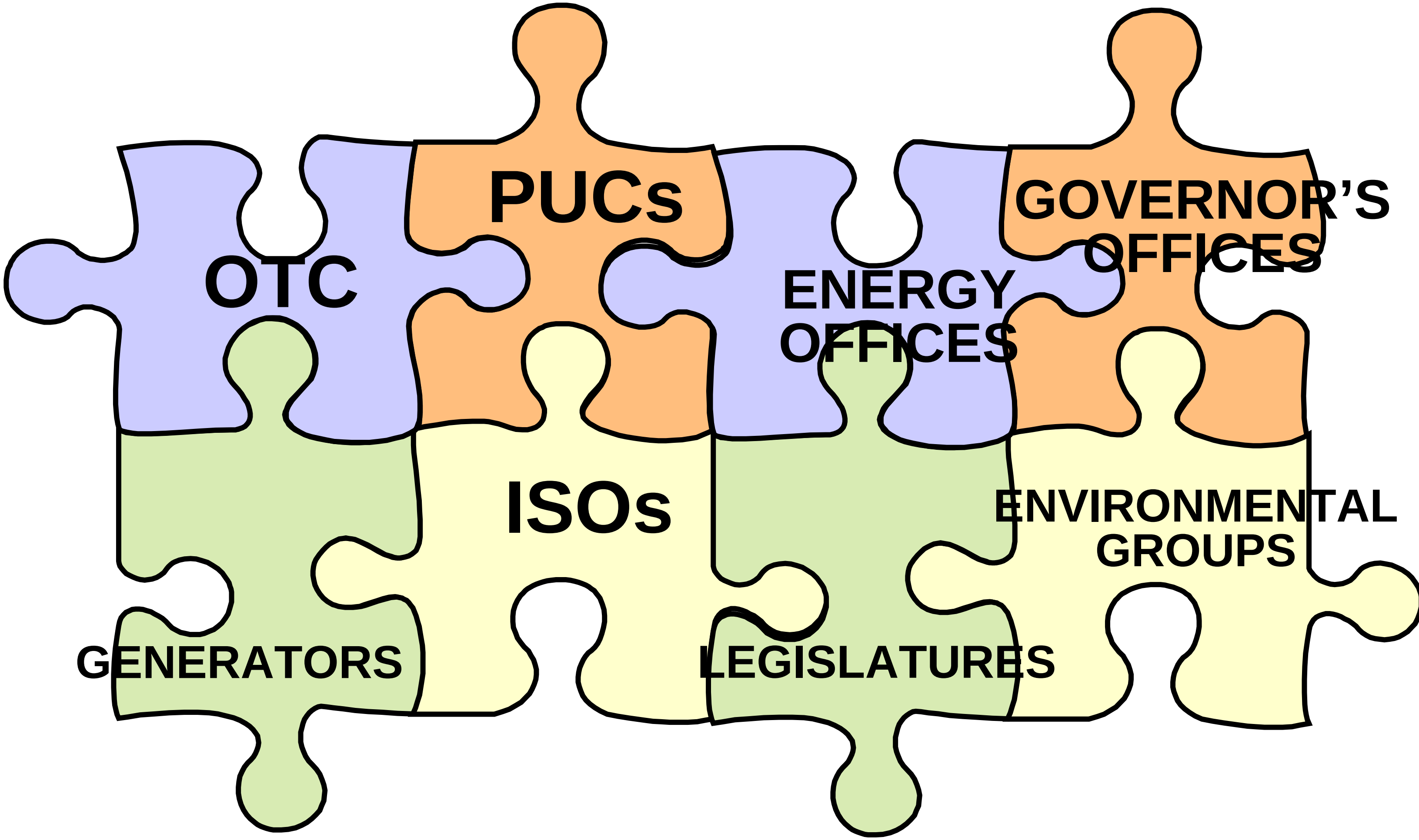
Figure 4.2.1: Cost of Energy Saved ($/kWh) for Six State Public Benefits Funds

Source: ACEEE 2004b.

- NY "Economic"EE potential up to 13,000 MW summer peak in 2012 -- less than 1,000 MW planned -- with up to 2,000 MW economically viable from RE

EPA

Putting it All Together



EPA

Conclusions

- Clean energy offers cost-effective reductions through proven delivery models
- Need to establish revenue streams, incentives to make investments
- Calls for coordinated policy efforts
  - OTC Members
  - ISOs
  - PUCs
  - Energy Offices
  - Governors Offices
  - Other Regional Organizations

Many Places to Look for More Information and Assistance

www.epa.gov/cleanenergy

Clean Energy-Environment Guide to Action: Policies,Best Practices and Action Steps for States

National Action Plan on Energy Efficiency

www.energystar.gov

Program Design

Guidance

Expert Assistance

Tools and Training