Dynamic Pricing

Accel Clean DG

Accel Demand Resp

Accel Energy Eff

Voluntary Load Response Program

- Given that some distribution utilities and ISOs already have load response programs in place, it would make sense to determine if these existing programs could be expanded to further reduce peak electric demand on summer afternoons when high ground-level ozone readings are anticipated.
- ISOs and interested distribution companies should meet to determine if existing programs can be expanded or coordinated to achieve additional reductions in peak energy demand on hot summer afternoons. For example, PJM has a Load Response Working Group that could serve as a forum for such discussions in PJM.
- Distribution companies and ISOs would solicit additional participation in load response programs based on any new incentive structures developed.

Voluntary Load Response Program (p. 2)

Issues

- **Voluntary versus Mandatory.** Programs must be voluntary to get customers to sign up. However, customers could voluntarily agree to mandatory response (some customers currently have mandatory contractual agreements in place with their distribution companies).

- SIP credit availability for voluntary versus mandatory programs?

- **Incentives**. What incentives, and $/MWh value, are required to get customers to participate and increase participation?

  - Avoided cost sharing (current model). Doesn't always provide enough incentive for voluntary action unless energy prices get very high.
  - New incentive options? RPS credits? Tier 1 or Tier 2? Some state programs may already be structured to allow? If not, challenge to update state laws/rules? REC value may not be significant enough financial incentive?
  - Public recognition, e.g. tagline that could be used by participants in marketing? Concessions for customer regarding other air regulatory requirements?

- Need to address customer use of "back-up" generation if it is uncontrolled/high emission rate. Some customers will truly curtail overall energy usage. Some could elect to use on site generation instead of grid power … allowance surrender concept one way to discourage uncontrolled on site generation.

Increase Solar Energy Capacity

- Provide incentives for a variety of photo-voltaic (PV) electric generation
  - Promote LSEs to install PV panels on a given percentage of residential homes
  - Promote large retail roof spaces for PV projects between LSE and building owners (e.g. Staples-Sun Elec. model in NJ)
  - Promote installation of PV at electrical substations to power transformer cooling reducing transmission losses which are greatest during times of peak demand.

Increase Solar Energy Capacity cont.

- Solar capacity produces no NOx emissions
- Solar capacity is maximized on sunny days which coincides with days of high demand and poor air quality
- Investment for solar capacity is in the range of $10,000 per kW
- Time horizon would be short to medium

Peak Day EGU NOx Red

Environmental Start-Up of EGUs

- Require EGUs to pay a surcharge on peak demand days where air quality is forecasted as unhealthful creating an environmentally sensitive dispatch of generating units
- CA has an $8/MWh adder now
- This would minimize the operating hours of the dirtiest generating units on days with peak demand and poor air quality

Environmental Start-Up of EGUs, cont.

- Reduces emissions on days with peak electric demand and poor air quality
- Would not significantly reduce capacity or reliability of available EGUs
- Investment would be based on the emission rate of an individual EGU
- Implementation within 1-3 years upon passing surcharge regulations

Pollution Control Capital Cost Recovery

- Prior to mandating pollution control technologies or outright replacement of CTs, the OTC should work with the Independent System Operators (ISOs) to ensure that there are mechanisms within their market rule structures to provide for an appropriate level of capital cost recovery related to pollution control equipment at existing combustion turbines (CTs) and/or replacement of existing CTs with dry low NOx combustion technology (DLN) CTs.

- Mechanisms could take different forms, depending on each ISOs existing, and evolving, market structures. Additionally, since the rules in the ISOs vary by region, it may be that some ISOs have sufficient structures in place or are currently working to establish sufficient structures (such as capacity payment reform that is occurring in PJM and New England).

- Objectives: 1) ensure system reliability is maintained; 2) provide for reasonable, appropriate level of capital cost recovery.

Pollution Control Capital Cost Recovery (p. 2)

Issues to Consider

- Universe of electric generating units (EGUs) to address. Consideration of unit design and operating hours.
- Form of capital cost recovery: capacity payments, energy bids, other payment structures.
- Ensuring system reliability.
- Minimizing costs to consumers.
- Coordination of timing with OTC and ozone attainment schedules.
- Long lead times are required for major capital stock turnover, particularly “across the board” mandates.
- Appropriate balance of costs and environmental benefits.
    - Water injection roughly $750K per CT.
    - New CTs +/- $500 kW (+/- $500 million per 1,000 MW replaced).

CAIR-Affected EGU CTs >= 25 MW in full OTR

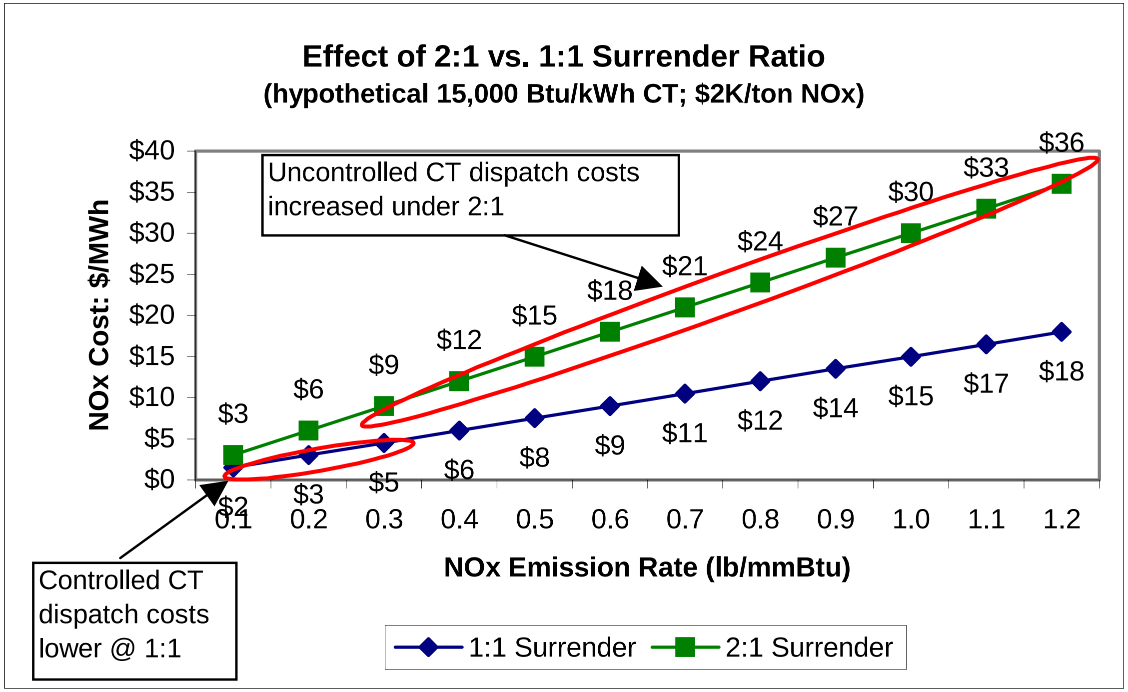
(preferably all 25 CAIR states regulated for ozone season NOx)

- Dry Low NOx (DLN) and controlled CTs surrender at 1:1 ratio of allowances to emissions.
  - Controlled CT defined as meeting one or more of the following requirements:
    1. Emission rate is at, or below its state NOx RACT emission limit;
    2. Operating hours are limited under its state NOx RACT program;
    3. Combustion controls such as water injection utilized;
    4. Post-combustion controls utilized.
- Uncontrolled CTs surrender at a 2:1 ratio.
- Require that current ozone season NOx allowances are used.
- Objectives: 1) re-order CT dispatch stack so that controlled CTs run first by increasing variable cost of uncontrolled units (increased costs scale to emissions and emission rates); 2) encourage higher capacity factor CTs to install controls; 3) reduce potential system reliability risk of across the board mandates.
- Issues: 1) Need analysis of how dispatch stack re-ordered (nodal modeling?); 2) agreement on: definition of controlled CT, references to state NOx RACT programs, geography, inclusion of non-CAIR industrial units, etcetera.

Non-CAIR Affected EGU CTs <25 MW in full OTR.

(preferably all 25 CAIR states regulated for ozone season NOx)

- "Actual" to "allowable" test utilizing emission limits in existing, or to be developed, state regulations that address units < 25MW.
- Controlled CTs surrender allowances equal to amount actual over allowable. Uncontrolled CTs surrender allowances equal to two times the amount that actual emissions are over allowable emissions.
- Require that current ozone season NOx allowances are used.
- Exemption for low capacity factor CTs.



Reliant Energy Allowance Surrender Proposal

- All CAIR affected EGUs
- All non-CAIR affected EGUs **and** other electric generation units
- Surrender CAIR ozone season NOx allowances
- Only current vintage ozone season NOx allowances allowed

Allowance Surrender Ratio

- "Inner Zone" units
  - Controlled units surrender at a 1:1 ratio
  - Uncontrolled units surrender at a 2:1 ratio
- "Outer Zone" units
  - All units surrender at a 1:1 ratio

Peak Day Cap and Trade Program

- Require all EGUs throughout the OTR to meet an output based NOx rate cap of 1.0 lbs/MWh on Peak Demand Days
- Peak demand days would be any day when:
  - Air quality is forecasted to be unhealthy and
  - High electric demand is anticipated due to high temperatures and humidity.
- All EGUs required to reduce their NOx rate to 1.0 lbs/MWh or obtain equivalent allowances generated on the same peak demand day.

Peak Day Cap and Trade Program cont.

- Reduces emissions on days with peak electric demand and poor air quality
- Would not significantly reduce capacity or reliability
- Implementation could happen within 1-2 years upon passing new regulations

Performance Stds

New Jersey DEP

Performance Standards for Addressing NO_x Emissions from High Electrical Demand Day Units

- **Traditional control methods (reduce emission concentrations)**
- **Standard:**
  - Mid-term (0 - 5 years) 2 lb NO_x per MWh
  - Long term (> 5 years) 1 lb NO_x per MWh
  - Averaged over 24 hour period, if CEM, or 3 test runs, if stack test, or verified manufacturers data, for units =< 450 kW
- **Capital cost per electric output capacity ($ per kW) best accounts for fact that these units are disproportionately used on high ozone days**

Control Technology Options

Unit Type	Control Technology	Potential Reductions[1]	Capital Cost	Time Horizon[2]
Boiler	SCR	70-90%+	$150/kW	3 years
	SNCR	30-50%	$15/kW	1 year
	Low NO_x Burners	30-50%	$17/kW	2 years
	Switching Fuel- #6 to #2 oil #6 to gas #2 to gas		$0-230/kW[3]	Immediate to 5 years[3]
	Boiler Replacement with FGR	NG: 55-65% Oil: 15-30%	Nominal on new boiler	3 years
Turbines	Water Injection	~50%	$40/kW	1 year
	SCR	70-98%		3 years
	Switching Fuel- #2 oil to gas		$0-?[3]	Immediate to 5 years[3]
	Turbine Replacement with Dry-Lo NO_x	90%	$500-800/kW	3 years
Diesel Engines	SCR	90%+	$75/kW	1 year
	Emulsified Diesel Fuel	5-30%		Immediate
	Engine Replacement with engine equipped with NO_x Adsorber (on horizon)	90% from federal Tier III engines	$130/kW	4-5 years[4]

[1] From uncontrolled

[2] Average

[3] Higher cost and longer time horizon if insufficient or no gas pipeline available

[4] EPA highlights engines with NO_x adsorbers as meeting 2011 stationary IC engine standards

High Electric Demand Day Targeted Command and Control Option

- This option is a variant of the performance standard option.
- The concept is to target emission controls at those HEDD units identified as significantly contributing to ozone levels in nonattainment areas and to exempt those units that are identified as being critical to maintaining reliability of the electric system and/or cannot physically be retrofitted with controls

High Electric Demand Day Targeted Command and Control Option

- Air quality modeling must be performed to identify HEDD units contributing significantly to ozone levels in nonattainment areas
- ISOs can identify units critical to maintaining local reliability (e.g., serving load pockets, providing voltage support, etc)
- Owners of HEDD units can determine technical feasibility of installing NOx control technology (e.g., water injection) on units.

Replacement/Repowering of Load Following and Peaking Generation Under Long-Term Contracts

Presentation Before the Ozone Transport Commission
September 18, 2006

Option Overview

- **Option** – Replace or Repower existing Load Following and/or Peaking Units with new Fast Start Units.
  - NESCAUM report from June 2006 shows New England NOx emissions from LFUs increase as ambient temperature increases.
  - New Units to be covered by a long-term, project financeable, Purchase Power Agreement (PPA) with state agency or LSE or ISO sponsored auction.
  - New Units will decrease dependence on existing units.
  - Make way for existing unit retirements upon coordination with regional ISO and commissions.

Option - Benefits

- Benefits of the Option are four-fold
  - **Environmental** – New Units have a lower NOx rate than existing LFU and will emit fewer tons on High Electric Demand Days. New Units will have SCR (~3 ppm NOx) and shorter start-up and minimum run times.
  - **Reliability** – New Units have greater operational flexibility and ability to respond to system contingencies.
  - **Fuel Diversity** – Opportunity to introduce alternate fuel on existing sites providing fuel diversity for the region.
  - **Cost** – New Units would be more fuel efficient and more appropriate for peaking service reducing total generation costs.

Air Reg Incentive

High Demand Incent