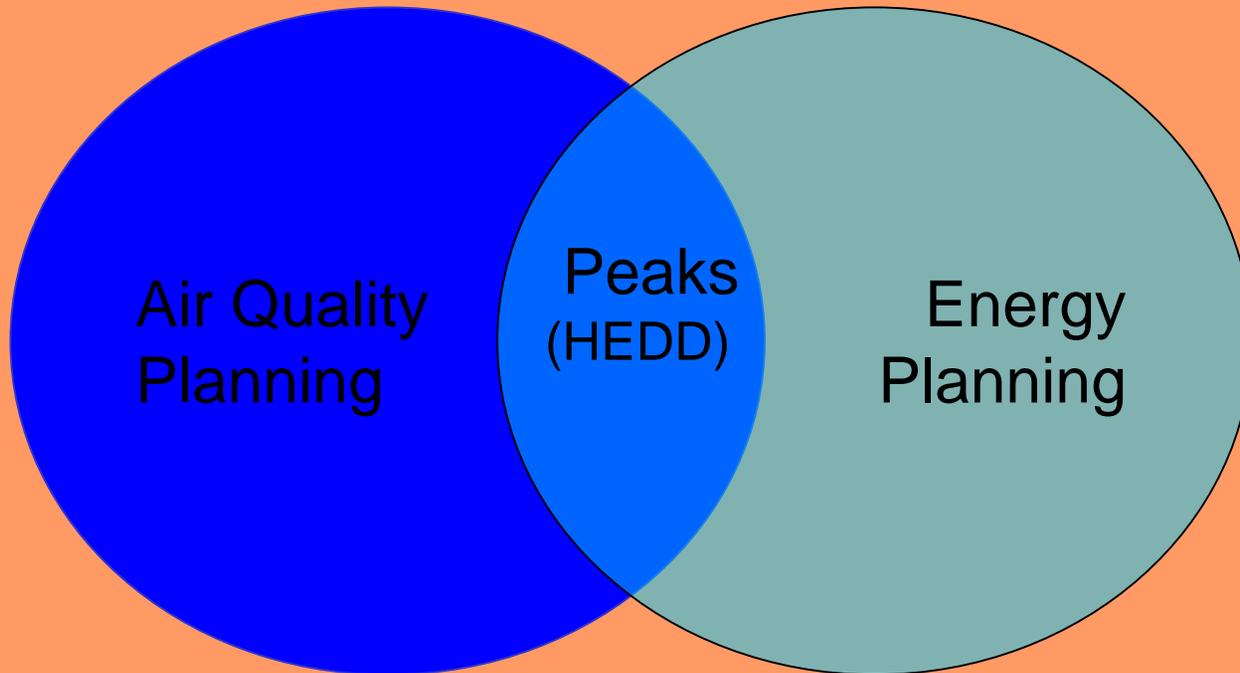


**Air Quality On  
High Electric  
Demand Days  
&  
What We Are Doing To  
Improve It**

Rick Rodrigue, CT-DEP  
February 8<sup>th</sup>, 2007

# HIGH ELECTRIC DEMAND DAYS



OTC  
2007

# CHALLENGES & OPPORTUNITIES

## Goal:

Keep the lights **ON**...



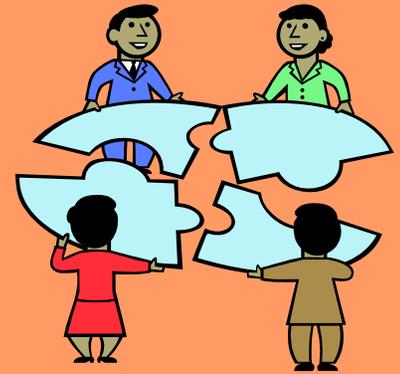
Keep the costs **DOWN**...



Achieve healthy  
**AIR QUALITY**...



# MUTUAL ISSUES



- Highest electric demand, worst air quality tend to coincide
- Meeting the peaks results in using dirtiest and most expensive sources
- Industry, generators and markets need certainty from energy and environmental regulators for planning purposes

# KEY AIR QUALITY CONSIDERATIONS



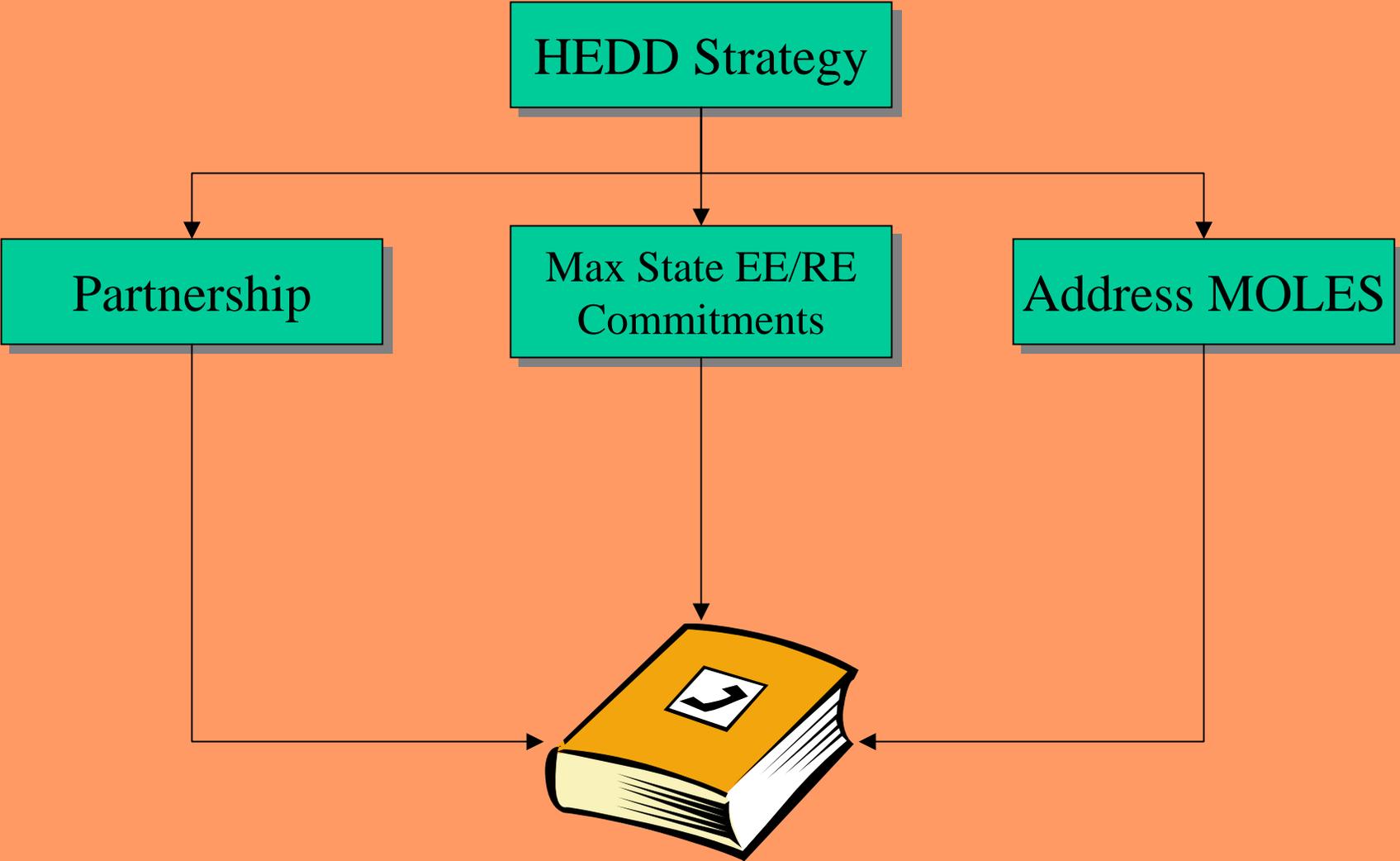
- Highest ozone levels occur on 90° days; emissions from EGUs are higher on these days
- Existing models/inventory designed for average summer day
- Regulatory standards designed for larger EGUs
- Regulatory programs designed for ozone season (CAIR, emission credit trading, allowances) designed for ozone season--- they bring down the curve, but don't adequately address the “peak”

# **Can't Attain w/o Effectively Addressing Peak Days**

- **Demand for electricity is increasing and the increase in the peak is growing faster than the base:**
  - PJM Interconnection: consumer peak demand for electricity will **rise ~ 1.6% annually** over the **next decade**.
  - NE ISO: peak demand will **rise ~2.4% annually**.
  - NYISO: relies heavily on many, many peakers to maintain NYC grid.
- **Meeting hot day peak electrical demand requires bringing on more units, which aren't necessarily clean. These same units appear insignificant in inventory.**
- **Attainment plans must address high demand day units.**

# Things We Know

- **Emissions from Electric Generating Units (EGUs) increase on high electric demand days**
- **Preliminary modeling has shown significant AQ benefit potential with NOx reductions on HEDDs**
- **Development of a Flexible and innovative HEDD NOx reduction program can help address this issue**



HEDD Bundled SIP

# Partnership

- **Objectives of HEDD Partnership Initiative**
- **HEDD Unit Definition**
- **Define the Emission Reduction Goal**
  - **Short Term**
- **Assigning Responsibility for the Goal**
- **Meeting the Goal**
- **The HEDD Partnership Program**

# Objectives of HEDD Initiative

- To establish a short term emission reduction goal (Ozone Season 2009), to help the OTC states attain the 8-hour ozone health standard.
- To establish a long term goal to clean up units by 2015
  - Note: State Implementation Plan Revisions are due in June 2007 for attainment by 2010 (Summer of 2009)
  - OTC to finalize HEDD actions on March 2, 2007

# **HEDD Unit Definition**

- **Analyzed All Units in Clean Air Markets Database (CAMD)**
  - **In Connecticut are 15 MW and larger**
- **Data from 2004, 2005, and 2006**
- **Using a 3 year average of operating time**
  - **Start with units which operate  $\leq 50\%$  of the total time in the ozone season**
  - **States revise their units list as necessary, to make sure combustion turbines and load following boilers have been captured**

# HEDD Units in Connecticut

Combustion Turbines		
Branford	540	10
Bridgeport Harbor Station	568	BHB4
Cos Cob	542	10
Cos Cob	542	11
Cos Cob	542	12
Devon	544	11
Devon	544	12
Devon	544	13
Devon	544	14
Middletown	562	10
Norwalk Harbor Station	548	10
Norwich	880022	TRBINE
South Meadow Station	563	11A
South Meadow Station	563	11B
South Meadow Station	563	12A
South Meadow Station	563	12B
South Meadow Station	563	13A
South Meadow Station	563	13B
South Meadow Station	563	14A
South Meadow Station	563	14B
Torrington Terminal	565	10
Tunnel	557	10

Load Following Boilers		
Bridgeport Harbor Station	568	BHB2
Middletown	562	2
Middletown	562	3
Middletown	562	4
Montville	546	5
Montville	546	6
New Haven Harbor	6156	NHB1
Norwalk Harbor Station	548	1
Norwalk Harbor Station	548	2

# **Defining NO<sub>x</sub> Increases on HEDD**

- **Compared an average demand summer day to a peak demand day**
  - **Non-Ozone Exceedance Summer Day (6/4/05)**
  - **Ozone Exceeding High Electric Demand Day (7/26/05)**

# HEDD NO<sub>x</sub> Differential

	Total NO <sub>x</sub>	Total NO <sub>x</sub>	Increased	Percent
STATE	6/4/2005	7/26/2005	Tons of NO <sub>x</sub>	Change
MD	84	218	134	160
NY	110	377	267	243
PA	233	404	171	73
CT	10	54	44	440
MA	47	74	27	57
DE	14	58	44	314
NJ	52	163	111	213
TOTAL	550	1348	798	145

# Breakout of the NO<sub>x</sub> Differential

Unit Sector	$\Delta$ Tons
Combustion Turbines	179
Load Following Boilers	252
Baseload	367
	<b>798</b>

# **Method to Define the Short Term Emission Reduction Goal**

- **Applied an emission reduction level to all uncontrolled HEDD units**
  - **Combustion Turbines – 40% Reduction (~ Water Injection)**
  - **Boilers – 30% Reduction (~ SNCR)**

# Assigning State Reduction Responsibility

State	NO <sub>x</sub> (Tons per Day)	% Reduction From HEDD Units
CT	11.7	-25%
DE	6.3	-30%
MA	6.1	-26%
MD	23.9	-32%
NJ	19.8	-28%
NY	46.1	-26%
PA	22.2	-32%
	<b>136.1</b>	<b>-28%</b>

# Connecticut's Responsibility Broken Down

Tons	State	Company
4.3	CT	Montville Power, LLC (Owner) NRG Montville Operations, Inc. (Operator)
3.0	CT	Middletown Power, LLC (Owner) NRG Middletown Operations, Inc. (Operator)
2.2	CT	Connecticut Jet Power, LLC (Owner) NRG Middletown Operations, Inc. (Operator)
2.0	CT	PSEG Power Connecticut, LLC (Owner/Operator)
<u>0.2</u>	CT	Norwalk Harbor Power Operations (Operator) Norwalk Harbor Power, LLC (Owner)
<b>11.7</b>		

# Behind the Meter Generation or “MOLES”



- Moles are dirty diesel generators that run at two distinct times
  - Demand response units running at ISO’s request during extreme electrical demand conditions (OP-4 Step 12)
  - Price response units running during high electric demand day hours. These units report their electrical output and hours of operation to the ISO and receive capacity payment as well as energy payments at the LMP.

# Connecticut Fossil Fuel Fired Electric Generating Units Peak Day Analysis



# Assessing the Impacts of Moles



- Recent studies of these sources of air pollution have varying conclusions
- States working with ISOs to overcome the challenges in obtaining the necessary data due to confidentiality agreements and lack of emissions data
- Determining if/what regulatory revisions are necessary to address these sources

# Meeting the Goal

## **The HEDD Partnership Program**

meeting the responsibilities

# The HEDD Partnership Program

## - States -

- Start or increase their EE/RE programs
  - Target these programs at the load pockets served by the HEDD units
- Resolve/address “mole” issue
- Work with PUCs to have aggregators register
- Work with ISOs to align emergency generator definition and usage in Forward Capacity Markets
- Long Term
  - Establish performance standards
  - Pursue Environmental Portfolio Standard (EPS)

# The HEDD Partnership Program

## - Generators -

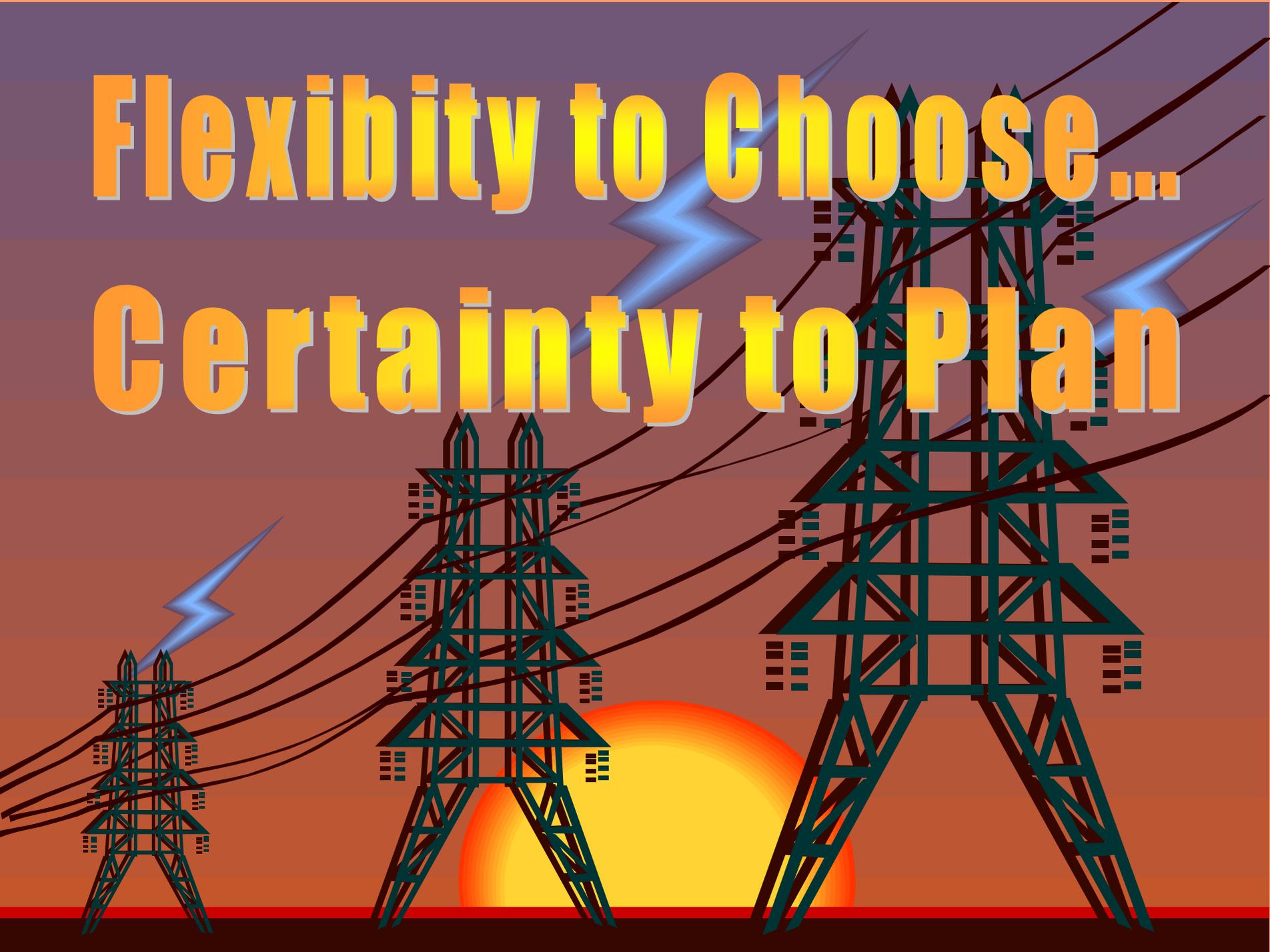
- Design program to meet responsibility
  - Retrofit existing units with NOx controls
  - Implement EE & Demand Response\* (DR) programs
  - Target load pockets served by the peaking units
  - Work with ISOs on targeting their commercial DR\* programs
  - Work with ISOs on structure of capacity market for incentives to install clean generation

\* DR programs to be load reduction programs or clean load shift programs; cannot shift to use of 'dirty' Diesel Generators

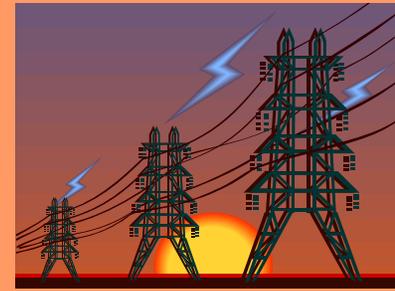
# **The HEDD Partnership Program Issues**

- **NO<sub>x</sub> reduction measures must have enforceable agreements containing:**
  - **Definition of measure**
  - **Method to quantify emissions**
  - **Reductions are in excess of all other requirements  
(No double counting)**
  - **Reductions can be verified on HEDD**
  - **Method of reporting NO<sub>x</sub> reductions**

**Flexibility to Choose...**  
**Certainty to Plan**



# Flexibility & Certainty



- **Flexibility**

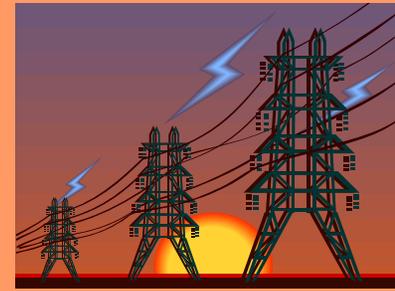
- HEDD unit owners choose the most cost effective path
- Can avoid “Command & Control” approach
- Can use conservation to minimize peaks & minimize the commitment impact
- If not double-counted, HEDD unit owners responsibility can span state borders if directionally correct
- Allows time to comply and continue to plan

# Flexibility & Certainty



- **Certainty**

- State and the source enter into a mutually agreed upon plan using a formal agreement as the “contract” which gets submitted in the SIP
- Lays out what is expected of both parties
- Provides the certainty required to plan future actions



**What's in it for...**

**The State:  Attainment**

**HEDD Unit Owners:  Flexibility  
& Certainty**

# **HEDD Long Term Goal:**

- **Replace Combustion Turbines with “Clean” Units**
- **Install SCR type controls on Load-Following Boilers**
- **Timing for long term goal is 2015**

# QUESTIONS ???

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All HEDD presentations are available  
at: [www.otc.org](http://www.otc.org)