OTC Annual Meeting

June 13, 2013

The Study at Yale

New Haven, Connecticut

Ali Mirzakhalili, P.E.
Stationary and Area Source Committee Update





OZONE TRANSPORT COMMISSION

Outline

- Update on Committee efforts
- Update on completing 2012 Fall Meeting Charge
- Moving Forward- Next steps for the SAS Committee

OZONE TRANSPORT COMMISSION

Charge to the Committee

- Largest contributor Analysis
  - Using most recent data available, identify the largest individuals and groupings of emitters of NOx and VOC within the OTR and outside the OTR that contribute at least 1% of the 2008 ozone NAAQS of 75 ppb.
  - Using above mentioned data and other data, identify emission sources with the highest short-term emissions of NOx and VOC.
  - Review available data to evaluate real world achievable NOx emission rates across load ranges to adjust long and short term expectations for emission reductions. Develop individual state EGU NOx emission rates achievable, considering reasonable available controls.

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Charge to the Committee… continued

- Distributed and Emergency Generator Inventory
  - Obtain information from system operators (PJM, ISO-NE, NYISO) concerning the location, operation and emissions of all units that participate or plan to participate with the system operator.
  - Analyze the collected data to understand the air quality impact of the operation of the distributed and emergency generators and make recommendations for potential control strategies to the Commission.

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Committee Focus

Responding to the Charge:

- **Research and data collection – Develop workplans**
- **Organize new workgroups - partnerships**
- **Economic analysis**

Stakeholder outreach

Revisiting and updating adopted measures

Analyzing EPA proposals

Discussing adoption and implementation issues

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Largest Contributor Analysis

EGU Workgroup has determined the Top 25 Ozone season NOx emitters for 2011 and 2012 in the OTC Modeling Domain.

- 2012 shows more units with SCR in the Top 25 emitters list than in 2011.

Analysis of daily EGU NOx emissions during the 2011 Ozone Season including emissions, fuel type, and temperature charts.

Analysis of 2011 and 2012 state level ozone season EGU NOx emissions and ozone season state average EGU NOx emission rate data.

Peak emissions on HEDD days vary greatly both in terms of level of emissions, EGU type & fuel mix.

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Top 25 NOx Emitters 2011 OS

State	Facility Name	Facility ID	Unit ID	SO2 (tons)	Avg. NOx Rate	NOx (tons)
IN	Rockport	6166	MB2	15215.217	0.2431	5,339
PA	Keystone	3136	2	12003.958	0.363	5,044
PA	Keystone	3136	1	11465.644	0.3717	4,855
PA	Hatfield's Ferry Power Station	3179	1	240.25	0.4923	4,288
PA	Conemaugh	3118	2	1741.005	0.317	4,086
PA	Hatfield's Ferry Power Station	3179	2	211.755	0.4746	3,984
AR	White Bluff	6009	1	8193.767	0.2755	3,956
PA	Conemaugh	3118	1	1581.72	0.3411	3,890
PA	Brunner Island	3140	3	3941.335	0.376	3,834
AR	White Bluff	6009	2	7577.479	0.2798	3,794
IN	Rockport	6166	MB1	10408.895	0.2372	3,616
OH	W H Zimmer Generating Station	6019	1	7574.883	0.2189	3,559
AR	Independence	6641	1	6946.97	0.2591	3,302
PA	Montour	3149	1	4217.97	0.3323	3,298
PA	Montour	3149	2	4088.761	0.3159	3,132
PA	Hatfield's Ferry Power Station	3179	3	272.927	0.432	2,848
MI	Monroe	1733	2	10698.832	0.2851	2,811
GA	Harllee Branch	709	4	13145.319	0.4076	2,806
WV	Fort Martin Power Station	3943	1	1001.621	0.3514	2,660
NY	Lafarge Building Materials, Inc.	880044	41000			2,647
AR	Independence	6641	2	5911.525	0.227	2,463
KY	Paradise	1378	3	1413.673	0.387	2,431
NY	Somerset Operating Company (Kintigh)	6082	1	4574.54	0.297	2,347
OH	Avon Lake Power Plant	2836	12	15158.146	0.400	2,328
OH	Eastlake	2837	5	14532.978	0.262	2,323

OTC Modeling Domain -2 Data by Tom McNevin, Ph.D. NJDEP (4/12/13)

OZONE TRANSPORT COMMISSION

Pink Highlight Indicates Unit with SCR Controls

TOP 25 NOx Emitters 2012 OS

State	Facility Name	Facility ID	Unit ID	SO2 (tons)	Avg. NOx Rate	NOx (tons)
MO	New Madrid Power Plant	2167	1	3783.145	0.627	5,786
IN	Rockport	6166	MB1	13080.843	0.221	5,001
PA	Keystone	3136	1	8325.276	0.365	4,661
IN	Rockport	6166	MB2	10779.121	0.224	4,215
MO	New Madrid Power Plant	2167	2	2741.181	0.505	4,134
PA	Conemaugh	3118	1	1476.726	0.320	3,909
PA	Montour	3149	2	3832.866	0.414	3,794
PA	Conemaugh	3118	2	1542.654	0.300	3,789
PA	Keystone	3136	2	5821.209	0.343	3,774
PA	Hatfield's Ferry Power Station	3179	3	646.229	0.509	3,677
PA	Hatfield's Ferry Power Station	3179	1	511.008	0.486	3,601
PA	Hatfield's Ferry Power Station	3179	2	537.327	0.520	3,589
PA	Montour	3149	1	3524.199	0.402	3,543
AR	White Bluff	6009	1	7759.429	0.278	3,504
AR	White Bluff	6009	2	8209.766	0.246	3,383
MO	Thomas Hill Energy Center	2168	MB2	1842.916	0.684	3,236
AR	Independence	6641	2	8125.013	0.205	2,816
WV	Fort Martin Power Station	3943	1	961.538	0.319	2,730
AL	E C Gaston	26	5	4615.664	0.203	2,656
WV	Harrison Power Station	3944	3	2624.735	0.308	2,628
PA	Brunner Island	3140	3	2868.012	0.346	2,601
WV	Harrison Power Station	3944	1	2174.755	0.313	2,569
MI	Monroe	1733	2	11776.072	0.259	2,536
MI	Monroe	1733	1	12493.547	0.247	2,517
OH	Killen Station	6031	2	1654.736	0.351	2,426

OTC Modeling Domain -2 Data by Tom McNevin, Ph.D. NJDEP (4/12/13)

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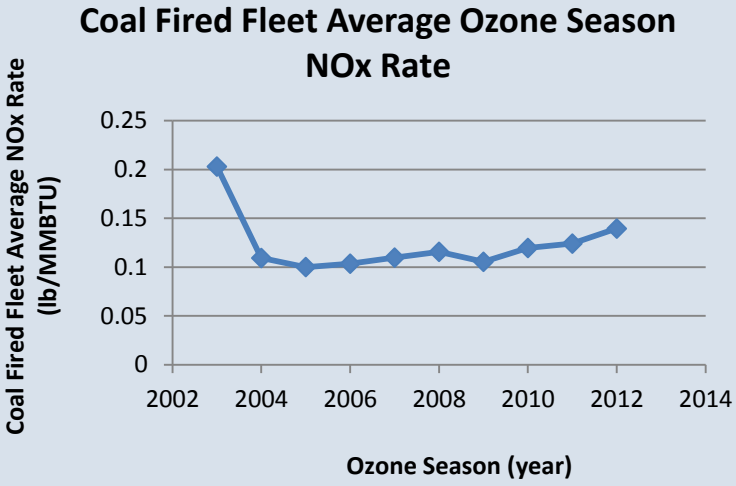
Pink Highlight Indicates Unit with SCR Controls

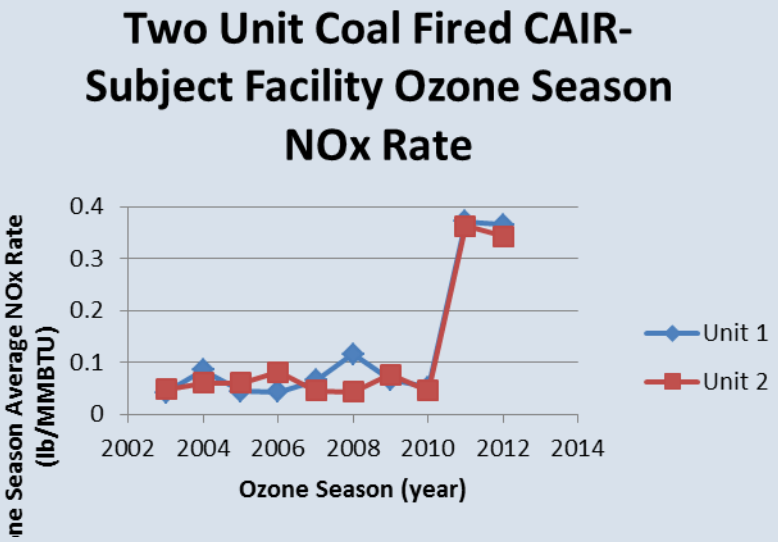
Largest Contributor Analysis

The top graph indicates some EGUs are getting dirtier, not cleaner.

The bottom graph highlights two units that are not running their installed SCR. Sources like this have been identified in AL, FL, GA, IL, IN, KY, MD, MI, NC, OH, PA, SC, TN, TX, VA, and WV.

In 2012, approximately 35% of the coal-fired units with post-combustion NOx controls had average ozone season NOx emission rates at least 50% higher than the year when that unit had its lowest ozone season NOx emissions rate in the period 2003 through 2012.





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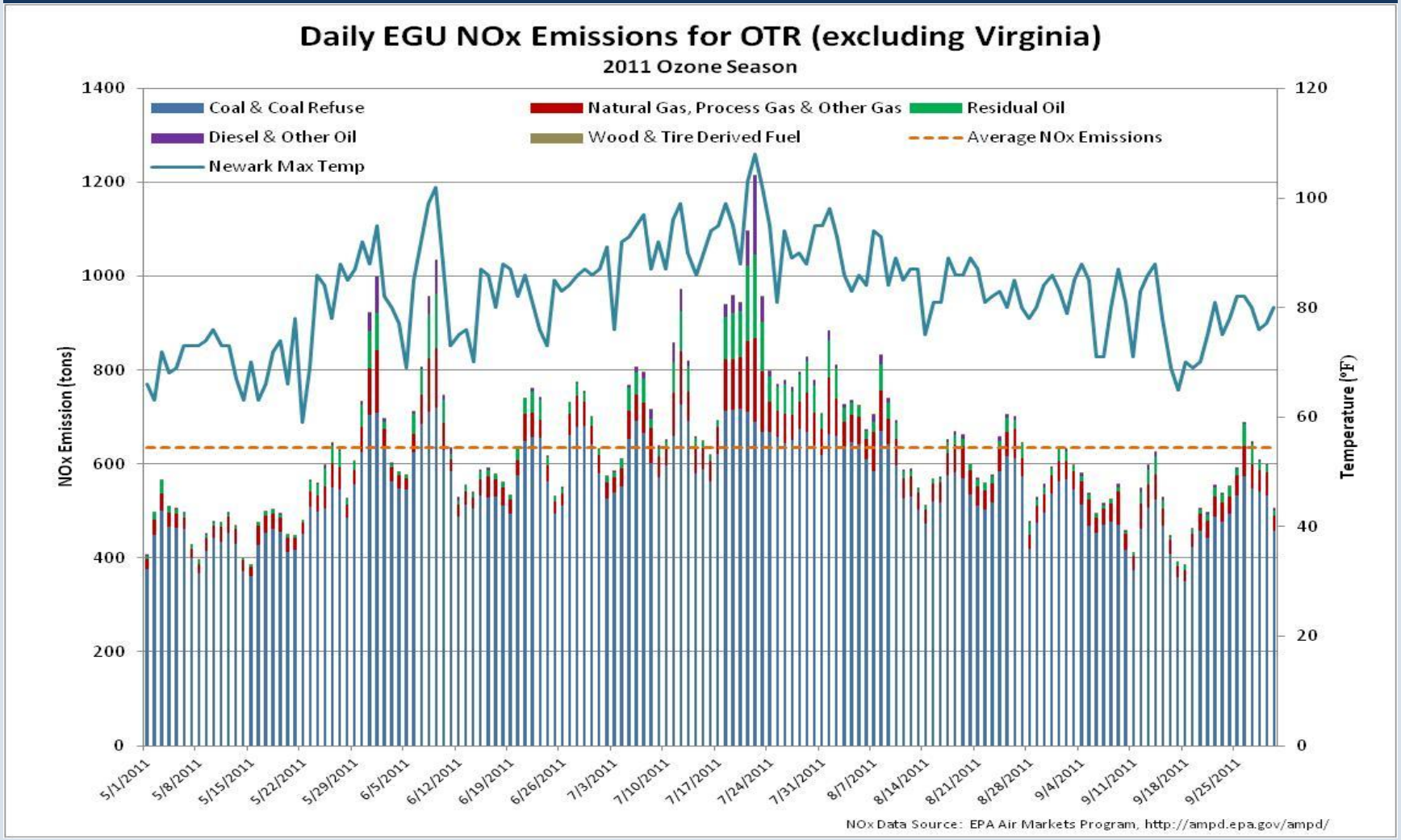
2011 OTC (Robin Baena CTDEEP)



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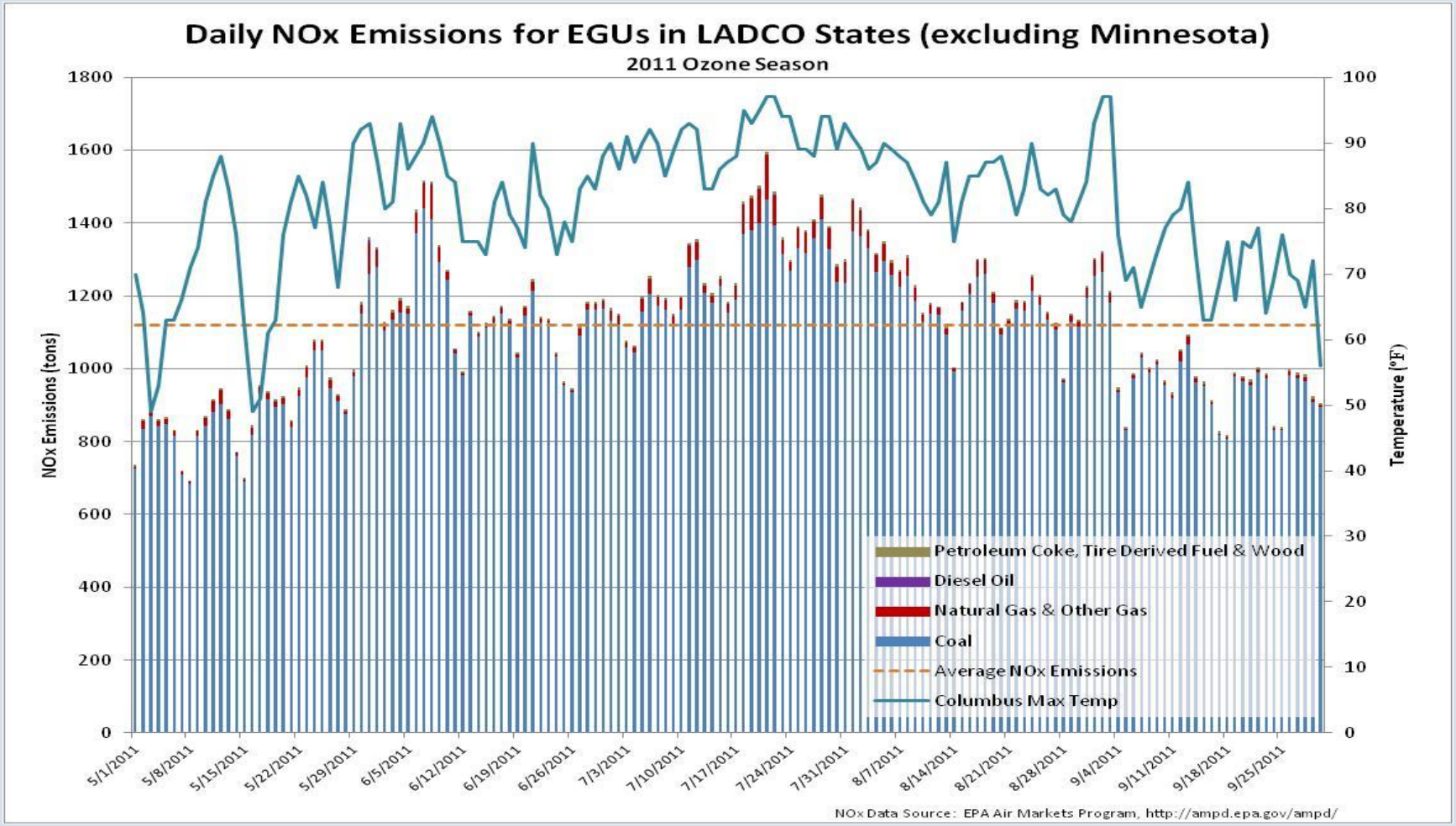
LADCO 2011 (Robin Baena CTDEEP)



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Startup and Shutdown Events May Be Significant

	06/20/12 hr 16	06/21/12 hr 3	06/21/12 hr 15
	(Peak NOx Hour)	(Low-NOx Hour)	(High 6/21 NOx Hour)
Unit Type	**(Units Operating/Units Off)**	**(Units Operating/Units Off)**	**(Units Operating/Units Off)**
Steam	533/160	499/194	529/164
Combined Cycle	228/18	197/49	226/20
Combustion Turbine	405/481	26/860	400/486

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Largest Contributor

Conclusions

- Short Term emissions are very significant
- Emission Control Technology is not being run during high demand hours
- More Units with SCR controls appear in the Top 25 NOx emitters list in 2012 than in 2011

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Next Steps

•Data from the EPA's Clean Air Markets Division (CAMD), Air Markets Program Data (AMPD) database (i.e., Acid Rain program (ARP) , Clean Air Interstate Rule (CAIR) program data and Cross-State Air Pollution Rule (CSAPR) program data) and information from the Department of Energy's Energy Information Agency (EIA) will be used to examine reasonably cost-effective post combustion EGU control technologies and to determine fleet-wide average NOx emission rates for the fossil fuel-fired electric generating units.

•Since the above estimates are made on a unit-specific basis, NOx mass caps could then be easily calculated in any type of regional basis (state specific, CAIR region, etc). The process described above would allow for a NOx mass cap calculation representative of the existing EGU fleet and its ability to achieve NOx emissions reductions.

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Largest Contributor Analysis

- OTC SAS Committee is working with MARAMA to get the Emissions Modeling Framework (EMF) and the Control Strategy Tool (CoST) housed and set up for inventory analyses
  - EMF is a tool to manage emission inventories.
  - EMF supports the management and quality assurances of emission inventories and emission related data.
  - CoST models emission reductions and engineering costs for control strategies applied to point, area, and mobile sources.
- EMF will be modified to perform tasks useful to regional planning and state inventory staff – including growing inventories and estimating emissions for short timeframes (seasonal, daily or hourly)
- State staff will be trained to use both EMF and CoST
- OTC and MARAMA are preparing a work plan and timeline for the completion of this analysis

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EMF Project

- MARAMA to develop a regional emissions inventory analysis team and platform
- Using USEPA developed software:
  - Emission Modeling Framework (EMF)
  - With COST tools
- State team use tools to project annual inventory and evaluate strategies.
- To get there: Software adapted, staff trained, platform set up, growth files developed.

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Benefits of EMF

- Annual inventory projection capability
- Develop in-house capability to prepare SMOKE-ready input files for multiple years
- Analyze effectiveness and cost of strategies

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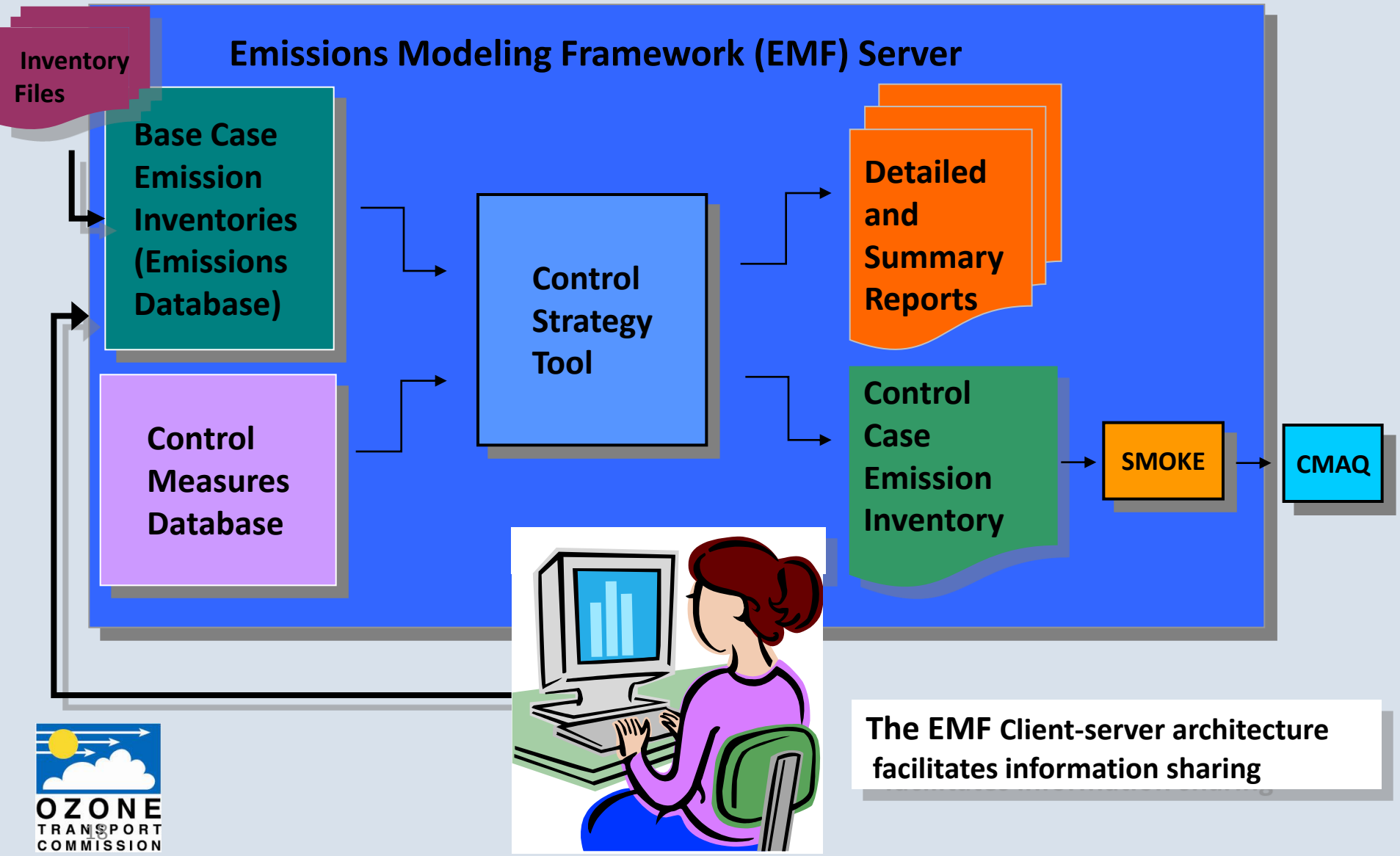
EMF is a Client - Server System



The EMF Client-server architecture facilitates information sharing

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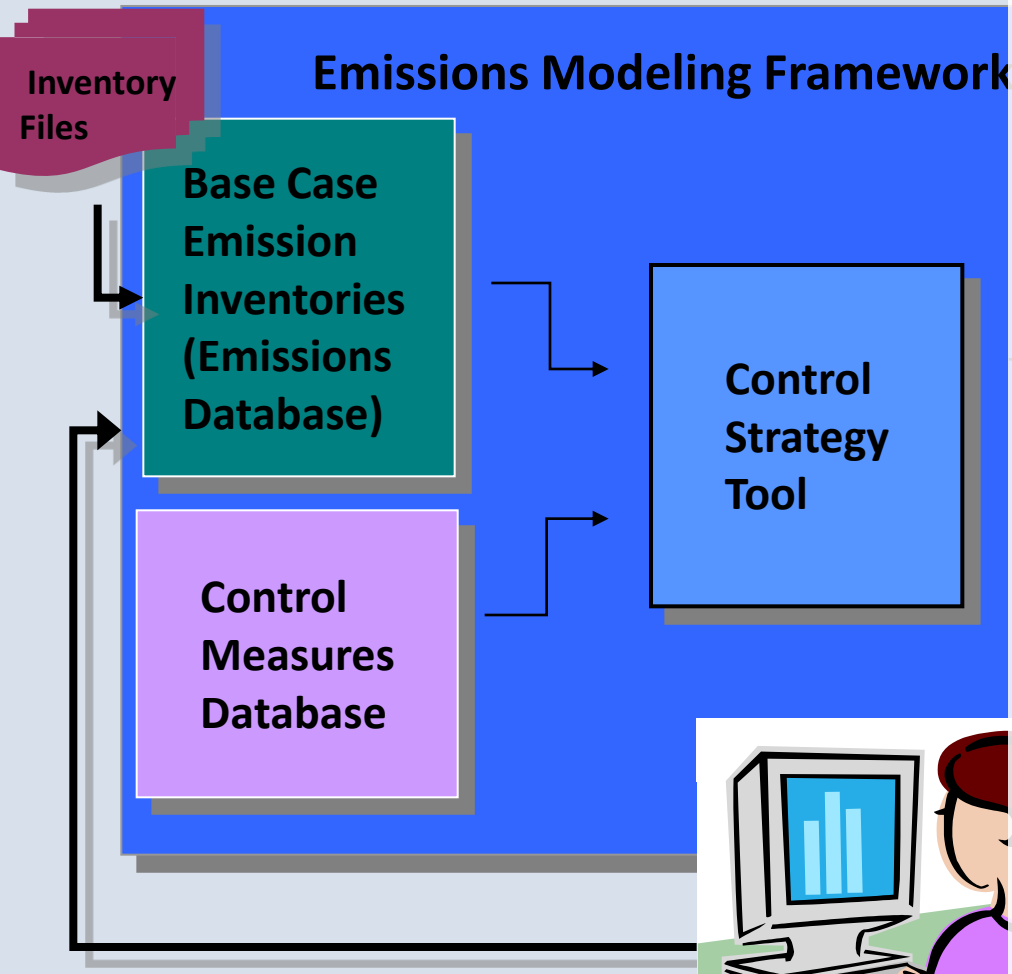
EMF Control Strategy Tool (CoST)



- **Built into the EMF**
- **CoST replaces AirControlNET**
- **Project inventory**
- **Analysis of emission control strategies - Point and nonpoint**
- **Emissions reductions and costs associated with:**
  - **Target pollutants (e.g., PM2.5, NOx, or SO2 for PM2.5 NAAQS Analyses)**
  - **Co-impacts of the selected measures on other pollutants**

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Use a team approach to build capacity

- Form a regional emissions inventory analysis team
- Contractor support to adapt EPA software
- Train team members to use software
- Set up platform on Cloud or dedicated server at MARAMA
- Contractor support to develop growth factors

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Preliminary timeline

Mar-Aug 2013

- MARAMA downloads and works with the software

July 2013

- Contract with UNC

May - Jul 2013

- RFP & contract for growth and control factors

Aug 2013 – Mar 2014

- UNC contract implemented
- Users Manual
- Team Training
- Modify EMF

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Distributed and Emergency Generator Inventory

• Workgroup has requested information (location, operations, emissions of Demand Response units) from the system operators, however, this information is not provided due to confidentiality agreements or not collected by the ISOs.

• Workgroup plans to request the similar information from the curtailment providers associated with the system operators, and work with EPA to determine how EPA plans to collect data under the new RICE NESHAP

•The Workgroup is evaluating other methods of obtaining the requested information on Demand Response Engines

• Reviewing the RICE NESHAP and its effects of DR units

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PJM Response

Addressing the specific information that you requested, it is either information that we do not collect or information that we do collect but cannot provide because it is confidential information of one or more PJM Members which PJM is required to maintain as confidential per section 18.17 of PJM's Operating Agreement.

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NYISO Response

At this time the NYISO does not require its market participants to provide the specific information you have requested in order for resources to participate in the NYISO's demand response programs. The NYISO does not require that distributed generation be explicitly enrolled as such in order to participate, nor does the NYISO require specific generator unit output data be provided to demonstrate performance in the NYISO's demand response programs. As a result, the NYISO does not have a comprehensive set of information that it can provide to you at this time.

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ISO-NE Response

ISO-NE cannot provide resource-specific data in response to the OTC's request. In some instances, the ISO may have information that is available to us as a system operator, but that information is the property of the asset owners and we are restricted in our ability to share it. In other instances the requested information is not collected by the ISO as part of its normal procedures.

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Curtailment Provider Information

- OTC sent similar request letters to 74 Curtailment providers listed on the NY-ISO, ISO-NE, and PJM website
  - 8 replied that they are only participate in load reduction, not generation
  - 7 replied they no longer participate in demand response for these ISO's
  - 59 have not replied to our request

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ISO – NE Response

Registration Data* - RTEG Fuel Mix

Dispatch Zone/Fuel Type	# of Generators	MW By Fuel Type	Percentage by Fuel Type
Distillate Fuel Oil. Including Diesel, No. 1	558	39.6	35.40%
Distillate Fuel Oil. Including Diesel, No. 2	693	681.0	60.48%
Distillate Fuel Oil. Including Diesel, No. 3	3	2.9	0.26%
Distillate Fuel Oil. Including Diesel, No. 4	2	0.7	0.06%
Gaseous Propane	2	0.1	0.01%
Gasoline	16	0.9	0.08%
Jet Fuel	3	6.3	0.56%
Liquefied Propane, No. 3	2	0.6	0.05%
Natural Gas	157	34.5	3.07%
Other	1	0.03	0.00%
Other Biomass Gas. Includes digester gas, methane, and other biomass gasses.	7	0.37	0.03%
Grand Total	**1444**	**1125.909**	100.00%

*These data are self reported by participants and not verified by ISO-NE

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Why are Engine Emissions a Concern?

- Pollutants emitted from stationary engines are known or suspected of causing cancer and other serious health effects:
  - Aggravation of respiratory and cardiovascular disease
  - Changes in lung function and increased respiratory symptoms
  - Premature deaths in people with heart or lung disease
  - Benzene and 1,3-butadiene are known human carcinogens
  - Noncancer health effects from air toxics may include neurological, cardiovascular, liver, kidney effects, also effects on immune and reproductive systems
- NOx and VOC can react in the presence of sunlight to form ozone

March 6, 2013 US EPA Webinar Presentation

6

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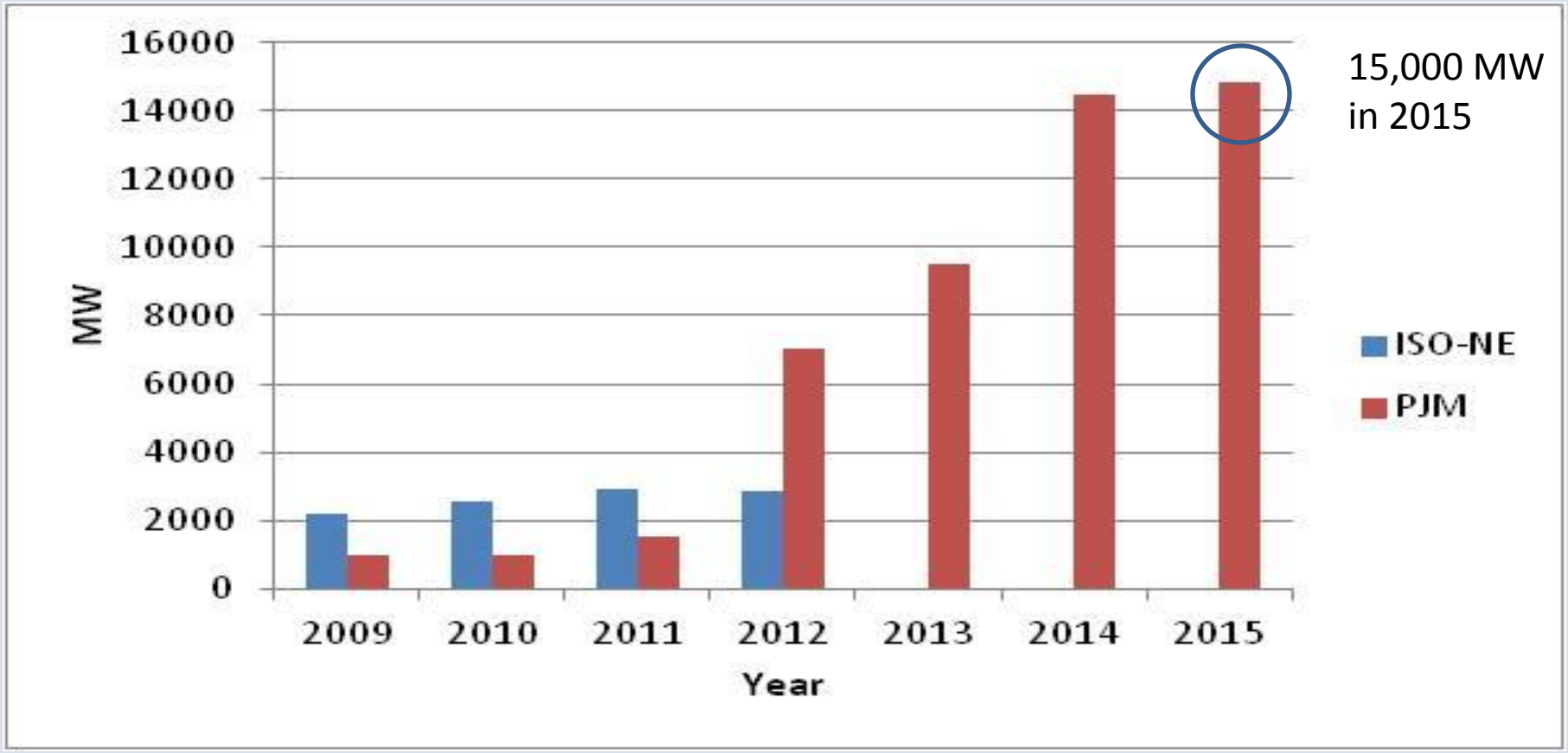
Demand resources growing in New England and PJM



Data from ISO New England and PJM website

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Estimating the resulting emissions using the PJM Auction

- Assume 50% of 15,000 MW bid into PJM DG market will be provided by emergency generators = 7,500 MW
- Allocate the generation to PJM states based on state electrical generation
- Use Bluestein Emission Factors to calculate state emissions
- Zero out emission in states that forbid the use of emergency generators to provide DG

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Julie McDill, MARAMA – August 2012

2015 Emissions Diesel Generators provide 50% of Emergency DSM

	ELECTRIC GENERATION MW	PERCENT OF PJM TOTAL %	EMERGENCY DSM 2015 MW	Estimated Emissions							
				Without current restriction on use of Emergency Generators for emergency DSM		With current restriction on use of Emergency Generators for emergency DSM		Without current restriction on use of Emergency Generators for emergency DSM		With current restriction on use of Emergency Generators for emergency DSM	
				NOX Annual Tons/Yr	NOX Daily Tons/Day	NOX Annual Tons/Yr	NOX Daily Tons/Day	PM2.5 Annual Tons/Yr	PM2.5 Daily Tons/Day	PM2.5 Annual Tons/Yr	PM2.5 Daily Tons/Day
TOTAL PJM GENERATION	**185,600**	**100%**	**7,500**								
DELAWARE	3,626	2%	147	160	10	-	-	5.7	0.3	-	-
MARYLAND	13,488	7%	545	594	36	594	36	21.3	1.3	21.3	1.3
NEW JERSEY	20,808	11%	841	917	55	-	-	32.8	2.0	-	-
OHIO	35,404	19%	1,431	1,559	94	1,559	94	55.8	3.3	55.8	3.3
PENNSYLVANIA	34,619	19%	1,399	1,525	91	-	-	54.6	3.3	-	-
VIRGINIA	24,644	13%	996	1,085	65	1,085	65	38.8	2.3	38.8	2.3
WEST VIRGINIA	17,274	9%	698	761	46	761	46	27.2	1.6	27.2	1.6
TOTAL EMISSIONS				**8,175**	**490.5**	**3999.8**	**240.0**	**293**	**17.6**	**143.1**	**8.6**

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Julie McDill, MARAMA – August 2012

NOx emissions from Emergency Generators compared with Point Source Emission

			Point Sources	Emergency Engines	
All Counties	NOX	TPY	373,126	10,893	3%
	NOX	TPD	1,022	654	64%
	PM2.5	TPY	76,409	390	1%
	PM2.5	TPD	209	23	11%
Ozone 8Hr Nonattainment	NOX	TPY	172,262	7,392	4%
	NOX	TPD	472	444	94%
PM Daily Nonattainment	NOX	TPY	161,920	5,368	3%
	NOX	TPD	444	322	73%
	PM2.5	TPY	31,564	192	1%
	PM2.5	TPD	86	12	14%
PM Annual Nonattainment	NOX	TPY	166,970	6,030	4%
	NOX	TPD	457	362	79%
	PM2.5	TPY	32,072	216	1%
	PM2.5	TPD	88	13	15%

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Julie McDill, MARAMA – August 2012

Demand Response

Conclusion

- Demand Response engine use is on the rise, and the lack of information/data available to the states make it difficult to determine their impact on air quality

- OTC needs the requested information to develop accurate control Strategy recommendations

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Other SAS Committee Updates

Consumer Products Rule

- Technical Amendment to the 2012 OTC Model Rule Approved at April 23-24 AD's meeting, making model rule more consistent with CARB

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Other SAS Committee Updates

AIM Coating

- Compliance issues with abuse of exemptions in the rule.

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Next Steps for the Committee

- Continue to work with MARAMA to establish the EMF and CoST inventory tools, and move forward with training staff on the use of these tools

- Continue to evaluate EGU NOx real world emission data to create a state specific NOx budget

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Next Steps for the Committee

- Continue to collect data from demand response units, as well as move forward in evaluating the air quality impact of these units, and prepare control strategy recommendation for the Commission

- A programmatic review of the existing model rules for potential updates due to improved control technologies, better data/information resources, etc. Included in the review process should be an assessment of the potential to expand the applicability (such as for smaller size units) and an assessment of incremental cost effectiveness of potential further reductions. Update any support documentation.

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Ongoing Committee Work

- Coordinate with Modeling Committee by providing emissions input, and emission reduction estimates;
- Develop economic analysis tools;
- Continue to track rule adoption efforts and provide technical support and a forum for collaboration;
- Continue evaluation of and comments on EPA proposals;
- Prepare for OTC meetings.

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Questions?

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