

Comments on Delaware Multi-Pollutant Regulation Development

on behalf of the Center for Energy & Economic
Development

Tom Hewson
Energy Ventures Analysis Inc.

May 23, 2006



Who is CEED ?

What is their interest in this proceeding?

- CEED represents firms that produce coal, transport coal, burn coal and provide coal-based technologies. Neither NRG or Conectiv are CEED members
- CEED members supply and transport coal to the two existing Delaware coal-fired power plants (Plants consumed 2.15 MMT of coal in 2005– 4.2% of MAAC coal use)

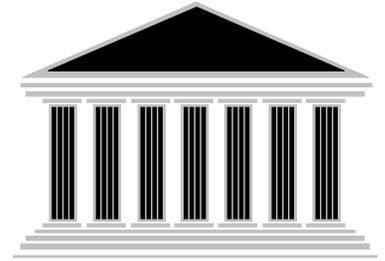


Why am I here?

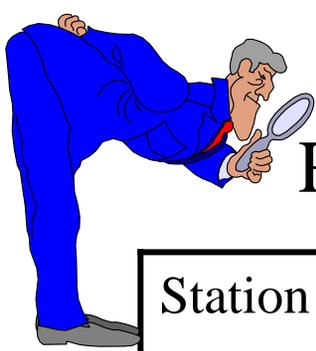


- EVA was commissioned by CEED to conduct an independent assessment of the emission reduction options, cost, and cost-effectiveness for reducing emissions at the two targeted Delaware coal-fired power plants— Conectiv's Edge Moor and NRG Indian River
- Based upon our outlook for PJM power markets, assess the risk that very strict regulation may increase risk that stations may retire.
- If a significant increased retirement risk exists, assess its potential impact on Delaware

Delaware Multi-pollutant Rulemaking



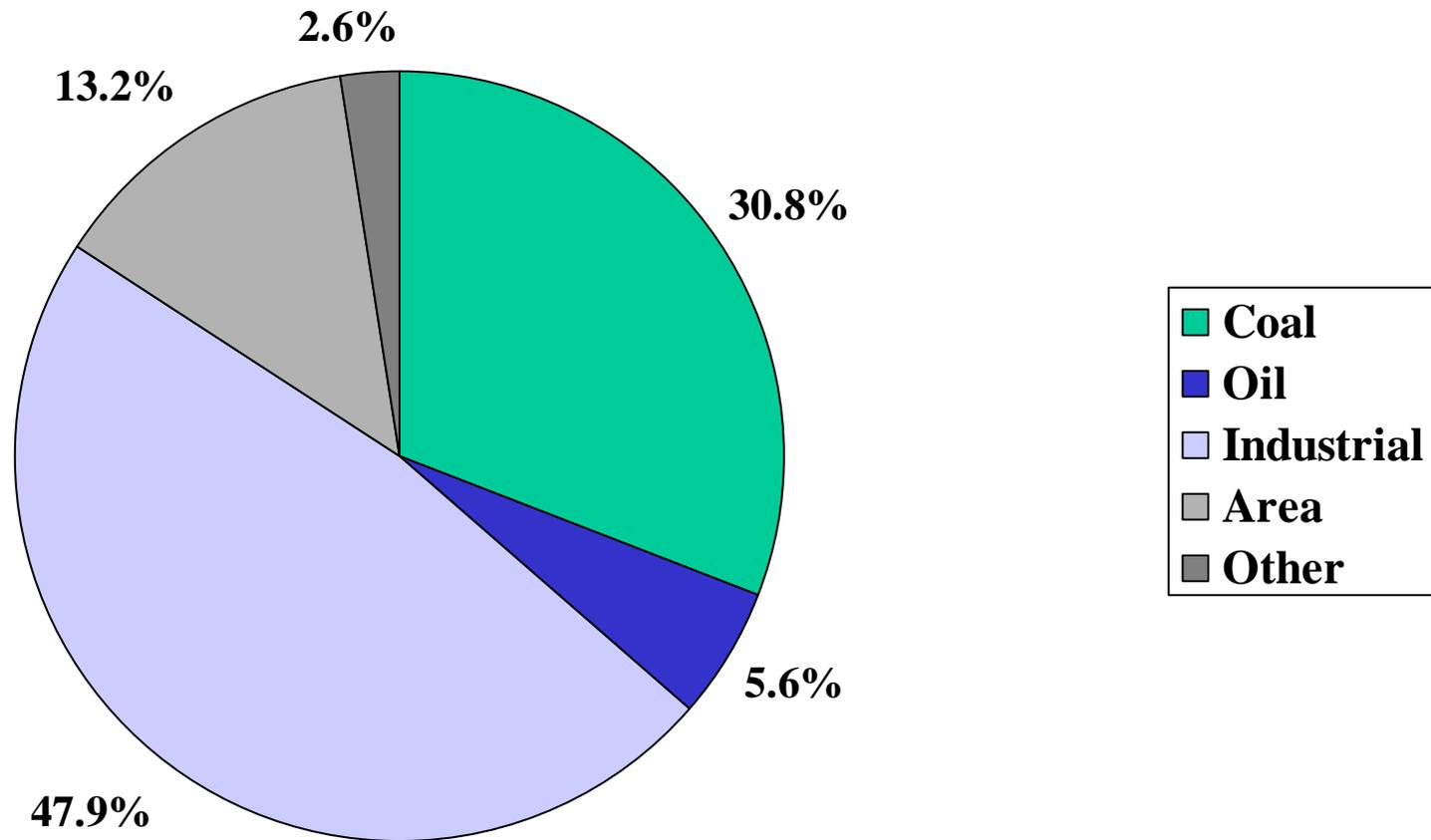
- Delaware Rulemaking focuses on three pollutants
 - Sulfur Dioxide
 - Nitrogen oxides
 - Mercury
- Federal Program already in place to regulate these pollutants
 - Title IV Acid Rain program
 - Clean Air Interstate Rule
 - Clean Air Mercury Rule
- State considering setting stricter environmental limits on Delaware's coal and residual oil fired units



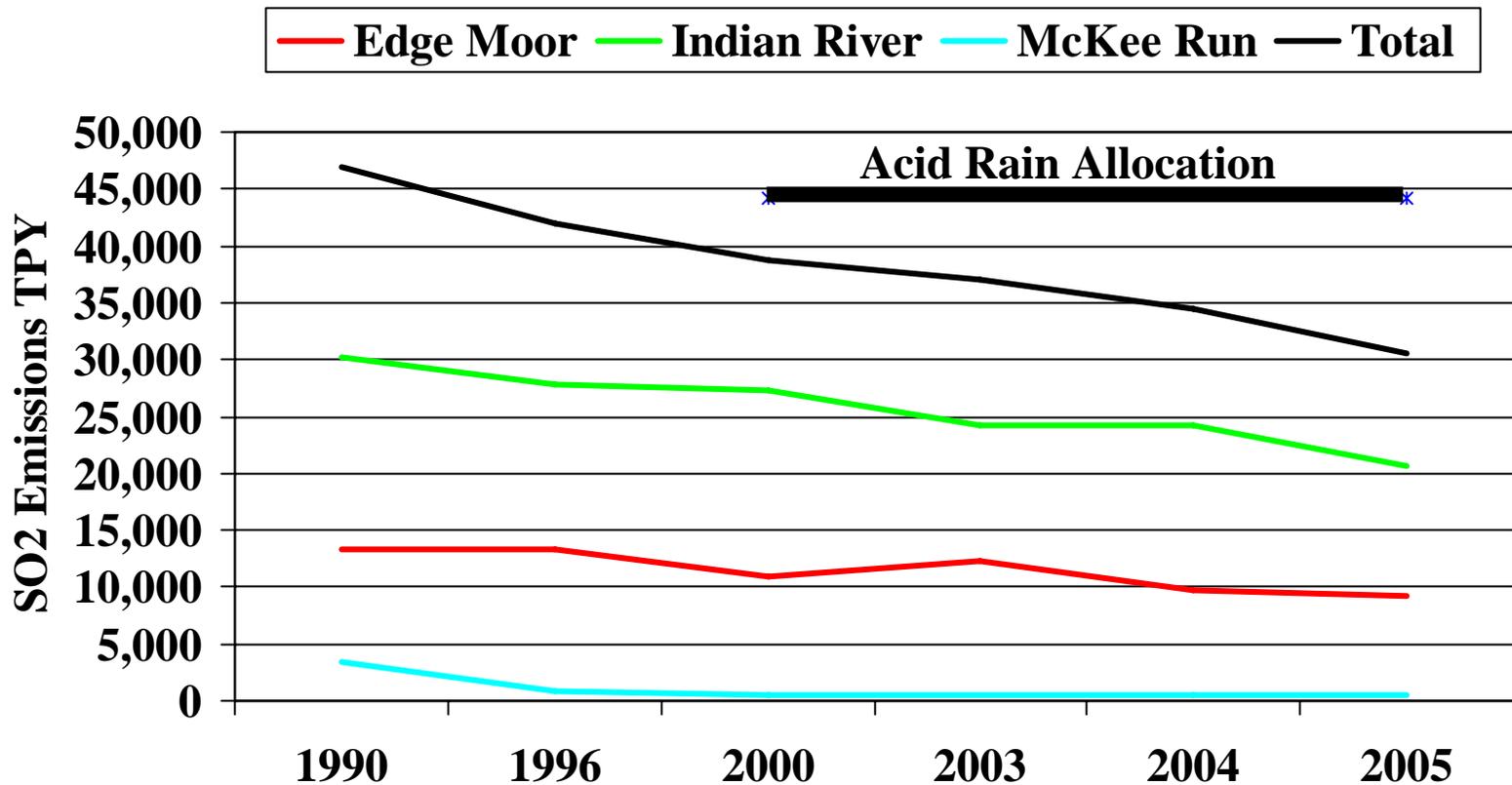
Rulemaking Targeted Delaware Power Plants

Station	Net Capacity (MW)	Year Online
Edge Moor #3 (Coal)	84	1954
Edge Moor #4 (Coal)	167	1966
Edge Moor #5 (Oil)	445	1973
Indian River #1 (Coal)	89	1957
Indian River #2 (Coal)	89	1959
Indian River #3 (Coal)	164	1970
Indian River #4 (Coal)	403	1980
McKee Run #3 (Oil)	136	1975
Total	996 MW coal 581 MW Oil	

Delaware Coal-Fired Power Plants Contributed Less than 1/3rd of the State SO₂ Emissions in EPA's Most Recent State Emissions Inventory-- 2001

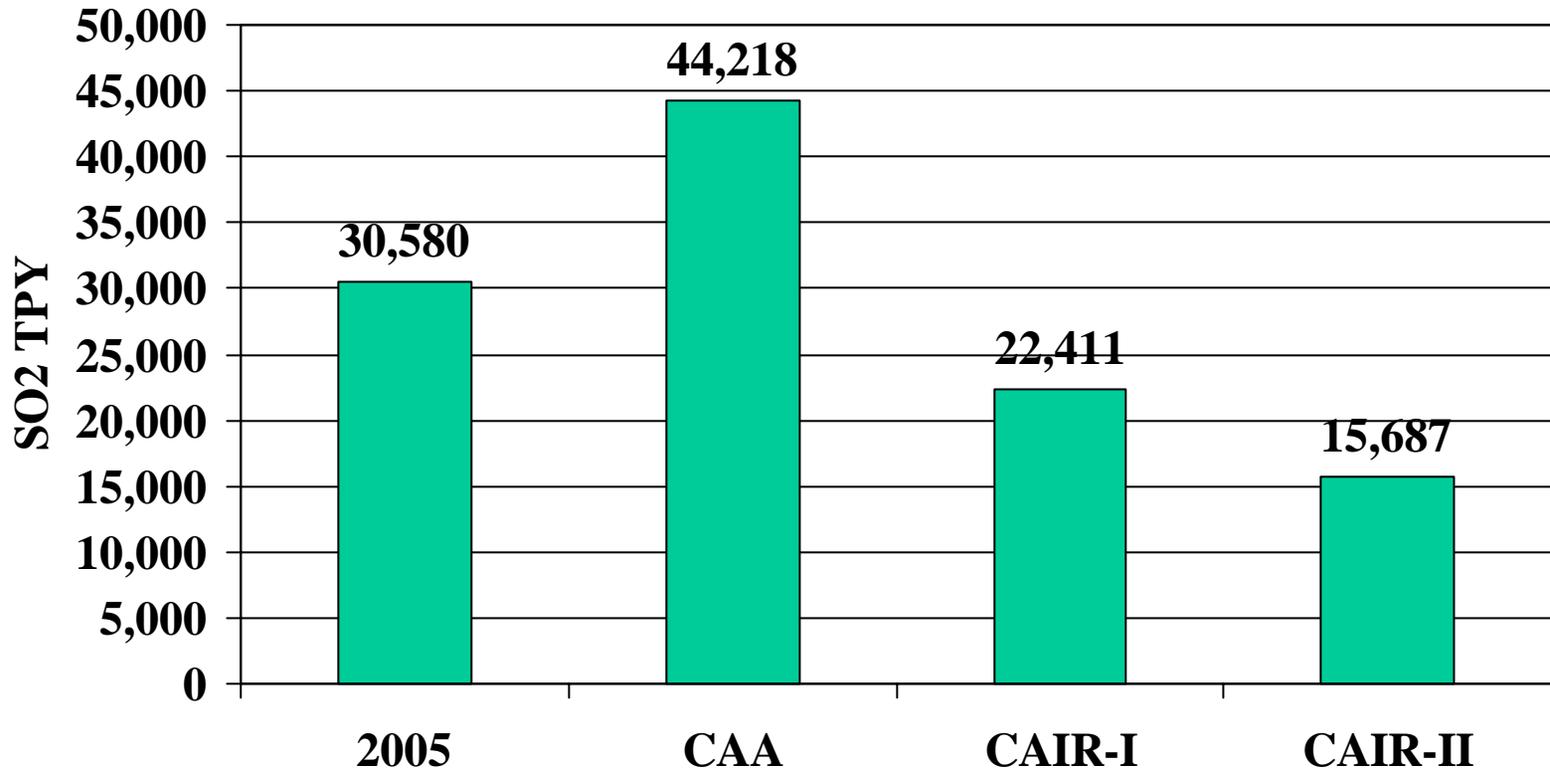


SO₂ Emissions for the 3 Targeted plants have dropped 35% since 1990 and 18% in past 2 years



State sources over-comply with current emissions cap

Further SO₂ Reductions Will Be Required under EPA's Clean Air Interstate Rule



Additional SO₂ Reduction Options



- Fuel switching
 - Lower sulfur coal (Indian River #1-3 for 45% reduction)
 - Lower sulfur oil (McKee Run, Edge Moor #5 for a 50% reduction)
- Retrofit environmental controls
 - Duct Sorbent Injection (Indian River #1-3, Edge Moor #3-4 for a 50% reduction)
 - Dry FGD (Indian River #4 for a 70-75% net reduction from current level)
 - Wet FGD Scrubber

Utility March 2006 Proposals would reduce current SO₂ emissions (30,483 TPY) by 60% to 12,059 TPY.

Average Emission rate would be 0.40#SO₂/MMBtu

Additional SO₂ Reductions Require Much Larger Capital Investment



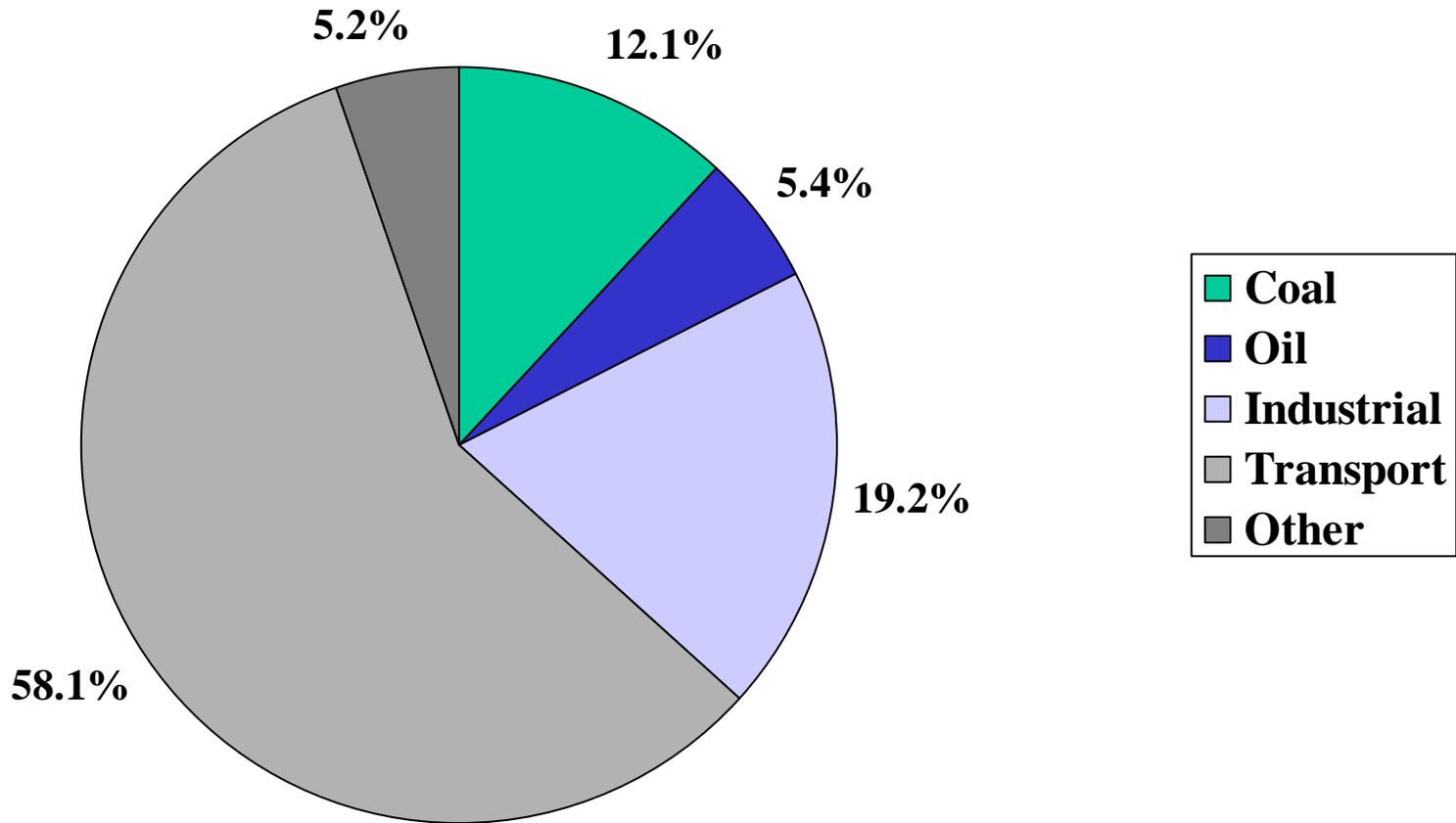
- To retrofit all six coal-fired boilers with wet FGD equipment would require a \$ 350 million (\$350/kW) capital investment
 - Small Delaware unit sizes unable to capture economies of scale savings available to most announced FGD retrofit projects.
 - Small coal unit retrofit SO₂ control projects dominated by duct injection— e.g. Sammis #1-4 (OH), Cherokee #2 (CO), Presque Island #7-9 (WI), Taconite #1-3 (MN), & Potomac River #1-5 (VA)
 - No state multi-pollutant bill has required sources to retrofit FGD controls on small generators

Wet FGD Systems Would Significantly Increase Annual Operating Costs



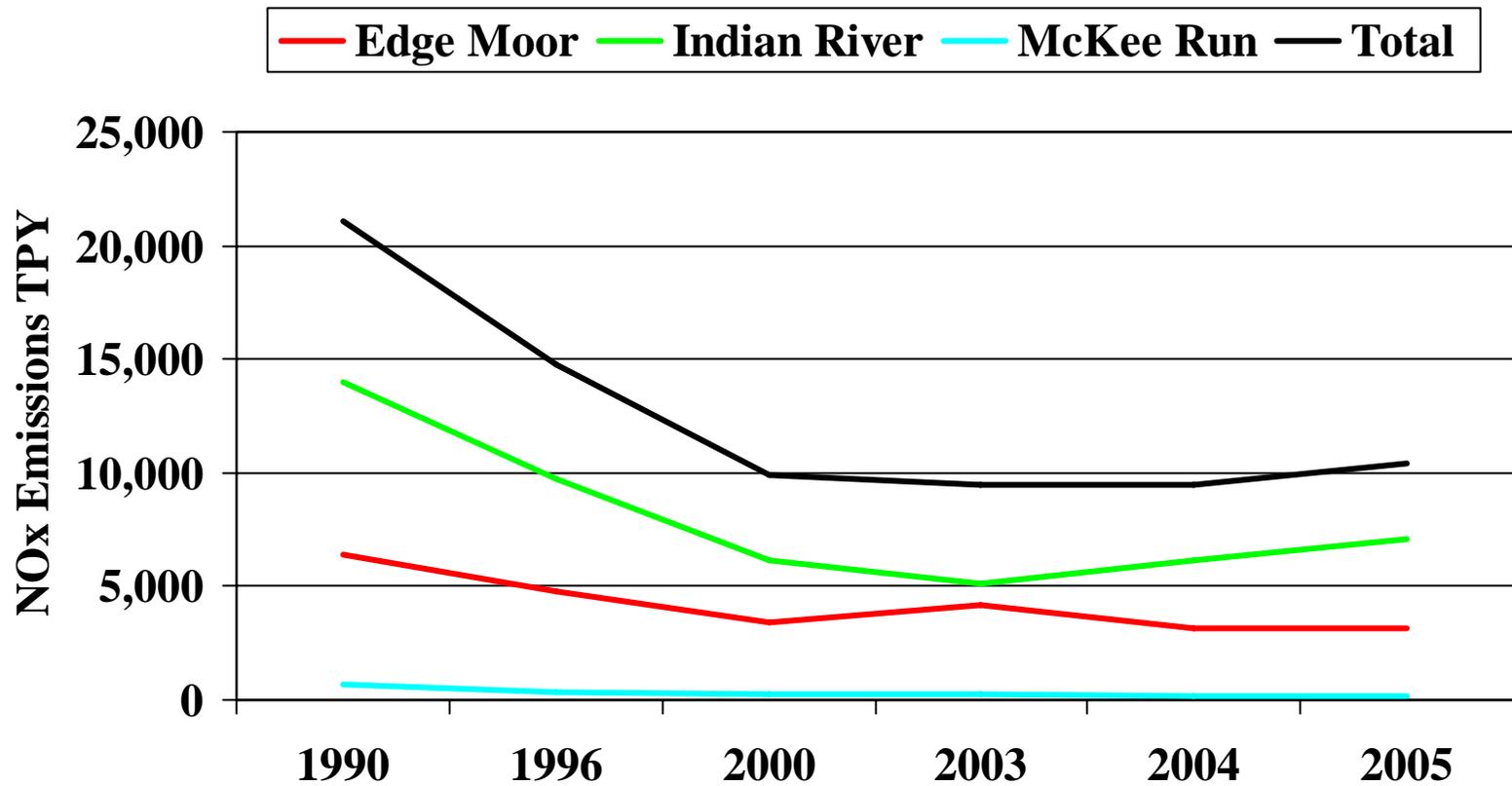
- Annual capital and fixed O&M costs would total more than \$46 million/year
- FGD operating costs would increase by \$0.87/MWh
- Some limited potential to lower fuel costs from increased fuel flexibility. However, coal plants still at fuel cost disadvantage to their regional competition because of their location, age and size
- State coal emissions could be reduced by roughly 24,800 TPY (vs 2005 rates) at a cost of more than \$2,030/SO₂ ton removed.
- Represents an incremental cost of greater than \$4,000/SO₂ ton vs. the March 2006 utility proposal (reduced emissions to 12,059 TPY SO₂)

Delaware Coal-Fired Power Plants Contributed 12% of the State NO_x Emissions in EPA's Most Recent State Emission Inventory-- 2001

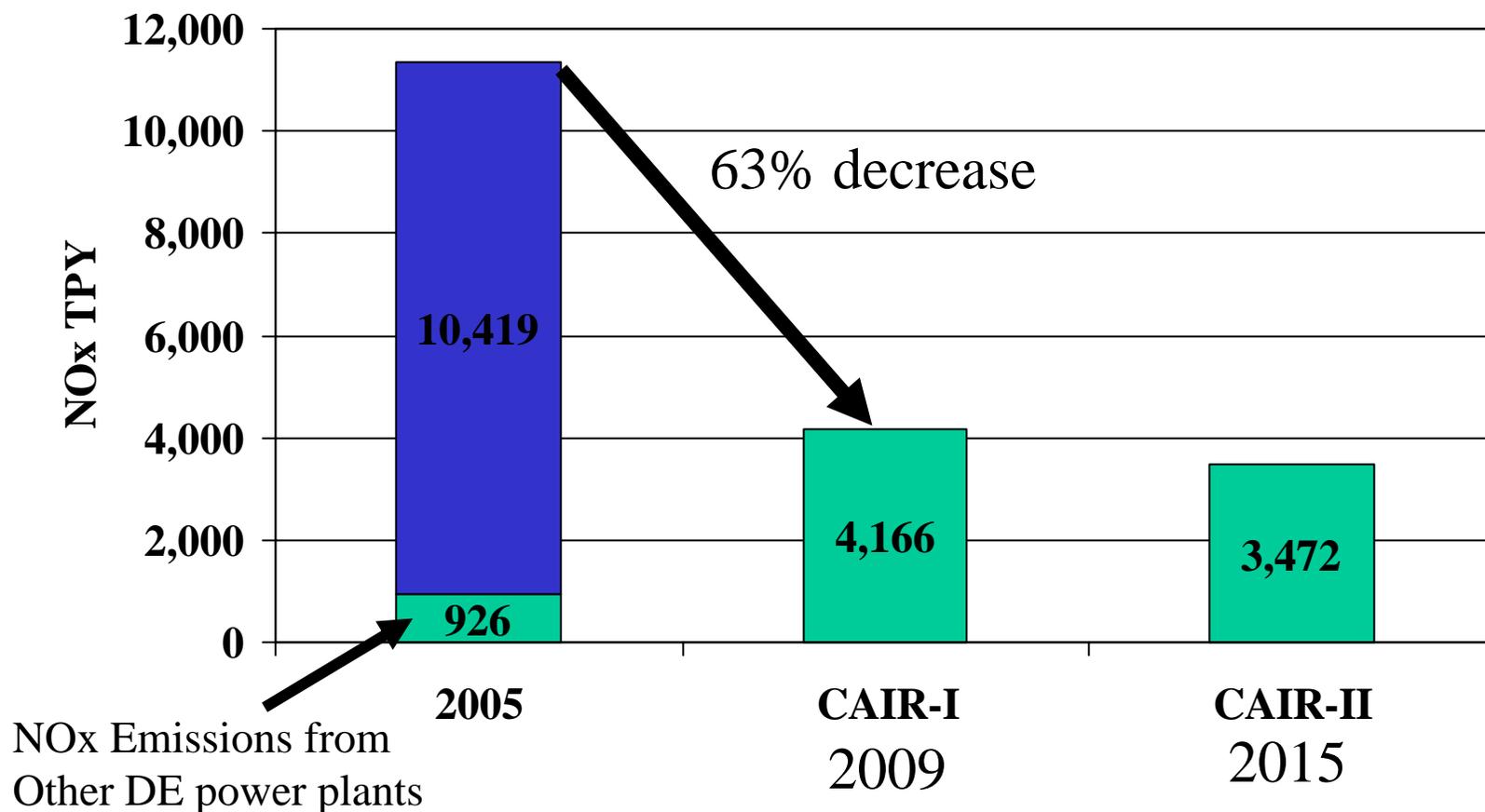


Source: EPA AIRS Database-- 2001 Delaware total NO_x emissions 60,362 TPY

Annual NOx Emissions for the 3 Targeted plants have dropped 51% since 1990



Further Annual NO_x Reductions Will Be Required under EPA's Clean Air Interstate Rule



Incremental NO_x Reduction Options



- Year-round operation of existing ozone seasonal controls
- Advanced combustion controls
 - Low NO_x Burners, over-fire air, gas recirculation (Edge Moor #5), gas reburn
- Retrofit environmental controls
 - Selective Non-Catalytic Reduction (Edge Moor #4-5, Indian River #1-2, McKee Run #3)
 - Selective Catalytic Reduction

Utility March 2006 Proposals would reduce current NO_x emissions (10,419 TPY) by 38% to about 6,500 TPY.

Average Emission rate would near 0.20#NO_x/MMBtu

Additional NO_x Reductions Require Much Larger Capital Investment



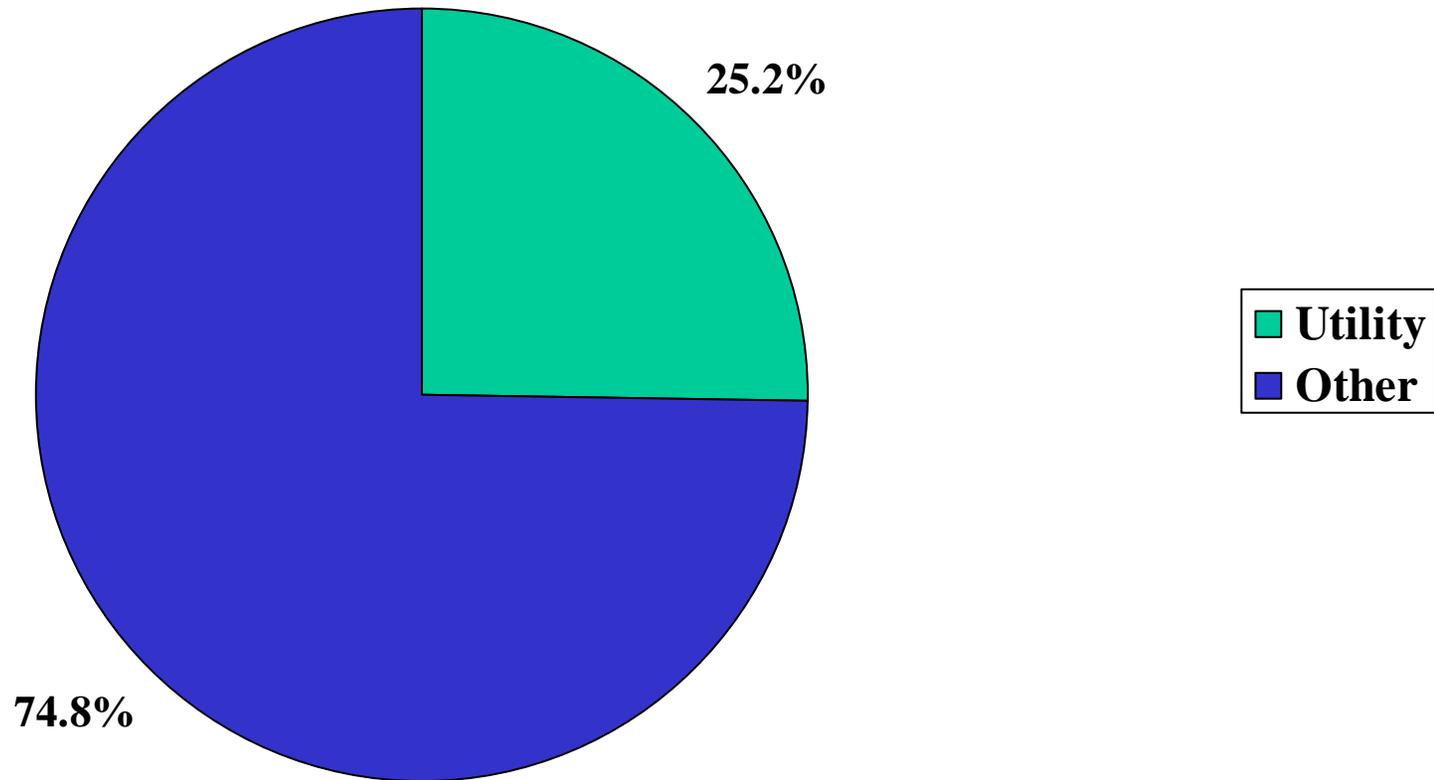
- To retrofit all six coal-fired boilers with SCR equipment would require nearly a \$150 million (\$150/kW) capital investment
 - Small Delaware unit sizes unable to capture economies of scale savings available to most announced SCR retrofit projects.
 - Small coal unit retrofit NO_x control projects dominated by SNCR— e.g. Sammis #1-4 (OH), New Castle #3-5 (PA), Armstrong #1-2 (PA), Harding #50-60 (IN), Mt Tom (MA) etc...
 - No state multi-pollutant bill has required sources to retrofit SCR controls on small generators

SCR Systems Would Significantly Increase Annual Operating Costs



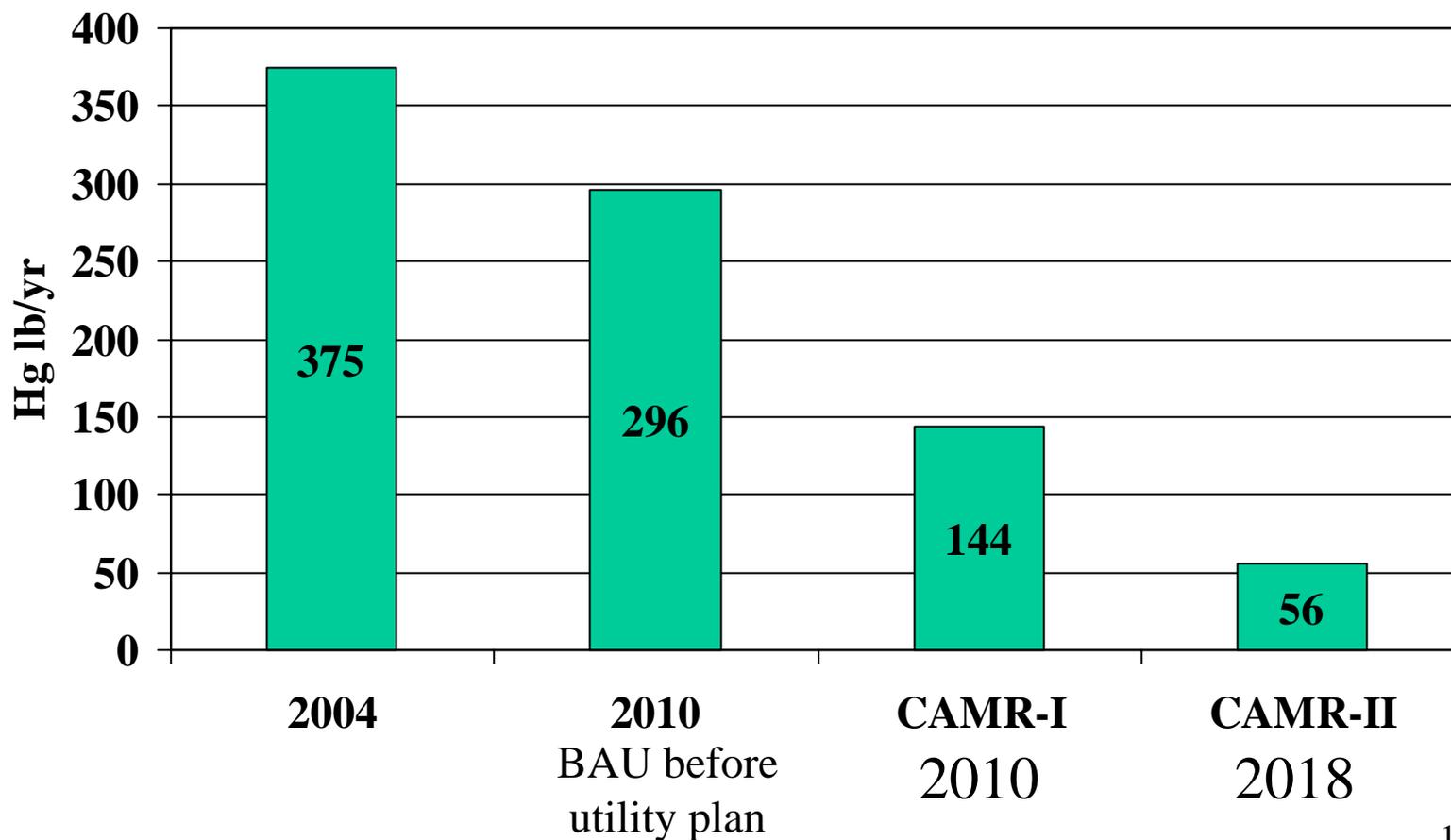
- Annual capital and fixed O&M costs would total about \$25 million/year
- SCR operating costs would increase by \$0.85/MWh
- Overall SCR operating production costs would be roughly \$6.00/MWh (at current utilization levels).
- State NO_x emissions could be reduced by roughly 7,645 TPY (vs 2005 rates) to near 2,800 TPY at a cost of more than \$3,700/ton NO_x removed. This represents an incremental cost of greater than \$4,000/ton NO_x vs. the March 2006 utility proposal (reduced emissions to 6,500 TPY NO_x)

Delaware Utility Power Plants Contributed 25% of the State Mercury Releases in EPA 2004 Toxic Release Inventory



Source: EPA 2004 TRI– Delaware had 1,958 lb of mercury releases

Mercury Reductions Will Be Required under EPA's Clean Air Mercury Rule



Incremental Mercury Reduction Options



- Co-benefit removals
 - Indian River #4 reductions from dry FGD (improves to near 90% mercury removal)
 - Indian River #1-3, Edge Moor #3-4 from duct injection (No EPA/DOE data to estimate mercury reduction performance)
- Sorbent Injection
 - Edge Moor #3-4 proposed activated carbon injection (estimated 30% more mercury reduction)
- COPAC-TOXECON

Additional Mercury Reductions Would Require Much Larger Capital Investment



- Unable to reach EPA CAMR Phase II state cap with current mercury control technology options alone. State must depend upon combination of control technology advancement and access to a mercury allowance trading system to comply.
- Estimated incremental cost of \$2.60/MWh to improve mercury removal to near 86% using activated carbon injection with added particulate controls
- Several promising control technologies are under development. DOE projects that technology performance and cost should continue to improve

Delaware Regulation Impact



- Targeted Delaware power plants have a competitive disadvantage to other regional coal plants because of their location (farther from coal fields, higher transportation costs), size (poor economies of scale) and age.
- Targeted plants provide in-state grid stability, improved system reliability and fuel diversity.
- Increased electricity growth in lower counties will place additional pressure for improved transmission and nearby electricity generation

Delaware Regulation Impact



- Targeted Delaware power plants have proposed to make significant emission reductions (60% SO₂, 38% NO_x, incremental mercury reductions) through retrofitting new controls.
- To further reduce emissions at plants to BACT will require a very large capital investment of about \$550 million in environmental controls-- \$350 Million FGD, \$150 Million SCR, \$25-75 Million COHPAC/TOXECON.

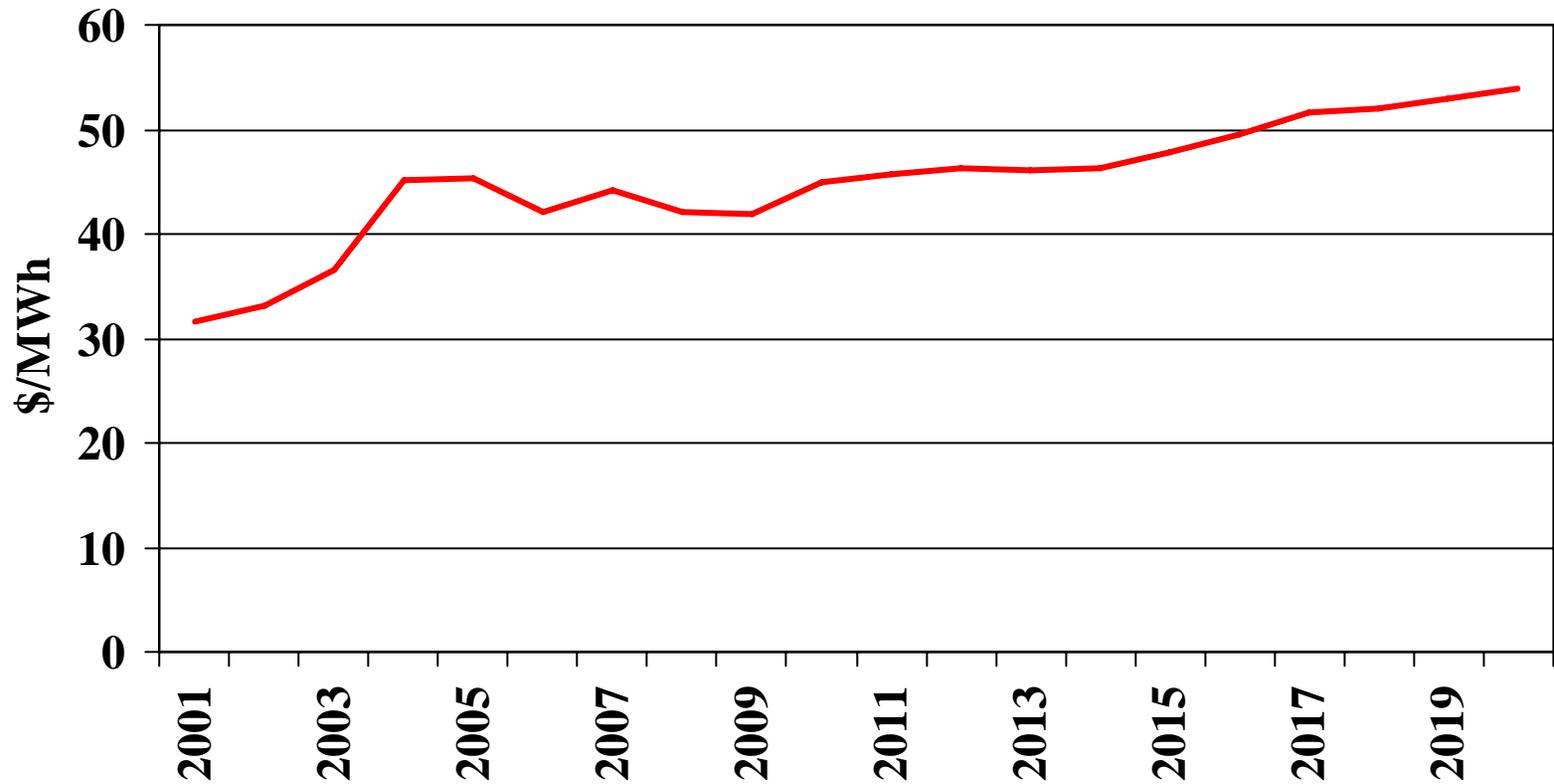
Delaware Regulation Impact



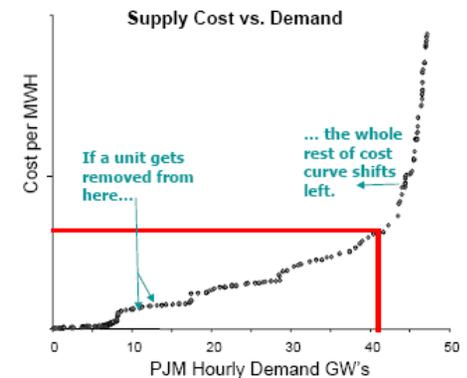
- Adding these controls will push production costs higher – In combination, three pollutants controls could increase coal unit costs by nearly \$20/MWh (2006\$) alone.
- These increased production costs would represent a significant portion of projected PJM East power prices.

If forced to retrofit these much higher cost controls, the risk that the Edge Moor plant and multiple units at Indian River would be retired would increase significantly.

Projected Average Power Prices- PJM East (Nominal\$)



Facility Retirement Impacts



- Increasing state reliance on imported power– In 2005, Delaware retail power sales were already 48% higher than in-state generation. If coal/oil units retire, state would lose 66 percent of its in-state power generation. Loss of generation near load will adversely affect grid stability and diminish system reliability.
- Increase Power Pool Economic Dispatch Costs– The loss of nearly 1,000 MW of coal-fired capacity will increase regional economic dispatch costs and place higher cost natural gas units on the margin for a higher percentage of the time– increasing power costs across the entire region.

Facility Retirement Impacts



- Increasing regional reliance on natural gas – Delaware’s targeted coal units accounts account for 4.2 percent of the MAAC regional coal generation. Overall 2.1 million tons of annual coal demand may be lost. Edge Moor station also currently burns landfill gas in its coal units. This demand would be lost and the gas may have to be flared if no replacement consumer is found.
- Lost Employment– NRG’s Indian River and Conectiv’s Edge Moor Stations employ over 290 people. McKee Run employs about 30 people. The stations’ coal burn also supports 300 direct coal-mining jobs and 50-100 rail jobs.
- Rail Service- Loss of the Indian River power plant may adversely affect rail service to other Delmarva businesses along the same rail spur.

Facility Retirement Impacts



- Loss of Cogeneration Source– The Edge Moor station provides steam to the adjacent titanium dioxide plant. Its closure would force owner to either restart its boilers, find another steam source or move production to another facility.
- Loss of Major State/Local Tax Source– Currently these stations pay several million in annual state and local taxes. These tax revenues would be largely lost if the plants closed
- Environment– No net emission changes since SO₂ and NO_x emissions are regulated under a cap & trade program.



Important Program Elements

- Emission Trading– Emission trading programs have been and continue to be an important environmental policy tool. These programs provide affected sources the needed flexibility to reduce emissions to meet environmental targets at the lowest cost. Facilities with higher incremental costs pay for greater reductions at larger facilities that benefit from better economies of scale.