Technical Supplement to Opening Statement
April 28, 2016
Clean Air Council Hearing
The Clean Power Plan: Impact on New Jersey

Assistant Commissioner John Giordano, Esq.
Air Quality, Energy and Sustainability
NJ Department of Environmental Protection
John.Giordano@dep.nj.gov
(609) 292 - 2795

EMISSION PROFILE: NJ's POWER SECTOR

New Jersey's power sector has some of the lowest emission rates in the country.

Compared to other states, NJ's emission rate is:

- 2nd lowest for Sulfur Dioxide
- 5th lowest for Nitrogen Oxides
- 5th lowest for Carbon Dioxide

EMISSION PROFILE (cont.)

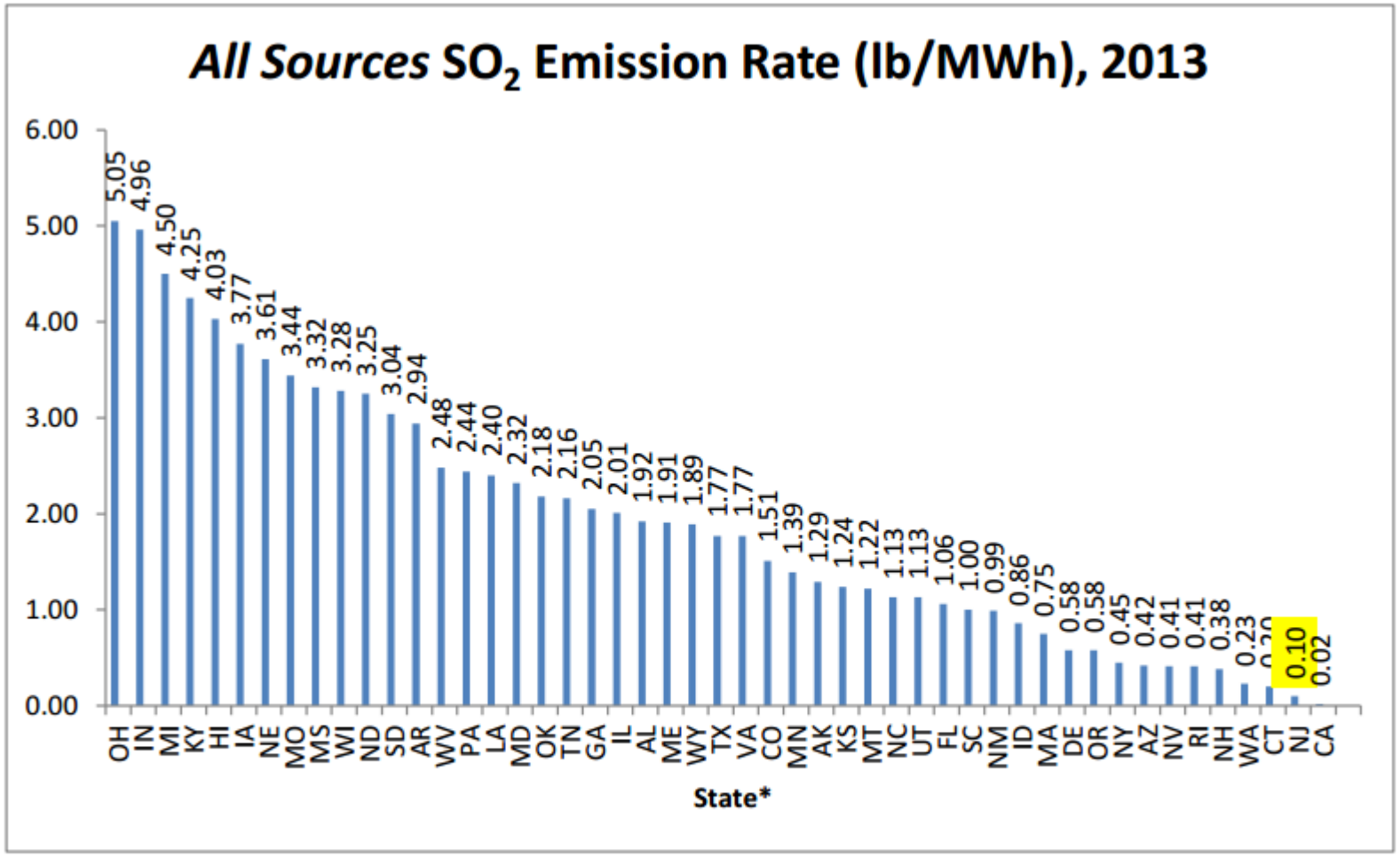
- In the Appendix of the New Jersey Energy Master Plan (EMP), there is a series of graphs which compare NJ's 2013 emission rates for 3 key air contaminants with those of other states.

- Comparisons include the rate of emissions for the entire electricity sector as a whole, and for the fossil fuel components alone.

    - The electricity sector as a whole, includes nuclear and renewable electric generation, as well as fossil fuels.

    - The fossil fuel component includes gas, oil and coal units.

- NJ's electricity sector is a remarkably low emitter of sulfur dioxide, nitrogen oxides and carbon.



*(Vermont excluded; limited power sector)

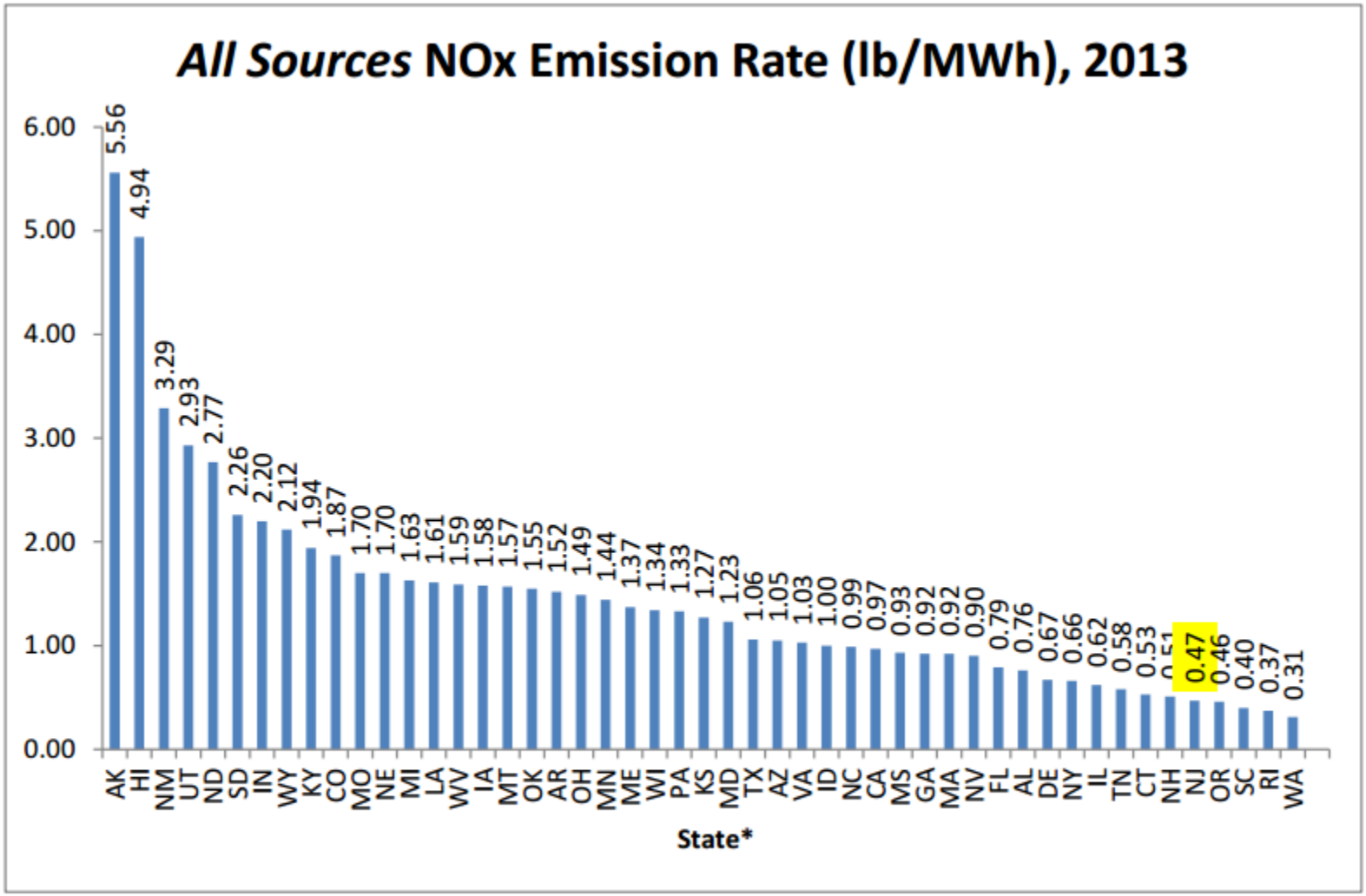
Source of Base Data: 2013 EIA State Historical Tables 1991-2013 (www.eia.gov/electricity/data/state); Emission Rate calculated as: (total emissions in Metric Tons/total generation in MWh) X 2,204.6 pounds/metric ton.

SULFUR DIOXIDE

- Sulfur Dioxide (SO2) – In 2013, NJ was 2nd lowest in the USA for the electricity sector (and 3rd lowest for fossil units).

- As low as NJ already is for power plant emissions, additional SO2 reductions are in the pipeline.

- Starting July 1 of this year, NJ's sulfur in fuel requirements for light oil will drop from 500 part per million (ppm) to 15 ppm, further reducing power plant SO2.



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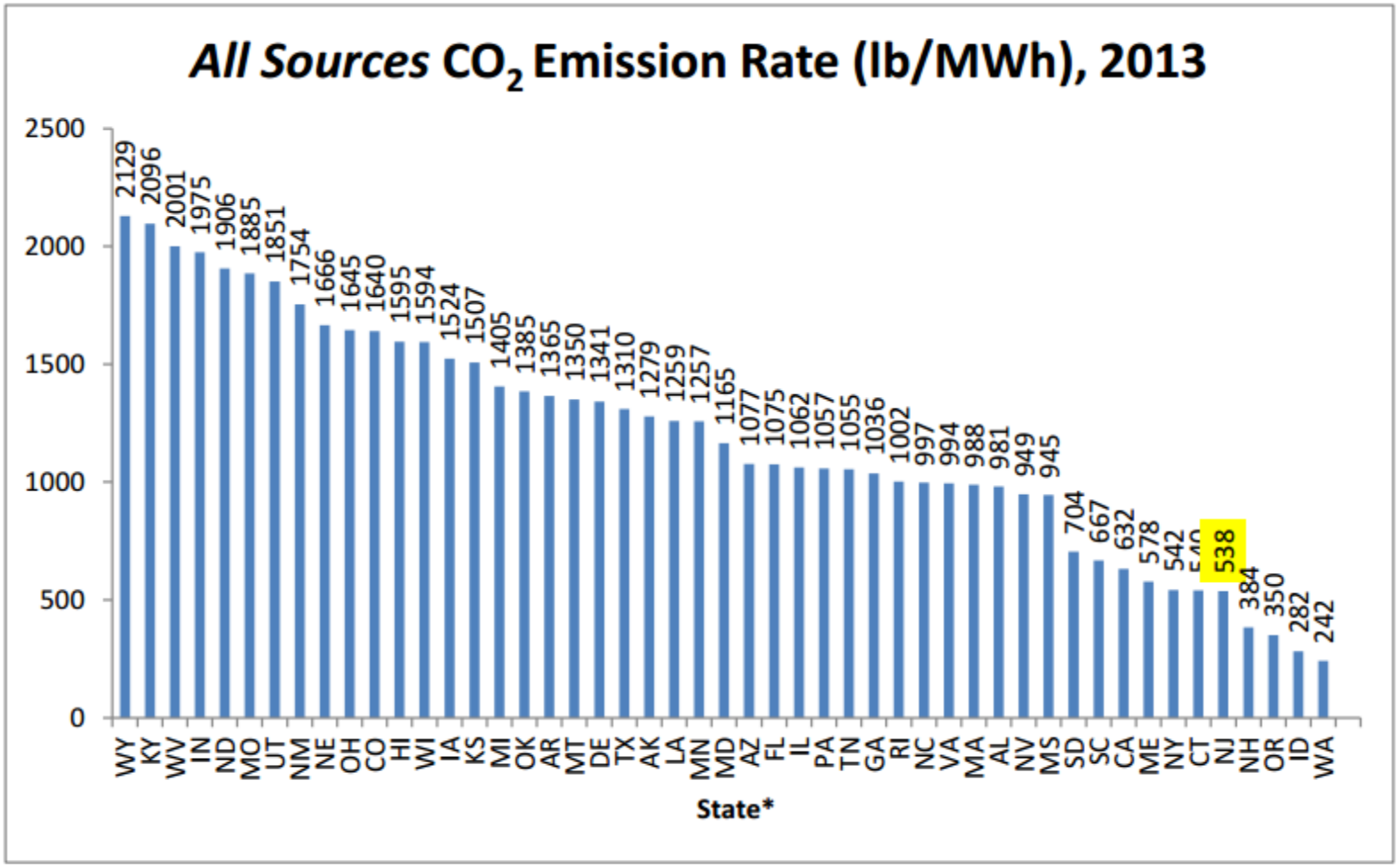
NITROGEN OXIDES

- Nitrogen Oxides (NOx) – In 2013, NJ was 5th lowest in the USA for the electricity sector and 3rd lowest for fossil units.

- And on May 1, 2015, NJ's tighter NOx limits for high energy demand day electric generating units was effective.

- This resulted in the shutdown of over 2000 MWs of old peaking units, further reducing NOx emissions on high ozone days.

- Here again, clean power progress continues in NJ.



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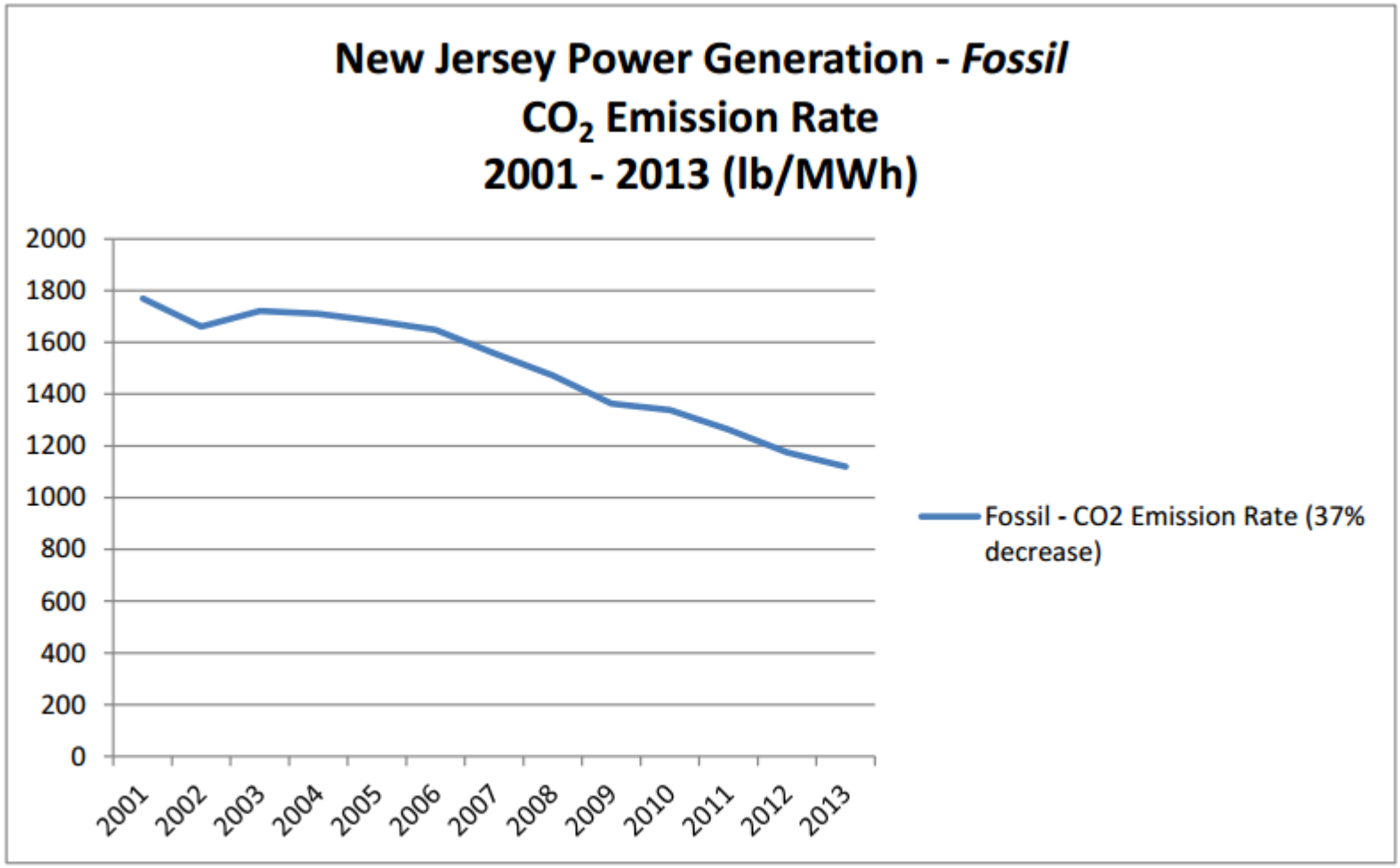
Source of Base Data: 2013 EIA State Historical Tables 1991-2013 (www.eia.gov/electricity/data/state); Emission Rate calculated as: (total emissions in Metric Tons/total generation in MWh) X 2,204.6 pounds/metric ton.

CARBON DIOXIDE

- Carbon Dioxide (CO2) – In 2013, NJ was 5th lowest in the USA for both the electricity sector and fossil units.

- And NJ's renewable portfolio standards and increased use of combined cycle natural gas power plants are further reducing our carbon emission rate.



Source of Base Data: 2013 EIA State Historical Tables 1991-2013 (www.eia.gov/electricity/data/state); Emission Rate calculated as: (total emissions in Metric Tons/total generation in MWh) X 2,204.6 pounds/metric ton.

CARBON TREND

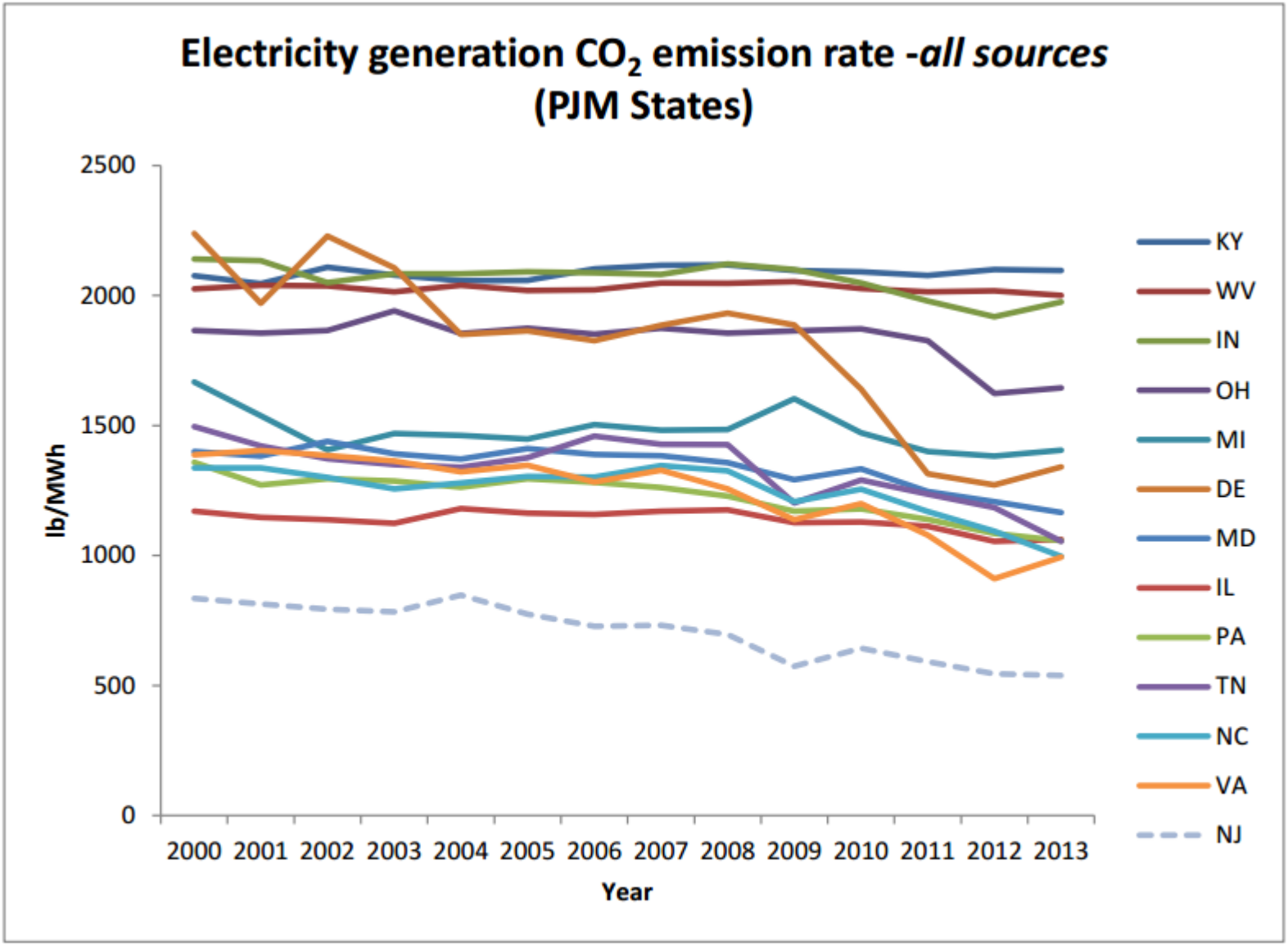
- Between 2001 and 2013, NJ's emission rate of carbon emissions from fossil fuel power plants dropped by 37%.

- That is primarily because of:

  1) Reduced use of coal in boilers,

  2) More use of natural gas in combined cycle turbines, and

  3) Increased renewable energy.



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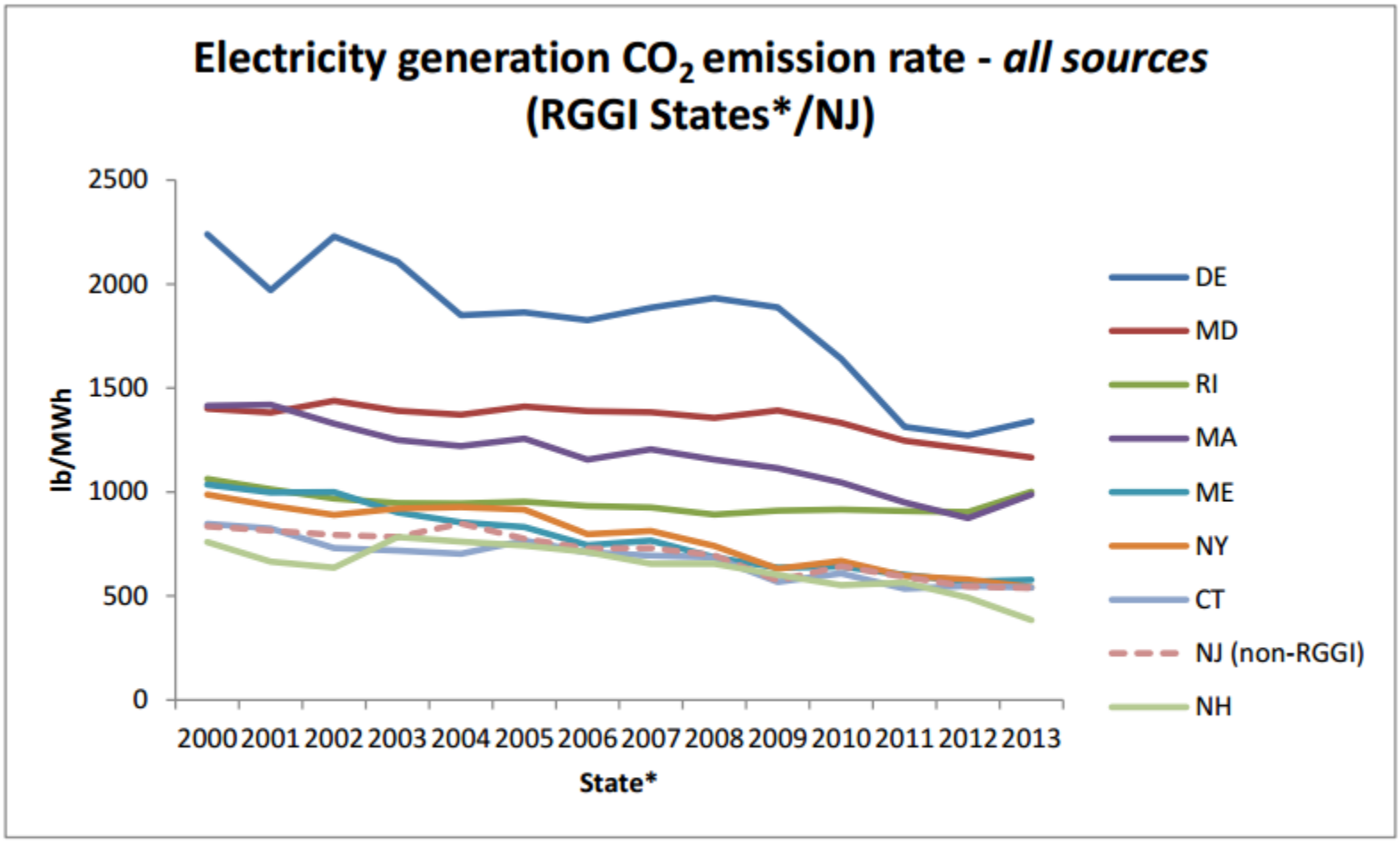
COMPARISON WITH 13 PJM STATES

- New Jersey is one of 13 states where electricity is supplied by the PJM electric grid.
- New Jersey's CO2 emission rate is by far the lowest of the PJM states.
- NJ's CO2 emission rate is approaching 500 lbs per MWhr, while the other 12 PJM states are between 1000 and 2200 lbs per MWhr.
- Therefore, on average, generating electricity in NJ emits ¼ to ½ the CO2 as generating electricity in other PJM states.
- What this means is that significantly lower regional CO2 emissions result when electricity is generated in NJ, rather than in other PJM states.



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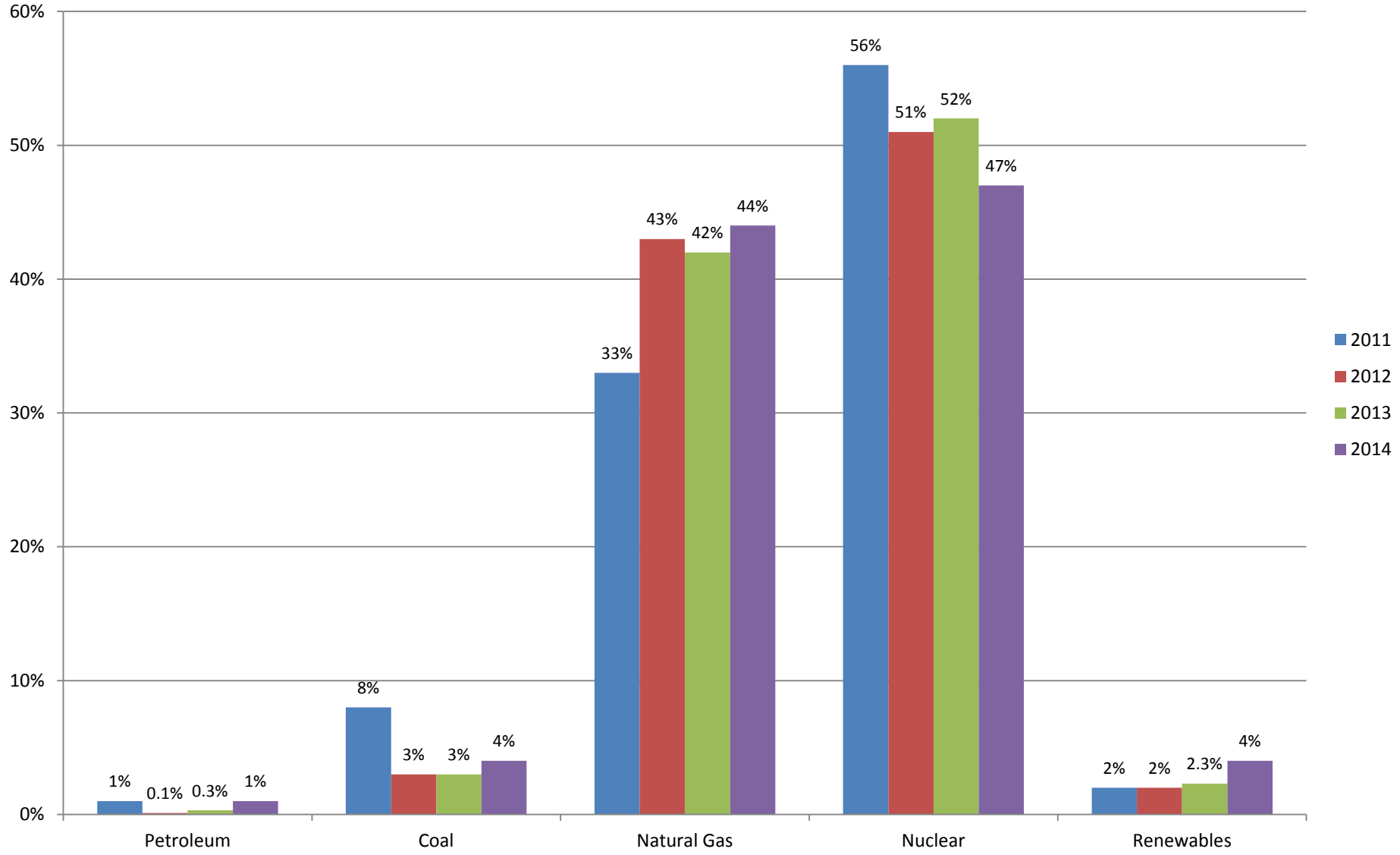
Source of Base Data: 2013 EIA State Historical Tables 1991-2013 (www.eia.gov/electricity/data/state); Emission Rate calculated as: (total emissions in Metric Tons/total generation in MWh) X 2,204.6 pounds/metric ton.

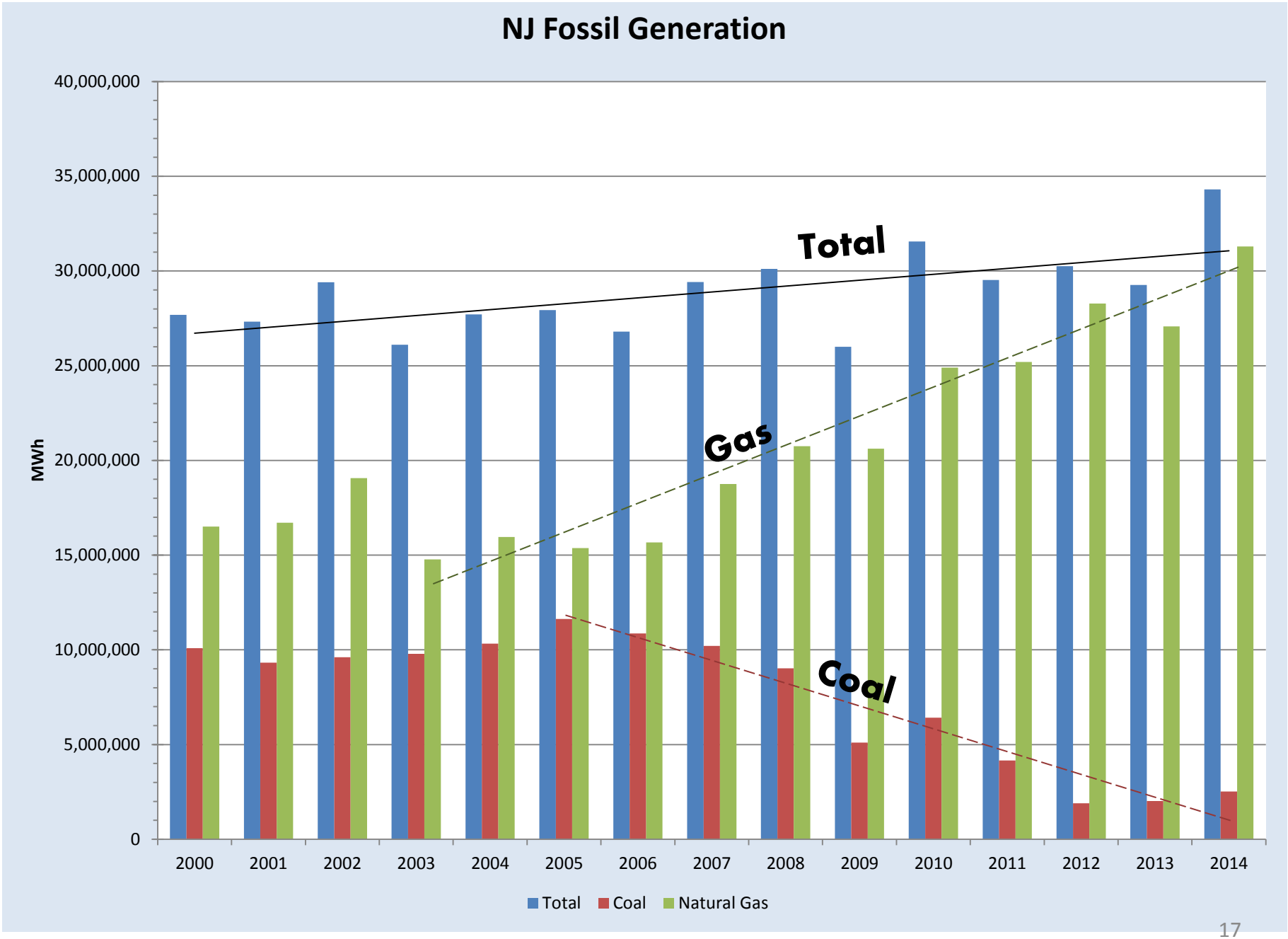
COMPARISON WITH RGGI STATES

- NJ is amongst the lowest CO2 emitters in the Northeast and MidAtlantic states that compose RGGI.
- Rejoining RGGI would increase the NJ cost of electricity by hundreds of millions of dollars per year (because utilities would charge ratepayers the value of the allowances that are required to produce electricity).
- NJ ratepayers already finance clean energy programs through the Societal Benefits Charge.
- Also, there would be higher CO2 and other air contaminant emissions in states to our west.
- That is because we would not be able to further decrease our imports of coal electricity if the RGGI new source emission cap prevents new clean gas units in NJ.
- NJ has experienced the effects of high NOx emissions from other states where power plants purchase allowances and turn off pollution controls.

New Jersey Recent Electricity Generation by Fuel Type (%), 2011-2014



Source of Base Data: EIA State Electricity Profiles – New Jersey


NJ Fossil Generation
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
MWh
Total
Gas
Coal
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Total
Coal
Natural Gas

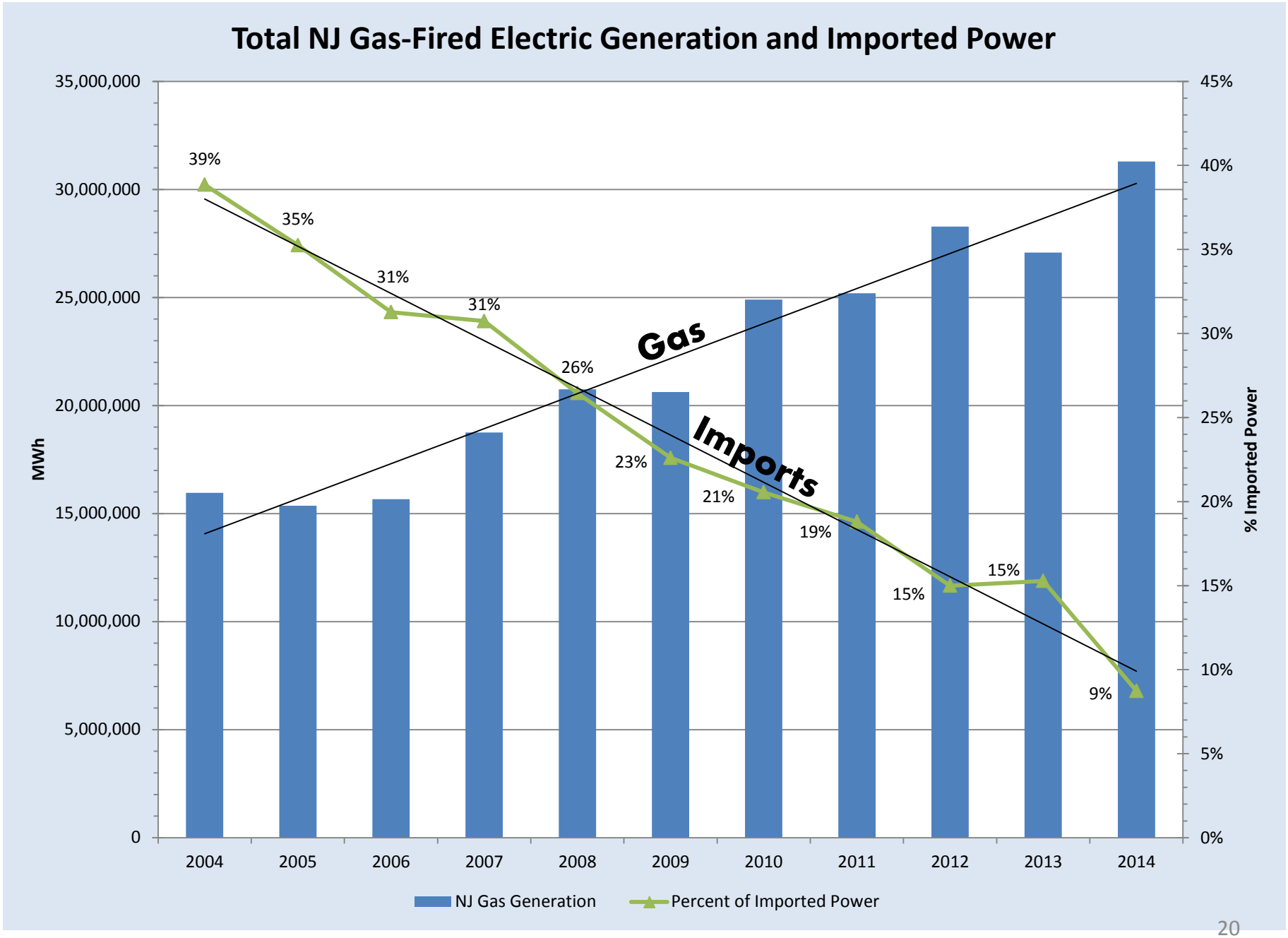
NJ RECENT ELECTRIC GENERATION BY FUEL TYPE

- Coal has dropped to 4% of electric generation. (10 years ago coal was about 20%).
- Renewables have increased to 4% and are equal to coal. (Renewables are mandated to be 22.5% of NJ electric consumption by 2021).
- Natural gas increased to over 40%.
- Nuclear is about 50%. (Nuclear will decrease to about 45% when Oyster Creek closes in 2019).
- Oil is 1% or less.
- 95% of NJ electric generation is from clean energy – nuclear, gas and renewable (all of which EPA is promoting with the Clean Power Plan).

NJ FOSSIL GENERATION

- Coal is the biggest source of CO2 from power plants in the USA

- In New Jersey, you can see that over the last 15 years:
    - Total in-state electricity generation (shown in blue) has gone up somewhat;
    - Electricity from natural gas (shown in green) has gone way up;
    - And electricity from coal (shown in red) has gone way down (only 4% in 2014).


Total NJ Gas-Fired Electric Generation and Imported Power
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
MWh
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
% Imported Power
39%
35%
31%
31%
26%
23%
21%
19%
15%
15%
9%
Gas
Imports
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
NJ Gas Generation
Percent of Imported Power

TOTAL NJ GAS-FIRED ELECTRIC GENERATION WITH IMPORTED POWER

- As our in-state gas-fired generation has gone way up, the electricity we've had to import from other states has gone way down.

- This is great news, because as you've seen, electricity generated inside NJ is cleaner than almost every other state, and much cleaner than states that rely on coal.

BREAKING NEWS – NJ BECAME A NET ELECTRCITY EXPORTER IN 2015

- The federal Energy Information Administration (EIS) just released their 2015 data, which indicates that NJ became a net exporter of electricity in 2015 (which is earlier than we expected).

- This likely reflects the operation of 2 of the 3 newest NGCC power plants in 2015, and the expansion of NJ's RE and EE programs.

- The 3d new NGCC power plant (CPV Woodbridge) just started operation in December 2015, so the trend toward more NJ electric exports (instead of imports) is continuing.

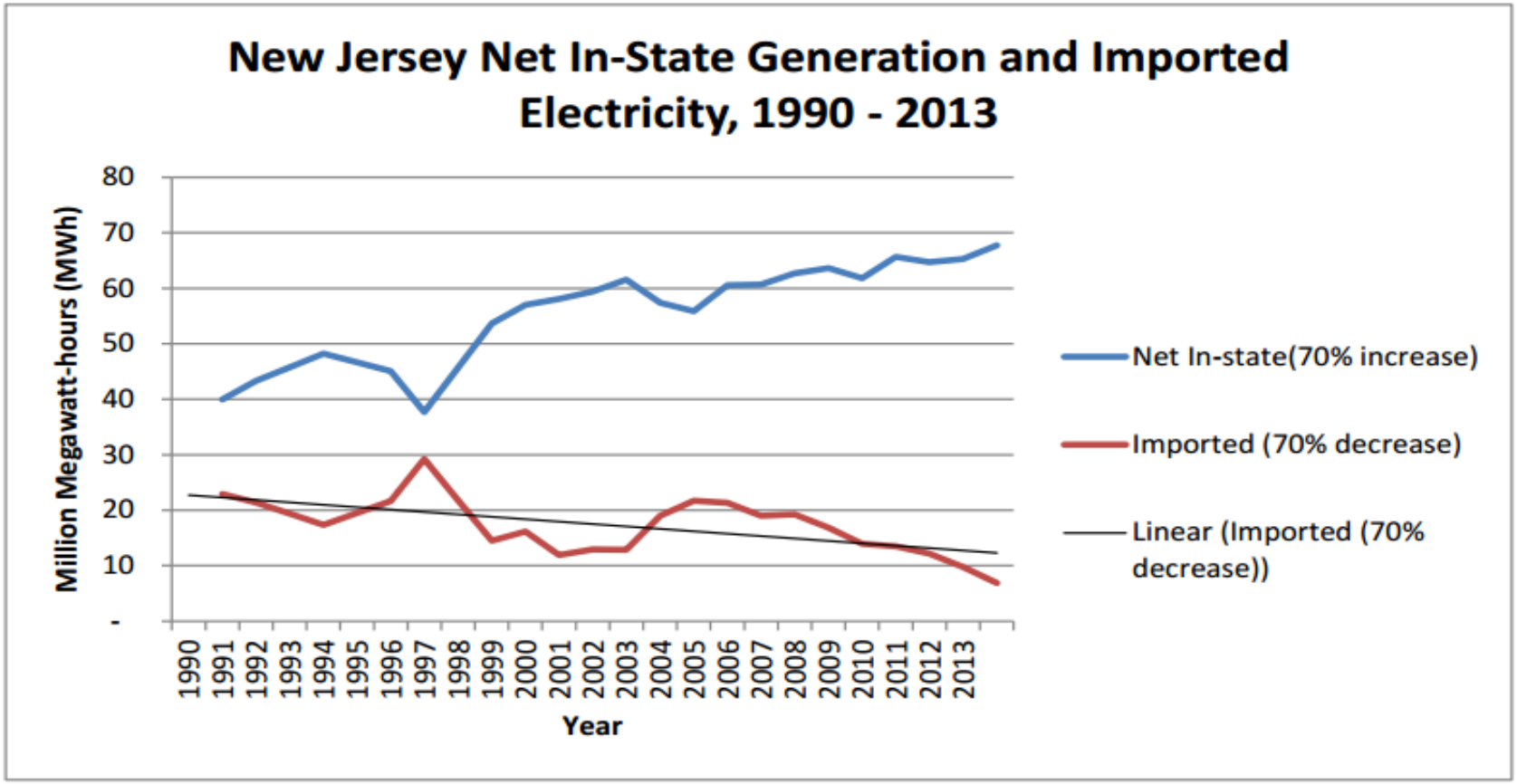
- The change is so dramatic we are double checking the EIS data. If it is correct, and we expect it to be, NJ has achieved one of the key goals of the Energy Master Plan, to not rely on out of state electricity projection from higher emitting coal fired power plants.

CO_2 IMPLICATIONS OF LESS ELECTRIC IMPORTS

- More production of electricity in NJ reduces CO2 emissions in the region because our electric generating sector emits much less CO2 than the other 12 PJM states.

- For every ton of CO2 emission increase in NJ from increased use of our generating units, there is at least a 2 ton CO2 emission decrease in the PJM region.

- Bottom line – It is best to generate electricity in the cleanest units in PJM, no matter where they are located.



*In 2013, NJ imported approximately 9% of its electricity needs (Source: NJDEP)

Source of base data: **USDOE/EIA,** 30 September 2015 **(http://www.eia.gov/electricity/state/newjersey/)**

NJ NET IN-STATE GENERATION AND IMPORTED ELECTRICITY

- NJ's net in-state generation has increased by 70%, and imported electricity has decreased by 70%.
- This means that more and more of NJ's energy needs are being met by cleaner, lower carbon electricity.
- New Jersey is successfully displacing coal, both inside the state and from neighboring states.

DECREASING IMPORTS (cont.)

- The trend for less NJ imports of electricity from the west and more NJ exports to NY City is likely to continue.

- This is good because it reduces the region's CO2 emissions.

- But it does create a dilemma for NJ for compliance with the Clean Power Plan.

DECREASING IMPORTS (cont.)

How does decreasing imports of electricity create a dilemma for compliance with the mass based option of the CPP?

- EPA did not consider changes in electricity imports and exports for states when making allocations of emission allowances.
- NJ power plants are expected to operate at higher than 2012 capacity factors as coal units shutdown in other PJM states.
- There is approximately a 30% allowance deficit in NJ for the 2030 NJ emission cap.

WHY IS NJ ELECTRIC POWER SO MUCH CLEANER THAN OTHER STATES?

Answer – NJ has Stringent Air Quality Regulations for Power Plants and policies that encourage clean power. Examples include:

1. Multipollutant standards for coal
2. Ultra low sulfur light oil
3. Daily NOx limits for gas and oil peakers
4. New Source Review
5. Distributed generation
6. Clean Air Act section 126 Petition
7. Natural Gas Combined Cycle Units

1. MULTIPOLLUTANT STANDARDS FOR COAL

- NJ was one of the first states in the USA to adopt multipollutant standards for coal fired boilers, including: mercury, sulfur dioxide, nitrogen oxides, and particulates.

- These rules required the installation of best available control technology, including carbon injection, scrubbers, selective catalytic reduction, and baghouses on coal fired units.

- NJ's mercury and particulate limits were precedents for the federal Mercury and Air Toxics (MAT) rule, which just had a compliance deadline on April 15.

2. ULTRA LOW SULFUR LIGHT OIL

- NJ led the effort of northeast states to lower the sulfur in light oil, which is used in homes, industry and power plants.
- Commissioner Martin adopted the 15 ppm sulfur limit, which is effective on July 1.
- Home heating oil and turbine fuel oil will now be as clean as natural gas for sulfur content.

3. HIGH ENERGY DEMAND DAY (HEDD) DAILY NOx LIMITS ON PEAKERS

a. USEPA's annual limits in tons per year (and seasonal limits in tons per 5 month ozone season) do not protect air quality from ozone that is associated with hot summer days.

b. USEPA's emission trading program for NOx has been ineffective at addressing high ozone day emissions from peakers (HEDD units).

c. Daily NOx performance limits (as are in place in NJ) are needed to achieve the ozone health standard.

HEDD NOx LIMITS ON TURBINES (cont.)

- NJ also led the effort of northeast states to reduce nitrogen oxide emissions from gas and oil fired turbines that are used to generate electricity on high energy demand days.
- This rule is now referred to nationally as the HEDD rule for peakers.
- Few other states have adopted NJ's HEDD rule.
- Reduction in NOx from these units is important because they are operated on the hottest days of the year when their NOx emissions contribute to unhealthful high ozone levels.

4. NEW SOURCE REVIEW

a. The best and most economical time to control a source is when it is being built.

b. The much lower emissions achieved with best air pollution control technology allows greater utilization of a power plant.

c. Replacing higher emitting units with new, much lower emitting units results in projects with the lowest net emissions and greatest public acceptance.

NEW SOURCE REVIEW (cont.)

NJ subjects all new and modified power plants to:

- Stringent new source emission limits, and
- Air quality modeling to ensure the local community will be protected from air contaminants.
- NJ was the first state in the USA to require selective catalytic reduction to control nitrogen oxides on coal fired power plants.

5. DISTRIBUTED GENERATION

a. Not all distributed generation is clean. The use of emergency diesel generators for peak power in some states results in up to 400 times the NOx emissions per MWhr, as compared to a new natural gas combined cycle unit.

b. NY has recently followed NJ's lead with a proposed rule to also restrict the use of emergency generators to provide peak power.

DISTRIBUTED GENERATION (cont.)

NJ promotes clean distributed generation by:

- Exempting most fuel cells from air permits;
- Having general permits for low emitting combined heat and power units up to about 6 MW; and
- Prohibiting the use of uncontrolled diesel engines for non emergency electricity production.

6. 126 PETITION

- NJ was the first state to successfully petition EPA (under section 126 of the Clean Air Act).
- This reduced air pollution from a power plant outside of the state.
- EPA ordered the Portland Power Plan in Penn to reduce sulfur dioxide emissions.
- Those emissions were causing the health standard to be exceeded in both NJ and Penn.

7. NATURAL GAS COMBINED CYCLE UNITS

- The cleanest fossil fueled power plants are the newest Natural Gas Combined Cycle (NGCC) units, which are most efficient (lower CO2) and have the best air pollution controls (especially for NOx).

- In addition to displacing much higher emitting coal fired units, NGCC units also will displace older less efficient NGCC units that are nearing the end of their useful lives.

- The new NGCC units also have the capability to provide peaking power, which helped to enable the shut down of over 2000 MWs of high NOx emitting peaker units in NJ.

- NGCC units also provide backup power for expanded use of renewable energy electric generation. NGCC units are capable of fast starts, which complements intermittent power, and increases opportunity for renewable energy development.

FACTS ABOUT NJ POWER PLANTS REGULATED BY THE CPP

- 24 power plants have CPP regulated units.
  - 1 has ceased operation (Deepwater).
  - 4 others plan to shut down or replace their CPP regulated units with new units by 2022.
- 19 regulated units will remain, unless there are more shutdowns.
  - 4 of these are coal or gas fired boilers (4% of annual generation).
  - 15 of these are natural gas combined cycle units (96% of NJ generation).
- 7 of the NGCC units are expected to produce over 80% of the fossil fuel fired electricity in NJ.
- Increased use of these most efficient and low CO2 emitting NGCC units will lower CO2 emissions regionally.

NJ Regulated Facilities Under the CPP