

Air Quality Regulation of Electric Generating Units

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NJ Multi Pollutant Requirements for Coal

<u>Pollutant</u>	<u>Typical Control Device Required</u>
Fine Particles	Baghouse (most units) Electrostatic Precipitation (2 units)
Nitrogen Oxides	Selective Catalytic Reduction (SCR)
Sulfur Dioxide	Scrubber (wet or spray drier)
Mercury	Low NOx Burner or Carbon Injection

Compliance Deadlines

Administrative Consent Orders	2004 to 2013
Rule	12/15/12 or 12/15/13

Summary of Coal Fired EGU's Air Pollutant Control Status and Future

	<u>Number</u>	<u>MW</u>	<u>When?</u>
1. Well controlled units	3	500	Now
2. Control being installed	4	1420	2004 to 2012
3. Will only burn gas	1	83	2010
4. Being replaced by gas turbine	1	25	2010
5. Uncertain	1	130	2013
Total	10	2158	2004 to 2013

Coal Fired EGUs in NJ (Specifics)

	Capacity	Controls
PSEG – Mercer 1 & 2	630 MW	SCR, Carbon Injection and Baghouses Installed. Scrubbers by December 2010.
PSEG – Hudson 2	630 MW	SCR, Carbon Injection, Scrubber and Baghouse by December 2010.
City of Vineland	25 MW	To be shut down by Dec 2010
Conectiv/Calpine Deepwater	83 MW	LNB and Baghouse; switch to NG in 2010

Coal Fired EGU in NJ (cont.)

	Capacity	Controls
BL England 1	130 MW	ESP & SNCR now. Carbon in 2012. Scrubber & SCR in 2013.
BL England 2	160 MW	ESP, SNCR, Scrubber, Carbon Injection now. SCR in 2012.
Carney's Point Unit 1 & 2	250 MW	LNB, SCR, scrubber and baghouse.
Logan Unit 1	250 MW	LNB, SCR, scrubber and baghouse.

Current High Electric Demand Day (HEDD) Rule

- HEDD units are low efficiency, high operation cost electric generating units used during periods of high electric demand
 - 2 phases of Nitrogen Oxide (NO_x) reductions
 - 176 turbines and 8 boilers - approx. 7,800 MW of generation is HEDD
 - Gas and Oil fired
- Phase 1 – about 30% overall NO_x reduction by 5/19/09

Current High Electric Demand Day (HEDD) Rule (cont.)

- Phase 2 – about 60% overall NO_x reductions by 5/1/15 (extension to spring 2017 being considered)

- performance standards for NO_x emissions

- 144 turbines and 8 boilers do not currently comply with the 2015 HEDD emission limits

- approx. 4,630 MW of generation

- Based on 2015 Plan submittals, 16 turbines (400 MW - Kearny unit 10 & 11) are expected to be shut down on 6/1/12 (Application for 196 MW of replacement turbines is pending.)

- Other HEDD units expected to be controlled, replaced, or displaced by DSM.

HEDD Units which must reduce NO_x emissions by 2015/2017

Company	Turbines	Boiler	Total MW
PSEG	102	1	2900
CAG	15	1	460
RRI	24	0	985
RC Cape May	0	1	147
Forked River	2	0	92
Vineland	1	1	48

Compliance Options (HEDD Rule)

- Shut down
 - Replace unit
 - Not replace unit because demand side management of peak load decreases the number of peaking units needed
- Control NO_x emissions from unit
 - Boiler-Selective Non-Catalytic Reduction (SNCR) or Selective Catalytic Reduction (SCR) NO_x emission control system
 - Turbine-High Temperature SCR system
- Put on Emergency Standby
 - For blackouts or brownouts (actual voltage reduction)

Expected Changes to HEDD Rule

- Extend the compliance date from 5/1/15 to 6/1/17 (allow 25 more months to comply)
 - From 4/1/17 through 5/31/17 (part of the ozone season) affected units would only be allowed to operate during MEG alerts
 - Available only to HEDD turbines that currently have 30% or better NO_x emission control
 - Rule proposal in final stages of consideration

Expected Changes to HEDD Rule (cont.)

- Allow HEDD turbines to become Grid Emergency Units (emergency standby unit)
 - Affected units would be exempt from new NO_x emission limits
 - Can only operate during periods of grid power outages (blackout), voltage reductions (brownout), or for necessary testing and maintenance
- Allows high NO_x units to provide emergency power, but not be used as peakers.

Emergency Generators

- NJ Rules Amended in Fall of 2005 (added voltage reduction as an allowed use)
- Clean Engines required for non-emergency Electricity Generation
 - Uncontrolled diesel engines emit 100 times as much NO_x and 5 times as much PM as a new combined cycle turbine
 - Controlled diesel engines (SCR equipped) may be used for peaking

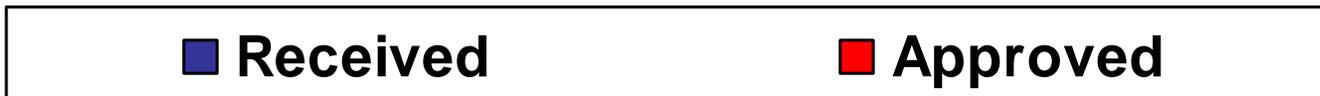
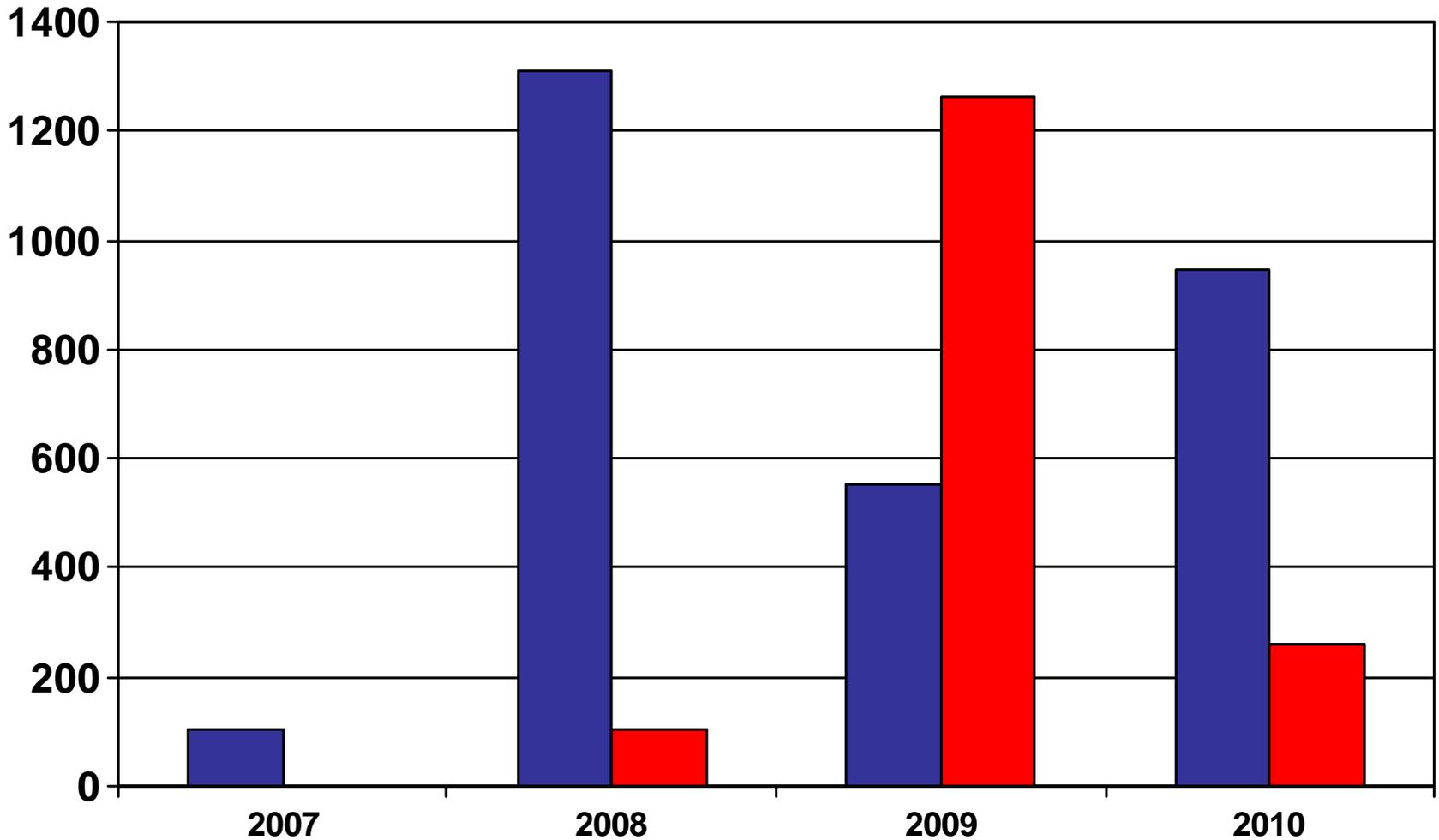
Emergency Generators (continued)

- Emergency Generators exempt from emissions standards, but allowable operations limited to:
 - Normal testing and maintenance
 - Power outage (or loss of mechanical or thermal energy) due to an emergency
 - Voltage reduction issued by PJM (actual voltage reduction)
- Testing/Maintenance prohibited on High Ozone days
 - Use the Air Quality Forecast to determine if Emergency Generator can be used for **normal testing/maintenance**.
<http://www.state.nj.us/dep/aqpp/aqforecast/index.htm>]
- Emergency generators can be used whenever needed **for true emergencies**, regardless of the air quality.

Recent Trend in EGU Permitting

	Application Received (MW)	Approved (MW)
2007	103	-
2008	1310	103
2009	553	1262
2010	946	260 (expected)

EGU Permitting in NJ (as of June 2010)



List of Pending EGU Applications

Facility	Type	Capacity
Camden Plant Holding	Simple Cycle	43 MW
Bayonne Plant Holding	Simple Cycle	43 MW
PSEG – Kearney	Simple Cycle	196 MW
Vineland Electric	Simple Cycle	60 MW
Gateway Energy Sayreville, Middlesex County	Combined Cycle	450 MW
Pur Gen – Linden	IGCC	750 MW

EPA Air Regulations Affecting the Power Sector

	Propose	Final
Tailoring Rule (GHG Permit Thresholds)		May 2010
CAIR Remand Response (SO ₂ and NO _x)	June 2010	Spring 2011
Utility Toxic Controls (MACT)	March 2011	Nov 2011
NSPS for EGUs	March 2011	Nov 2011
BART Determinations (SO ₂ , PM, NO _x)	2011 to	2013

EPA Clean Air Interstate Rule (CAIR) Replacement Rule

- **Purpose** – To reduce the interstate transport of air pollution
- **Air Pollutant Categories and Controls**
 - Sulfur dioxide – scrubber
 - Nitrogen oxides – low NO_x burners, selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR)
- **Compliance Deadline**
 - Depends on attainment deadlines for new National Ambient Air Quality Standards (NAAQS) for ozone and PM

EPA Maximum Achievable Control Technology (MACT) Rules for Hazardous Air Pollutants (HAPs)

- **HAP categories and control devices**
 - Mercury - carbon injection
 - Particulate HAPs - fabric filters (possibly large ESPs)
 - Organic HAPs - good combustion (possibly new burners)
 - Acid Gas HAPs - scrubbers
- **Compliance Deadline:** likely to be 2015.
- **Implications:**
 - 7 of 10 NJ coal boilers will have these technologies before 2015. (1 unit to burn gas, 1 unit to be replaced with gas turbine, 1 unit uncertain).
 - Many of the smaller units in other states may shut down, rather than install controls (30% of units?, 10% of MW?, 5% of annual capacity?).

EPA National Ambient Air Quality Standards Anticipated NAAQS Implementation Milestones

Pollutant	NAAQS Promulgation Date	Designations Effective (approximate date)	110(a) SIPs Due (3 yrs after NAAQS promulgation)	Attainment Demonstration Due	Attainment Date
PM2.5 (2006)	Sept 2006	Dec 2009	Sept 2009	Nov 2012	Nov 2014/2019
PM2.5 (2011)	Oct 2011	Dec 2013	Oct 2014	Dec 2016	Dec 2018/2023
Ozone	Aug 2010	Aug 2011 (based on 2008-10 data)	Aug 2013	Dec 2013 (to be proposed)	Dec 2017 (Moderate)
SO2 (primary)	June 2010	July 2012	June 2013	Jan 2014	July 2017

New 1-hour Sulfur Dioxide Health Standard 75 ppb

- Adopted – June 2, 2010
- Attainment – January 2014
- Example of Coal EGU that exceeds this health standard
 - Portland Power Plant in PA – 400 MW, burning approx. 2% sulfur coal, no scrubbers
 - NJDEP petitioned EPA to reduce emissions

Comparison of Old Coal-Fired Boiler and New Gas Turbine

	Vineland Municipal Electric Utility (VMEU) Existing Unit 10	Vineland Municipal Electric Utility (VMEU) New Unit 11
Fuel	Coal	Natural Gas
Maximum Heat Input	357 MMBtu/hr	590 MMBtu/hr
Generating Capacity	25 MW	64 MW
SO2 Emissions	479.7 lb/hr	0.8 lb/hr
NOx Emissions	0.45 lb/MMBtu	0.01 lb/MMBtu
	160 lb/hr	5.4 lb/hr
TSP / PM-10 Emissions	30 lb/hr	5 lb/hr
Mercury (Hg) Emissions	0.018 lb/hr	0.000163 lb/hr

Comparison of Old Coal-Fired Boiler and New Gas Turbine

