



Indian River Generating Station Emissions Reduction Presentation

DNREC – Rulemaking Process

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- NRG/Indian River – Who are we?
- Delaware's Energy Future
- Emissions Reduction Efforts
- State-Specific Rulemaking

Indian River Generating Station - NRG Energy, Inc.

- Located in Millsboro, Sussex County
- 171 employees
- 805 MW total capacity and reliable energy
 - Four coal-fired steam boilers @ 788 MW
 - One oil-fired combustion turbine @ 17 MW
- Dispatched into PJM
- 72% of Delaware's coal-fired capacity
- Delaware's lowest cost energy resource

Developing new regulations to reduce power plant emissions, keep the lights on, and keep energy affordable is challenging

- Regulations required to develop SIP to meet new NAAQS standards to meet CAIR and CAMR requirements
- Conflicting priorities - emissions vs. energy cost vs. reliability
 - Regulations impact Delaware's generation, which is primarily coal
 - Proposed regulations will impact ongoing coal plant viability, while driving a decrease in fuel diversity, with reliability/cost implications and increasing reliance on natural gas, potentially neutralizing Delaware's economic advantage
- Delaware's increasing need for reliable low cost energy
- Cost of emissions controls vs. benefits
- Lack of cost recovery for Delaware's merchant plants in a deregulated market is an issue where significant controls are required

Meeting the energy needs of the public - a difficult balance of three priorities:

- **Affordability/Stability** – Assure affordable and stable energy
- **Reliability** - Assure energy is available when needed 24/7
- **Environmentally Friendly** – Make usable energy while minimizing impacts to the environment through emissions reductions and conservation

Post Commissioning - Emissions Reduction Investments (after plant was in service)

- Installed Electrostatic Precipitators
 - Removes particulate matter 99.5%
- Tall Stack & Low Sulfur Coal Procurement
 - Reduces sulfur dioxide 65%
- Low NOx Burner/Over-Fire Air Technology
 - Reduces nitrogen oxides 55%
- Selective Non-Catalytic Reduction (SNCR)
 - Removes nitrogen oxides 30%
- Already invested > \$100MM in emissions reduction projects
- Facility is operated in compliance with all Federal and State regulations
- NRG's philosophy: proactive; realistic; engage in constructive dialog with stakeholders

Indian River Solutions – Based on balancing three objectives:

- **Environmental Responsibility**
 - Continue to operate in compliance, with first priorities on safety and environmental performance
 - Seeking technology solutions to improve performance
 - Focus on state SIP requirements
- **Reliability Obligations**
 - Assure units are available when needed to support existing requirements and growth in State
 - Maintain a business strategy to assure the plants can compete and survive in today's energy markets
- **Low Cost Energy Provider**
 - Utilize available fuels and technology to make low cost energy
 - Continue to use America's most abundant and lowest cost fuel resource: coal
 - Balance capital costs, operating costs, and emissions reductions investment costs to minimize price of power

- Emissions Reduction Initiative
 - Result: cost-effective reductions that make sense for compliance with new state and federal emissions regulations (suggested reductions as specified below in this presentation)
- Repowering Initiative
 - Result: compliance with new emissions regulations, increased output and efficiency, base load generation for Delaware's future (suggested reductions as specified below in this presentation)
- Shut Down
 - Result: if compliance with proposed emissions regulations requires such significant investment that it will be uneconomical for the facility to continue operation, then the plant will be forced to shut down when regulations take effect

Why “Shutting Down” is not an option for Delaware

- Delaware needs more power
 - Demand is increasing at ~2-3% per year
 - Population has grown over 17% since 1990
 - Population in Sussex County grown over 38%
 - No new power projects on the horizon in PJM
- Delaware needs to stabilize electric rates
 - 59% electric rate increase announced
 - Natural gas – limited availability, expensive and volatile
 - Oil – high price volatility
 - Coal – over 250 year domestic supply, lower cost fuel at more stable prices

Option 1 – Emissions Reduction Initiative



- Emissions limits to be established by proposed regulations should be set at levels consistent with the reductions shown on the following slide
- The proposed emissions reductions reflect the levels that can be achieved while keeping Indian River economically viable as a major employer and taxpayer in Delaware
- Emissions limits are presented in terms of % reductions to emissions rates

Option 1 – Emissions Reduction Initiative (continued)



- Sulfur Dioxide: Target 70% Reduction
 - Evaluate alternative fuels to gain early emission reductions
 - Reduce Indian River Emissions 70% (from 2003 rates) by 2012
- Nitrogen Oxides: Target 40% Reduction
 - Install/upgrade certain equipment to reduce Indian River Emissions 40% (from 2003 rates) by 2008
- Mercury
 - Reduce Hg emissions based on commercially available technology – still evolving

Facility SO₂ Estimated Reduction: 70%

- Project Duration: Current to 2012
 - PRB conversion - Units 1, 2 & 3
 - 60% PRB/40% Bituminous blend
 - Estimated Reduction: 45%
 - In-duct scrubber - Units 1, 2 & 3
 - Estimated Reduction: 50%
 - Dry scrubber - Unit 4
 - Estimated Reduction: 70% - 75%

Facility NO_x Estimated Reduction: 40%

- Project Duration: 2006 to 2008
 - Upgrade Low NO_x Combustion Systems on all units
 - Estimated Reduction: 15%
 - SNCR - All units
 - Install new SNCR - Units 1 & 2
 - Estimated Reduction: 30%
 - Upgrade SNCR - Units 3 & 4
 - Estimated Reduction: 15%

- Mercury
 - Hg mitigation/monitoring technology is still in development and not yet proven (based on EPA/DOE assessment)
 - Facility Expects Hg Reduction with:
 - In-duct scrubber - Units 1, 2 & 3
 - Dry scrubber - Unit 4

- NRG has identified Indian River as a candidate for IGCC (Integrated Gasification Combined Cycle) or other repowering options
- NRG has completed a feasibility study for Indian River and two other sites in the Northeast. We have begun a “phase 2” analysis to test the economic and technical feasibility of clean coal technology for Indian River

We will determine this year whether to proceed with a clean coal repowering at Indian River

- Clean Coal Facts
 - Optimal size ~650 MW
 - Estimated cost @ \$1,600 - \$1,800/kW: \$1 Billion to \$1.3 Billion
 - Consistent with timeframe for emissions reduction proposal, but construction will take 4 years, in addition to project development and permitting
 - Possible to maintain some or all of existing facility with clean coal repowering

- Clean Coal Emissions Estimates (based on the DOE definition of Clean Coal)
 - SO₂: 98% removal
 - NO_x: 0.1 #/MMBtu
 - Hg: Potential for 90+% reductions
 - CO₂: Pre-combustion removal potential

■ Emissions Reduction Initiative

- Proposed emissions reductions are achievable within the time frames listed without compromising reliability
- Includes backend control technology and cap-and-trade provisions to meet compliance obligations where additional controls are not feasible
- Additional reductions are not feasible as plant ceases to be financially viable in the absence of material incentives supporting backend control capital costs
- Incremental costs for next level technology exceed additional reduction benefit achieved

■ Repowering Initiative

- NRG will continue to evaluate clean coal technologies for Indian River
- Long-term contract and other incentives are necessary to underpin a viable clean coal repowering

- National Program Benefits
 - Air quality is a national issue with interstate emissions transport and regional results
 - Efforts are more effective if addressed within one unified national program such as CAIR
 - National programs “level the playing field”, set uniform targets and timelines and provide certainty for generation planning
 - Acid Rain and NOx Budget cap-and-trade programs are successful and optimize reduction efficiencies
 - EPA has designed CAIR and CAMR to meet NAAQS and maintain our nation’s energy infrastructure

- State rulemaking must recognize and work in concert with existing federal rules
 - Programs that ignore federal standards or eliminate key components undermine federal programs and their effectiveness
 - Programs should avoid a compromise of the state or region's energy reliability, restrictions on interstate commerce, and local impacts on the State's economy

Delaware Rulemaking Components for the Implementation of SIP for CAIR and CAMR

- **Targets/Timelines/Standards**
 - Delaware rulemaking should follow CAIR targets and timelines
 - Reduction targets and timelines should be achievable, reasonable, and yield cost effective benefits
- **Federal Provisions**
 - Emissions trading such as Acid Rain and NOx Budget and defined in EPA's CAIR and CAMR rulemaking must be retained – market forces have demonstrated history of being most efficient way to achieve emissions reductions

- Technology Expectations
 - Requirements should be left to the sources – to allow businesses to implement the most efficient programs
 - Solution should be commercially available, proven and economically feasible for the given source
- Emission Reduction Targets
 - Emission reductions should be quantifiable
 - Targets should be defined in terms of % reductions to emission rates
 - Targets should be based on CAIR allocations for SO₂ and NO_x and CAMR for Hg

- Delaware Rulemaking should follow national and federal programs targets and timelines
- State rulemaking should not undermine existing federal programs
- Significant sums have already been spent at Indian River for emissions reductions
- NRG has proposed further significant emissions reductions (involving additional material capital expenditures) that are achievable and do not compromise energy reliability
- NRG is evaluating repowering as an alternative option