conectiv energy

A New Generation of Energy

Multi-Pollutant Regulation Development

Edge Moor Power Plant

Regulatory Stakeholders Meeting

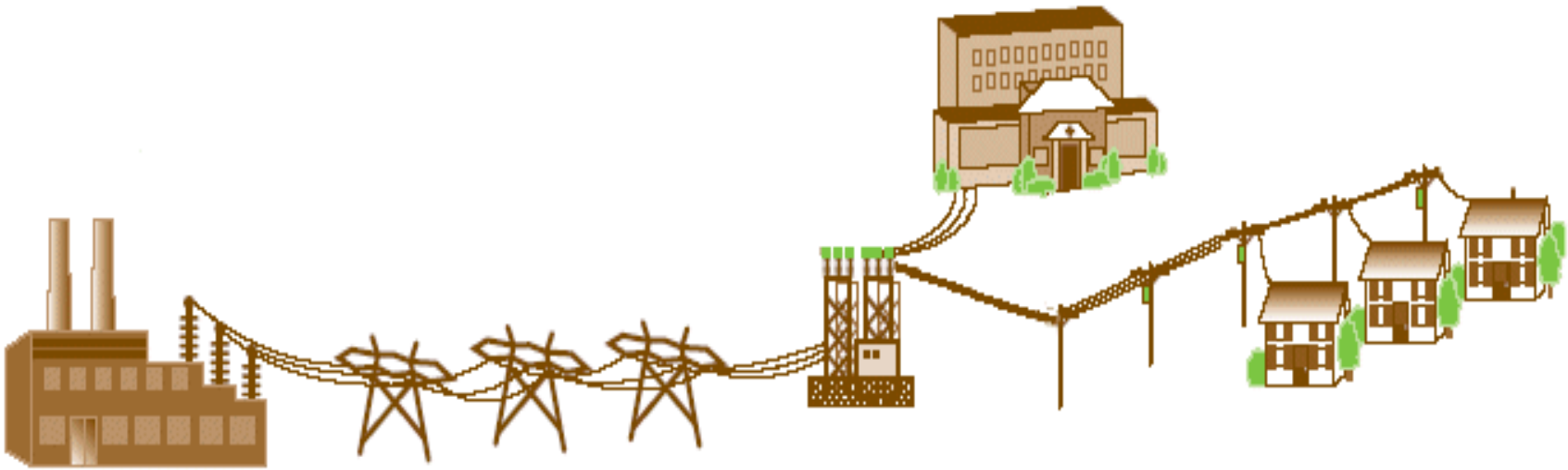
March 9, 2006

Agenda

- Overview of the Deregulated Marketplace
- Background of Edge Moor Power Plant
- Technology Assessment
- Results of Analysis
- Conectiv Energy Proposal

The Deregulated Marketplace

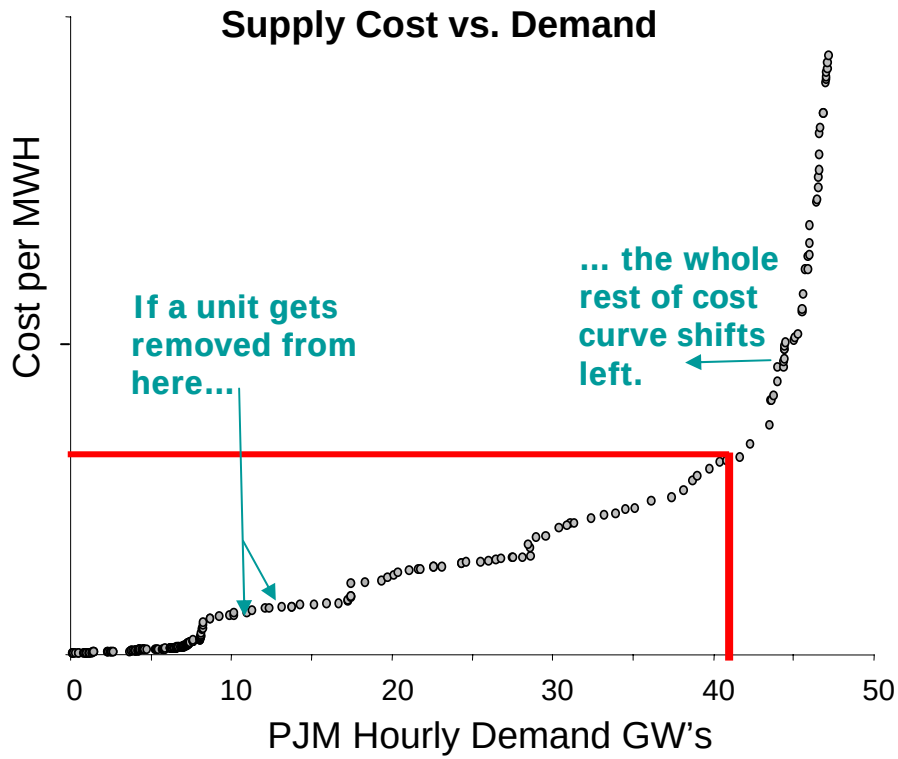
- Electric Generation (Conectiv Energy) – Deregulated in 1999
  - Sells to the Deregulated Wholesale Market Through PJM
  - Each unit must run profitably or face shut down
- Transmission & Distribution (Delmarva Power) – Remains Regulated
  - Tariff Rates set by FERC (Transmission) and DE PSC (Distribution)
  - Rates are set to recover all operating costs and return on investment



Generation Transmission Distribution Customers

The Deregulated Marketplace

- If the owner(s) of Delaware's generating units judged their assets to be uneconomical to operate:
  - Replacement power would be obtained at a higher cost to the consumer



Impacts on Regulated T&D Business

- If the Owner(s) of Delaware's generating units judge their assets to be uneconomical to operate:
  - Transmission congestion would lead to delivery constraints during peak load periods, increased cost and lower reliability
  - The Transmission System would not have sufficient capacity to reliably serve the load during all hours of the year:
    - System is not designed to operate without the presence of local generation
    - Delmarva Peninsula could be subject to periods of brownouts and blackouts.
  - It would become necessary for the regulated utility to construct new major transmission facilities which would take years to permit and build.

Background on Edge Moor Units

Edge Moor – Steam Generation (Boilers)

- EM3 and 4
  - Low Sulfur (≤1%) Bituminous Coal
  - Unit 3: ~84 MW, Built 1954
  - Unit 4: ~154 MW, Built 1966
- EM5
  - Low Sulfur (≤1%) Residual (#6) Fuel Oil
  - ~415 MW, Built 1973
- Significant capital investment has been made to comply with existing regulations
- Units capable of burning Landfill Gas
- Units provide co-generated steam to neighboring industrial facility

Background on Edge Moor Units

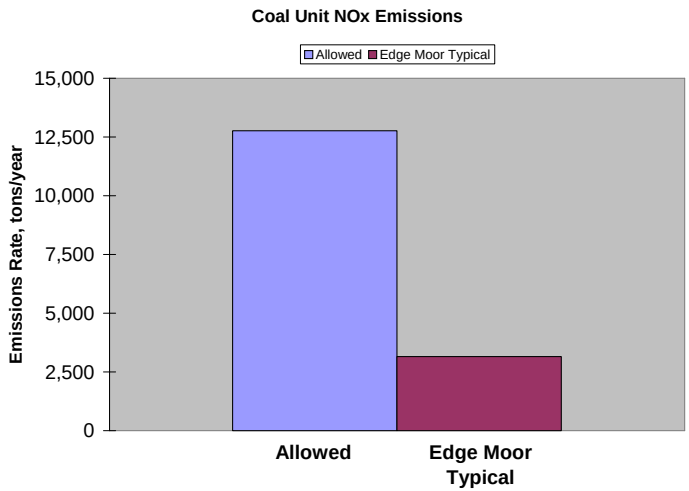
Background on Edge Moor Units

Emission Controls Currently In Use

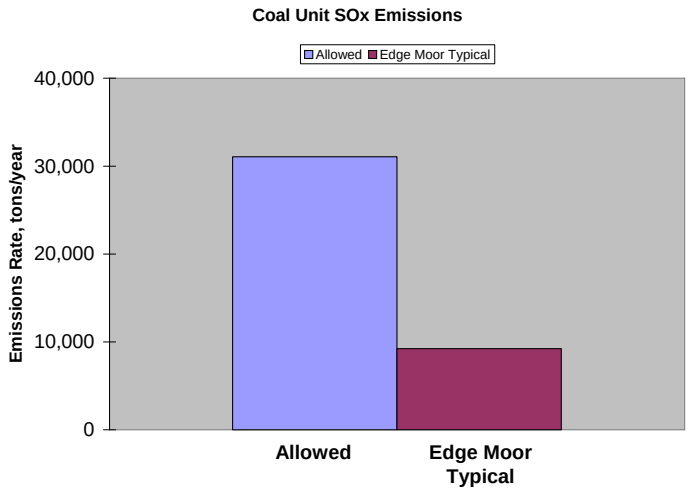
- EM3
  - NOx – Low NOx Burners, Selective Non-Catalytic Reduction
  - SOx – Low Sulfur Coal ($\leq$ 1% S)
  - Hg – Electrostatic Precipitator
- EM4
  - NOx – Low NOx Burners, Over-Fire Air, Gas Reburn
  - SOx – Low Sulfur Coal ($\leq$ 1% S)
  - Hg – Electrostatic Precipitator
- EM5
  - NOx – Low NOx Burners, Over-Fire Air
  - SOx – Low Sulfur #6 Fuel Oil ($\leq$ 1% S)

Edge Moor Emissions Baseline

- Edge Moor Actual Annual NOx Emissions Are ~75 % Below the Allowed Limit



- Edge Moor Actual Annual SOx Emissions Are ~70 % Below the Allowed Limit



Edge Moor Emissions Baseline

NOx	EM3	EM4	EM5
Current RACT Regulation	0.38 lb/MMBtu	0.38 lb/MMBtu	0.45 lb/MMBtu
Typical Emissions	~0.28 lb/MMBtu	~0.23 lb/MMBtu	~0.32 lb/MMBtu
“New Source” Target	0.15 lb/MMBtu	0.15 lb/MMBtu	0.15 lb/MMBtu

SOx	EM3	EM4	EM5
Current Regulation	≤ 1% Sulfur in Fuel	≤ 1% Sulfur in Fuel	≤ 1% Sulfur in Fuel
Permitted Emissions	~1.70 lb/MMBtu	~1.70 lb/MMBtu	~1.0 lb/MMBtu
Typical Emissions	~1.20 lb/MMBtu	~1.20 lb/MMBtu	~0.70 lb/MMBtu
“New Source” Target	0.20 lb/MMBtu	0.20 lb/MMBtu	0.5%S Oil (0.50 lb/MMBtu)

Hg	EM3	EM4	EM5
Current Regulation	None	None	None
Emissions *	~1.19 lb/TBtu	~0.75 lb/TBtu	N/A
Current % Reduction *	81%	79%	N/A

* Note: Based on results of limited, short term stack testing conducted in July 2003.

Technology Assessment

- Technology Based Options for SOx, NOx & Hg
  - Sorbent Injection, Wet and Dry Scrubbers for SOx
  - Low NOx Burners, Over-Fire Air, Gas Recirculation, Gas Reburn, SNCR & SCR for NOx
  - Carbon Injection, Sorbent Injection for Hg
- Fuel Switch Options for SOx
  - Lower Sulfur Coal, Beneficiated Coal
  - Lower Sulfur Oil
- Repowering Option
  - IGCC

Technology Assessment

Evaluation Process

- 115 Options Analyzed – Combinations of Technologies & Fuel Switching
- Options Compared in Terms of:
  - Emissions Reduction Effectiveness/Guarantees
  - Impact on Unit Operations – Availability and Performance
  - Maturity of Technology
  - Implementation Time & Schedule
  - Site-Specific Impacts
  - Business Impact
  - Permit Considerations

Analysis Results – IGCC Repowering

- Emission Rates Out Perform New Source Targets
- Capital Cost: ~$ 1.1 Billion (650 MW Plant)
- Earliest Possible Commercial Operation Date: 2012
- Site Specific Impacts:
  - Installation of IGCC Plant requires demolition of existing units
  - Loss of generation capacity from Edge Moor Units 3, 4 and 5 during entire construction of new plant
  - Use existing Coal Handling and Storage
  - Assumes continued use of Once-through Cooling System
  - Limited real estate contributes to low construction productivity and higher material costs
  - No longer able to burn Landfill Gas at Edge Moor
  - Not able to provide steam to neighboring industrial facility during demolition/construction
  - Assumes receipt of applicable permits in a timely manner
  - Conectiv does not consider IGCC a commercially mature option
  - Economic viability requires Power Purchase Agreement which guarantees Return on Investment

Analysis Results – IGCC Conceptual Layout

Analysis Results – IGCC Conceptual Schedule

Analysis Results – "New Source" Targets

- Scope: EM3 & 4 Wet Scrubbers & SCR
  EM5 SCR & Lower Sulfur Oil (0.5%)
- Emission Rates Meet New Source Targets
- Earliest Possible Commercial Operation Date: 2011
- Site Specific Impacts:
  - Assumes receipt of applicable permits in a timely manner
  - Significant increase in disposal of new Solid Waste Product
  - Significant increase in Water Consumption
  - Limited real estate, phased construction, multiple tie-in outages contribute to low construction productivity and higher material costs
  - No longer able to burn Landfill Gas at Edge Moor
  - High Capital and Operating Cost impacts business viability for entire plant

Analysis Results – "New Source" Conceptual Layout

Analysis Results – "New Source" Conceptual Schedule

Conectiv Energy Proposal

SOx Control:

- Reduce SOx Emissions from EM3 & EM4 through the use of Sorbent Injection Technology
  - Expected SOx Emission Rate: ~0.50 lbs/MMBtu
- Reduce SOx Emissions from EM5 through fuel switching to lower sulfur (0.5% S) fuel oil
  - Expected SOx Emission Rate: ~0.50 lbs/MMBtu
- Commercial Operation Achievable by 2009

Conectiv Energy Proposal

NOx Control:

- Reduce NOx Emissions from EM3 & EM4 through installation of additional layered control technologies of Low NOx Burners, OFA and SNCR.
  - Expected NOx Emission Rate: ~0.2 lbs/MMBtu

- Reduce NOx Emissions from EM5 through installation of additional layered control technologies of Flue Gas Recirculation and SNCR.
  - Expected NOx Emission Rate: ~0.2 lbs/MMBtu

- Commercial Operation achievable by 2009

Conectiv Energy Proposal

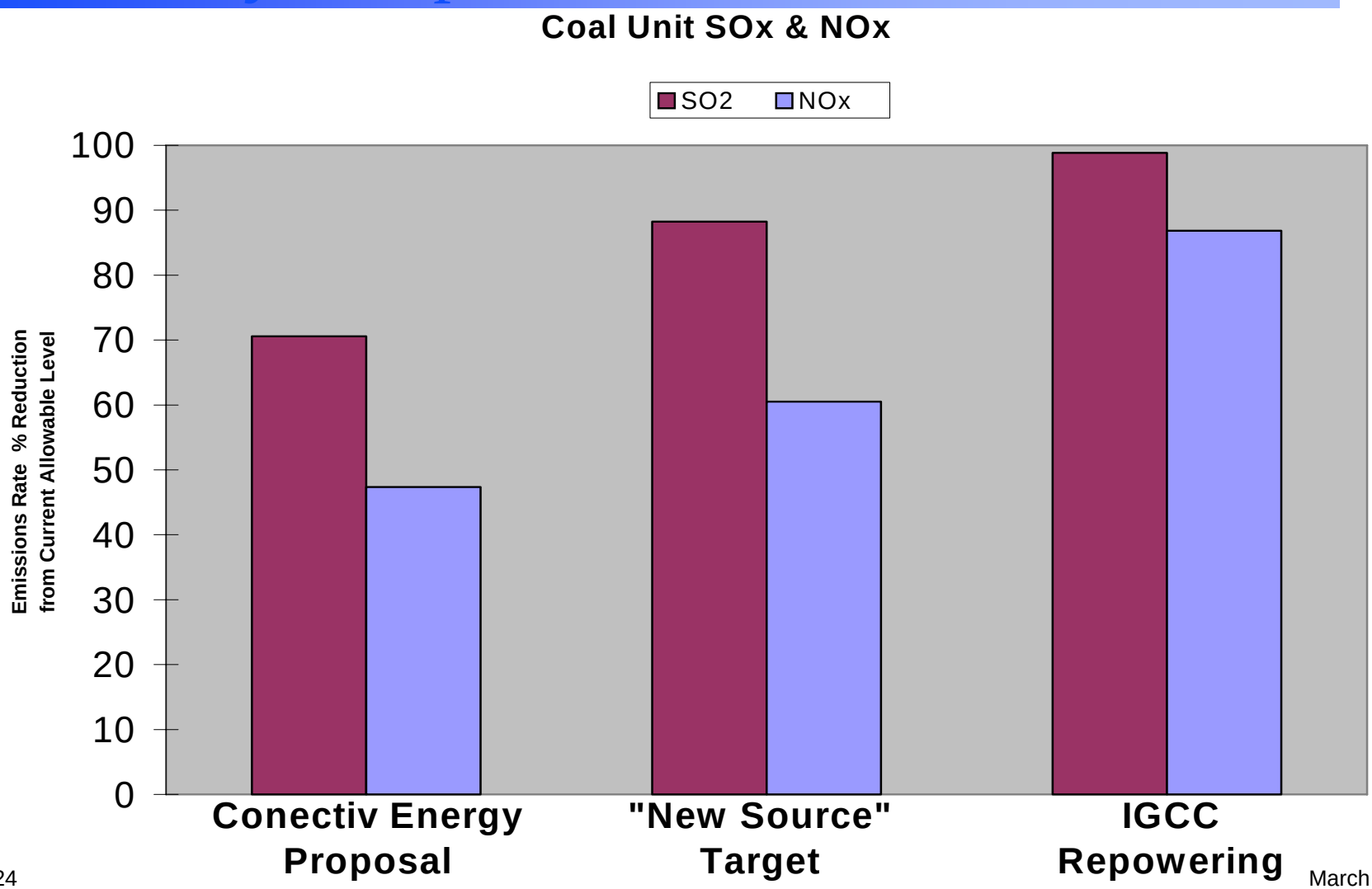
Hg Control:

- Reduce Hg Emissions from EM3 & EM4 by use of existing Electrostatic Precipitators, co-benefits of Sorbent Injection Systems for SOx control and supplemented by Carbon Injections Systems as needed
- Expected Hg Emissions can not be accurately predicted due to variability of Hg content in coal and combustion conditions
- Carbon Injection is not a commercially mature technology
- Commercial Operation achievable by 2009

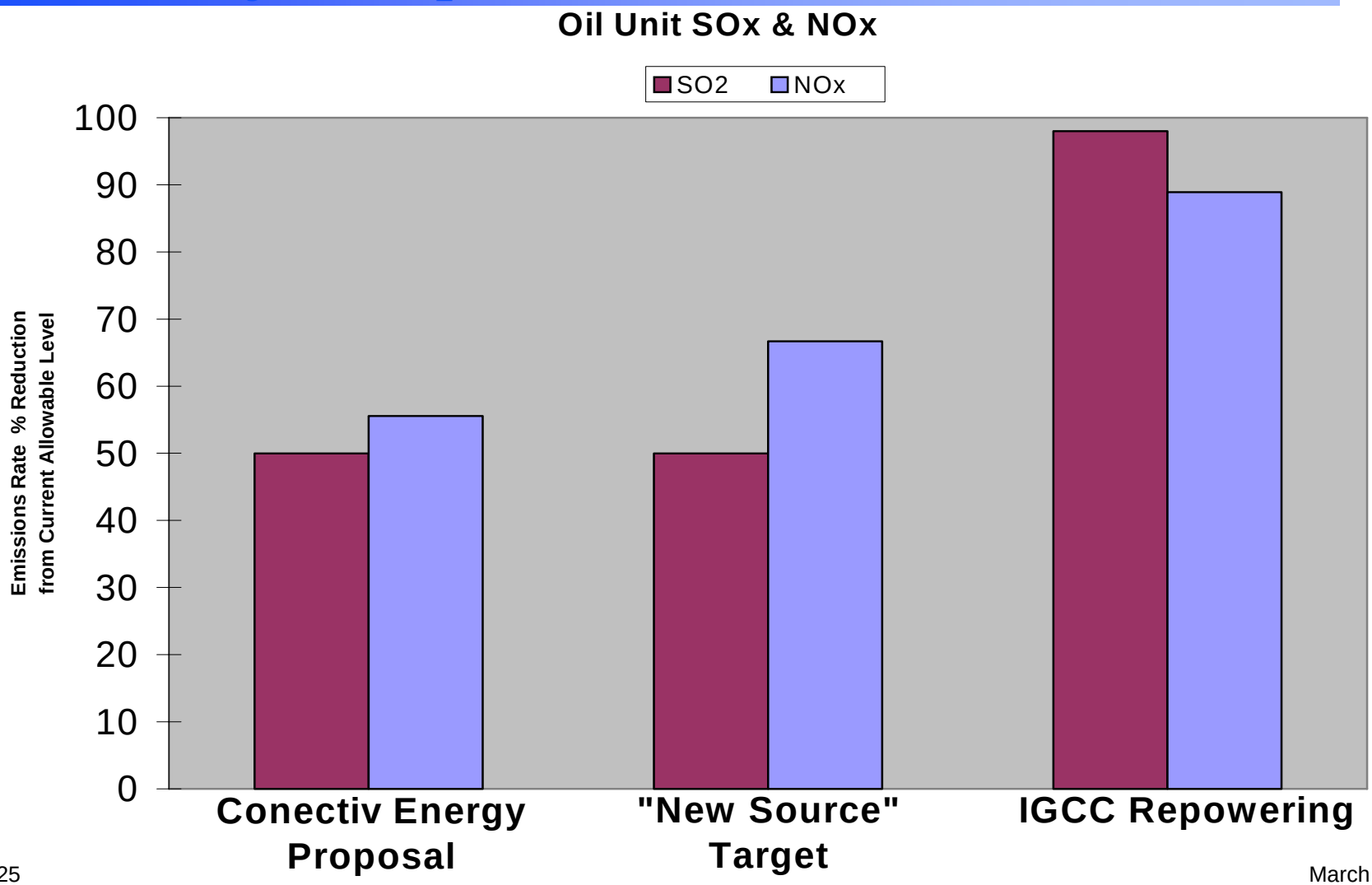
Conectiv Energy Proposal – Conceptual Layout

Conectiv Energy Proposal – Conceptual Schedule

Summary Comparison



Summary Comparison



Summary Comparison

- Conectiv Proposal Benefits Delaware By:
  - All units will have technology based controls which are not mandated by Federal cap and trade programs
  - Substantial reductions from existing allowable limits
  - Earliest possible implementation of emissions control technologies
  - Maintains capability to burn Landfill Gas and provide co-generated steam to neighboring industrial facility
  - Maintains continued operation of Edge Moor Power Plant supporting local jobs, tax revenue and local economy
  - Maintains continued operation of Edge Moor Power Plant which provides low cost electricity and insures transmission system reliability for Delawareans