

# Otter Tail Power Company Coyote Station Efficiency Improvements



Presented to ND Energy  
Development Committee

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## Otter Tail Mission Statement

- To produce and deliver electricity as reliably, economically, and environmentally responsibly as possible to the balanced benefit of customers, shareholders, and employees and to improve the quality of life in the areas in which we do business.

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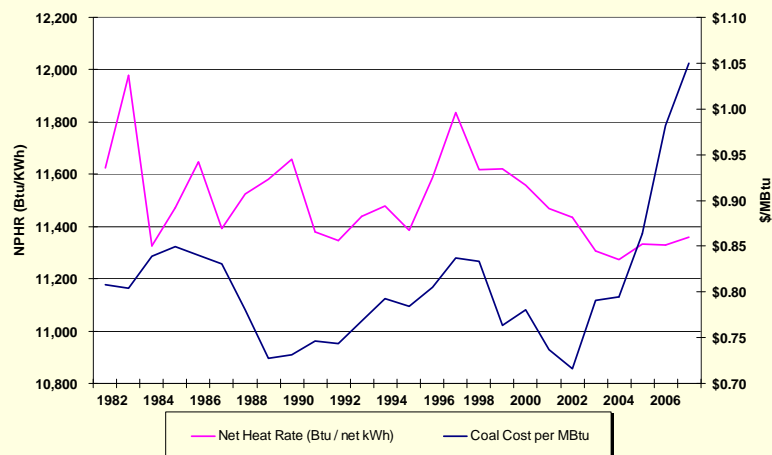
## Background

- Coyote Station is a lignite fired power plant operating at 408 net MW @ 3.2 million lb/hr steam flow
- Coyote Station is co-owned by:
  - Otter Tail Power Co. 35% (Operating agent)
  - Northern Municipal Power Association 30%
  - Montana-Dakota Utilities 25%
  - Northwestern Energy 10%
- Commercial Operation May 1981
- Lignite Fired B&W Cyclone w/Dry SO<sub>2</sub> Scrubber

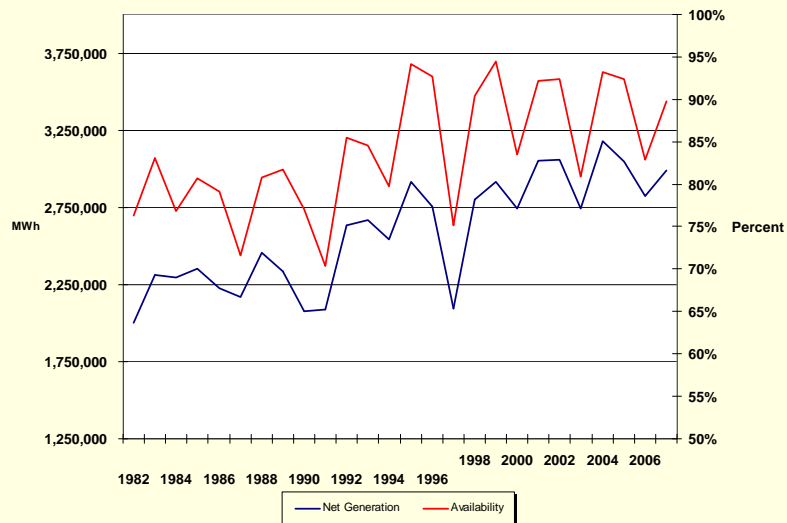
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## Plant Performance

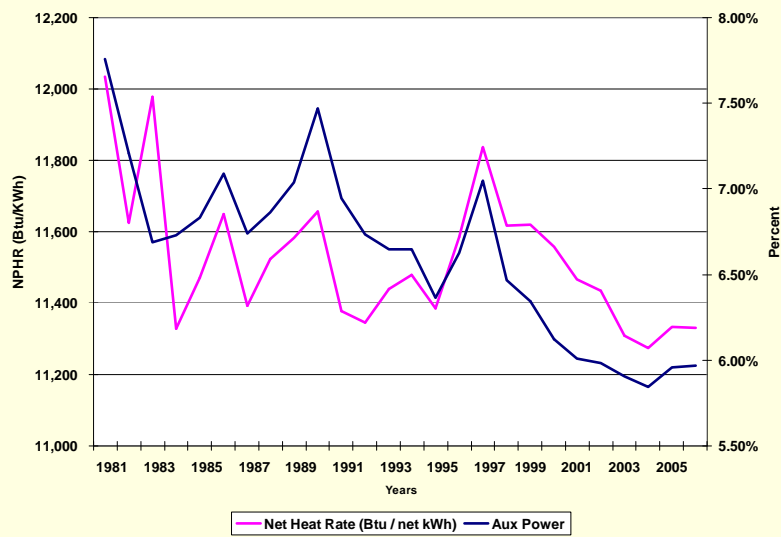
Fuel Costs and Net Plant Heat Rate



## Annual Generation/Availability



## Percent Aux Power Usage/Net Heat Rate



## Operational Practices to Improve Efficiency

- Quarterly boiler high-pressure water wash
- Annual air preheater high-pressure water wash
- Condenser tube cleaning
  - High-pressure water/Chemical
- Chemical Cleaning
  - Annual turbine copper deposit cleaning
  - Five year boiler cleaning
- Three performance engineers on staff

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## Efficiency Improvement Projects

- 1999 - Computerized efficiency monitoring package
- 2003 - New Low Pressure Turbine Rotor
  - \$5,000,000 capital project
  - 2 percent plant efficiency improvement
- 2003/2006 - Control System Replacement
  - Improved reliability
  - Minor heat rate improvement due to more stable control
- 2000-2005 - Feedwater Heater Replacements (4)
- 2005-2009 - Cooling Tower Variable Speed Drives
- 2009 - New High/Intermediate Pressure Turbine
  - \$10,300,000 capital project
  - 4 percent plant efficiency improvement

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## Environmental Upgrades

- Converted original soda ash SO<sub>2</sub> scrubber to lime in 1989 at a cost of \$21.5 million.
- Added Continuous Emissions Monitoring System (CEMS) in 1994
- PO issued for Mercury CEMS in 2007

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## EPA Law Requirements

- Clean Air Act- In compliance
- CAIR- ND not included
  - (clean air interstate rule)
- BART- Coyote not BART eligible
  - (BEST AVAILABLE RETROFIT TECHNOLOGY)
- CAMR- Installing required CEMM 1<sup>st</sup> half of 2008
  - 2009 1<sup>st</sup> reporting year
  - Expecting to get most of required allowances
  - Look at installing necessary equipment
    - Carbon injection
    - Compliance by 2010
  - (clean air mercury rule)

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## Synergies

- Coyote has had discussions with ethanol plant developers, however we do not have room under our air permits to burn the additional coal needed in order to provide the total steam requirements of a 50 mgpy ethanol plant.
- Coyote has had discussions with other interested parties for use of waste heat, such as tree farms and greenhouses.

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## Renewable Energy

- We will meet our MN Renewable Energy Standard (RES-25% by 2025) and our ND Renewable Energy Objective (REO-10% by 2015) primarily through wide application of wind facilities.
- ND tax breaks for wind (property/sales/income taxes) help improve ND's competitive position as it competes for market share of MN's 25% RES.
- OTP installed wind capacity in ND is 21 MW (currently), 60 MW (under construction)
- OTP will adhere to "least-cost" principles and avoid areas of transmission congestion.



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Are there any questions?