

**Minnesota Reliability
Administrator**

**RESOURCE ASSESSMENT
STUDY**

October 23, 2009

Statutory Requirements

2007 Laws, Chapter 136, Art. 4, Sec. 16

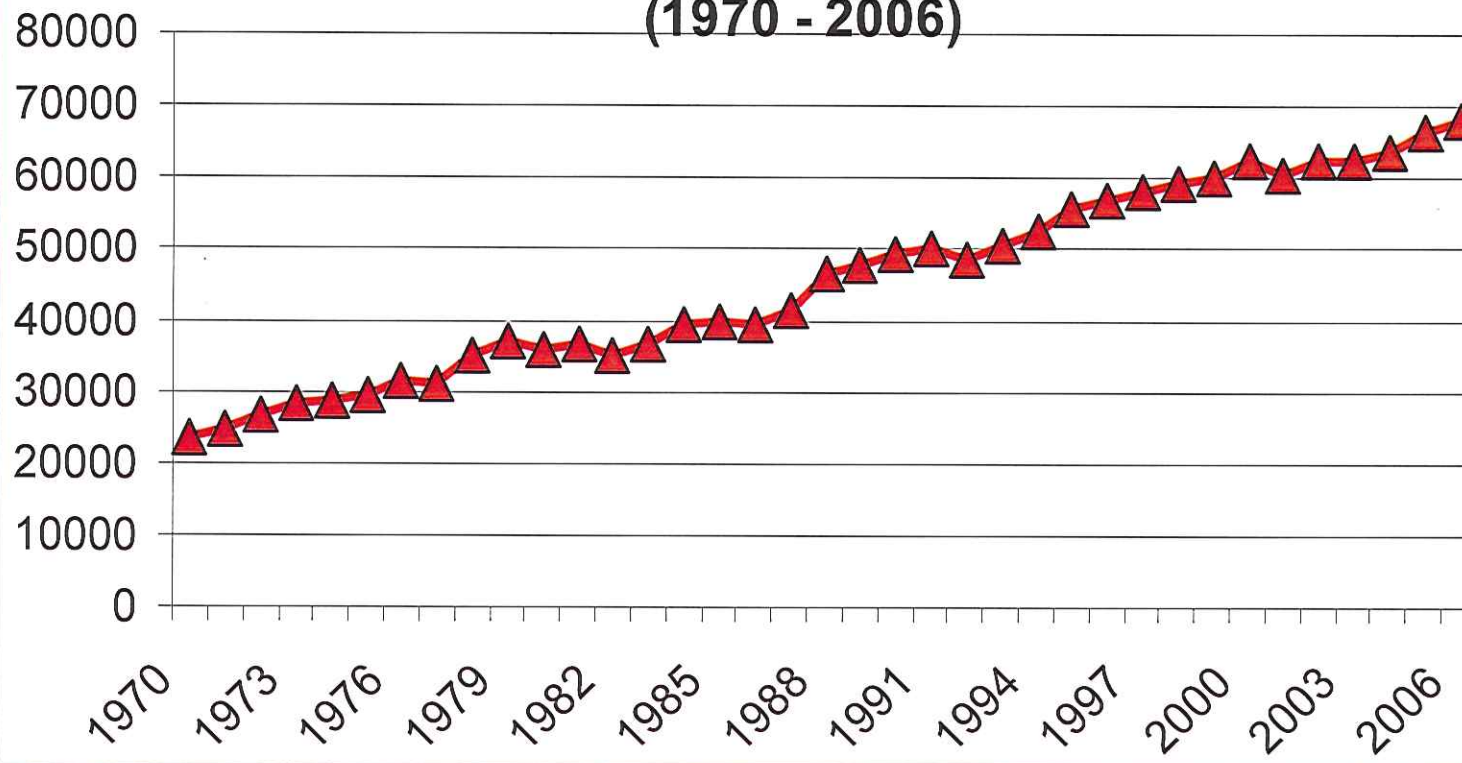
- Assessment of MN's electricity resource needs
 - Through 2025
 - With a focus on baseload resources
- Additional generation and transmission resources
 - To meet the state's renewable energy standard
 - Projected CIP energy savings
- Most recent Minnesota utilities'
 - demand forecasts
 - integrated resource plans
 - transmission projects reports
- Independent projections of supply and demand
 - For 2010, 2015, 2020, and 2025

Base Case Results

Cumulative Generation Additions 2010-2025

Year	Fossil Fuel	Renewables
2010	168 MW	600 MW
2015	1,590 MW	2,200 MW
2020	3,012 MW	3,200 MW
2025	4,139 MW	4,000 MW

Utility-Reported Minnesota Electric Consumption Annual GigaWatt Hours (1970 - 2006)



Study Process

- Technical Review Committee
 - Proposed methods
 - Assumptions
 - Preliminary data and results
- Committee began work July 2008
- 2008 MISO model used

Caveats

- Not a planning document
- Excludes any pending issue before the Legislature or the PUC
- Does not provide recommendations

Structure

■ Generation

- Load forecast—long term
- Base case assumptions established, w/stakeholder input
- Scenarios chosen, w/ stakeholder input

■ Transmission

- Most critical need
- Review of the many planning efforts underway—
Minnesota, Regional, National
- Impact on evolving technologies

Generation Modeling

- Model
 - Used *Strategist* software
 - MISO provided subregional base case
- Assumptions and Criteria
 - Formulated set of proposed assumptions
 - Stakeholders reviewed and commented
 - Incorporated Stakeholder comments

Starting Point

- Insert existing facilities
- Included approved facilities
- Biggest utilities included
- Menu of available technologies
 - Nuclear not allowed
- Established Base Case assumptions
- Model picks resources to meet demand and minimize costs

Key Assumptions

- Natural Gas costs
 - Range from \$7 to \$14 per million Btu
- Carbon Costs
 - Range from \$4 to \$45 per ton
- Capital Costs
- Unit Sizes

Scenarios and Contingencies

■ Scenarios:

- MN RES and CIP 1.5% compliance
- MN RES and CIP 1.0% compliance
- National RPS

■ Contingencies:

- High/Low fuel prices
- High/Low capital costs for new facilities
- Range of carbon costs

Base Case Scenario

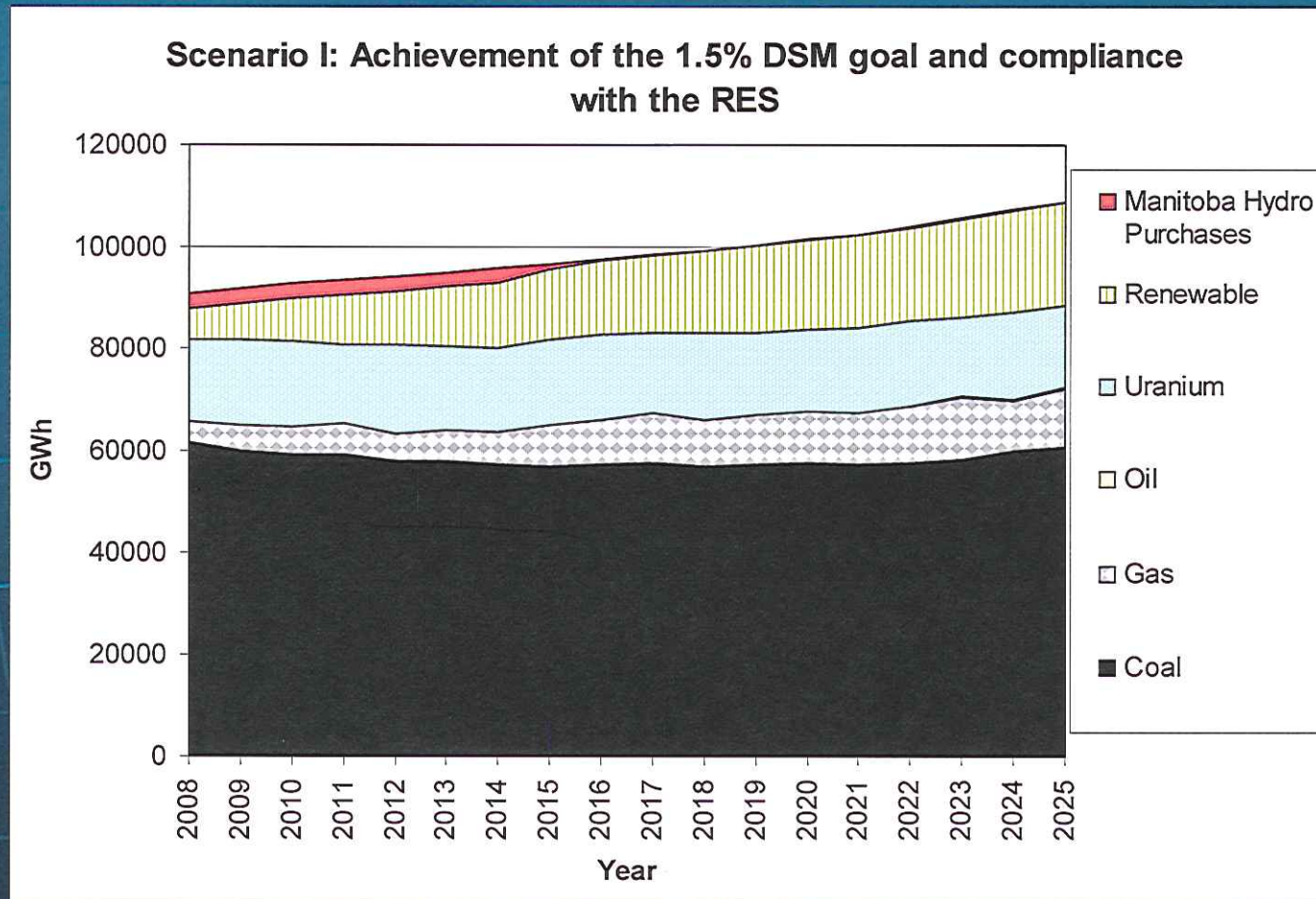
■ Assumptions:

- MN RES and CIP 1.5% compliance
- Gas Cost Starting at \$9/million BTU
- Carbon Cost at \$17/ton
- Coal plants, 500 MW, \$3,000/kW capital cost

■ Result:

- 1 Coal Plant Selected

Base Case Scenario



Modeling Results

- 57 scenarios/contingencies were examined
- Between 0 and 9 coal plants were selected, depending on scenario

Questions?

- Bill Glahn
 - Director, Office of Energy Security
- 651-296-9325
- www.energy.mn.gov



