Montana-Dakota Utilities Co.

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Wind Resource Modeling

Case No. PU-10-124

Purpose of Additional Analysis

Discuss modeling assumptions and results comparing Montana-Dakota's wind investments to available least cost options.

Least Cost Modeling

- EGEAS (Electric Generation Expansion Analysis System) model developed by EPRI (Electric Power Research Institute).
- Resource expansion model with 20 year study horizon and 50 years of costs.
- Model determines least cost solution of identified needs with available resources (existing and proposed).

2009 IRP Model

Closely represents the economic conditions and alternatives that Montana-Dakota had available at the execution of the Diamond Willow II and Cedar Hills projects.

Big Stone II included in 2009 IRP model.

MISO energy prices were $40 per MWh off-peak and $60 per MWh on-peak.

Adjustments to 2009 IRP Model

Removed the three wind projects as in-service or committed resources. The three wind projects available to model for selection at their actual installed cost.

20 years of costs were used to match the life of the wind project investments.

Site Specific Wind Alternatives	Size (MW)	Capital	Capital per kW	In-service Available
Diamond Willow I	19.5	$39.4 Mill	$2,020	Jan. 2009
Diamond Willow II	10.5	$25.4 Mill	$2,419	June 2010
Cedar Hills	19.5	$47.4 Mill	$2,431	June 2010

Scenarios

First Scenario – Least cost with and without Big Stone II and no in-service or committed wind projects.

Second Scenario – Least cost with and without Big Stone II committing the wind projects not selected in First Scenario.

Cost Difference between scenarios represents the additional revenue requirements for wind project investments over 20 years versus least cost alternative.

Results

- First Scenario
  - With Big Stone II – no wind projects selected
  - Without Big Stone II – DWI selected
- Second Scenario
  - With Big Stone II – DWI, DWII and Cedar Hills committed resources
  - Without Big Stone II – DWII and Cedar Hills committed resources

Results

First Scenario

Case	Net Present Value*
With Big Stone II	$1,439.8 Mill
Without Big Stone II	$1,370.5 Mill

Second Scenario

Case	Net Present Value*	Percent Increase
With Big Stone II	$1,481.7 Mill	2.9%
Without Big Stone II	$1,386.9 Mill	1.2%

* Net Present Value based on 20 year life in 2008 Dollars

20 year annual levelized cost adder to North Dakota customers for Diamond Willow II without Big Stone II is $375,000 per year.

Sensitivity - $20 and $40 per MWh MISO Energy Prices

First Scenario

Case	Net Present Value*
With Big Stone II – no wind	$1,410.1 Mill
Without Big Stone II – no wind	$1,314.6 Mill

Second Scenario

Case	Net Present Value*	Percent Increase
With Big Stone II	$1,458.7 Mill	3.4% (Original 2.9%)
Without Big Stone II	$1,337.9 Mill	1.8% (Original 1.2%)

* Net Present Value based on 20 year life in 2008 Dollars

Sensitivity – 25 Year Book Life

First Scenario

Case	Net Present Value*
With Big Stone II – no wind	$1,648.7 Mill
Without Big Stone II – DWI	$1,593.5 Mill

Second Scenario

Case	Net Present Value*	Percent Increase
With Big Stone II	$1,675.7 Mill	1.6% (Original 2.9%)
Without Big Stone II	$1,599.6 Mill	0.4% (Original 1.2%)

* Net Present Value based on 25 year life in 2008 Dollars