2009 NOS Regional Economic Benefit Analysis Summary

Strategy Integration

April 6, 2010

Preliminary Results for Discussion Purposes Only

REBA and NOS

- The Regional Economic Benefit Analysis (REBA) studies the economic impacts to the Northwest (and WECC) of proposed system reinforcements resulting from the NOS Cluster Study.
  - REBA is a separate analysis from the commercial analysis (CIFA).
  - REBA is a factor in the final NOS rolled-in rate determination.

Scope of Study

- The study employed an hourly power system simulator to assess the benefits and impacts of adding the 2009 NOS generation
  - There was considerably less generation in the 2009 NOS than the 2008 NOS
- The benefits and effects to be identified include:
  - Is there a reduction in future variable production costs (fuel and variable O&M) resulting from system operational changes with the addition of the 2009 NOS generation?
  - What is the effect on BPA's internal flowgate loadings with the 2009 NOS generation additions?
  - Are there significant changes in production costs and internal flowgate loadings due to the imposition of carbon dioxide costs?

Assumptions

- Precedent Transmission Service Agreements (PTSAs) were categorized as new generation, existing generation and other uses
- The study models the Western Interconnection as a ‘single-owner’ system, seeking an overall optimal operation (minimizing cost)
- Variable costs for wind-powered electricity are assumed to be negligible
- Production Tax Credit is not taken into account
- The study dispatches thermal generation based on incremental cost and not offered price (no fixed cost recovery)

Assumptions-Continued

- Path loadings were considered high if hours are at or above 75% of the path's limit
- The study assumes all lines and voltage support are in service at all times
- The study assumes 2002 hydro conditions (near median), expected loads for 2015 timeframe, and typical wind based on National Renewable Energy Laboratory data
- Forced outages of generators and transmission were not modeled

2009 NOS Generation

Generator Name	Type	MW	Start	End	Bus
NOS-09 Harney 115	Wind	60	12/01/09	12/01/39	Harney 115
NOS-09 Garrison 500	Other	100	01/01/09	01/01/14	Garrison 500
NOS-09 Slatt 500	Wind	100	12/01/11	12/01/16	Slatt 500
NOS-09 Bdman 115 A	Wind	10	02/01/09	08/01/25	Boardman 115
NOS-09 J Day 500 A	Wind	400	01/01/10	01/01/15	John Day 500
NOS-09 Midway 230	Hydro	150	01/01/11	01/01/16	Midway 230
NOS-09 Rocky Rch 230	Other	125	01/01/10	01/01/15	Rocky Reach 230
NOS-09 Dalreed 230	Other	8	03/01/09	03/01/14	Dalreed 230
NOS-09 Wdlnd Tp 230	Hydro	88	05/01/09	07/01/12	Woodland Tap 230
NOS-09 Longview 230	Thermal	12	05/01/09	05/01/14	Longview 230
NOS-09 FCRPS	Hydro	13	10/01/11	10/01/21	FCRPS
NOS-09 J Day 500 B	Wind	91	06/01/09	02/01/19	John Day 500
NOS-09 McNary 500	Wind	200	12/01/12	12/01/17	McNary 500
NOS-09 Garrison 500B	Coal	14	01/01/10	01/01/15	Garrison 500
NOS-09 Vantage 230	Other	4	10/01/12	10/01/19	Vantage 230
NOS-09 Spearfish 115	Hydro	6	01/01/13	01/01/18	Spearfish 115
NOS-09 Alcoa 115	Thermal	25	10/01/11	10/01/16	Alcoa 115
NOS-09 Ch Joe 500	Hydro	25	10/01/11	10/01/16	Chief Joseph 500
NOS-09 J Day 500 C	Hydro	25	10/01/11	10/01/16	John Day 500
NOS-09 Grand Coulee	Hydro	25	10/01/11	10/01/16	Grand Coulee Contig
NOS-09 Bdman 115 B	Wind	72	01/01/10	01/01/24	Boardman 115
Resources Added for 2009 NOS		947			
Resources Assumed Existing		606			
Total NOS Resources		1553			

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Cases Studied

- Impact of adding the 2009 NOS generation
  - No other generation added beyond the 2009 NOS resources.
- Impose a $5/MWh wheeling charge on all power moving into and out of the Northwest region
  - Reflects inter-balancing authority hurdles
- Carbon dioxide scenarios
  - $22, $33 and $45 per ton

Generation Addition Observations

- The 2009 NOS generation additions result in substantial production cost savings. About 30% of production cost savings occur in the Northwest, while over 60% accrue to the Southwest
- The 2009 NOS generation projects added were in the same geographical area as the bulk of 2008 NOS resources, resulting in a lack of wind-regime diversity
- At peak wind output, most of the Northwest fossil generation has already been displaced by the 'older' wind generators, leaving the new wind to displace out-of-region generators
- At times of low wind in the Oregon-Washington wind zones, the new generation projects offer no diversity and only exacerbate operational problems

Wheeling Charge Observations

- Placing a $5/MWh wheeling charge on all interfaces between the Northwest and other regions increases inter-regional price disparities and price volatility.
- Flows across all external interfaces are reduced significantly.
  - It costs $10/MWh to move power from Wyoming to the Northwest and then to California
- Locational marginal prices are reduced in the Northwest, increased in the Southwest.

CO2 Observations

- Imposition of carbon dioxide costs in the dispatch calculation results in significant (10-20%) reductions in CO2 emissions
- Thermal fuel costs increase about 4-12%
- This emissions penalty represents about 60% of variable production costs
- Congestion is reduced on most paths and flowgates, particularly out of coal-producing regions and into California

Summary

- There were notable impacts on congestion and production costs
  - Congestion on the West of John Day transmission flow gate more than doubled
- Most of the production costs savings occurred in the Southwest; approximately a third in the Northwest
- CO2 emissions decreased by about 10% with a $33/ton cost and by about 20% with a $45/ton cost