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## MEMORANDUM

**TO:** Council Members

**FROM:** John Fazio, Senior Power System Analyst

**SUBJECT:** Analysis of Electricity Oversupply

Electricity oversupply occurs when the minimum generation of a power system exceeds firm load and secondary sales markets. The minimum generation for the NW power system is set by minimum turbine flow constraints, snow-melt runoff volume and must-run non-hydro resources. Secondary sales include the displacement of more expensive non-hydro resources in both the Northwest and the Southwest.

Oversupply conditions are not new to the Northwest. Because of the sometimes high volume of runoff (usually in spring) and limited storage behind dams, the region has often experienced times when the power supply has more energy than it needs. Once secondary markets are satisfied, river flows are reduced as much as possible. If oversupply remains, some flow can be diverted through spillways but only up to the biological opinion limits that prevent excessive gas super-saturation.

The focus of this work is to assess the timing and size of potential oversupply conditions. The Wind Integration Forum is working on a set of actions to alleviate oversupply conditions.

Preliminary analysis for 2013 indicates that the magnitude of oversupply, in excess of the NW secondary market, will exceed the *expected SW market* 8% of the time in April, 20% of the time in May and 16% of the time in June. Oversupply will exceed the *intertie capacity* 5%, 12% and 9% of the time for these months. The expected amount of oversupply energy beyond the intertie capacity is about 60,000 megawatt-hours for April, 135,000 megawatt-hours for May and 110,000 megawatt-hours for June. Analysis also shows that as more wind resources are added, the expected amount of oversupply will increase.

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# Briefing on Electricity Oversupply Analysis



# Defining Oversupply

Oversupply conditions occur when minimum system generation exceeds:

- 1) the amount of firm load and
- 2) secondary sales markets

# Secondary Sales Markets

1. Displaceable NW resources
2. Displaceable out-of-region resources

# Likelihood of Oversupply for 2013

<b>% of Time Greater</b>	<b>than SW Market<sup>1</sup></b>	<b>than Tie Capacity<sup>2</sup></b>
April	8%	5%
May	20%	12%
June	16%	9%

<sup>1</sup>Assumed SW market is about 5,500 MW.

<sup>2</sup>Tie capacity assumed to be 7,000 MW.

# Mitigation Action

- Once NW and SW markets are saturated
- **Additional bypass spill** can be provided up to the BiOp cap limits
- This additional spill can “absorb” some of the oversupply

# Magnitude of Oversupply for 2013

	<b>Expected<sup>1</sup> (MW-hrs)</b>	<b>Maximum<sup>2</sup> (MW-hrs)</b>
April	0	300,000
May	160,000	450,000
June	140,000	400,000
<b>Total</b>	<b>300,000</b>	<b>1,150,000</b>

<sup>1</sup>Additional bypass spill energy has been removed from these results.

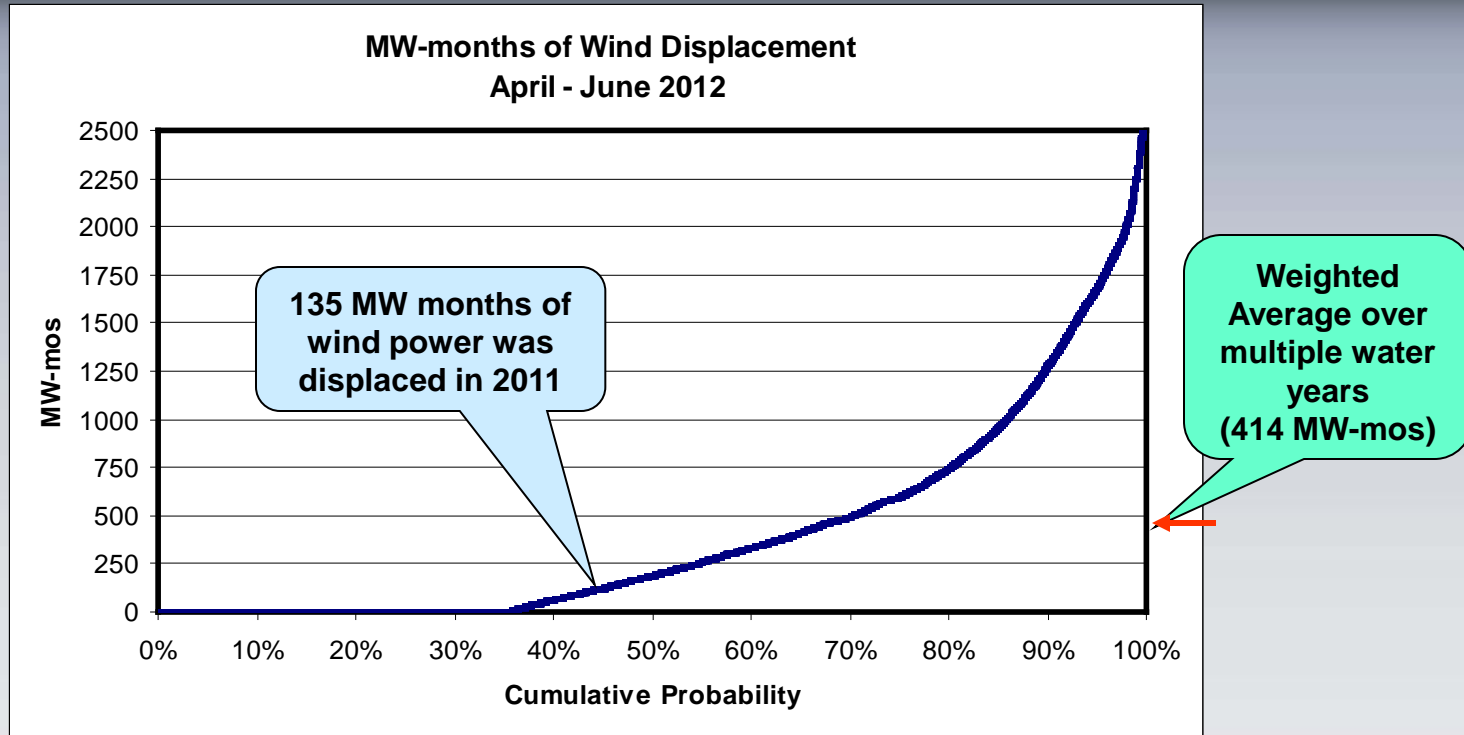
<sup>2</sup>No additional spill is assumed for highest water year.

# BPA's Analysis

- BPA's use of displacement in 2011 was modest relative to expectations based on the analysis in BPA's February 2011 Overgeneration Analysis, *Northwest Overgeneration: An assessment of potential magnitude and cost*.
- BPA refined its oversupply analysis modeling based on its spring 2011 experience. The refined modeling, using forecasted load and resource information for 2012 were then combined with:
  - 70 water years (1929 – 1998)
  - 15 hydro shapes (1996 – 2010)
    - Weekly HLH/LLH shapes
  - 30 synthetic wind generation patterns
    - Consistent with those used in BPA rate case
- Above combinations result in 31,500 games or potential outcomes
- BPA's oversupply modeling estimated the amount of displacement we might expect in 2012 using our forecast of the size of the wind fleet and loads. Modeling of a large number of different water and wind conditions resulted in an average estimate of 414 MW-months (302,000 MW-hr), about **three times** what occurred in 2011. (Conditions have been drier than average since that modeling was done, so this estimate may be somewhat high – but conditions can change significantly and quickly.)
- This amount is approximately **3-4%** of total wind generation expected in 2012.
- Based upon preliminary displacement cost data provided by a portion of the wind fleet, the expected value of lost contract revenue, PTCs (29% of wind fleet), and RECs (valued at \$16/MW-hr) of this amount of curtailment is estimated to be **\$12 million**.



# BPA Forecast for 2012



- 35% probability that in 2012, conditions will not result in oversupply conditions.
- There is a low probability that extreme conditions could lead to significantly greater amounts of oversupply than experienced in 2011.

135 MW-months = 98,500 MW-hrs  
414 MW-months = 302,000 MW-hrs