Northwest **Power** and **Conservation** Council

June 2, 2015

MEMORANDUM

TO: **Power Committee Members**

FROM: **John Fazio, Senior Systems Analyst**

SUBJECT: **Final Resource Needs Assessment 2016 – 2035**

BACKGROUND:

Presenter: John Fazio

Summary In traditional resource planning, utilities compare their existing resources with their anticipated load growth to determine future resource needs. This exercise is also the first step in the Council's planning process. Staff will present the results of its analysis of the gaps between projected future demand and existing resource generating capability for the region.

For annual average energy needs, the region is surplus throughout the study horizon under the low demand forecast. Under the high forecast, the surplus runs out in about 2026. For peak demand needs, the region is short in all cases except for the first few years under the low demand forecast.

The results described above, however, take a deterministic approach by simply comparing the expected low and high growth scenarios with expected resource availability (and firm hydroelectric generation). To make this accounting a bit more useful, planners generally add a reserve amount to the demand forecast, to account for various future uncertainties. The implied target for resource acquisition is to exactly match resource capability with load plus reserves. However, this target does not guarantee that the resulting resource mix will be adequate, that is, that its loss of load probability (LOLP) will be five percent or less (the

Council's adopted adequacy standard).

A more precise and sophisticated approach to assessing resource needs is to calculate the LOLP for various years along the study horizon for both the low and high demand forecasts. Then by examining the resulting record of potential shortfalls, the exact amount of peaking needs (capacity) and annual generation needs (energy) can be calculated.

Staff has completed this assessment for both the capacity and energy needs of the region through 2035 and will present results at the power committee meeting on June 9th. The general conclusion shows that the region needs peaking resources more than it does energy resources. By 2035, under the low demand forecast, the region will need only about 50 average megawatts of energy but about 4,300 megawatts of capacity to maintain a five percent LOLP. Under the high demand forecast, the region will need about 800 average megawatts of energy but about 10,600 megawatts of capacity.

Relevance This assessment is valuable because it gives planners an indication of the range of potential energy and capacity needs the region may need over the next 20 years. Of course, the Council's resource strategy, which is developed with the aid of the Regional Portfolio Model (RPM), is a much more robust and adaptable plan that covers a wider range of future uncertainties. To ensure that the RPM will produce a resource strategy that does not violate the Council's five percent LOLP adequacy standard, the energy and capacity needs are converted into adequacy reserve margins, which are used in the RPM as minimum resource acquisition limits.

Workplan: B. Develop Seventh Power Plan and maintain analytical capability
C. Co-chair and manage the Resource Adequacy Advisory Committee

Background: One of the criticisms of past power plans is that verification of the adequacy, efficiency, economy and reliability of resulting future power supplies could have been more robust. To improve that, the Council has done two things. First, it has developed an Adequacy Reserve Margin for both energy and capacity (based on the five percent LOLP standard) that is used in the RPM as a minimum resource acquisition amount to maintain resource adequacy through time.

Second, the Council has asked staff to assess the future resource needs of the region for various economic growth scenarios. The resource needs assessment can be used as a quick check to verify that future power supplies are in the range of both the energy and capacity requirements derived from the Council's adequacy standard.

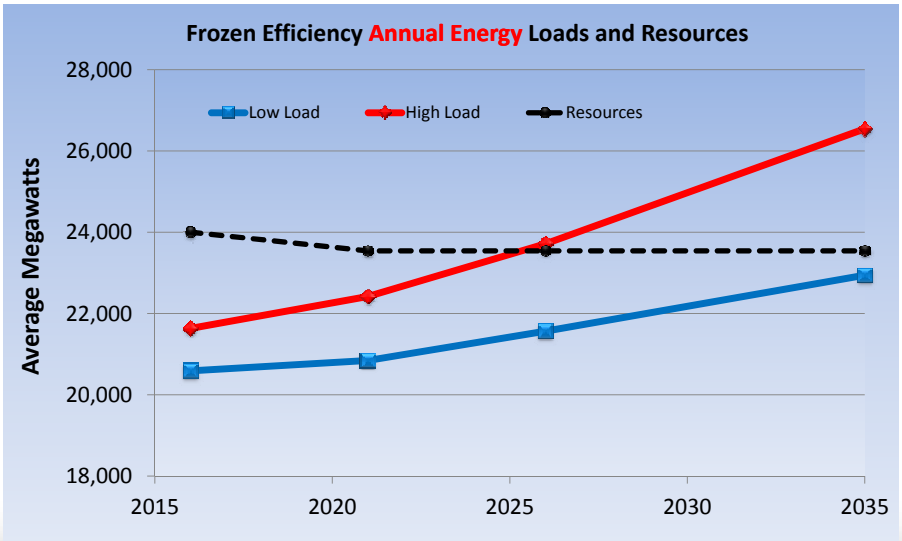
More Info: None at this time

2016-2035
Resource Needs Assessment

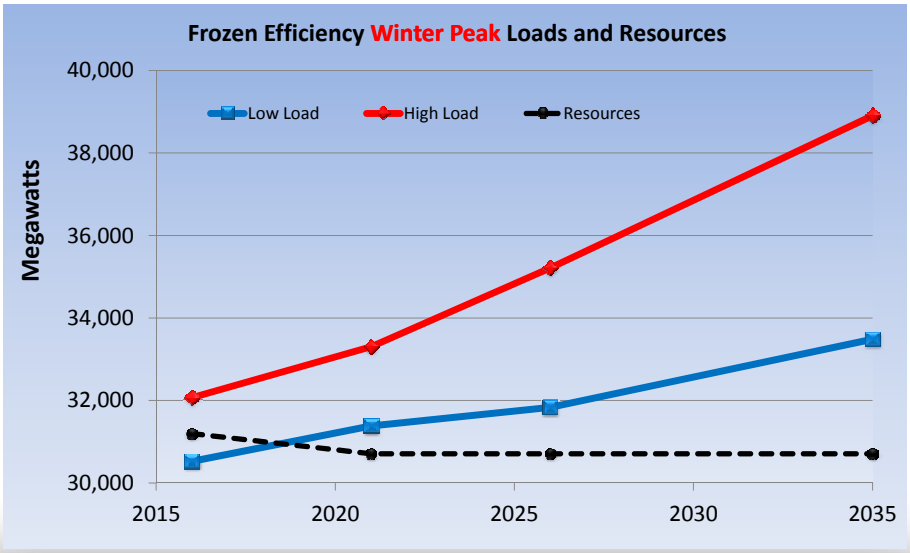
SEVENTH NORTHWEST POWER PLAN

NW Power and Conservation Council
Power Committee Meeting
Portland, Oregon
June 9, 2015

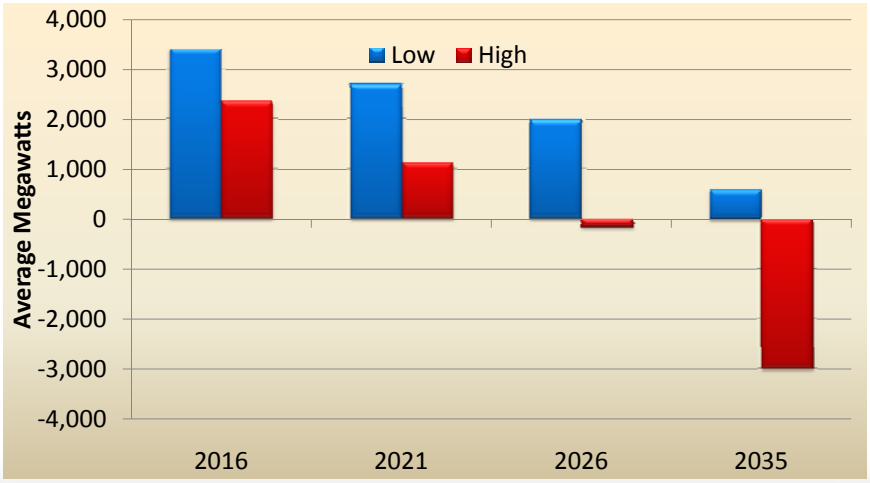
Energy Loads & Resources 2016-35



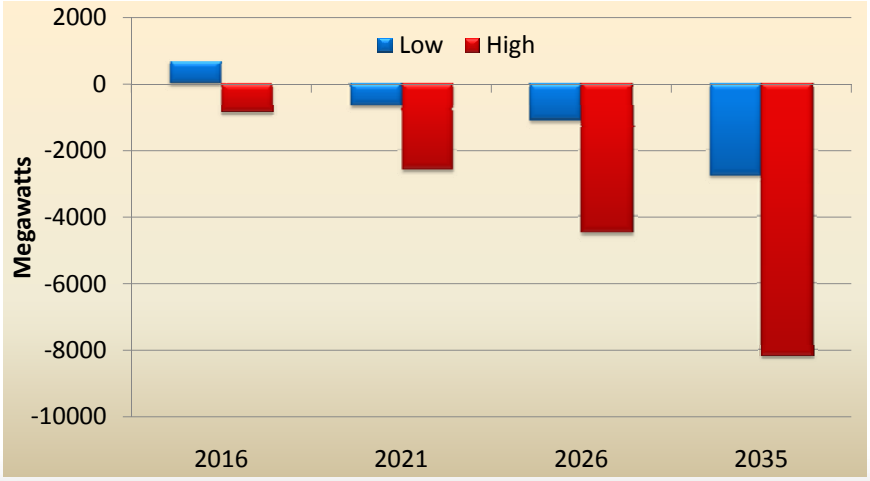
Capacity Loads & Resources 2016-35



Energy L/R Balance



Capacity L/R Balance



Load/Resource Balance

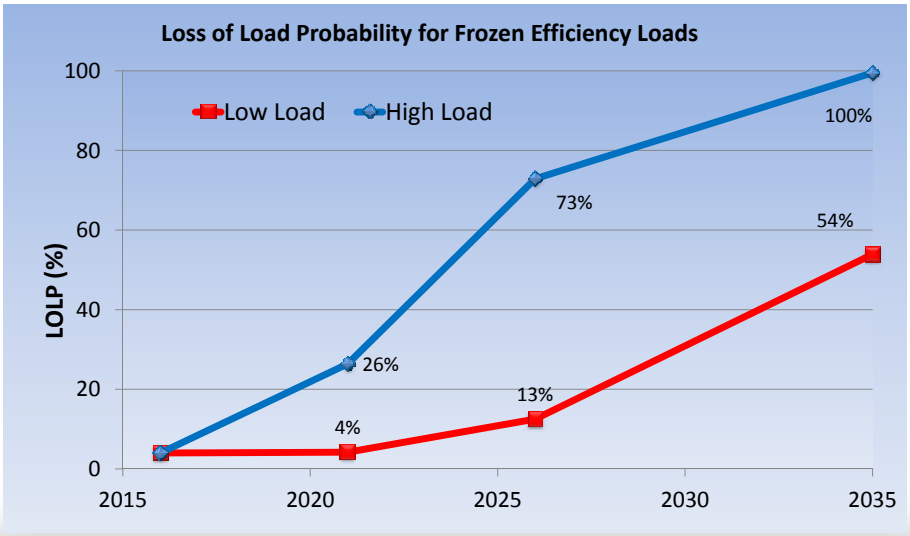
Energy (average megawatts)

Forecast	2016	2021	2026	2035
Low	3411	2699	1976	598
High	2369	1121	-173	-3003

Capacity (megawatts)

Forecast	2016	2021	2026	2035
Low	671	-673	-1126	-2778
High	-875	-2594	-4504	-8196

LOLP 2016-35



Loss of Load Probability
(Percent)

Load Forecast	2021	2026	2035
Low	4.2	12.5	53.9
Med		38.8	
High	26.4	72.9	99.5

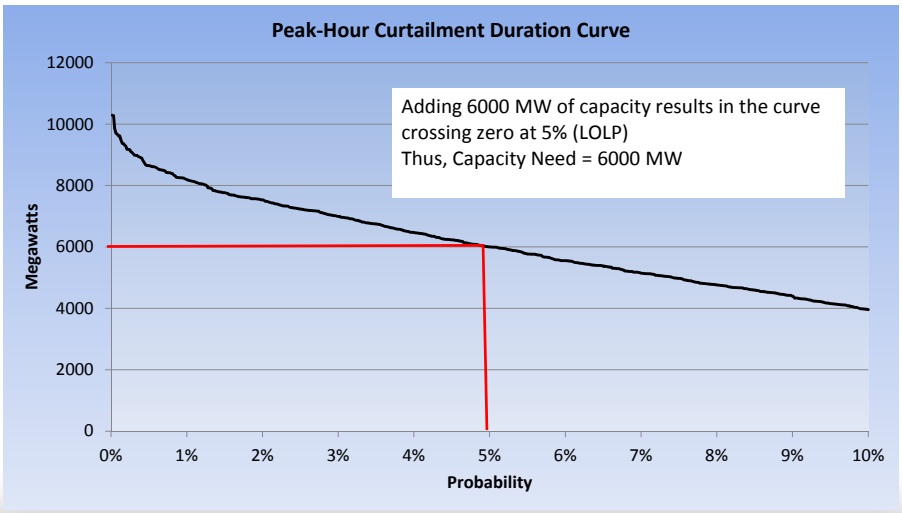
Needs Assessment (Old Method)

- Objective –Add Resource or Reduce Load to achieve a 5% LOLP
- Previous Method
  - Capacity Need – add gas-fired resources only
  - Energy Need – reduce load only (shaped)
- Problem with previous method
  - Gives us the wrong answer – doing both will greatly overstate needs
  - Resources & demand both have energy & capacity components
  - Method should assess how much capacity and energy is needed (not how much capacity or energy)

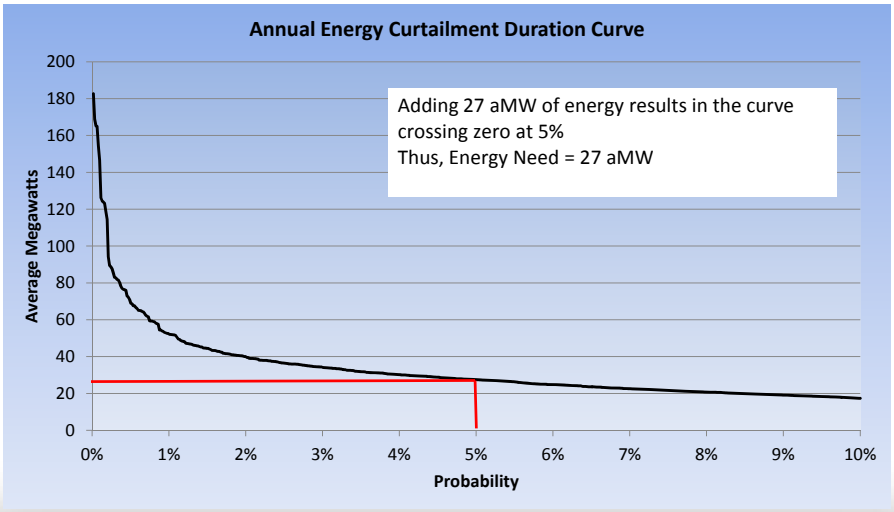
Needs Assessment (New Method)

- Energy Need – Energy required for the annual-energy curtailment duration curve to cross zero at 5%
- Capacity Need – Capacity required for the peak-hour curtailment duration curve to cross zero at 5%
- To verify, create a standby resource with the above capacity and energy limits and run the GENESYS postprocessor to verify that the resulting LOLP is 5%
- Actual process is more complicated but this describes the general methodology.

Example – Capacity Need



Example – Energy Need



Needs[1] Assessment

Energy (average megawatts)

Load Forecast	2021	2026	2035
Low	0	5	55
High	15	105	800

Capacity (megawatts)

Load Forecast	2021	2026	2035
Low	0	1945	4315
High	3010	5850	10570

[1]To get to a 5% LOLP

Adequacy Requirement in RPM

- Use new capacity and energy needs to calculate the adequacy reserve margins ARM_C and ARM_E
- RPM attempts for find the best mix of resources to match capacity and energy needs without over acquiring either capacity or energy