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

Pacific Northwest Power Supply Adequacy Assessment for 2019

Final Report

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Executive Summary

The Pacific Northwest's power supply is expected to be close to adequate through 2019. The Council estimates that the likelihood of a power supply shortage (more commonly referred to as the loss of load probability or LOLP) in that year is 6 percent, slightly higher than the 5 percent maximum standard adopted by the Council in 2011. By 2021, however, after the planned retirements of the Boardman and Centralia-1 coal plants (1,300 megawatt combined capacity), the LOLP rises to about 11 percent.

The Council's adequacy assessment only counts existing resources and planned resources that are already sited and licensed for operation in the year assessed. There are other planned resources that appear in utility long-term strategies that are not counted because they do not meet this criterion. It should also be noted that this is a regional assessment and does not reflect the constraints and special needs of individual utilities. Each utility must make its own assessment of adequacy.

Between 2017 and 2019, regional demand, net of targeted energy efficiency savings, is expected to grow annually by about 130 average megawatts (0.6 percent per year). Energy efficiency savings assumed for this analysis are the 350 average megawatts per year from the Council's Sixth Power Plan. Achieving these savings is critical to adequacy. For example, if the region were to only acquire half of the targeted savings, the 2019 LOLP would grow to over 7 percent. Having a better understanding of the hourly shape of efficiency savings would also improve the accuracy of our assessments.

Since the last adequacy assessment (7 percent LOLP for 2017 released in December 2012), Portland General Electric has proceeded with plans to acquire 667 megawatts of new dispatchable generation. An additional 267 megawatts of new wind nameplate capacity is also expected. The gains in new generation are somewhat offset by reduced capability of standby resources: demand-side actions and emergency resources used only during shortages. The assumption about the availability of winter peak-hour imports from California was also increased from 1,700 to 2,500 megawatts based on an analysis of California loads and resources for 2019.

Actions to bring the 2019 and 2021 power supplies into compliance with the Council's standard may include various types of new generating resources or demand reduction programs. For example, adding 400 megawatts of dispatchable generation by 2019 would bring the LOLP back to 5 percent. Alternatively, lowering the 2019 annual load by about 300 average megawatts (via additional energy efficiency savings) would do the same. Looking ahead to 2021, Portland General Electric is expected to define a Boardman replacement strategy in its next integrated resource plan, and other Northwest utilities show a combined 1,800 megawatts of planned new generation over the next 10 years that is not included in this assessment.

The Resource Adequacy Standard and What it Means

In 2011, the Northwest Power and Conservation Council adopted a revised regional power supply adequacy standard to “provide an early warning should resource development fail to keep pace with demand growth.” The standard deems the power supply to be inadequate if the likelihood of curtailment five years in the future is higher than 5 percent. The Council uses probabilistic analysis to assess that likelihood, which is most often referred to as the loss of load probability.

The assessment only counts existing resources and planned resources that are already sited and licensed for operation in the year assessed. Other planned resources are not counted unless they meet this criterion.

The assessment also includes targeted energy efficiency savings from the Council’s Sixth Power Plan. When the likelihood of curtailment exceeds the 5 percent limit, the Council conducts a separate analysis to quantify the minimum amount of new generation or load reduction needed to bring the loss of load probability back down to 5 percent.

2019 Resource Adequacy Assessment

An adequacy assessment takes into account all resources that should be available to Northwest utilities during times of stress. It does not take cost into consideration. A power supply may be adequate, but not necessarily economical or efficient. Ultimately, the optimal amount and mix of new resources needed to maintain an adequate, efficient, economical, and reliable regional power system is determined during the development of the Council’s power plan.

The Pacific Northwest’s power supply is expected to be close to adequate through 2019. The Council estimates that the likelihood of a power supply shortage that year is 6 percent, slightly higher than the 5 percent adequacy standard. It would require about 400 megawatts of new dispatchable generation or 300 average megawatts of reduced demand (via additional energy efficiency savings) to re-establish the power supply as adequate.

The last assessment, released in December 2012, reported the likelihood of a supply shortage to be 7 percent for 2017. Portland General Electric has since proceeded with plans to acquire 667 megawatts of new dispatchable generation, scheduled to be online by 2017, which is included in the 2019 assessment.

Between 2017 and 2019, regional demand, net of targeted energy efficiency savings, is expected to grow by about 260 average megawatts (about 0.6 percent per year). Energy efficiency savings are targeted to be 350 average megawatts per year during this period. An additional 267 megawatts of new wind nameplate capacity is also expected. The gains in new resources are somewhat offset by reduced capability of standby resources: demand-side actions and emergency resources used only during shortages.

The other major change in assumptions is the availability of winter peak-hour purchases from California. For the 2017 assessment, 1,700 megawatts was assumed to be available during all winter peak-load hours. By 2019, California is scheduled to retire 2,641 megawatts of its coastal water-cooled thermal power plants, and nearly 10,000 megawatts will either be retired or replaced over the next 10 years. In addition, California has lost 2,200 megawatts of San Onofre Nuclear Generating Station capacity.

However, according to an Energy GPS report, California surplus is expected to greatly exceed the south-to-north intertie transfer capability during Northwest winter peak-load hours.

Even though the combined AC and DC intertie loading capacity is on the order of 7,900 megawatts, the actual transfer capability is limited by conditions on either end and will vary as those conditions change. A review of historical south-to-north transfer capabilities during high-load hours in December, January, and February shows a range from about 1,500 to 4,600 megawatts. The Council's Resource Adequacy Advisory Committee concluded that using 2,500 megawatts as an assumed constraint for the amount of available import capacity during winter months is reasonable.

Originally, the Northwest-Southwest interties were built to take advantage of seasonal diversity in loads and resources, allowing the Northwest to access idle California resources in winter and allowing California to access idle or surplus resources in the Northwest during summer. Both energy and capacity exchange contracts helped to "firm up" import availabilities. During the 1990s, however, momentum to deregulate the electricity industry reduced interest in these exchanges in favor of short-term transactions. Because the magnitude of the expected surplus in California during winter peak-load hours is so large, it may make sense to reconsider whether seasonal power exchanges and transmission capacity enhancements may be more cost-effective than building new generating resources in the Northwest.

Dependence on the Market

The methodology used to assess the adequacy of the Northwest power supply assumes a certain amount of reliance on non-utility supplies, within the region and imports from California. The Northwest market is made up of independent power producer resources. The full capability of these resources, about 3,470 megawatts, is assumed to be available for Northwest use during winter months. However, during summer months, due to competition with California utilities, the Northwest market availability is limited to 1,000 megawatts.

California import availability is divided into on-peak and off-peak availabilities. The <u>off-peak</u> availability is assumed to be 3,000 megawatts year round. Energy from the off-peak market is purchased during light-load hours before periods of potential shortfalls and is often referred to as a purchase-ahead resource. The <u>on-peak</u> availability is assumed to be 2,500 megawatts during winter and is not available at all during summer.

Northwest utilities routinely rely on in-region and out-of-region markets to maintain adequate power supplies. The amount of non-utility and import supply actually used in a given year depends on a number of conditions, with the biggest factors being stream flow levels, outages of utility-owned resources, and temperature-driven load variations. For 2019, assuming only existing resources and targeted energy efficiency, the analysis shows the region would purchase an average of 1,150 megawatt-months of combined import and within-region resource generation in December, representing about 18 percent of the total available energy (6,470 megawatts-months). In August the region would purchase an average of 350 megawatt-months of combined import and resource generation or approximately 9 percent of the total available energy (4,000 megawatts-months).

Because averages can often be misleading, a more important statistic is how much market supplied energy is needed during extreme events, when the regional load-resource balance tightens. Ten percent of the time, market purchases would exceed 2,140 megawatt-months in December (33 percent of the total) and 680 megawatt-months in August (17 percent of the total). The full amount of market supplied energy (within region and from California) would be needed in less than 1 percent of all hours.

Uncertainties

The Council's analytical tools account for uncertainties in stream flows, wind generation, temperature-driven demand variations, and generating resource availability. However, there are additional uncertainties that are not explicitly modeled. Two of the more significant uncertainties are economic load growth and the availability of the California market. The expected 6 percent loss of load probability assumes the Council's medium load forecast and 2,500 megawatts of California on-peak winter import availability.

To investigate the potential impacts of different combinations of economic load growth and California import availability, scenario analyses were performed. In the conservative case, with high load growth and no California import, the loss of load probability would be 15 percent. Fortunately, this scenario is not very likely. In the least conservative case with low load growth and maximum winter import availability (2,500 MW), the loss of load probability drops to 4 percent.

Future Assessments

The Council will continue to annually assess the adequacy of the power supply. This task is becoming more challenging because the power system is more complex. Because of increasing amounts of variable generation, combined with changing patterns of electricity demand, utility planners and operators must carefully assess what resources are needed in reserve so demand can be met minute to minute. The current adequacy assessment assumes a certain amount of within-hour balancing reserves, but it's not certain this will be sufficient for future power supplies. Regional planners are evaluating various methods to quantify and plan for these flexibility needs and the Council will include new data when available.

Another emerging concern is the lack of access to supplies for some utilities due to insufficient transmission or other factors. For the current adequacy assessment, the Northwest region is split into two subsections in which only the major east-to-west transmission lines are modeled. Similarly, only the major Canadian-U.S. and Northwest-to-Southwest interties are modeled. For the next adequacy assessment, scheduled for release in May 2015, the Council is planning to separate the southern Idaho area from the currently modeled eastern region.

Other issues identified by the Council's Resource Adequacy Advisory Committee to consider for next year's assessment include:

- Quantifying market friction (which could limit the availability of shareable resources) and possible solutions to reduce market friction
- Coordinating with the existing Western Gas-Electric Regional Assessment Task Force to develop gas-limited scenarios and assess their effect on adequacy
- Working with transmission planning entities to investigate greater use or expansion of the existing Northwest-Southwest intertie as a cost-effective alternative to building new generation in the Northwest
- Examining the effects of the planned expansion of the DC intertie capacity (by as much as 900 megawatts)
- Assessing opportunities for imports from other regions, particularly Canada

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