

A New Resource Adequacy Standard for the Pacific Northwest

Council Document Number 2011-14



12/6/2011

PURPOSE

The Northwest Power and Conservation Council has adopted the following methodology, recommended by the Resource Adequacy Forum, to assess the adequacy of the Northwest's power supply. The purpose of this assessment is to provide an early warning should resource development fail to keep pace with demand growth. The Council has also approved developing a *State of the System* report, to accompany the assessment. This report will provide additional information regarding the status of the power supply.

RESOURCE AND LOAD ASSUMPTIONS

The Forum will evaluate the region's power supply adequacy five years into the future. Regionally owned generating resources, expected efficiency savings and some level of market resources are assumed for the assessment. Council staff will collect and maintain resource data, which also includes information on firm import and export contracts and on variable resources (such as wind). Regionally owned generating resources include existing plants and planned projects that are expected to be operational during the year being assessed. Assumptions regarding the amount of in-region and out-of-region market supplies and the use of hydroelectric system flexibility¹ will be made by the Forum. Load assumptions will be based on the Council's short-term load model medium forecast and will be adjusted to include the expected efficiency savings from the Council's latest power plan.

METHODOLOGY

The adequacy of the Northwest's power supply is assessed by computing the likelihood of a supply shortfall, five years into the future, using probabilistic simulation methods. This approach differs from historical static methods that simply tally expected regionally owned resource capability and expected regional demand. Probabilistic methods are commonly used around the country and the world as they offer a better assessment of adequacy than static measures of load/resource balance and of capacity planning margins.

The metric used to assess the adequacy of the Northwest's power supply is the loss-of-load probability (LOLP). The LOLP is measured by performing a chronological hourly

¹ Hydroelectric system flexibility in this context is energy derived from drafting reservoirs (for short periods of time) deeper than contractual drafting rights elevations during periods of stress. This "borrowed" energy is replaced as soon as possible and rarely carries over into the following month. This is a common practice in operations.

simulation of the power system's operation over many uncertain conditions², including water supply, temperature (load variation), wind generation and resource forced outages.

The resulting simulated shortfalls (periods when resources fail to meet demand) are compared against the aggregate peaking and energy capability of standby resources. Standby resources are generating resources and demand-side management actions, contractually available to Northwest utilities, which can be accessed quickly, if needed, during periods of stress. These resources are intended to be used infrequently.

Shortfalls that exceed the aggregate capability of standby resources are considered curtailment events.³ The LOLP is assessed by dividing the number of simulations with at least one curtailment event by the total number of simulations.

THE STANDARD

The power supply is deemed adequate if its LOLP, five years into the future, is 5 percent or less. This means that the likelihood of at least one curtailment event occurring sometime during that year must be 5 percent or less.

The Council added a second level to the assessment, to indicate whether the power supply is close to becoming inadequate. The metric and associated threshold for this second-level test will be defined by the Forum and will likely include the probability of standby resource use. In that case, when the LOLP is less than 5 percent but the likelihood of using standby resources is greater than what utilities can tolerate, the power supply is considered to be approaching inadequacy.

The Council has adopted a color code to differentiate among three possible conditions for the power supply. When the LOLP is less than 5 percent and the second-level metric is below its threshold, the power supply is deemed adequate and is given a "green light" status.⁴ When the LOLP is less than 5 percent but the second-level metric exceeds its threshold, the power supply is approaching inadequacy and a "yellow light" status is

² This type of simulation is often referred to as a Monte-Carlo analysis.

³ It should be noted that these simulated curtailment events do not necessarily translate into real curtailments because utilities often have other, more extreme, actions that they can take. However, for assessing adequacy, the threshold is set at the capability of standby resources.

⁴ A "green light" status should not be interpreted as meaning that the region has a cost effective and economic risk-averse power supply. An adequacy assessment does not equate to a resource planning strategy, as is developed in the Council's power plan.

assigned. When the LOLP is greater than 5 percent, the power supply is deemed inadequate and a “red light” status is assigned.

IMPLEMENTATION PLAN

The adequacy standard adopted by the Council does not mandate compliance or imply any enforcement mechanisms. It does not apply to individual utilities because each utility faces different circumstances. It is intended to be an early warning should aggregate regional resource development fall short, for whatever reason. The Council believes that information in the assessment and the associated *State of the System* report will provide utility planners a wealth of useful information to aid them in developing their own integrated resource plans.

The Council will release its adequacy assessment and *State of the System* report annually. If the status is yellow, meaning that the power supply is closer to becoming inadequate, the Forum will be asked to review the data and analysis. If the status is red and conditions are more critical, the Forum will be asked to identify where potential shortfalls could occur. Details about the role of the Council and the Forum can be found in the implementation plan.⁵

STATE OF THE SYSTEM REPORT

The *State of the System* report, which the Forum is developing, is intended to provide more detail about the status of the power supply. It should be viewed as a complementary report to the Bonneville Power Administration’s *White Book* and to the Pacific Northwest Utilities Conference Committee’s *Northwest Regional Forecast*.

The report begins with the adequacy assessment and other commonly used adequacy metrics. These other metrics, while not a part of this standard, measure different aspects of the power supply’s adequacy and are often used in different parts of the country and the world. By providing these measures, the assessment can be interpreted more easily by other regions. Among other things, they provide information about the size and frequency of potential problems.

The report will provide analysis on annual, monthly and hourly results. It will break down the LOLP assessment into monthly components so planners can identify periods of the year when problems are more likely to occur. It will provide a monthly assessment of

⁵ The current implementation plan can be found at <http://www.nwcouncil.org/library/2008/2008-07.pdf>.

how often and how much of the market supply is used. Statistics for simulated shortfall events will be presented along with conditions under which they occur. Hourly probability distributions will be provided for important parameters like the use of market resources. The format of the report is likely to change for several years, as planners determine which results are most useful to them.

q:\jf\ww\2011\council document 2011-14 new adequacy standard.docx