Northwest Power and Conservation Council

October 18, 2006

DECISION MEMORANDUM

TO: Council Members

FROM: Wally Gibson, Manager, System Analysis and Generation
John Fazio, Senior System Analyst

SUBJECT: Resource Adequacy Standard for the Northwest

PROPOSED ACTION: Approve the release of an issue paper (Council document number 2006-18) for public comment describing a proposed pilot capacity standard for the northwest.

SIGNIFICANCE:

- Recent adoption of the energy bill gives the Federal Energy Regulatory Commission (FERC) authority to assess the adequacy of the nation's power supplies. We expect that the Western Electricity Coordinating Council (WECC) will be designated to assess the adequacy of the western power supply. We intend this proposed standard for the Pacific Northwest to be integrated into WECC's efforts.
- The Bonneville Power Administration (BPA) has been a joint sponsor of the Resource Adequacy Forum and intends to incorporate the standard in its Regional Dialogue and the ensuing contracts.
- The establishment of a regional resource adequacy standard will provide a consistent context to utilities, regulatory commissions and public utility boards in their assessment of individual utility resource plans.

BUDGETARY/ECONOMIC IMPACTS:

- There are minimal effects on the Council's budget. At this time, there is no indication that additional funds would be needed for contracting work or for advisory committee member travel expenses.
- The regional economic benefits of establishing a resource adequacy standard could be significant. Historically, the region has experienced periods of surplus and deficit energy supplies. Neither situation is desirable from an economic point of view. The establishment of an adequacy standard will help minimize the number of times the region finds itself in a costly situation of too little or too much energy supply.

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BACKGROUND:

Recent events such as the Western energy crisis of 2001, which led to curtailments in California and to West-wide price spikes, have forced utilities and regulators to rethink their approach to planning and operating the power system. In that year, the Northwest experienced its second-lowest water year (based on historical records since 1929). Also, few new resources were developed during the late 1990s, leading to areas of resource deficiency throughout the West. Combined with a flawed electricity market design in California and apparent market manipulation, these factors led to the undesirable events of 2001. The Northwest is still recovering from the economic recession following that crisis.

The crisis demonstrated that the public has little tolerance for high and volatile market prices over a prolonged period. It also became clear that the financial community will not lend money for power-plant construction unless developers have power contracts in hand and/or utilities have included the costs of those contracts in their rates.

In an environment where an increasing number of parties will be taking on the responsibility for acquiring resources to serve regional load, a resource adequacy standard is key to ensuring overall regional sufficiency of resources to meet load at reasonable costs. The Pacific Northwest is unique, not only in the predominately hydroelectric nature of its resources, but also in the ratio of public utilities to investor-owned utilities (IOUs). Resource adequacy is more difficult to achieve in the Northwest for the following reasons:

- The ability to rely on wholesale electricity markets and surplus hydroelectric generation (in most years) can mask a condition of resource deficiency.
- The capital risk of constructing new resources in a market with substantially varying supply levels from year to year may be deemed too great for many developers.
- There is a continuing lack of clarity about the responsibility for resource acquisition between the public utilities and BPA.

One way to alleviate the problem is to develop a regional resource adequacy standard and implementing framework. Such a standard would help utilities and their regulators gauge whether they have enough resources to meet their loads under a regionally accepted measure of generation sufficiency. A framework for implementing the standard would lay the foundation for those entities to plan for and acquire sufficient resources to meet load.

In its Fifth Power Plan, the Council recognized the importance of developing a resource adequacy standard and implementing framework. Action items ADQ-1 and ADQ-2 in the plan call for the establishment of resource information-gathering protocols and for the development of a resource adequacy standard for the Pacific Northwest. To achieve these goals, the Council and BPA instigated the Pacific Northwest Resource Adequacy Forum (Forum), with the intention that this group would develop a resource adequacy standard for the northwest.

ANALYSIS:

The Resource Adequacy Forum has been working on this task for the better part of a year. Analysis and documents, including meeting notes, are posted on the Council's web site at

http://www.nwcouncil.org/energy/resource/Default.asp. The Forum is comprised of a technical work group and a policy steering committee.

The proposed standard consists of a metric (something that can be measured) and a target (an acceptable value for that metric) for both the energy and the capacity capabilities of the system. The standard is designed to be transparent and simple to understand while being linked to a more sophisticated analytical process, which includes hourly as well as seasonal analysis.

The Council has already adopted an energy standard (Council document number 2006-01), which uses the region's annual load/resource balance as a metric. The balance is calculated using a resource "planning adjustment" value that is derived from a loss-of-load-probability analysis. The objective (or target) is for resource generation to be no less than expected load three and five years into the future.

For the capacity standard, a planning reserve margin, based on the system's sustained-peaking capability, is proposed. This portion of the overall resource adequacy standard is defined in the attached document. The capacity metric is defined as the surplus generating capability over the expected peak demand load, measured in terms of percent. As with the energy standard, a portion of the target is determined by a loss-of-load-probability analysis.

The targets for both the energy and capacity standards are expected to be dynamic, in that they will be adjusted as conditions in the energy and capacity markets change and as the region's ability to measure and analyze the power system's capability improves.

ALTERNATIVES:

- One alternative is to not develop a Northwest resource adequacy standard. This means that the region would continue to develop resources without the benefit of an overarching strategy. The likely outcome of this alternative is a greater possibility of periods of over- or under-building for the needs of Northwest consumers. Quantifying the potential regional cost of this alternative is difficult but based on past experiences could be significant.
- A second alternative is to allow the WECC to establish a West-wide adequacy standard, which would also apply to the Northwest. The drawback to this alternative is that WECC has little or no expertise in planning for systems that are energy-limited (as opposed to capacity-limited regions such as California). The WECC standard would not likely address Northwest needs in an appropriate way.

ATTACHMENTS:

The recommended regional pilot capacity standard is presented in the attached paper (Council document number 2006-18). This recommendation was developed by the Pacific Northwest Resource Adequacy Forum and was unanimously agreed to by its steering committee.

Northwest Power and Conservation Council

October 4, 2006

MEMORANDUM

TO: Council Members

FROM: Terry Morlan

SUBJECT: Release of Capacity Adequacy Standard for Comment

The Council will be asked to approve release of a *capacity* adequacy standard for comment. The Council has already adopted an *energy* adequacy standard and has released a resource adequacy implementation paper for comment. These three papers complete the initial work of the Northwest Resource Adequacy Forum. However, assessment of the region's performance in meeting the standards and refinement of the standards themselves will be an ongoing process.

Attached you will find a decision memorandum, a cover letter requesting comment on the capacity adequacy standard, and the standards document itself including a plan for continued Adequacy Forum work.

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Northwest Power and Conservation Council

October 18, 2006

A Pilot Capacity Adequacy Standard For the Pacific Northwest

Council Document 2006-18

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Northwest Power and Conservation Council

A Pilot Capacity Adequacy Standard for the Pacific Northwest

The Pacific Northwest Resource Adequacy Forum[1] (Forum) has developed a regional pilot capacity adequacy standard (to be used in conjunction with the previously adopted energy adequacy standard) for guidance in long-term resource planning. The Forum recommends that the Northwest Power and Conservation Council (Council) adopt this pilot standard as an interim guide for regional entities to inform their planning efforts with the understanding that the Forum will test and refine the standard and propose a final standard within a year. The Forum also recommends that this interim regional standard be submitted to the Western Electricity Coordinating Council (WECC) in order to inform WECC's ongoing process to develop West-wide adequacy standards.

The term "standard" in this context does not mean mandatory compliance nor does it imply an enforcement mechanism. Rather, it is meant to be a gauge used to assess whether the Northwest power supply is adequate in a physical sense, that is, in terms of "keeping the lights on." It can be thought of as the minimum threshold for resource acquisition.

The regional resource adequacy standard consists of a metric (something that can be measured) and a target (an acceptable value for that metric) for both the energy and the capacity capabilities of the system. One of these targets will be the limiting constraint for a region or sub-region in the West. For the Northwest, energy capability is most likely the limiting factor in winter but recent analysis shows that capacity might be the limiting factor in summer. However, the region is currently both energy and capacity surplus. Therefore, the Forum is comfortable recommending this pilot capacity metric and targets as an interim standard.

The Forum believes that the form of the capacity metric and the initial values of the capacity targets presented in this paper are appropriate. As the effort to test and refine the metric and targets progresses, the Forum will finalize the underlying assumptions and resource counting protocols. Within a year, the Forum will recommend the final regional capacity standard to the Council for adoption. Appendix A includes a draft work plan that is intended to identify remaining tasks required to finalize the capacity standard. However, even after the final standard is adopted, the intent is for this process to be dynamic. The Forum recommends that both the energy and capacity targets be re-evaluated on an annual basis to ensure that they continue to mark the threshold for an adequate Northwest power supply.

The Pacific Northwest Regional Capacity Standard

The capacity metric for the Pacific Northwest[2] is defined to be the planning reserve margin (PRM), which is the surplus *generating capability* over *expected peak load* during the *peak load hours* for each month[3] (also referred to as the surplus sustained-peaking capability), in units of percent, where:

- *Generating capability* is defined as the sustained peaking capability[4] from:
    - All non-hydro resources[5] (adjusting for fuel-supply limitations and/or environmental constraints and not counting resources on scheduled maintenance and assuming that no resource is on forced-outage)
    - Uncontracted in-region Independent Power Producer (IPP) resources: 100 percent in winter but in summer only that portion of IPP generation that may be accessible to northwest utilities during peak load conditions (1,000 megawatts will be used as a placeholder until better information is obtained)
    - Hydroelectric resources available to meet 1 in 2, or expected loads, based on critical water[6] conditions
    - Hydro flexibility (a conservative estimate of additional hydroelectric generation that can be provided over the peak load hours during a 1 in 20 year temperature event without invoking emergency actions): 2,000 megawatts in winter and 1,000 megawatts in summer
    - Out-of-Region spot market resources: 3,000 megawatts in winter and 0 megawatts in summer
    - The net of firm imports and exports into and out of the region
- The *peak load hours* are defined to be the 10 consecutive hours per day over 5 days that yield the highest average load.
- *Expected peak load* is defined as the average load over the peak load hours, based on the expected coldest (or hottest) daily-average temperature.
- Until better information is obtained, the capacity targets will be assessed using daily average regional temperatures and loads.

The pilot capacity target for the Pacific Northwest is 25 percent for winter and 19 percent for summer. The generating capability of the power supply in these months should be at least this much higher than the expected peak load over the peak load hours of the day. The capacity targets are comprised of:

- A component to cover operating reserve requirements: 6 percent[7] for both winter and summer, and
- A component to cover planning adjustment reserve[8] requirements: 4 percent for winter and 7 percent for summer, and
- A component to cover the load increase arising from a one-in-twenty year temperature deviation from the expected coldest/hottest day: 15 percent for winter and 6 percent for summer.

Endnotes

1. The Pacific Northwest Resource Adequacy Forum was created in response to action items ADQ-1 and ADQ-2 in the Council's 5th Power Plan (see www.nwcouncil.org).

2. The Pacific Northwest is defined to be the geographical area referenced in the 1980 Northwest Power Act, which includes the states of Oregon, Washington, Idaho and the western part of Montana.

3. The pilot capacity standard is in the form of a sustained peaking planning reserve margin (PRM), which can be calculated for every month. However, only the most critical month in winter and in summer are needed for resource planning purposes.

4. Peaking capability is the maximum sustained peaking capacity associated with the peak load period adjusted for fuel limitations or other operating constraints. For out-of-region resources, the peaking capability should be that portion of the resource that is contracted to serve regional loads. The Council's Natural Gas Advisory Committee will evaluate whether sufficient gas supply and transportation capacity is available to allow for counting the full peaking capability of the region's gas-fired power plants to meeting monthly or seasonal PRMs.

5. For the pilot standard, wind generation will be assessed at 15 percent of nameplate capacity.

6. For the region, under current operating constraints (including actions listed in NOAA Fisheries' biological opinion), the critical water year is defined by the hydrologic conditions from August 1936 through July 1937.

7. The 6 percent operating reserve requirement is an average for the region. The requirement calls for a 5 percent reserve for hydroelectric generation and a 7 percent reserve for thermal generation. The region's firm energy supply is almost equally divided between hydroelectric and thermal generation, thus the 6 percent average.

8. The planning adjustment reserve is derived from a loss-of-load-probability (LOLP) analysis. It is intended to protect against contingencies beyond those covered by the operating and adverse temperature reserves. The planning adjustment reserve tends to be higher during the summer when out-of-region supplies and hydro flexibility are less available. It is somewhat similar to the planning adjustment energy line item defined in the energy standard in that it is related to the northwest's dependence on non-firm resources, such as out-of-region supplies.

Appendix A

Resource Adequacy Forum Work Plan 2006-07

This work plan is primarily intended to identify remaining tasks required to finalize a capacity standard for the northwest. The schedule is tentative and will likely change over the course of the next year.

October 2006

- Steering Committee recommends a pilot capacity adequacy standard to the Council.
- Council votes to release the pilot capacity adequacy standard for comment.
- Council receives comments on the implementation approach.
- Technical Committee develops a set of assumptions regarding how resources are to be counted for energy and capacity adequacy assessments. Suggestions are made for revising the PNUCC reporting process.

November 2006

- Steering Committee resolves reporting issues, if Technical Committee cannot come to consensus on final proposal for revised reporting processs. Meeting, if needed, is tentatively scheduled for November 17th.
- PNUCC makes its annual request for resource and load data.
- Council votes to adopt the implementation approach.
- Council receives comments on the pilot capacity adequacy standard.
- Technical Committee begins development of a benchmark for the LOLP analysis.
- Technical Committee begins reassessing the current LOLP definitions of what constitutes an adequate energy and capacity supply.

December 2006

- Council votes to adopt the pilot capacity adequacy standard.
- Council staff finalizes temperature/load relationships for assessing the adverse temperature reserve requirement.

January 2007 through May 2007

- Technical Committee begins to explore economic targets for both the energy and capacity standards. This process will include examining the impacts to cost and to economic risk of changing adequacy targets.
- BPA staff briefs the Technical Committee on suggested peak period durations for both winter and summer.
- Technical Committee begins developing guidelines for interpreting regional energy and capacity adequacy standards for individual utilities.
- Technical Committee works with others to develop assumptions regarding wind resources.
- Technical Committee reassesses the availability of surplus out-of-region capacity to be used in the analyses.

- Technical Committee refines assumptions regarding the inclusion of uncontracted IPP generation in resource adequacy assessments.
- Technical Committee refines assumptions regarding the availability of hydro flexibility

- Technical Committee begins to explore the use of a "loss of fish operation probability" (LOFP) metric to assure that fish and wildlife operations are not unduly curtailed.

June 2007

- Council assesses the region's resource adequacy (from a top-down perspective).
- PNUCC publishes its Northwest Regional Forecast, assessing adequacy from a bottom-up perspective.
- Results of the top-down and bottom-up assessments are compared.
- If necessary, Council evokes actions called for in the implementation approach.

July 2007 through August 2007

- Steering Committee finalizes guidance for interpreting regional energy and capacity standards for individual utility resource planning.
- Steering Committee decides on economic adequacy targets for energy and capacity.
- Steering Committee decides on assumptions regarding the peak duration period.
- Steering Committee decides on assumptions for out-of-region spot market availability, uncontracted IPP generation, wind generation and hydro flexibility for the top-down regional resource adequacy assessments.
- Steering Committee considers the use of a fish-operation reliability index to asssure that PNW resource adequacy standards do not impose unreasonable risk to required fish operations.

September 2007

- Technical Committee prepares the final capacity adequacy standard and forwards it to the Steering Committee.
- Suggested changes to resource and load reporting are incorporated into PNUCC's process.
- Technical Committee reviews the energy adequacy standard to incorporate any revised assumptions adopted for out-of-region spot market availability, uncontracted IPP generation, wind generation and hydro flexibility as well as revisions to the LOLP analyses.

October 2007

- Steering Committee decides on a final capacity adequacy standard to forward to the Council.
- Council votes to release the final capacity adequacy standard for public comment.
- Technical Committee recommends revisions to the energy adequacy standard, if any, to Steering Committee for consideration.

November 2007

- Council takes comments on the final capacity adequacy standard.
- Steering Committee forwards any revisions to the energy adequacy standard it approves to the Council for adoption.

December 2007

- Council votes to adopt final capacity adequacy standard.
- Council requests public comment on revised energy adequacy standard, if needed.
- Technical committee completes background documentation in support of the Northwest regional resource adequacy standard.
