Northwest Power and Conservation Council

February 27, 2008

MEMORANDUM

TO: Power Committee

FROM: Terry Morlan, Director, Power Planning Division
Wally Gibson, Manager, System Analysis and Generation
John Fazio, Senior System Analyst

SUBJECT: Adoption of a Resource Adequacy Standard for the Northwest

At its March 11th meeting, the Council will vote whether to adopt proposed language for a Pacific Northwest resource adequacy standard. The draft language was released for public comment on February 14th (Council document number 2008-01) and is included in the full Council packet under agenda item number 1.

To date only two comments have been received. The first suggests removing non-firm resources from the definition of the metrics for both the energy and capacity portions of the standard. The Northwest Resource Adequacy Forum (Forum) has discussed this issue at length and has decided to keep non-firm resources in the definitions. The second comment is more of a warning to the Council that it may face a communication problem when it releases its adequacy assessment and compares it to other regional reports. The Forum recognizes this potential problem and will prepare a fact sheet that explains the differences among the various regional reports on resources and demand. The fact sheet will be released with the adopted language for the standard.

At its meeting, the Power Committee will discuss all comments received and amend the draft language, if necessary, before passing it on to the full Council for adoption. However, because the comment period does not close until March 7th, a full summary of comments will not be available until March 11th, thus there are no attachments to this memo.

At the March 11th meeting, Power Committee members will receive;

- A full summary of comments and response to those comments,
- An amended version of the draft language, and
- A fact sheet provided by the Forum.

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Northwest Power and Conservation Council

March 10, 2008

MEMORANDUM

TO: Council Members

FROM: John Fazio, Senior System Analyst

SUBJECT: Comments received for Council document 2008-01 "A Resource Adequacy Standard for the Northwest" and staff response

Steve Weiss (at the power committee meeting on February 12, paraphrased):

Steve believes that the current adequacy metrics are appropriate but would prefer that they only include "firm" regional resources. He said he would exclude the "planning adjustment" line item from the energy metric and show a deficit energy target. (The planning adjustment line item represents contributions from out-of-region spot markets and from non-firm hydro). He made no indication that within-region uncommitted IPP capability should be removed from the metric.

Response

The Forum's technical and steering committees have debated this issue at length. The prevailing opinion was that creating an adequacy standard with a deficit target would present a difficult public relations challenge. In addition, committee members agreed that non-firm resources relied upon to contribute toward regional adequacy should be explicitly accounted for in the standard's metrics.

Recommended action*: none*

Dick Adams, PNUCC (at the power committee meeting on February 12, paraphrased):

Dick reminded the committee of the "communication" problem that arose last year after the Forum released its first assessment of the power supply's adequacy. The Forum assessment showed a large surplus while the NRF (PNUCC report of loads and resources) showed deficits -- even though each report was describing the same system. He suggested that we could preempt the problem this year by preparing a message statement or a fact sheet explaining why differences exist.

Response

Dick's suggestion of preempting this potential problem by issuing a fact sheet makes a great deal of sense. The Forum did experience a communication problem last year when its assessment indicated the region to be largely surplus (with respect to the energy adequacy target) while both the PNUCC and BPA reports indicated the region to be deficit or near deficit. The problem arises because each report is compiled for different purposes and counts resources in a different way. All three reports are describing the same power system but their results are used in different ways. The Forum's assessment indicates whether the region is in danger of a significant curtailment due to a shortage of supply, irrespective of price, whereas both the PNUCC and BPA reports have more traditionally been used to assess whether regional utilities should be acquiring resources for both adequacy and economic reasons.

***Recommended action**: Prepare a resource adequacy fact sheet to be released with the standard.*

Jim Sanders, Chairman, PNUCC Board of Directors (written statement):

Jim reiterates Dick Adam's concern regarding the "message" that the Forum's resource adequacy assessment is sending. He says that the adequacy standard was "written for a technical audience" but that "the public is an increasingly important audience for messages about adequacy." He goes on to say that the paper identifies "two related but distinctly different concepts in assessing the power system's adequacy – a physical standard and an economic standard," yet "falls short of differentiating between these two measures of adequacy when communicating with the larger public." While people in the industry should understand the difference between these two standards, the general public likely will not. He cautions the Forum about being attentive to the messages that they <u>are</u> communicating versus those that they <u>intend</u> to communicate. He recommends re-writing the paper "as necessary to clearly delineate these two different measures of adequacy."

Response

Jim's comments closely parallel those of Dick Adams. Rewriting the paper to more clearly explain the purpose of the regional standard and how it would be used is not a bad idea. However, doing so would delay the process of adopting the standard, which could affect the schedule for development of the Council's next power plan and the already delayed schedule for completion of BPA's regional dialog. By design the standard was written to be complete but concise – enough information to implement the standard and perform an assessment but not overwhelmed by background information. It has taken the Forum over two-and-a-half years to develop this standard. There exists a wealth of information describing the process and the decisions that were made along the way. A more practical way to alleviate Jim's concern may be to develop a fact sheet that provides this background information and explains more fully the purpose of the standard and its relationship to other regional reports.

***Recommended action**: Prepare a resource adequacy fact sheet to be released with the standard.*

Mitzi Bennett, Senior Utility Analyst, Snohomish Co. PUD (email):

Mitzi asked how the 5 percent loss-of-load probability fits with the 23 and 24 percent planning reserve margin targets. She said that the two concepts seem independent of one another. The implication is that the paper does not make it clear enough how the adequacy targets are derived from the loss-of-load analysis.

Response

The question about how the 5 percent LOLP relates to the capacity planning reserve margin targets is commonly asked. It should be noted that the practice of linking a planning reserve margin to an LOLP is very common in other NERC sub-regions.

Using a Monte-Carlo simulation computer model (GENESYS), the LOLP is defined as the number of simulated futures with significant curtailment events divided by the total number of simulated futures. If that number is 5 percent or less, then the power supply is deemed to be adequate. To determine the planning reserve margin targets, a scenario with exactly a 5 percent LOLP is selected. The sustained peaking capability of the resources for that particular scenario can be calculated (although the hydro component is always a bit tricky to estimate). The excess peaking capability (over weather-normal load) is then converted into a planning reserve margin by dividing it by the weather-normal load. This percentage becomes the planning reserve margin target. Saying it in another way, a power supply that has this particular amount of reserve margin (or surplus sustained peaking capability) would yield a 5 percent LOLP in a GENESYS analysis.

***Recommended action**: Prepare a resource adequacy fact sheet to be released with the standard, which contains a more detailed description of how the adequacy targets are determined.*

Tim Culbertson, General Manager, Grant County PUD (written statement):

Tim made several suggestions regarding how resources should be counted in the adequacy standard. First, he argued that generating capability from uncommitted independent power producer resources should not be depended on at any time of the year. Second, he proposed that out-of-region market generation also should not be counted on at any time of the year. Finally, he states that the proposed contributions from wind resources toward the energy and capacity adequacy assessments have not yet been resolved. He strongly proposes that wind's contribution should be "based on the ability of the resource in question to produce the required peaking power during each hour of the sustained peaking period." Grant County PUD may be implying that a resource adequacy assessment not be redone until this issue is resolved.

The first two suggestions may seem to be similar to Steve Weiss' comment but they are not. Steve proposes only counting "firm" resources but also adjusting the targets to the appropriately lower values. Grant County PUD suggests counting only "firm" resources but leaving the targets unchanged. This clearly implies that the generating capability from "firm" resources should at least match firm loads.

Response

The Forum technical and steering committees have debated this issue at length. Grant County PUD refers back to the situation in 2000-01 to support its position. The majority of the other Forum committee members, however, believe that the likelihood of such an event is so rare that that the region should not build resources to cover that type of event. The situation in 2000-01 was a combination of the second driest water condition in the Northwest with a lack of surplus resources from the Southwest. However, part of the lack of surplus from California was due to market manipulation and a flawed market structure. Since that time there has been a tremendous increase in resource development in California. For adequacy purposes, price issues notwithstanding, the majority of the Forum committee members agreed that not counting any non-firm resources would lead to an overbuilt and more expensive power supply for the Northwest.

Grant County PUD also correctly pointed out that the capacity and energy contributions of wind resources have not yet been resolved. Council staff agrees and is working with the wind integration committee to resolve this issue. However, delaying the adoption of this standard until this issue is resolved would jeopardize the schedule for the Council's next power plan and for BPA's regional dialog. Using placeholder values for wind resources will not affect the assessment of the adequacy of the Northwest's power supply.

***Recommended action**: Highlight the importance of resolving the issues surrounding wind resources in the Northwest.*

M. Steven Eldrige, General Manager and CEO, Umatilla Electric Cooperative (written statement):

Mr. Eldrige states that "some of the findings and conclusions of the proposed Adequacy Standard are in conflict with the adequacy standards that I, as a utility manager, and my peers in the electric power industry, must apply to insure that the lights stay on in our respective service territories." He goes on to say that the Forum has not fully explained "what it will mean to the region if the Council adopts this proposed standard." This is, in essence, a reiteration the comment from the PNUCC that the "message" from the adequacy assessment is unclear, if not misleading. Mr. Eldrige gives an example. He states that the current assessment (done in June of 2006) shows the region to be more than 4.000 average megawatts surplus. His interpretation is that utilities need not acquire new resources and, in fact, should immediately "develop strategies for the region to address the high cost of over-building the electric power system by such a large margin." That conclusion he says is "inconsistent with what is happening in the region's electric power industry."

Mr. Eldrige also has concerns regarding the 1,300 average megawatt planning adjustment added to the resource capability in the adequacy assessment. He understands that this value is determined by a loss-of-load probability analysis. He correctly interprets this to mean that planning to a critical water standard is "too conservative." He states that this represents a fundamental change from the 40 plus years of Pacific Northwest Coordination Agreement (PNCA) planning. He recommends that the Council "must have independent peer review of the

LOLP analysis to verify the conclusion that critical water for resource planning is too conservative."

Mr. Eldrige also has concerns regarding the counting of uncommitted IPP generation and out-of-region market generation. His belief is that only "firm" resources should be counted on to meet firm load. In fact, he goes on to say that "the universal guidelines that are clearly defined in PNCA, and have been previously followed in the Council's regional power plans, is that 'firm resources' must exceed 'firm loads.'"

Mr. Eldrige points out that the regional load/resource balances as published by the PNUCC are "incomparable to those proposed in the Regional Adequacy Standard." He suggests that this discrepancy be resolved.

Mr. Eldrige's comments regarding the capacity standard are similar to those he made for the energy standard. He states that the current assessment shows the region to be capacity surplus yet "Bonneville and other major utilities are pursuing capacity additions to maintain their system reliability."

Mr. Eldrige's overriding comment is that the "message" being sent by the resource adequacy assessment, as currently defined in the standard, is not the correct message that utilities should be getting. He says that "if the Council's power plan is to be useful in meeting the needs of the region, is should provide a clear and unambiguous message about what utilities should be doing at this time."

Response

Council staff agrees with Mr. Eldrige that a better explanation of the purpose of the adequacy standard along with a clearer description of how it is related to other regional reports is needed. Mr. Eldrige's comments concur with those of the PNUCC regarding this issue. A well written fact sheet, as proposed earlier, should satisfy this need while not delaying the Council's next power plan or BPA's regional dialog process.

The issue of critical water planning has been debated in the region since the early 1960s. Even in those early days, it was recognized that planning resource additions based solely on critical water would be too conservative – knowing that the likelihood of a critical water event is less than 2 percent and that California would have surplus winter capacity if it built sufficient resources to meet its summer peak loads. Back then, the hydroelectric system was operated in the fall based on slightly better than critical water (a practice commonly referred to as "shifting" and "shaping" hydro power). In the event of a critical water event, winter energy purchases from California could be made or, if that supply was unavailable, service to the region's aluminum plants could be curtailed (by prior agreement with their owners). Service to aluminum plants was rarely, if ever, curtailed due to a low water condition. Of course, today the aluminum load is a small fraction of what it used to be and is no longer used as a contingency option during emergencies. However, given the magnitude of resource development in California over the past several years, Southwest winter surplus for import into the Northwest should be available for a long time to come.

Mr. Eldrige's comment regarding the inclusion of uncommitted IPP resource capability in the adequacy metric is consistent with his comment regarding the use of critical water for resource acquisition planning. The real question is whether or not these "non-firm" resources would be available to Northwest utilities during emergencies. Because the Northwest is a winter peaking region, competition for these uncommitted resources during that season should be minimal since the only other winter peaking region is Canada and it currently has surplus resources. In the summer, when both the Northwest and the Southwest may be competing for the same uncommitted resources, a different situation is observed. Since some IPP resources do not have direct access to interregional transmission lines, is seems logical to believe that Northwest utilities would have a first shot at their generation during emergencies, given enough forewarning. The Forum committee members agreed that the amount of available IPP generation for Northwest summer use should be limited to those resources that do not have direct access to interregional transmission.

Mr. Eldrige comments that "'firm resources' must exceed 'firm loads,'" in context to resource planning, yet in the 1900s when the load/resource balance was much more deficit than today (based on PNUCC reports) utilities in the region were <u>not</u> actively pursuing new resource acquisition. Over the past two years, Forum committee members have debated the issue of how much reliance the region should have on non-firm resources. Members agreed (although there were some dissenting votes) that some level of non-firm resources should be counted on when assessing regional power supply adequacy. This decision is supported by the loss-of-load probability analysis. Of course, if individual utilities do not have access to such resources or if they choose to be more conservative in their planning approach, then planning for new resources based only on "firm" resources makes sense for them.

Finally, Mr. Eldrige reiterates other comments received related to the "message" that the Forum is sending to both utilities and to the pubic. Council staff agrees that this message needs to be clearer and proposes writing a fact sheet to accommodate this need.

***Recommended action**: Prepare a resource adequacy fact sheet to be released with the standard.*

Paul Norman, Senior Vice-President, Power Services, Bonneville Power Administration (written statement):

Mr. Norman comments that the Bonneville Power Administration is satisfied with the regional adequacy standards developed by the Forum and recommends that the Council adopts them. However, BPA endorses "PNUCC's caution that proper public communication about the standard is crucial, to avoid misinterpretation of their implications for regional resource development." Mr. Norman also emphasizes that although BPA agrees with the concepts outlined in the adequacy standards, much more significant technical work needs to be done to properly implement them. In particular, he listed:

- Resolving the issues surrounding the capacity value for wind
- Refining the evaluation of the hydro system's capacity contribution
- Re-evaluating the contribution of independent power producer resources toward winter capacity
- Reflecting wind integration requirements in the capacity targets

Response

Council staff agrees with Mr. Norman that a better explanation of the purpose of the adequacy standard along with a clearer description of how it is related to other regional reports is needed. In addition, staff recognizes that much more technical work lies ahead. The issues raised by Mr. Norman will be addressed by the Forum's technical committee over the next year.

***Recommended action**: Prepare a resource adequacy fact sheet to be released with the standard. Develop a detailed work plan for the Forum's technical committee to address the issues raised by Mr. Norman.*

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DRAFT 2 BPA, TM, WG, CW, JF

Northwest Resource Adequacy Standard
Fact Sheet

March 8, 2008

Electricity does more than keep the lights on in the Pacific Northwest. It literally powers our economy. The absence or presence of an adequate electricity supply can either curtail or facilitate economic growth. That's why the region's electricity experts have been working on a resource adequacy standard – to help ensure we continue to have an adequate electricity supply.

In the worst extreme, an inadequate electricity supply can affect public health and safety, as in a blackout, for example. Fortunately, such events are rare and when they do happen are most often caused by a disruption in the delivery of electricity (transmission lines), not the supply. However, there have been times – during extreme cold spells or heat waves – when the supply has been tenuous. The fact that most of the region's electricity comes from hydropower presents unique challenges to the energy supply, too, since periods of drought that limit hydropower production are unpredictable.

While most disruptions in supply have been short term, the Western United States did experience an extended energy crisis in 2000-2001. At its root, the crisis was precipitated by an imbalance of electricity supply and demand centered in California and the Pacific Northwest, where for years development of new energy resources had lagged behind energy demand. The ripple effects were felt throughout the West as the crisis drove electricity prices and consumer rates to historic highs.

Electricity planners in the Pacific Northwest are taking the lessons learned from that crisis to heart. They have been working to ensure that such a crisis does not happen again in this region.

The Adequacy Forum

In the summer of 2005, the Bonneville Power Administration and the Northwest Power and Conservation Council jointly initiated the Pacific Northwest Resource Adequacy Forum. The Forum includes representatives from the region's electric utilities and utility organizations, public utility commissions and public interest groups, as well as from BPA and the Council. It is made up of a steering committee and a technical committee.

The Forum's overarching goal is to *"establish a resource adequacy framework for the Pacific Northwest to provide a clear, consistent, and unambiguous means of answering the question of whether the region has adequate deliverable resources to meet its loads reliably and to develop an effective implementation framework."*

To that end, the Forum has been working to forge a set of consensus-based energy (annual needs) and capacity (hourly needs) adequacy standards for the region. These standards have been designed to help Northwest utilities determine if they have sufficient resources to meet growing demand for electricity well into the future. This is important, because it takes time – usually

years – to acquire or construct the infrastructure necessary to provide an adequate electricity supply.

As part of this effort, the Council accepted the recommendations of the Forum and has adopted the proposed resource adequacy standard for the Northwest. The Council also adopted a voluntary implementation plan that was developed and recommended by the Forum.

The Regional Standards

As the standards were developed, the Forum considered a number of recent changes in the regional power picture. These changes include the growing role of independent power producers, enhanced wholesale power trading, reduced flexibility in the hydroelectric system, the increased importance of natural gas-fired generation, growing use of intermittent wind generation, and higher summer air conditioning loads.

The new standards are based on a sophisticated hourly assessment of loads and resources and how they might be affected by temperature (load deviations), precipitation (water supply), forced outages to generating resources, and other factors. At the heart of the Forum's effort is a computer program that estimates the future likelihood of a significant power curtailment under many possible load and resource conditions. Resource strategies are developed that limit the probability of a loss of service to no more than 5 percent for both energy and capacity needs. This assessment, usually referred to as a loss-of-load probability (LOLP) analysis, is converted into an equivalent, but simpler and more familiar load/resource balance measurement that regional planners use in their calculations. The text below summarizes the current standard. To view the actual standard, go to: http://www.nwcouncil.org/energy/resource/Default.asp.

energy standard

Energy in this context refers to the annual electricity needs of the region. The energy metric is defined as the annual average load/resource balance in units of average megawatts. The target for the energy metric is set so that the resulting loss-of-load probability assessment yields a 5 percent value.

In determining resource generating capability, the Forum includes hydroelectric generation available under critical water (driest year on record), available annual output of regionally committed thermal generators and renewable resources, and a portion of the uncommitted independent power producer generation. The Forum also includes a planning adjustment which reflects the likelihood that some non-firm resources such as out-of-region market supplies and non-firm hydroelectric generation will be available. The amount of this planning adjustment is determined by the 5 percent loss-of-load probability analysis.

In determining load, the standard uses the region's average annual firm load based on normal temperatures and adjusted for firm out-of-region energy contract sales and purchases and savings from conservation programs.

capacity standard

Capacity in this context refers to the peak electricity needs of the region. The capacity metric is defined as the planning reserve margin, or the surplus sustained-peaking capacity, in units of percent. It represents the surplus generating capability above the sustained-peaking demand under normal weather conditions.

In determining resource peak capability, the Forum includes the same firm and non-firm resources used to assess the energy adequacy for the region. The planning reserve margin is assessed over the six highest load hours of the day for three consecutive days (sustained-peak demand). This is intended to simulate a cold snap or heat wave – periods of the year when the Northwest requires the most capacity. The planning reserve margin is computed relative to normal weather sustained-peak loads. The target for the capacity metric is determined by the 5 percent loss-of-load probability analysis and should be sufficient to serve load deviations due to extreme temperatures and the loss of some generating capability.

Implementing the Standards

The Forum's standard adopted by the Council does not set mandatory compliance or imply enforcement mechanisms. Rather, it is used as a gauge to assess whether the Northwest electricity supply is adequate to meet the region's needs now and in the future. In effect, the standard guides long-term resource planning by setting "minimum thresholds" for acquiring new electricity resources. It can be viewed as an "early warning system" for the region. It should be noted that there are other reasons, primarily economic, for utilities to develop higher levels of generating resources and conservation savings than dictated by the adequacy standard. In fact, the resource strategy in the Council's Fifth Power Plan would have the region acquire a much higher amount of generating capability than the adequacy targets.

The Forum also wanted to ensure it did not overstep the jurisdiction of states or the prerogatives of individual utilities in planning and acquiring resources to meet load. Because each utility's circumstances differ, it is difficult to translate a regional standard into a utility-specific standard. Therefore, the implementation plan depends on utilities and their existing governing bodies to consider the regional standards as they make their own resource plans. It also relies on regional sharing of information, transparency of assessment methodologies, and regional coordination. The Forum believes that a voluntary approach will work because utilities and their governing bodies have a strong incentive to develop adequate resources to meet retail loads.

BPA will also play a significant role. As it signs new wholesale power contracts with its utility customers, BPA will require that customers provide forecast loads and resource data annually, on a confidential basis, to the Pacific Northwest Utilities Conference Committee (PNUCC), or its successor organization. This information will be used to facilitate regional resource adequacy assessments. BPA expects its customer contracts to include terms that define which parties will have responsibility to serve load growth.

The Future

Many utilities already are seeking assistance from the Council and the Forum in understanding how to interpret the standards for use in their own resource planning. Council staff and the Forum will continue to provide this assistance. The Forum also is looking at an economic standard that would, in addition to "keeping the lights on," minimize the risk of future high costs. While an economic standard may mean a higher investment in resources or demand management programs, possibly increasing the average cost of the power supply, it would reduce the likelihood of extreme price spikes in the future. The economic standard for resource adequacy is based on the Council's power plan.

Finally, the Northwest is not alone in focusing on ensuring an adequate power supply. The North American Electric Reliability Corporation (NERC) plans to release a resource adequacy assessment standard in 2008, which will require the Western Electricity Coordinating Council (WECC) to develop an adequacy assessment framework. WECC has spent the past several years developing a framework for the West's power supply, which is currently in place. WECC's framework is explicitly not intended to override any state or regional assessments, targets or metrics. The work of the Forum is important because the dominance of the hydro system requires different considerations for adequacy assessments than are common in the rest of the West or nation.

Frequently Asked Questions

Q: The current adequacy assessment says the region has a large surplus while BPA and PNUCC say the region could face deficits. Aren't these very different messages?

A: The Forum's adequacy assessment counts committed resources that are owned, under contract, or in the case of the hydro system, expected to be available under critical water conditions. In addition, the Forum concluded that uncommitted power from independent power producers is likely to be available to serve regional load, albeit at a potentially high price. The Forum also added a planning adjustment to the resources that reflects the potential availability of out-of-region purchases and hydro that is available most of the time, but is not available in the driest conditions.

Uncommitted independent power resources are not counted in the BPA and PNUCC assessments, nor is the planning adjustment When these entities use the term "deficits," they mean deficits against those committed resources; that is, resources a utility can count on as available and, more importantly, can count on at a predictable and acceptable price.

In addition to this major conceptual difference, there are several differences in the approaches to load forecasting and in the accounting for resources that contribute to the difference between the two conclusions. For example, some utilities count the *expected* output from certain resources, whereas the Forum counts full availability of all resources assuming that under emergency conditions all resources would be fully dispatched.

Q: If the region has a large surplus, then why should utilities be in the process of acquiring resources?

A: Resource adequacy is just one of several factors that utilities use to define the amount and type of resources they acquire. The resource adequacy standard defines the minimum level of resources needed to maintain an adequate supply up to five years into the future. Utilities' resource plans may appropriately call for more acquisitions than are implied by the adequacy standard for other reasons such as more control over their own costs. By acquiring more resources, the average cost of the power supply may increase, but the likelihood of large swings in electricity prices (due to more reliance on the open market) will be minimized. This additional cost is analogous to an insurance premium against extreme price volatility. In fact, the Council's Fifth Power Plan calls for a resource strategy that would have the region acquire a much higher generating capability than the minimum dictated by the adequacy standard.
