Northwest Power and Conservation Council
Sixth Northwest Power Plan

Statement of Basis and Purpose for the Sixth Power Plan
and
Response to Comments on the Draft Sixth Power Plan

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Introduction

The Northwest Power and Conservation Council adopted the Sixth Northwest Power Plan in February 2010. This document briefly summarizes the statutory framework and substantive and procedural requirements that guided the Council's power-planning effort; steps the Council followed in developing, considering, and adopting the Sixth Power Plan; key issues, conclusions, and recommendations in the Council's consideration and adoption of the power plan; comments on the draft Sixth Power Plan from the Bonneville Power Administration, Bonneville's customers, state and local governments, business and public interest groups, and many other entities and individuals; and, finally, how the Council considered and responded to those comments and to other information and issues in its deliberations on the final Sixth Power Plan, highlighting the changes and continuities from the draft to the final power plan. This document also serves as the "statement of basis and purpose" described in Section 553 of the federal Administrative Procedures Act to accompany agency decisions on final rules.

Statutory Framework – The Northwest Power Act

The Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act) directs the Northwest Power and Conservation Council to develop a "regional conservation and electric power plan" and to review the plan not less than every five years. The Council had adopted the Fifth Northwest Power Plan in December 2004. In December 2007 the Council began the power plan review that led to the development and adoption of the Sixth Northwest Power Plan.

The Northwest Power Act directs the Council to develop a power plan that gives priority to resources the Council determines to be cost-effective in the following order: first, to conservation; second to renewable resources; third, to generating resources using waste heat or generating resources of high fuel-conversion efficiency; and fourth, to all other resources. The plan must also set forth a general scheme for implementing conservation measures and developing generating resources with due consideration by the Council for (A) environmental quality; (B) compatibility with the existing regional power system; (C) protection, mitigation, and enhancement of fish and wildlife and related spawning grounds and habitat, including sufficient quality and quantity of flows for successful migration, survival, and propagation of anadromous fish; and (D) other criteria that may be set forth in the plan.

The Power Act then requires the plan to include the following elements:

- an energy conservation program, including model conservation standards
- recommendations for research and development
- a methodology for determining quantifiable environmental costs and benefits
- an electricity demand forecast of at least 20 years
- a forecast of power resources estimated by the Council to meet the obligations of the Bonneville Power Administration and the amounts that can be met by resources in each of the priority categories. The power resource forecast shall (i) include regional reliability and reserve requirements; (ii) take into account the effect, if any, of the requirements of the fish and wildlife program on the availability of resources to Bonneville; and (iii) include the approximate amounts of power the Council recommends Bonneville acquire on a long-term basis and may include, to the extent practicable, an estimate of the types of resources to be acquired
- an analysis of electricity reserve and reliability requirements and cost-effective methods of providing reserves designed to insure adequate electric power at the lowest probable cost
- the fish and wildlife program promulgated earlier by the Council under Section 4(h) of the Act to protect, mitigate, and enhance fish and wildlife and related spawning grounds and habitat affected by the development and operation of any hydroelectric project on the Columbia River and its tributaries

As for the process involved in adopting such a plan, the Power Act generally requires that both the Council and Bonneville ensure widespread public involvement in developing regional power policies by maintaining comprehensive programs to inform the Northwest public of major regional power issues, obtain public views concerning major regional power issues, and secure the advice of Bonneville's customers and others. The Power Act directs the Council to consult with Bonneville's customers and include their comments in the record of the Council's proceedings. The Council also is to recognize and not abridge the authorities of state and local governments, electric utility systems, and other non-federal entities responsible to the people of the Pacific Northwest for the planning, conservation, supply, distribution, and use of electric power and the operation of electric-generating facilities.

Specifically relevant to the power plan, the Power Act requires the Council to hold public hearings on the proposed plan in each state represented by the members of the Council before adoption. The Power Act also requires that in the preparation, adoption, and implementation of the plan, the Council and Bonneville shall encourage the cooperation, participation, and assistance of appropriate federal agencies, state entities, state political subdivisions, and Indian tribes. The Council also largely follows the notice-and-comment procedures specified in the federal Administrative Procedures Act, providing notice of the draft power plan and an opportunity for written public comment and opportunities to testify at public hearings in the four states represented in the Council.

Developing the Sixth Northwest Power Plan

In December 2007, the Council began the most recent power plan review by releasing a paper titled "Issues for the Sixth Pacific Northwest Power and Conservation Plan." In that paper, the Council described major issues that would be important to address in the Sixth Power Plan and asked for a public response on the importance of those issues and suggestions for other topics of special concern to the region. Issues identified included the effects of climate change and related policies; whether the region has sufficient capacity to meet loads on an annual, daily, hourly, and sub-hourly basis and related issues about integrating wind and other intermittent resources; expanding the menu of conservation, efficiency, and generating resource choices; transmission constraints and their impact on electricity markets and resource development; power system interactions with the fish and wildlife program; and appropriate avoided-cost measures for resource decisions. http://www.nwcouncil.org/library/2007/2007-22.htm.

Over the course of the next two years, the Council engaged in a series of technical and policy analyses necessary for the power-planning process, occasionally releasing additional papers and draft forecasts for further public comment, formal and informal. *See, e.g.*, http://www.nwcouncil.org/library/2008/2008-13.htm and http://www.nwcouncil.org/library/2008/2008-14.htm (draft fuel price forecasts released for public comment and revised); http://www.nwcouncil.org/library/2009/2009-03.htm (same for draft demand and economic forecasts); http://www.nwcouncil.org/library/2008/2008-05.htm (2008 interim wholesale power price forecast); http://www.nwcouncil.org/energy/powerplan/6/default.htm (record of ongoing work to develop conservation-supply curves; fuel-price forecasts; economic and demand forecasts; rates and bills information). The Council also established and held public meetings of a number of advisory committees to obtain additional information and views, including advisory committees for conservation resources, demand forecasting, generating resources, and natural gas. Through these efforts and advisory groups, the Council obtained the views of Bonneville, Bonneville's customers, relevant public interest groups, the region's ratepayers, and other important participants in regional power policies. http://www.nwcouncil.org/energy/powerplan/6/default.htm.

The Council then released for public review the draft Sixth Power Plan in September 2009, making sure to provide wide public notice of the draft plan to Bonneville, Bonneville's customers, other utilities, state, federal, local, and tribal agencies and governments, businesses, trade associations and public interest organizations, and the public at large. http://www.nwcouncil.org/energy/powerplan/6/draft/default.htm. The Council received written public comments on the plan until November 6, 2009, taking in well over 750 written comments. The Council also held public hearings on the draft power plan in cities across the region (Seattle, Spokane, Pasco, Portland, Eugene, Astoria, Boise, Idaho Falls, Missoula), including at least one public hearing in each state represented in the Council, receiving the testimony of hundreds of interested individuals and representatives of organizations, utilities, businesses, public interest groups, and government agencies. Council members and staff also received comments by telephone and in informal consultations, preparing comment summaries for the administrative record. All written comments, comment summaries, and public hearing transcripts were circulated to Council members and relevant staff.

After significant deliberations by the Council and its power committee from November 2009 into February 2010, the Council revised the draft plan in certain respects and then unanimously voted to adopt the final Sixth Northwest Power Plan at the Council's regularly scheduled public meeting in February 2010 at the Council's central offices in Portland, Oregon. The Sixth Power Plan contains all of the substantive elements required by the Northwest Power Act. The Council made its final decision after carefully considering all of the information developed for the power plan's administrative record, including extensive staff analyses and the views expressed in the comments and consultations generated by public review of the draft plan. After the adoption of the final Sixth Power Plan in March 2010, the Council also approved a set of supporting technical appendices and, finally, this response to comments and general explanatory statement.

Summary of Key Issues, Conclusions, and Recommendations in the Sixth Power Plan

The Northwest's energy system faces significant uncertainties about a range of important issues, including future climate-change policies, fuel-price uncertainties, integrating rapidly growing amounts of variable generation (especially wind), uncertain economic growth, and significant salmon recovery actions. In the face of such uncertainties, the Council's Sixth Power Plan offers the region clear direction, particularly with regard to important near-term actions. The plan's resource strategy minimizes the expected cost and risk of the regional power system over the next 20 years. Across the multiple scenarios considered in the development of the plan, one conclusion was constant: The resource that is the most cost-effective and results in the least-risk for the region is conservation.

If developed aggressively, the plan finds that enough cost-effective conservation is available to meet 85 percent of the region's load growth over the next 20 years. Consequently, pursuit of conservation is the primary focus of the plan's actions for the next five years. Combined with investment in renewable generation required by state renewable portfolio standards (RPS), conservation will help postpone investment in new and more expensive fossil-fueled power plants until future environmental legislation is clear and alternative low-carbon energy sources become available.

Bonneville, by statute, observes the Council's resource strategy, especially in acquiring resources. The plan helps to guide choices by Bonneville and the region's utilities that will reliably meet the region's growing electricity needs at the least-cost and lowest-risk in the face of an uncertain future. The timing of specific resource acquisitions is not the essence of the strategy because the timing of resource needs will vary for each utility. Rather, the important message of the resource strategy lies in the nature and priority of the resources.

The resource strategy is summarized in five specific recommendations:

1. Improved efficiency of electricity use is by far the lowest-cost and lowest-risk resource available to the region. Cost-effective energy efficiency should be developed aggressively and consistently for the foreseeable future. The Council's plan demonstrates that cost-effective efficiency improvements could on average meet 85 percent of the region's load growth over the next 20 years. Develop at least 1,200 average megawatts of conservation by 2015 and equal or slightly higher amounts every five years through the year 2030.
2. Renewable-resource development is required by resource portfolio standards in three of the four Northwest states. The most readily available and cost-effective renewable resource is wind power, and it is being developed rapidly. Wind requires additional strategies to integrate its variable output into the power system and, in addition, it provides little capacity value for the region. The region needs to devote significant effort to expanding the supply of other cost-effective renewable resources, many of which may be small in scale and local in nature.
3. Remaining needs for new energy and capacity should be based on natural gas-fired generation until more attractive technologies become available. The resource strategy

does not include any additional coal-fired generation to serve the region's needs. Further, the Council's plan demonstrates that meeting the Northwest power system's share of carbon reductions called for in some state, regional, and federal carbon-reduction goals will require reduced reliance on the region's existing coal plants.

4. The challenges of wind integration and the need for additional within-hour reserves initially should be addressed through improvements in system-operating procedures and business practices. Changes in wind forecasting, reserve sharing among control areas, scheduling the system on a shorter time scale, and advancing dynamic scheduling can all help address wind integration and contribute to more efficient use of existing system flexibility. The region is already making significant progress in these areas. Because the inherent balancing capability of the system may eventually prove insufficient, the Council recommends an assessment of the cost-effectiveness of generation, storage, and demand-side measures for augmenting balancing capability.
5. Finally, the Council's resource strategy calls for efforts to expand long-term resource alternatives. The region should demonstrate the potential of smart-grid applications to improve the operation and reliability of the regional power system and to enable consumers to provide demand response for the capacity and flexibility of the power system. The region should continue to assess new efficiency opportunities, expand the availability of cost-effective renewable energy technologies, and monitor development of carbon capture and sequestration, advanced nuclear technologies, and other low-carbon or no-carbon resources.

The region must also maintain and improve the reliability of its power system. Investments in additional transmission capability and improved operational agreements are important, both to access growing site-based renewable energy and to integrate it effectively into the system. The plan encourages investment in cost-effective, small-scale cogeneration or renewable-energy resources available at the local level.

The plan acknowledges that meeting capacity needs and providing the flexibility reserves necessary to integrate growing variable-generation resources may require near-term investment in conventional generating resources. In addition, the Council recognizes that individual utilities have varying degrees of access to electricity markets and varying resource needs. Consequently, the regional plan is not necessarily a precise blueprint for each individual utility in the region, but is intended to provide guidance to the region on the types of resources that should be considered and their priority of development.

Longer-term needs also must be addressed, so the plan encourages exploring advanced technologies for the long-term development of the power system. For example, emerging smart-grid technologies could provide incentives to consumers to reduce power use during peak periods, helping keep the system in balance. Given the uncertainties of the future, the region should not concentrate on any one future solution to its power needs but should explore a diversity of future resources and conservation.

Uncertainty surrounding future climate policies was identified as one of the most important issues to address in the Sixth Power Plan. The Council's key findings include the following:

- Absent any carbon-control policies, carbon emissions from the Northwest power system would continue to grow to 6 percent greater than 2005 levels by 2030. The growth in emissions would be far greater were the region not to develop cost-effective conservation, even without carbon policies
- Current policies alone would stabilize carbon emissions from the Northwest power system at 2005 levels but would not meet existing carbon-reduction goals
- Assuming a risk of higher carbon prices, the plan's resource strategy could reduce average regional power-system carbon emissions to 9 percent less than 1990 levels, or 30 percent less than 2005 levels, adjusted for normal hydropower conditions
- Significant reductions of carbon emissions from the Northwest's power system require reduced reliance on coal
- If public policy raises the cost of carbon emissions, typical consumers' electricity bills will increase and carbon emissions will decrease
- Preserving the capability of existing regional hydroelectric generation helps keep power-system costs and carbon emissions down

In the past, regional resource planners could focus mostly on annual average energy requirements, leaving the minute-to-minute balancing required for system reliability to system operators. This was because the hydroelectric system had enough peaking capacity and flexibility to provide the needed operations as long as there was sufficient energy capability. For several reasons this is changing. Growing load is reducing the share of hydroelectricity in total demand, peak loads have grown faster than annual energy, the capacity and flexibility of the hydrosystem have been reduced over time for fish operations, and growing amounts of variable wind generation have added to the balancing requirements of the system. As a result, planners must now weigh the energy, capacity, and flexibility characteristics of potential new resources. Changes also can be made in the operation of the power and transmission systems that will reduce flexibility reserve needs at a cost lower than adding peaking generation, demand response, or flexibility storage. Such changes can be implemented more quickly.

The Council's Columbia River Basin Fish and Wildlife Program is by statute a component of the plan. One of the roles of the plan is to help ensure reliable implementation of hydrosystem operations designed to mitigate the adverse effects on fish and wildlife due to the construction and operation of the Columbia River hydroelectric system. System operators have reliably provided hydrosystem actions specified to benefit fish and wildlife (and Bonneville ratepayers have absorbed the cost of those actions) while maintaining an adequate, efficient, economic, and reliable energy supply. This is so even though such operating requirements have had a measurable impact on power generation. Since 1980, the plan and Bonneville have addressed this impact through changes in secondary power sales and purchases, by acquiring conservation and some generating resources, by developing resource-adequacy standards, and by implementing other strategies to minimize power-system emergencies and events that might compromise fish operations.

The future presents a host of uncertainties that are sure to pose challenges to successfully integrating power system and fish and wildlife needs. These include possible new fish and wildlife requirements, integrating increased wind generation and other variable, renewable resources that could require more flexibility in power-system operations, conflicts between

climate-change policies and fish and wildlife operations, possible changes to the water supply from climate change that might make it more difficult to deliver flows for fish while also meeting power needs, and possible revisions to Columbia River Treaty operations to match 21st century power, flood control, and fish needs. In planning for the region's future energy needs, the Sixth Power Plan takes these uncertainties into account throughout the 20-year planning period.

Response to Comments on the Draft Sixth Power Plan

Most of the comments the Council received, even those that eventually expressed a concern or sought a change in the draft, expressed both appreciation for the draft power plan and general support for the proposed key findings, as well as the resource plan in the draft. Very few comments challenged the basic premises of the draft plan or sought significant changes in the resource strategy or general structure and organization of the draft power plan. The comment summary focuses only on the comments that raised a concern or sought some sort of refinement in the draft.

The major issues raised by the comments are shown in bold, followed by a response explaining how the Council dealt with the issue in the final power plan. The issues are loosely organized by topic. Comments have been paraphrased and summarized. They are not individually identified, with minor exceptions, since in most cases similar comments came from multiple individuals or entities. Not every comment has been separately summarized or responded to, especially given the overlap in topics. Also, a number of specific comments sought relatively minor clarifications, corrections or slight modifications of particular language in the draft plan. The Council addressed these comments through corresponding minor revisions in plan language not otherwise discussed here. The key point, however, is that the Council members and key staff reviewed and carefully considered *all* comments, written and oral, in shaping the final power plan.

Between the draft and final power plan, the Council and its staff continued to review and update the technical information and analysis underpinning the plan's resource strategy, whether highlighted by the comments or not. This included continuing work to update the plan's economic assumptions and demand forecasts, fuel price and electricity price forecasts, and conservation and generating resource supply curves and cost estimates (which are themselves influenced by the other assumptions and forecasts). Because these are inputs into the resource portfolio model (RPM), the Council re-ran all the RPM scenarios prior to the final plan with the updated information. (The RPM runs for the final plan also corrected the use of the discount rate in the model, noted later in the discussion of comments on the discount rate selected by the Council.) The Council also updated other analyses dependent in part on these inputs or on the RPM runs, such as the effects of resource strategies on rates and bills. The adjustments and updated information were within the scope of the original analytical work done for the draft plan. The resource planning insights gained for the analysis and the resource strategies chosen by the Council for the final Sixth Power Plan did not change materially from the draft plan following the updated analytical work.

For example, based on a continuing review of information about various conservation measures, the Council, with technical support from conservation staff, revised the seasonal and daily shape of the conservation savings in the conservation supply curves that are used by the resource portfolio model. The revisions included a more detailed description of the time-based shape of savings from individual measures, among other changes. The results of the modified shape of the conservation supply curves were to shift more of the anticipated savings in the supply curves to the low-load hours relative to high-load hours. These changes then influenced the way the RPM selected conservation and the nature of the risk adder or premium assumed by the model,

presumably contributing to slight changes in the amount of conservation and other resources selected, particularly power from gas-fired turbines. Nevertheless, the analysis for the final plan, as for the draft, continued to find nearly 6,000 average megawatts of available, cost-effective conservation over the next 20 years, and the five-year conservation targets did not change. Changes in the amounts of other resources resulting from the final plan analyses were also minor and the plan's final resource strategies and priorities did not change.

In addition to the Council's own internal analytical work, the Council grappled with the following issues presented by the comments:

The Council received many comments encouraging the Council to increase the amount of conservation and renewable resources in the power plan.

Response: The Council's recommended resource portfolio includes all of the conservation measures and renewable-generation resources that the Council found to be cost-effective and available. The conservation supply curves developed by the Council for the plan include dozens of additional available conservation measures for consideration in the next decade. However, the Council determined that none of these measures were cost-effective at the time they would be needed compared to the cost of other resources, even with the 10 percent cost-effectiveness benefit afforded to conservation resources under the Northwest Power Act. Because these resources were not found cost-effective under the Act's definition, the Council could not include them in the plan's conservation-resource targets. In the transition from the draft to the final plan, the Council did in fact review the information on conservation measures and adjust the supply curves. The amount of conservation selected in the final RPM studies for the plan increased approximately 130 average megawatts due to the reassessment of the measures and supply curves.

Several hundred megawatts of additional renewables that may be cost-effective were not included in the final portfolio analysis because quantitative information regarding these resources was not available at the start of that analysis. Some of these resources, notably "niche" biofuel resources, have been at least partially quantified since the draft plan and appear to be cost-effective on the basis of levelized costs. Others, including new hydropower and hydropower upgrades, remain unquantified because of a lack of necessary information. The plan responds to the likely availability of these resources, first by calling for special efforts to seek out and develop these opportunities and secondly by calling for efforts to quantify the cost-effectiveness and potential of currently unquantified resources.

The majority of these comments emphasized that the Council could or should be more aggressive in forecasting technological progress in efficiency and renewables. However, the Act includes a condition that resources included in the power plan be "similarly available and reliable." The Council has interpreted that to mean it should be conservative in forecasting large changes in technology or cost that make resource measures available and cost-effective.

Another argument was that the Council should evaluate and quantify the economic costs of environmental damage from coal and natural gas-fired plants, which would make new coal and natural gas plants more expensive and additional conservation and renewable resources more

cost-effective. The Council did include in resource costs the costs of current environmental compliance, plus a range of costs representing uncertainty over future emissions policies. From the Council's experience, it is possible to quantify the costs to prevent and mitigate environmental damage by assessing the costs of current regulatory compliance and then estimating the range of costs that may result from potential future regulation and policy developments. This methodology also reflects society's primary approach to assessing environmental costs in the last few decades. The Council has not been able to quantify in dollar terms the residual environmental damages that might result from generating or conservation resources (which in concept are produced by all resources, not just coal and gas plants). The amount of conservation in the resource strategy was not sensitive to different levels of carbon-emission regulation, so different scenarios using different carbon prices resulted in similar levels of conservation. This is because acquiring conservation in the future proved to be the least-cost, least-risk strategy regardless of the policy landscape.

The Council also received comments asserting that the conservation targets in the draft plan were too high. Small and rural utilities were particularly concerned that they would not be able to meet the targets and argued for reducing them, especially for lowering the low end of the target range of conservation. Other comments expressed concern about over-reliance on a single type of resource, whether conservation or wind resources expected to meet state renewable portfolio standards. The Council was encouraged to consider the uncertainties of conservation achievement and costs, as its analysis does with respect to other resources.

Response: The Council's conservation targets are based on regional analysis and are regional targets. The final plan makes clear that sharing regional targets based on a simple allocation by load is inappropriate. Bonneville has also made clear that it will not allocate its share of the conservation targets to individual utilities. The plan also specifies that the measures and assumptions built into the conservation targets should include efficiency savings from actions other than utility programs, such as savings from improved building codes and revised appliance-efficiency standards. The final plan also acknowledges uncertainty in achieving the five-year target.

The Council's conservation staff worked extensively with public utility staffs to explain the Council's conservation methodology, assumptions, and data, and carefully considered the utilities' analysis and revised the estimates of near-term achievability rates for particular conservation measures as appropriate. The Council also added clarifications and provisions in the action plan to help address the utilities' concerns. These include CONS-17, generally accounting for unique circumstances of small or rural utilities; CONS-14, which counts the savings for utility-acquired compact fluorescent light bulbs (or CFL) toward conservation targets until federal standards take effect in 2012; and CONS-10, calling on the Regional Technical Forum (RTF) to work with the smaller or more rural utilities to identify conservation measures that acknowledge the limited capabilities, customer and service territory characteristics, and experience of the region's small or rural utilities.

The Council declined to change the conservation targets in the draft plan. This includes not reducing the lower end of the regional five-year conservation target to 1,000 average megawatts,

leaving it at 1,100 average megawatts as in the draft plan. Based on the comments and on the ongoing collection of technical data, the Council carefully reviewed the conservation supply curves and other inputs supporting the conservation targets. Based on additional information on efficiency technology and costs (information constantly updated), the final plan includes small adjustments in various components of the conservation supply curves to bring them up to date (and to correct minor analytical errors). The overall totals did not change materially. The Council is satisfied that the information on the amount of available and cost-effective conservation reasonably supports the plan's conservation targets.

The analysis presented by the public utility workgroup to the Council's Conservation Resource Advisory Committee may have resulted in a 1,000 average megawatt regional five-year conservation target as realistically achievable, but among other things, that analysis did not include the conservation potential from compact fluorescent light bulbs that will be covered by federal standards taking effect in 2012. Since the Council's final Sixth Power Plan permits a portion of its conservation target to be met through CFL savings, the proposed 1,000 average megawatt lower-end target would be too low. In 2008, savings from CFL through local utility incentive programs and Bonneville's regional "Savings with a Twist" program were over 25 average megawatts, excluding the efforts of the Northwest Energy Efficiency Alliance (NEAA). If the trend continues, local CFL program savings could increase to 30-35 average megawatts per year in 2010 and 2011, producing from just this one measure an additional 60-70 average megawatts above the 1,000 average megawatts deemed realistically achievable.

It is important to note that the region exceeded the Fifth Power Plan's five-year conservation target of 700 average megawatts in just four years. In 2008, regional utility savings reached 235 average megawatts, 35 average megawatts above the Sixth Power Plan's target for 2010. The Council fully expects that current conditions are more favorable for efficiency than they were in 2008, when the region set an all time record for conservation accomplishments by utilities, directly and through a system benefits charge program. The Council weighed a number of conservation drivers that exist today:

- The cost of new generation is up significantly
- Bonneville has adopted tiered rates for new resources, placing an additional incentive to pursue cost-effective conservation to avoid higher Tier 2 resource costs
- Before the Sixth Power Plan, utilities with service territories representing roughly half of the region's load were already targeting conservation at levels that would reach the 1,200 average megawatt target
- Conservation budgets are up regionwide
- The Northwest Energy Efficiency Alliance's (NEEA) strategic plan calls for a doubling of its budgets, and its plan is funded
- The federal administration is committed to efficiency, with a strong emphasis on improving federal efficiency standards
- Considerable federal stimulus money has been directed toward efficiency
- Federal and state climate-change legislation is possible in the near future, and all proposed bills include provisions focused on energy efficiency, including provisions designed to assist small rural co-operatives
- Energy codes are poised for improvement in all four states

- States and local governments are adopting efficiency policies and establishing incentives
- The private sector is engaged as never before, and the energy-efficiency industry and infrastructure are growing fast and attracting talented people from other industries

The risks associated with conservation are small compared to most other resources. Carbon policies, fuel prices, and load growth are risks attached to generating resources, not conservation. The primary risks with conservation are overestimating its availability or the region's ability to achieve planned levels, inadvertently creating a resource deficit. To address these risks, the final plan includes a biennial assessment of progress toward meeting the conservation targets, as well as ongoing monitoring and reporting of conservation progress. The targets might need to be adjusted as conditions change. Historically, the error has been to *underestimate* efficiency gains, not overestimate them.

The Council intends to explore the implications of conservation uncertainty. The plan already has done so through scenario analysis of high and low conservation scenarios. The Council also worked with staff to modify the resource portfolio model to include a measure of conservation uncertainty, and continued to obtain additional information on efficiency technologies and their cost, and will continue to do so. Finally, the Council added an analytical task to the final action plan, ANLYS-17, to incorporate conservation acquisition risk. This provision notes that the Council has already begun modifying the model to reflect uncertainty about conservation achievement rates. The revisions will be completed next year, treating conservation uncertainty in the same manner as generating-resource uncertainty.

A number of utilities and utility associations urged the Council to consider changing or adjusting its methodology for estimating regional conservation potential, if not for the Sixth than at least for the Seventh Power Plan. They recommended that the Council employ a conservation analysis that begins from a "utility-up" perspective rather than from a "top-down" perspective, and asked the Council to convene a group of stakeholders to help the Council define the most appropriate modeling approach to meet the region's needs at the lowest possible cost. As part of this effort, the regional research and development efforts called for in the action plan should focus on filling utility-specific data gaps to allow a better "bottom-up" assessment of conservation potential. Bonneville requested that this effort commence shortly after the adoption of the Sixth Power Plan.

Response: These comments reflected concern about how the Council's regional conservation targets might be applied to individual utilities. The Council addressed this in the plan by recognizing utility differences and by making it clear that the Council does not recommend that the conservation targets be assigned pro rata to each utility. The Council also agrees that a significant improvement in estimates of regional conservation potential could be achieved if utility-specific data were available for use as inputs to the Council's conservation assessments. Because representative survey data have not been available, the Council's Sixth Power Plan relies in part on individual utility-market studies to represent current conditions. For this reason, the Council added an analytical task to the action plan to improve conservation-resource assessments in time for the Seventh Power Plan:

ANLYS-15. Improve Regional Conservation Resource Potential Assessment Input Assumptions and Methodology. The Council will convene the Conservation Resources Advisory Committee to identify data and methodological requirements that are required to support regionally consistent utility or sub-regional assessments of the conservation-resource potential. The Council, in cooperation with NEEA, Bonneville, regional utilities, and administrators of system benefit charge programs, will seek to prioritize market research and data development necessary to implement improvements in both the Council and utility conservation-potential assessments.

At the same time, however, the Council does not agree that its independent assessment of regional conservation potential should be based on the "sum of individual utility estimates." The Council, in the final power plan, explains in a number of places why the regional resource assessment and power planning effort called for in the Northwest Power Act is not the same as, and cannot be the same as, simply aggregating each utility's load and resource forecasts and planning. The two types of planning exercises are parallel – the regional plan and individual utility's assessments – and they should inform and guide each other, but summing up the individual assessments is not the same as a regional analysis. With regard to conservation assessments in particular, not all utilities do or will conduct assessments of conservation resource potential or conduct them in the same way. Consequently, a simple aggregation will never produce accurate results. Also, the methodology used by the Council is closely integrated with its regional end-use demand forecasting system. Very few (if any) utilities in the region employ end-use forecasting models, and even if they did, they would not reflect a regional view. The Council's system requires consistent assumptions across the load forecast and conservation assessment with regard to such inputs as number of households, commercial-building stock by building type, equipment and appliance saturations, and energy use in order to ensure that conservation opportunities are not under- or over-counted. A simple "aggregation" of individual utility conservation assessments also presumes that the underlying load forecast could be aggregated to a regional total. This is clearly not the case. Third, it is not evident that a utilities' aggregated assessment would be the most cost-efficient or independently justified approach to developing a consistent assessment of conservation potential.

The Council should not consider actual achievement, high or low, as a rationale for adjusting the conservation target at the biennial assessment of progress toward the conservation targets.

Response: The Council, in the final plan, continues to consider actual achievements when determining whether to continue or adjust the five-year conservation targets after the plan's biennial assessment. *See* CONS-1 and CONS-16. This includes considering utility program accomplishments and achievements related to the adoption or revision of state codes and federal standards. But the Council understands the concerns motivating the comments from both perspectives. For example, allowing the conservation targets to be lowered based on underachievement may be a disincentive to invest in available, cost-effective conservation. On the other hand, raising targets based on overachievement in other sectors, such as codes and standards, may result in unrealistic program targets. The Council will not simply raise or lower targets based on achievements. It will scrutinize a number of factors, along with actual achievements, to understand the reasons for progress or lack of progress, and it will determine

whether the targets need to be modified to account for unexpected conditions or circumstances. These include a slower- or faster-than-anticipated economic recovery, substantially different power market conditions, carbon control requirements, advancing technology, success or failure of acquisition mechanisms and strategies, progress on research and development, and adoption of codes and standards, including whether those codes and standard adoptions overlap utility programs. The Council expects its regional conservation target to be accomplished through multiple mechanisms. If utility program accomplishments are lower, but codes and standards are in place to capture these savings, then the utilities' share of the regional target could simply be lower, without changing the plan's aggregate target.

Bonneville commented that the conservation chapter of the plan (chapter 4) should include language stating that savings for "utility-acquired" compact fluorescent light bulbs will be counted toward the regional savings target until 2012. Bonneville also commented that the Council should include in the final plan a description of how it estimated the avoided costs used to compare the cost-effectiveness of conservation, for both retrofit and lost-opportunity conservation resources, and include the results of the analysis for conservation in terms of cost per megawatt-hour.

Response: The Council did add text to the conservation chapter noting that the targets include compact fluorescent light bulbs until these products are covered by federal standards. The Council also agreed on the need for additional text clarifying how the resource portfolio model results translate into cost-effectiveness thresholds for conservation programs. Text to this effect has been added chiefly in appendix E, at the end of the section entitled "Cost-Effectiveness Methodology Used in the Portfolio Analysis Model."

The action plan should include a new item that supports investments in training for building operators and code officials by utilities and others in the region.

Response: The Council agrees that training building operators and code officials has been shown to improve building energy-efficiency performance. The Council concluded that the scope and emphasis of training and education programs will best be considered during the development and implementation of the regional strategic plan for conservation acquisition called for in CONS-14.

The Columbia River Inter-Tribal Fish Commission (CRITFC) recommended that the Council assume that 100 percent of the cost-effective potential in the plan is achievable, citing two peer-reviewed papers that conclude that long-term estimates of conservation potential (including those done for prior Council plans) have underestimated actual improvements in efficiency. The Northwest Energy Coalition commented that the Council should rely on research and data from actual programs and maintain its planning assumption that over the 20-year period covered by the Sixth Power Plan at least 85 percent of the cost-effective conservation opportunities should be achievable. In contrast, Tacoma Power asserted that the 85 percent "achievability" assumption is not justified for individual measures and may not be valid as the region targets new measures and practices. Tacoma cited studies showing that individuals who had adopted certain behaviors (health and farming practices) discontinued these behaviors over time. Tacoma

also cited a Hood River project evaluation reportedly finding that only 72 percent of measures recommended by energy audits were installed.

Response: The Council retained the planning assumption that 85 percent of the cost-effective energy savings identified in the plan can be achieved over the 20-year period covered by the Sixth Power Plan. The Council established the 85-percent upper limit in its first power plan in 1983, and it has used this limit in all subsequent plans. Use of the limit is based in part on the actual achievements in the Hood River Conservation Project sponsored by Bonneville and operated by PacifiCorp. The Hood River Conservation Project made weatherization measures available to all Hood River County residents with electric heat at no cost over two years. Contrary to Tacoma Power's comments, 83 percent of that project's technically feasible (audit recommended) weatherization measures representing 93 percent of the potential savings in the electrically heated residences were installed within a period of just two years.[1] The Council, in the Sixth Power Plan, continues to assume that on average it will take up to 20 years to accomplish this level of market acceptance for the bulk of the current conservation measures. The studies cited by Tacoma reporting discontinuance of new behaviors or practices do not apply to most of the energy-efficiency measures identified in the Sixth Power Plan. These measures are capital improvements (installing more efficient appliances, lighting, and equipment and insulating buildings) that are far less "reversible" than changes in behavior. Finally, the peer-reviewed papers cited by CRITFC and the Council's own review of the estimates of conservation achievability in its prior plans support the assertion that at least an 85-percent achievability assumption has proven reasonable, even largely conservative.[2]

One utility commented that the anticipated ramp rates for installing improvements in residential lighting and showerheads in the draft plan were too aggressive and should be extended from five to 10 years. In addition, the utility was concerned that the conservation potential from low-flow showerheads has been overstated because some of the potential savings from showerheads have already been captured by regional utility programs.

Response: The Council estimates the conservation potential across a wide range of conservation measures. The plan does not prescribe the measures that individual utilities should use to accomplish conservation; it simply asserts that in the aggregate, it is possible to achieve the regional conservation target. Residential-lighting efficiency improvements are low-cost and they have been a large part of recent utility-program savings, so the Council reasonably anticipates that utilities will continue to focus on this measure. The plan includes two ramp rates for residential lighting. The ramp rate for lighting improvements in existing homes assumes that these savings can be captured in five years. The ramp rate for new homes assumes that the savings will be captured throughout the entire 20 years. For existing homes, the ramp rate assumed in the Sixth Power Plan can be achieved by installing no more than nine additional compact fluorescent light bulbs in homes during the five years. It does not assume that LED (solid state lighting) technology will be required to accomplish the goal. The assumed ramp rate for existing homes would mean a rough doubling of the current market penetration. Between

[1] Hirst, E. 1987. Cooperation and Community Conservation: The Hood River Conservation Project, ORNL/CON 235, pp. 36-37.

[2] Northwest Power and Conservation Council. "Achievable Savings: A Retrospective Look at the Northwest Power and Conservation Council's Planning Assumptions. August 2007. Council Document 2007-13.

2005 and 2008, regional CFL sales increased at a far greater pace than assumed in the Sixth Power Plan, growing from just under 7 million lamps to just under 25 million lamps, an increase of over 300 percent. The Council concluded that the ramp rates in the Sixth Power Plan are therefore reasonable, if possibly conservative.

The plan assumes that savings available from installing low-flow showerheads are also achievable in a five-year period. This assumption is consistent with what regional utilities accomplished with low-flow showerheads in the early 1990s. In addition, the Sixth Power Plan did account for the savings already captured by current utility programs by estimating that 5 percent of the region's dwellings have already installed these measures.

Tacoma Power commented that the Council's Conservation Resource Advisory Committee had recommended a conservation target range of 1,000 to 1,400 average megawatts, not 1,100 to 1,400; had found that only 50 percent of the measures that made up the conservation target were ready for acquisition at the assumed ramp rates and that the remaining 50 percent were not available for technological, programmatic or market reasons; and had recommended slower ramp rates for many conservation measures.

Response: The Council's Conservation Resource Advisory Committee (CRAC) considered a number of scenarios and approaches, including those noted in these comments. But the CRAC did not make the findings or recommendations asserted by Tacoma Power. With regard to the conservation targets, the CRAC agreed to a 1,200 average megawatt target and also agreed that this target should be expressed within a range that would take into account various uncertainties. However, the CRAC did not come to consensus regarding either the low or the high end of the range. Some CRAC members did argue for a lower bound of 1,000 average megawatts for the target range. Other members not only said that the 1,000 average megawatt lower bound was "too low," they also called for an upper bound of 1,450 average megawatts, not 1,400 average megawatts. For a number of reasons, the Council concluded that a range of 1,100 to 1,400 average megawatts (with a biennial assessment) for the five-year conservation target is reasonable for the final plan. The suggestion that only "50% of the measures in the target were ready for acquisition" was presented to the CRAC by representatives of a public-utility workgroup. However, many members of the CRAC had reservations about such a finding, and the CRAC did not forward that recommendation to the Council. For example, other CRAC members pointed out that the measures identified by the public utility workgroup as having a "low readiness" status were actually a small fraction of the proposed five-year target, representing less than 100 average megawatts out of a total target of 1,200 average megawatts. While some representatives of the public-utility workgroup did express concerns about the pace of conservation needed to achieve a regional conservation target of 1,200 average megawatts, other members of the CRAC said the pace was achievable, and indeed that many other utilities anticipated meeting or surpassing their share of the 1,200 average megawatt target.

Tacoma Power expressed a concern that the plan included conservation measures that were not commercially available or that were too new to the consumer market to be widely accepted by consumers, adding to uncertainty in the amount of conservation that can be achieved. In particular, Tacoma recommended that heat-pump water heaters (HPWH) be removed from the Sixth Power Plan's conservation targets, listing a range of specific

concerns regarding their cost, estimated energy savings, consumer acceptability, and the fact that the RTF had not been asked to review the "ramp rate" (pace of market growth) assumed for this measure. Tacoma believed the Council also overestimated the regional applicability of HPWH, asserting that their application is limited in many climates due to the location of most HPWH and undervalued concerns that consumers may be skeptical whether HPWH will provide hot water in the same timely manner as traditional water heaters.

Response: As noted earlier regarding comments on specific measures, the Sixth Power Plan does not prescribe the conservation measures that utilities are to employ, which in aggregate can achieve the regional conservation targets. Even so, the HPWH savings included in the plan accumulate a total of 12.2 average megawatts by the end of 2014, or approximately 1 percent of the final 1,200 average megawatt five-year target. If a utility cannot achieve this amount relying on HPWH savings, there are many alternative measures that have a cost ($30 per megawatt-hour) comparable to or lower than the cost of the HPWH. While HPWH account for a small fraction of the region's near-term conservation targets, they are expected to play a much larger role after 2014.

Tacoma commented that this technology does not meet the Northwest Power Act's requirement that resources included in the plan must be "reliable and similarly available within the time it is needed." The Act does not require that resources be available at the time the plan is adopted, only that they be *available when they are needed*. For example, the Sixth Power Plan includes both geothermal and wind resources. These resources and the transmission lines necessary to connect them to the regional power grid have yet to be sited, licensed, and built. However, it is anticipated that these resources will be available when they are needed. In developing its regional assessment of potential savings available from HPWH, the Council relied heavily on data and analysis prepared for the U.S. Department of Energy's (DOE) rulemaking process on water heating. Before the DOE promulgates any standard, it carries out detailed analysis of the costs and benefits associated with options for improving the efficiency of the appliance or equipment under review. At the very outset of this process, the DOE conducts a "screening analysis" to determine whether a particular measure or technology will be considered.[3] The DOE's review of HPWH found that this technology satisfies all of its screening criteria, which include: 1) technological feasibility; 2) practicability to manufacture, install, and service on a scale necessary to serve the relevant market at the time the standard takes effect; and 3) impact of the performance of the product for consumers. The DOE is required to publish a final rule amending energy-conservation standards for residential water heaters no later than March 31, 2010. Under the federal law governing DOE standards setting, these standards will take effect five years from their adoption, in this case no later than March 31, 2014. The Council viewed the DOE's decision to consider HPWH as a minimum federal standard within five years as evidence of their "technological and market readiness," and so considered HPWH a resource largely available after 2014.

The Council does agree with the comment that the installed cost of some HPWH in the region were initially understated, although not in the draft plan. The DOE analysis of HPWH

[3] Procedures for Consideration of New or Revised Energy Conservation Standards for Consumer Products; Final Rule. 10 CFR Part 430, Section 4.

installation cost assumed an average of $560 for a typical 50-gallon unit compared to $457 for a standard resistance water heater (2007$). The Council used this average, incremental installation cost for all units. This "average" represents a mix of new and existing units installed indoors and outdoors in vented and unvented configurations. The DOE estimated that the incremental installation cost for units in the "vented" configuration assumed by the Council was similar to the cost of installing a condensing-gas water heater, or about $425. The DOE also assumed that these installations might require an additional $100 to cover the cost of a booster fan, venting kit, and weatherproof duct termination.[4] Assuming these costs apply to all HPWH installed in the region, total installation cost would increase $145, from $560 to $706 (2007$). This higher installation cost was used in the draft plan. This assumption reduced the total resource cost benefit-to-cost ratio from 2.2 to 1.8 and increased the total resource levelized cost from just under $20 per megawatt-hour to $26 per megawatt-hour. Even with the higher average installation cost, HPWH remained highly cost-effective.

As for the comments about regional applicability, the Council assumed that HPWH *could be* (not necessarily would be) installed in one-half of the single-family and manufactured homes with electric water heating in the region in the next 20 years. The Council further assumed that HPWH, even if located inside homes, will vent exhaust air outside so as not to affect the indoor temperatures. It was also assumed that if HPWH are located outside, air supply would come from inside the home, minimizing the impact of air supply temperature on heat-pump performance. Installing HPWH in this way ensures that the air supplied to the heater is nearly always at or above 60 degrees Fahrenheit and the cooled exhaust air does not increase the heating load of the home. These configurations eliminate "low temperature" performance and permit HPWH installations in all areas of the region, regardless of climate conditions.

Regarding consumer acceptability, the primary task of a water heater is to produce hot water in the amount desired and at the time needed. The Council reviewed information indicating that all of the HPWH models that are qualified for the Energy Star label (the efficiency level assumed in the Sixth Power Plan) have first-hour recovery ratings equal to or higher than similarly sized electric resistance water heaters, typically 60 gallons per hour.[5] There is no indication that HPWH will function differently for consumers than traditional water heaters or that consumers will be unusually reluctant to install HPWH because of performance concerns.

Tacoma is correct in its statement that the RTF did not review the assumptions used to determine the regional potential (number of applicable units and ramp rates) of HPWH. The RTF was not asked to review assumptions of this type for *any* measure included in the Council's conservation-supply curves. The RTF's role has historically focused on establishing the cost and savings of measures or evaluation protocols. Instead, reviewing assumptions to determine the aggregate

[4] U.S. Department of Energy. Preliminary Technical Support Document: Energy Efficiency Program for Consumer Products, Energy Conservation Standards for Heating Products, Appendix 8-A, Installation Cost Determination. pp. 8-A-8 and 8-A-9. January 5, 2009, http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/app_8a_direct_heat_standards_tsd.pdf.

[5] First-Hour Rating is the amount of hot water (in gallons) a storage water heater can supply per hour (starting with a tank full of hot water). The rating, in gallons of usable (desired temperature) hot water, is calculated by combining the amount of usable hot water stored in the tank with the number of gallons of usable hot water the water heater can generate in one hour of operation. For example, if a 50-gallon natural gas water heater will store 45 gallons of usable hot water and can deliver 20 gallons of usable hot water in the first hour, its First-Hour Rating is 65 gallons.

conservation potential for measures is one of the primary functions of the CRAC, which it carried out with vigor and thoroughness during the plan's development, including review of the HPWH assumptions, which were found to be reasonable. Moreover, in addition to soliciting the CRAC's review, the Council held two full-day stakeholder meetings to explain all of the inputs to the Council's conservation-resource assessment. Updates to the Council's conservation potential assessment for HPWH and all other measures included in the draft plan were first posted on the Council's website for review by interested parties in February 2009, and updates were posted until the close of the comment period.

The Council based its ramp rate for HPWH and its estimate of consumer acceptance of this technology on the market growth of instantaneous gas-fired water heaters. HPWH face nearly the same set of market and technical barriers that instantaneous gas-fired water heaters faced when first introduced into the U.S. market. While instantaneous gas-fired water heaters have been used in Europe and Asia for years, they are a new technology for both U.S. consumers and contractors. This is also true of HPWH. Due to their high efficiency, instantaneous gas-fired water heaters require special venting. The preferred installation of HPWH also requires special venting. Compared to standard gas-fired storage water heaters, instantaneous gas-fired water heaters are also more expensive.[6] Again, this is also true for HPWH, and these costs are factored into the conservation assessment.

With regard to industrial conservation, comments on the draft plan criticized the amount of conservation potential in the food-processing sector as too low, while others said the amount of conservation potential displayed for the pulp and paper sector was too high.

Response: The Council did not materially change the plan based on these comments. The conservation estimate for the pulp and paper industry carefully considered and reflected the latest information on plant-specific issues in the Pacific Northwest, including:

- NEEA's recent pulp and paper survey of Pacific Northwest plant managers, owners, and operators
- BC Hydro's in-depth analysis of opportunities based on plant-process flow analysis and interviews with plant managers and engineers
- A review of benchmark studies of plants for the U.S., Canada, and international competitors
- U.S. DOE's Industrial Technology Program results, which developed a wide variety of measures that have been researched and demonstrated as part of the DOE's effort to improve energy efficiency by 25 percent across the entire sector
- Case studies and papers regarding measures of whole-plant systems

In addition, one of the utilities with a large pulp and paper facility in its service territory raised concerns about the assessment early in its development. These comments were considered and addressed point-by-point by the industrial assessment contractors and by staff in the work leading up to the development and review of the draft power plan by the Council.

[6] Based on data from the Energy Trust of Oregon, instantaneous gas-fired water heaters cost two or three times more than gas-fired storage water heaters.

The Council used a similar approach for assessing conservation potential in food processing, and on review, concluded that the assessment is appropriate. The biennial evaluation of conservation progress will provide an opportunity to update the assessment if there are new data to consider.

For the final plan, the Council did make several adjustments to the draft industrial conservation supply curves based on the comments and on the Council's own review. Savings from transformers were reduced, and savings from efficient-motor rewinds and motors over 200 horse power were added. In addition, several technical corrections were made in the analysis, and the underlying industrial-load forecast was updated. The overall result of these changes was a small decrease in total industrial-conservation potential and a small increase in total cost.

A number of comments urged that conservation be encouraged by pricing electricity to reflect the true costs of electricity, by removing barriers to efficiency improvements, and by improving consumer decisionmaking.

Response: These are actions that could support efficiency acquisition. *See* CONS-13 in the action plan calling for utility commissions, utilities, the states, Bonneville, and others to identify and address regulatory barriers and disincentives to conservation. The Council committed to working with these regional interests to evaluate, among other factors, the use of different pricing structures and other incentives to encourage achieving the conservation targets. In addition, pricing changes will be required to gain the full benefits of smart grid-based demand response and efficiency acquisition as called for in the comments from the Northwest Energy Efficiency Council. The final action plan also supports the work of the Northwest Energy Efficiency Taskforce (NEET), and that forum is working to achieve these improvements.

A large number of comments called for the final plan to be more assertive in advocating for policies and actions to reduce carbon emissions and in planning to meet targets to reduce carbon emissions. The Council should explore the costs of meeting a specific carbon-reduction goal and describe actions the region needs to take to meet that goal, including a resource strategy that will allow the regional power system to meet its share of reduction targets established by three of the four Northwest states. Many asserted that the draft power plan did nothing to reduce carbon emissions. Others said the Council should call for the closure of all the coal plants in the region or eliminate coal from the regional power system in order to reduce carbon emissions. One comment questioned the amount of natural gas-fired power added for coal-plant replacement in scenarios in which coal plants were retired, remarking that the natural gas power added seemed too little compared to the amount of lost coal power.

Response: As described in the power plan's overview, the issue for the Council, under the power-planning mandate in the Northwest Power Act, was to identify prudent strategies for the region while carbon-pricing policies are unclear. The Council did not take a position on any particular regional carbon-reduction goal or carbon price in the Sixth Power Plan. The plan did recognize the uncertainty about future carbon prices and that possible carbon-emission reductions are important risk issues for the regional power system. The plan's multiple carbon-reduction scenarios, including a carbon-risk scenario that considers a range of future carbon

prices between $0 and $100 per ton, provide relevant information for policymakers in the region. The resource strategy in the power plan will allow Washington and Oregon to meet their carbon-reduction targets and address the risk of uncertain future carbon policy, even as the states and the federal government will need to take additional actions in order to achieve these targets.

The Council has a responsibility to consider the quantifiable environmental costs and benefits of different resources as it decides what *is* within its planning authority; what are the most cost-effective resources to add to the existing system over time to meet forecast load growth and potential changes to the existing system. The cost of compliance with current environmental regulation is included in the Council's resource analysis, and the potential cost of future carbon policies is included as a quantified risk in the plan. In assessing resources that may need to be added to the system, the Council also considered the effects that current and future policy might have on the existing power system, including the effects of carbon-emission reduction targets established by three of the four states. These are state legislative policies without regulatory mechanisms in place.

The final plan, as did the draft, includes scenarios that provide a range of carbon reductions and significant information on actions needed to achieve such reductions. This includes information on the differences in net present value system costs, rates, and customer bills under a number of scenarios with different carbon-reduction effects. The resource strategy in the Council's draft plan, as in the final, would result in reduced carbon emissions, contrary to many of the comments. The only resource scenario analyzed by the Council that did not reduce carbon emissions was the no carbon policy scenario, which was included for comparison purposes only and did not form the basis for the plan's resource strategy. Even the current policy scenario reduced carbon emissions below 2005 levels. For the final plan, the Council ran three scenarios that in different ways simulated the effects of probable future carbon policy and would likely allow the power system to meet its share of the targets set by the three states: carbon risk, $45 carbon, and coal retirement scenarios. The Council added the $45 carbon scenario for the final plan to force the analysis toward resource strategies that would result in a power system with carbon emissions that most closely matches the system's share of state-established targets. The resulting resource plan and costs were similar to the results of the carbon-risk scenario run for the draft plan and updated for the final, allowing the regional power system to adjust to likely future carbon policy and meet state targets. Potential carbon pricing played an important role in the Council's resource strategy, with the exception of the conservation resource, which remained a key component regardless of climate-change policy assumptions.

Most important, future carbon emissions from the power system would be much higher without the conservation and renewable resources included in the plan. The plan anticipates meeting 85 percent of the region's load growth with conservation. That conservation will reduce the carbon emissions of the power system by about 17 million tons per year compared to a plan without efficiency gains. Carbon reductions from efficiency improvements dwarf the savings from renewable resources, and actually reduce the costs of the power system, whereas all other policies to reduce carbon emissions increase the cost of the power system.

The Council did not include new coal-fired generation in the plan. As noted earlier, the plan explores the effects of retiring existing coal plants as one strategy to significantly reduce carbon

emissions. Based on the plan's analysis, the Council expects that retiring some of the region's existing coal plants would be the most cost-effective and certain approach to reducing carbon emissions. It might also turn out that some combination of carbon costs and other circumstances could make existing coal plants economically marginal or uneconomic to continue operating. Regarding replacement power, the final plan provides more detail on adjusting to coal retirement. The Council analyzed these possible future effects, along with many others, and recommended resources to add to the system over time. However, calling for the retirement of coal plants from the existing system to meet carbon reduction targets is not within the Council's planning mandate in the Power Act. Also, a national or regional cap-and-trade system or carbon tax would have broader effects beyond regional power-system planning.

A number of comments addressed the way in which the Council assessed possible carbon costs in the plan. Some comments supported the costs analyzed by the Council that ranged from $0 to $100 per ton of carbon and had a central tendency of $47 per ton. Other comments called for the Council to model a higher carbon cost, a different cost range that would produce a higher central tendency, or a lower end of the range that was something greater than $0. Others recommended including only the effect of existing carbon and not to model a quantified carbon-cost risk from future policy changes. One comment criticized the modeling analysis in the draft plan for the way in which carbon prices increased quickly and then leveled out.

Response: The Council gathered information on a wide range of proposals for federal, regional, and state carbon-emission policy and regulation and commissioned an assessment of future carbon prices. The Council extrapolated from this information a representative range of carbon costs that might result or that represented the effects of such regulation. The range of policy and cost uncertainty captured in the analysis is reasonable, representing a range from no new regulatory policies to new regulatory targets with substantial additional costs. Most of the comments focused on the average carbon cost that resulted from the analysis, largely missing the point that the analysis tried to capture the wide range of risk and uncertainty of unknown future carbon costs to determine the most cost-effective resource strategy to avoid or mitigate that risk. The final plan analysis demonstrated that the specific level of carbon pricing did not much affect the key element of the plan's resource strategy--conservation--given that conservation is the least-cost resource under any considerations. The variation of carbon prices had the greatest impact on the dispatch of existing coal plants.

A number of comments expressed concern about one of the action plan items in the draft plan (what was GEN-8d in the draft; GEN-10d in the final) that called for greater parity among resources in policies and regulatory mandates intended to reduce carbon emissions. These comments asked for further explanation or modification of this provision, or asked that it be deleted, as they were concerned about the implied criticism of policies to promote renewable resources. They also emphasized that the policies supporting these resources support economic development and market transformation as well as immediate greenhouse-gas reductions. Other comments, however, supported the provision.

Response: The Council was sensitive to these comments, but decided to retain the provision, believing there is a need for greater emphasis on conservation along with renewable resource generation as key components of climate policy.

Tacoma Power commented that in forecasting how much wind power and other renewable resources would be added to the system to satisfy the state renewable portfolio standards, the Council did not take into account the impact of rate caps in the RPS statutes. Tacoma also asserted that the cost-reduction forecasts in the draft plan for wind and other new resources were not credible and that RPS-driven demand will offset any gains from technological improvements and economies of scale.

Response: In the draft plan, the Council assumed full achievement of the RPS standards and full liquidity of all potentially qualifying existing resources within load-resource zones (at least for the wholesale-price forecast). Based on the comments and a further review of available information, the Council altered the analysis to include a slight discounting (95 percent RPS achievement) as an appropriate adjustment to reflect uncertainties about the effects of the rate caps, renewable energy credit (REC) market friction, and similar matters.

One impact of the economic downturn has been to reduce new resource costs a measureable degree. For this and other reasons, the Council retained the assumption that equilibrium costs midway between 2004 and 2008 costs will be achieved for most new resources within the next several years. In addition, because increasing production and construction capability for non-carbon emitting resources (and accelerated technological development) are expected to be driven by continued strong demand for such low-carbon resources, the Council retained the long-term forecast reduction in the cost of wind and solar technologies and in the cost of biomass fuel. Even so, the Council incorporated substantial construction cost uncertainty and variation for the RPS wind, solar, and geothermal resources, resulting in a substantial number of futures in which costs were higher than the baseline forecast over the entire study period.

The Council should evaluate the effect of out-of-region utilities, notably in California, acquiring significant amounts of wind power and other renewable resources developed in the region.

Response: The Council agreed that further assessment of this issue is needed. While California's renewable resource policies are out of the region's control, utilities and independent power producers selling to California will affect the availability of low-cost, transmission-accessible wind power for Northwest RPS requirements. The final plan recognizes that a significant amount of existing wind power is already committed to California utilities. Some of the energy may remain in the region, but without its renewable credits. The plan also notes uncertainty about how much wind developed in the region (or its renewable credits) may be dedicated to meet California or other states' requirements. The action plan, GEN-10, states the Council will assess these matters further to better understand the future unbundled REC market, its benefits and costs, and how to remedy significant impacts.

A number of comments raised issues about integrating and balancing wind resources, and about system capacity and flexibility in general. The Renewable Northwest Project and the

Northwest Energy Coalition commented that the discussion of wind integration issues in the draft plan needed significant changes to provide a more balanced approach to these issues. They expressed concern that the draft plan overemphasized the difficulties of adapting system operations to balance wind and the need for additional resources. A number of utility comments noted that the draft plan did not account for the cost of using natural gas-fired and other thermal resources to balance wind or the carbon produced by those resources.

Response: The capacity and flexibility chapter in the final plan (as in the draft plan), describes the basic attributes of a power system (energy, capacity, and flexibility), notes some of the ongoing power system issues with capacity and flexibility, and focuses on the capacity and flexibility issues raised by adding large amounts of wind generation to the system. It also recommends ways to address those issues. The Council considered these comments in decisions on the final language, but did not materially change the analysis or approach. The appropriate tone and balance have been achieved by highlighting the issues and noting that while the issues are significant and receive wide attention in the industry, a number of potential solutions to the issues exist and many are well underway. The Council believes there is no disagreement about how best to improve wind integration going forward. The action plan includes steps to use the existing balancing capability of the system more effectively and to develop additional balancing capability as needed. These recommendations are in accord with the recommendations of the Northwest Wind Integration Forum. Included are calls for system operators and utilities to give priority to operational and management measures to reduce the demand for balancing reserves and to expand access to the latent flexibility of the existing system before adding generating resources for this purpose. The Council did not find it possible at this time to model in a quantitative way demand for system flexibility or the extent to which operational measures will satisfy that demand, calling for additional work to develop that analytical capability.

The Council did include, in the chapters on generating resources and resource portfolio modeling, estimates for the costs of balancing variable resources over the long term. Estimated future balancing costs are greater than current costs using the hydrosystem because the Council assumes that thermal resources will increasingly be used for balancing services. The Council did not, however, include in the resource plan any new resources explicitly added for balancing purposes and did not account for carbon emissions from new balancing resources. The Council does not have the capability at present to forecast this component of carbon production with any level of credibility, although the plan acknowledges the issue. Because the thermal resources that will be used in the future for balancing wind and other variable and intermittent resources are for the most part likely to be resources already on or near the dispatch margin, the incremental carbon production of providing balancing services from these resources is expected to be small. And the more that balancing can be achieved through operational means, the smaller that impact will be.

A number of comments objected that the draft plan did not consider nuclear power or did not give it sufficient consideration or include it in the final resource strategy. Several comments argued for consideration of small, modular reactors.

Response: The draft plan did, in fact, assess the availability and costs of nuclear power as a possible generating resource to add to the system, as does the final plan. The costs and characteristics of nuclear power are discussed in the generating resource chapter (Chapter 6), and inputs to the resource portfolio model included an advanced nuclear-power option among the resources that the model could select. The modeling and other analyses for the plan found that nuclear power was less cost-effective than developing conservation, wind, and gas-fired combined-cycle units, largely because of the long lead-time (period needed for construction), large unit size, and high capital cost of current generation and advanced nuclear plants. The Council included additional discussion of this in the final plan. The plan also recognizes the long-term potential for advanced nuclear power, even if it does not have a prominent role in the near-term resource strategy. See action plan, GEN-9. Proposed small modular reactors (SMR) promise to reduce lead-time, unit size, and the magnitude of capital investment, and may improve the cost-effectiveness of new nuclear plants. However, SMR are in the very early stages of development, and prototype units are not expected to be operational for at least a decade, if then. For this reason, they cannot, at this time, be considered "equally available" to other resource alternatives.

The plan should call for the removal of the federal dams on the lower Snake River to recover listed salmon and steelhead.

Response: For the purpose of providing information to the region on the value of the existing hydrosystem, the Council ran a model scenario that included removing a number of dams. It found that removing the dams would increase power system costs and carbon emissions. The Council has no other reason to run the scenario and no obligation or responsibility to do so. Removal of these dams is not a measure in the Council's Fish and Wildlife Program (which is incorporated by statute into the power plan), and the Council has no authority within its power-planning mandate to consider or call for the removal of an existing part of the system.

A number of utility comments called for the Council to provide a power-needs assessment for the region in the final plan, and illustrate it in simple graphics early in the plan. It should be more easily compared with other regional assessments, such as the Pacific Northwest Utilities Conference Committee's (PNUCC) Northwest Regional Forecast and Bonneville's White Book. To the extent the draft plan contained a needs assessment, it is not consistent with the utilities' perspective on needs. Others said that the Council should demonstrate more clearly in the plan how the resource strategies would result in an adequate and reliable power system.

Response: The Council's draft plan did include a needs assessment, but perhaps not as clearly stated or as early in the plan as was optimal. The final plan contains the demand forecast and then the "needs assessment" in Chapter 3 so that current firm resources can be compared to forecast load. This part of the chapter also provides an assessment of needs from a utility perspective, along with a comparison of the Council's and utilities' perspectives. The information is presented in a way that is comparable to other regional reports. The final power plan also has a description of resource adequacy standards in Chapter 14, along with a report on the most recent resource-adequacy assessment, a section on resource adequacy from a utility's perspective, and a comparison with the resource-adequacy perspective of the regional plan.

The Council's treatment of uncertainty and risk provides a far wider and more robust view of potential needs than can be shown in a simple graphic based on a range of demand forecasts. This is because the Council's analysis includes uncertainty surrounding hydropower generation amounts, short- and long-term loads, fuel prices, availability of generation from independent power producers, and electricity market transactions and prices. These differences have always made it difficult to compare the Council's analysis to PNUCC's forecast, which assumes only firm utility-owned or contracted resources and critical period (driest condition) hydroelectric generation. The needs assessment from a utility perspective, however, will help illustrate the differences and similarities between the two perspectives.

The same is true of the difference between assessing the adequacy of a particular configuration of a power system, which is the basis for assessing the near-term adequacy of the system, and assessing the adequacy of a future resource planning strategy. The discussion in Chapter 14 provides the necessary information to understand the distinction and includes a description of how the adequacy standards are incorporated into the Council's planning models and analysis, which should ensure that the resulting strategy will provide an adequate power supply.

Comments said the natural gas price forecast and economic assumptions in the draft plan were not up to date in capturing the most recent economic developments. Two comments said that the natural gas price forecasts were too high.

Response: The Council's power plan is primarily focused on medium- and long-term trends and uncertainties. The comments on this topic were oriented more toward recent or near-term events or forecasts. The Council tries to incorporate very recent or near-term events or forecasts as appropriate, including the continuing effects of the recent economic downturn. However, the Council's forecasting focus remains on longer-term trends and uncertainties. Nonetheless, the Council reviewed and updated the natural gas price forecasts for the final plan, with review and comments from members of the Natural Gas Advisory Committee (a committee itself not in consensus on these matters). The Council also updated the economic and demand forecasts, with review by the appropriate advisory committee and the forecast of wholesale power prices. Finally, to the extent that the natural gas price forecast had a bearing on resource selection, the wide range of forecasts represented in the risk analysis included levels well below those that the comments proposed.

A number of utilities commented that the draft plan understates the costs of future power supplies. They also said the Council should explore ways to improve its display of the costs of future power supplies. Several comments said that levelized costs are not a good basis for comparison among resources; that other important resource characteristics are left out, and that costs can affect different utilities differently.

Response: The plan describes the costs of alternative scenarios for the future power system in the form of net present value system costs, electricity rates, and residential bills. The results did not appear as dramatic as many expected. The Council recognizes that the use of net present values or annualized costs does tend to hide patterns of costs that can be important. In addition, regional averages can mask important differences among utilities or areas. However, the use of a

common and comparable metric for planning is necessary for the Council to compare resources and actions that have different temporal cost characteristics. Levelized costs are also only a starting point for resource analysis, but they succeed in including the total direct system costs of the resources and placing them on a comparable level. The Council recognizes the limitations as well as the benefits of levelized-cost comparisons in Chapter 6 of the plan. But the Council's experience has shown levelized costs to be a reasonable predictor of cost-effectiveness for this purpose. This is a well-accepted planning methodology, consistent with the provisions and definitions in the Power Act, and allows the Council to compare the total system costs of different resources and to choose the most cost-effective resources. In addition, the Council receives many requests for resource information, including for levelized costs, and for that reason includes levelized-cost information.

Even so, the Council sought ways to clarify its methodology, including information on the timing of costs. It is also true that some resources provide flexibility or capacity or environmental benefits. These characteristics are considered in developing the resource strategy and can be considered benefits rather than costs. Both benefits and costs are important inputs to the Council's power plan.

The Council's analysis indicated that while the costs of electricity will probably increase over time, the increases will likely be much less than those caused by the resource development and planning mistakes of the 1970s or the 1990s. The Council rejected the comments asking the Council to include in the plan's vision an assertion that energy costs would be substantially higher in the future.

The Council received two comments on the discount rate used in the cost estimations: one that discounting to 2010 masked the impact of large costs later in the planning period and the other that the Council's approach to the discount rate was not the correct way to calculate a social discount rate.

Response: Discounting to present values of some year other than the present, in this case 2010, would be highly unusual, and the Council did not believe it appropriate. The Council's approach in choosing a discount rate was to use a "corporate cost of capital" approach, not a social discount rate approach, as explained in Appendix N. Between the draft and final plans, there were minor updates to the values that did not change the resulting discount rate. The Council did discover that the resource portfolio modeling for the draft plan used the wrong discount rate. The Council corrected this in the modeling for the final plan. The costs of the different scenarios were all thus significantly lower in net present value terms in the final plan, but all by the same factor or magnitude, so correcting the error in the discount rate in the modeling did not affect the resource or scenario comparisons or the resource strategy in the final plan.

The Council should explicitly recognize that the regional costs of either reducing carbon or removing the lower Snake River dams will not affect the region's utilities and consumers equally.

Response: The Council understands that the power system's regional costs, as calculated in the power plan, will not be spread evenly among the region's citizens. For example, reliance on coal

and access to hydropower vary significantly among the region's utilities. The final plan recognizes these points as it looks at needs and adequacy from a utility's perspective, in the plan's discussion of resource costs, in the discussions in the appendices on costs, and on the implications for consumer rates and bills.

The Council should re-evaluate its use of the resource portfolio model. The Council should consider a model that is more transparent and understandable. The Council should in future plans improve its analytical capability to address capacity and flexibility issues.

Response: The Council agreed that a better analysis of capacity and within-hour reserves is of growing importance in the region. The region has already made significant modeling improvements to address capacity issues by developing an hourly demand model and improving the ability to analyze the capacity characteristics of the hydroelectric system. In addition, the Council has worked with the region through the Regional Adequacy Forum to adopt adequacy standards and assessment procedures. Additional work is needed to understand and reflect reserve requirements for within-hour system operation. The final plan takes a first step by helping the region better understand how the power system operates, describing the issues and needs clearly, and committing the Council to work with others to increase our analytical capabilities. The Council will work with system operators in the region to reflect these requirements better in future analysis. Even without such a sophisticated analytical ability, the final plan provides useful guidance on necessary steps in wind integration.

The Council also included action plan items in the final plan to evaluate and improve the Council's own modeling and analytical capability. This is the Council's usual practice and is not new. Between the Fourth and Fifth Power Plans the Council developed the resource portfolio model. The model has been hailed as the most significant improvement in the Council's analysis since the first power plan. It is complicated, but so is the regional power system, and modeling future uncertainty and risk is by nature complex. The model is largely an attempt to use analysis to help reduce planning errors that can impose huge costs on the regional power system. The model has been well documented, written in Microsoft Excel, and is available from the Council's website. It is the first planning model to tackle quantitatively the risks that future uncertainty poses for power system planning, and it is the first planning model to include the cost of adapting a plan to changing circumstances. The Council will continue to improve the model and explanations of its findings, and will continue to demonstrate its strengths by using it to address specific planning problems faced by the region or individual utilities.

The Power Act requires the Council's plan to include a methodology for determining quantifiable environmental costs and benefits. The draft plan did not include such a methodology and so was not in compliance with the Act.

Response: The Council agreed with the comment. While the draft plan *applied* a methodology for determining quantifiable environmental costs and benefits, nowhere in the draft plan did the Council state that methodology explicitly. The Council added Appendix P and adopted that appendix as part of the final power plan, describing the Council's current methodology.

Several public utilities commented that the Council should not, in the power plan, interfere in Bonneville's rate issues or the issue of service, if any, to direct service industries (DSI).

Response: These comments referred to action plan items BPA-2a and BPA-9 in the draft plan. BPA-2a provides that Bonneville should fund conservation primarily as a Tier-1 cost. The Council retained this principle in the final plan. The Council has consistently held to this position through the Bonneville Future/Regional Dialogue process. The Council included the word "primarily" to allow some flexibility in crafting agreements between Bonneville and its customers. However, the Council continues to believe in the basic principle that those benefitting from the Federal Base System should pay for preserving and extending its capability, and that this is more than a rate matter. It is a basic premise inherent in the requirement in the Power Act that Bonneville have an ongoing conservation program.

The Council revised the action plan item BPA-9 simply to highlight the point that if Bonneville decides to serve the DSI and can do so consistently with the Power Act and the relevant court rulings, Bonneville should include the reserves required under the Power Act and provide, so far as possible, additional ancillary services.

Comments on integrating the fish and wildlife program into the power plan focused mostly on how the power-system costs of the fish and wildlife program are calculated and reported. A number of utilities, utility associations, and Bonneville commented that the draft plan was wrong to calculate the cost of fish operations using Bonneville's priority firm power rate. Others comments, like the Northwest Energy Coalition's, supported the discussion and methods of cost calculation in the draft plan. The Columbia River Inter-Tribal Fish Commission, and others, commented that the power plan ought to downplay or eliminate discussions of cost. Comments supported the separate discussions of power system/fish and wildlife program integration and resource planning. One individual commented critically on the substance of the Council's Fish and Wildlife Program, as well as the effect on ratepayers of including the program in the power plan.

Response: The Council eliminated the lengthy discussion of fish and wildlife costs that appeared in the draft plan's Appendix M. Instead, the appendix focuses on the resource planning and other matters involved in integrating the fish and wildlife program into the power plan and accommodating fish and wildlife operations within the power system. The Council also emphasized future issues and uncertainties that might affect that integration. The Council then added a short section to the power plan's chapter on Bonneville describing the fish and wildlife cost categories and how Bonneville reports those costs.

The plan and appendix note that the costs of the fish and wildlife program have no direct bearing on the development of the power plan's resource strategy. The important parameters affecting the power plan are the physical impacts of fish operations: changes to annual, monthly, and hourly hydroelectric generating capability. These physical changes have been incorporated into all of the Council's planning models and the resulting resource strategy in the power plan incorporates actions to deal with fish operation impacts.

The process for reviewing and adopting the power plan was not an appropriate forum for considering the comment criticizing aspects of the Council's Fish and Wildlife Program and calling on the Council to reject that program and its inclusion in the Sixth Power Plan. As explained in Appendix M to the Sixth Power Plan, before issuing a draft power plan, the Northwest Power Act requires the Council to follow and complete a separate process for amending the Fish and Wildlife Program, a process set forth in Section 4h of the Act and involving substantial public review and comment opportunities. The statute then makes the amended Fish and Wildlife Program automatically part of the power plan; the Council has no legal authority to reconsider the Fish and Wildlife Program in the power planning process. The Council adopted the revised Fish and Wildlife Program in February 2009. Comments about the validity of provisions in the Fish and Wildlife Program and challenges to the program had to have been made within the context of the earlier process. The Council also disagrees with the comment about the legal validity of the Fish and Wildlife Program, even as the comment is not properly before the Council in this proceeding.

As for that and other comments to the effect that including the Council's Fish and Wildlife Program in the regional conservation and electric power plan makes the regional electricity system more costly for consumers, the Council agrees. As explained in Chapter 13 and in Appendix M, the power system is indeed less economical as a result of fish and wildlife program costs. However, it is still affordable in a broad sense, as explained in the plan. Including the Fish and Wildlife Program in the Sixth Power Plan helps assure reliable implementation of fish and wildlife operations, as expected in the Act. The overall cost of the Fish and Wildlife Program's measures becomes but one cost the Council evaluates in determining whether the power plan results in assuring the region an adequate, efficient, economical, and reliable power system. A discussion of the power plan's overall implications for consumer rates and bills can be found in the appendices.

The forum to integrate fish and wildlife and power called for in action plan item F&W-1 in the draft plan received both support and comments that such a forum would duplicate existing institutions like the Council itself and various elements of the regional forum, which implements the FCRPS Biological Opinion.

Response: The Council agreed and modified this action plan item to state that the Council will work with federal, state, tribal, and other entities to expand the discussion on integrating long-term fish and wildlife and power planning. The planning and implementation forums outside of the Council give sufficient consideration to these broader and longer-term integration issues, emphasizing either one aspect or the other.