Issues for the Fifth Power Plan

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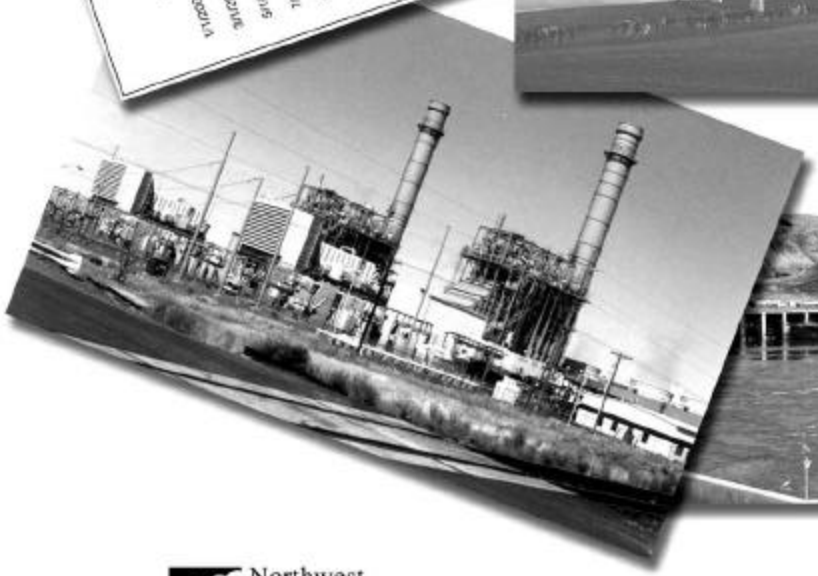


Northwest Power Planning Council

Council Document 2002-01

Issues for the Fifth Northwest Power Plan

February 6, 2002

Introduction

The Council is beginning development of its fifth power plan. As required by the Northwest Power Act, the Fifth Northwest Power Plan will incorporate 20-year forecasts of demand for electricity, assess resource strategies to meet those demands at the lowest cost to the region and make recommendations for implementing those strategies. The development of a new power plan also provides the Council with the opportunity and the responsibility to address important issues that can affect the achievement of the Act's dual goals of an adequate, efficient, economic and reliable power supply and protection, mitigation and enhancement of the fish and wildlife resources of the Columbia River Basin. Through the process of developing the plan, the Council hopes to engage the region on these issues and influence their resolution in ways that are beneficial to the region. The purpose of this paper is to discuss the issues we intend to address in the plan and to seek public comment on them.

The Act requires a 20-year time frame, calling explicitly for 20-year forecasts of demands and of the resources required to meet those demands. While this time frame was largely a result of the long lead-time, highly capital-intensive resources and fully regulated electricity markets of the 1970s, there remain important longer-term issues affecting the objectives of the Northwest Regional Power Act. Given the relatively short-term focus of the current electricity market, the Council is one of the few organizations able to take a long-term perspective.

That said, the reality of much shorter lead-time, lower capital-cost resources and more competitive electricity markets leads to a shorter-term focus. This shorter-term focus cannot be ignored. Moreover, we believe there are a number of important issues that will have to be addressed over the next five to seven years. Consequently, we plan to focus much of our attention on the initial five to seven years of the 20-year, 2002 –2021 planning horizon.

The experience of the past year and a half, with its extremely high and volatile prices, the threat of blackouts, and the need to resort to emergency hydropower operations suggests that electricity markets in the West are not functioning as efficiently and effectively as most market participants would desire. While there are many factors that contributed to this situation, electricity market structure is a significant one. That structure might be termed a "mixed" market. By a mixed market, we mean that the wholesale and retail parts of the market are not directly connected for most consumers within the region, or for that matter, in the rest of the West. The wholesale power market is a loosely regulated "competitive" market in which prices are determined through market

transactions, and the development of new resources is largely undertaken by private developers responding to market signals. Those signals are typically a combination of spot market prices and the prices that can be negotiated for longer-term bilateral contracts. In the retail market, most customers are buying from regulated utilities, either regulated by state commissions or local governing bodies. Retail rates are generally established in rate proceedings that lag the wholesale market. Rate structures generally do not provide "real time" signals of the current value of power. While there are some retail customers who are directly exposed to market signals, they are, for the most part, larger customers, and this situation is by no means universal even for them.

For many reasons, we think this general structure will persist for at least the next five to seven years. We think it is unlikely that states in the region will move farther down the road to retail competition beyond those steps already taken, and there is some possibility that some steps toward retail competition will be reversed. On the other hand, we think it is unlikely that there will be any significant reversal of national policy encouraging wholesale competition. As a practical matter, the important issue is not restructuring power markets in any overall sense. It is, we think, seeking improvements within this mixed market structure that will allow it to function more efficiently and effectively. We recognize that many utilities and others in the region feel they are fully occupied in dealing with the aftereffects of high power prices and other consequences of the recent electricity crisis. However, if we fail to address these issues over the next few years, the chances of a repeat of the power supply and price problems experienced over the last year are greatly increased.

Addressing the problems of the current market structure would benefit the Council's fish and wildlife responsibilities as well. As we saw this year, severe shortages in the electricity market can also affect the region's ability to achieve its fish and wildlife mitigation goals.

In this paper, we describe some of the issues raised by the current market structure and other issues that we think should be addressed in the Fifth Northwest Conservation and Electric Power Plan. They include:

- **Incentives for Development of Generation** -- The current market structure appears to have failed to provide adequate and timely incentives for adding new capacity to ensure power supply adequacy and to moderate price volatility. The Council proposes to assess existing incentives and disincentives for development of new generation and examine options available to encourage development that will moderate potential supply-demand imbalances and price volatility. Options will be analyzed to determine their effect on prices, system cost, adequacy and reliability. If appropriate, the plan may recommend measures to address systematic problems or improve signals for market development.

- **Increasing the Price Responsiveness of Demand** -- Most analyses of the 2000-2001 electricity situation agree that the lack of a demand response to wholesale prices worsened supply problems and price volatility. The Council proposes to

evaluate alternatives for increasing the price responsiveness of demand. The analysis would address the effects of various mechanisms on system cost, reliability and prices. If appropriate, the plan may make recommendations for implementing measures to improve the price responsiveness of demand.

- **Sustaining Economically Efficient Investment in Efficiency --** Over the past several years, investment in energy efficiency has followed a "roller coaster" pattern – investment at below cost-effective levels when market prices were low followed by "crash" programs when prices exploded. The Council proposes to assess the strengths and weaknesses of different approaches to achieving economically efficient levels of investment in energy efficiency in a more volatile electricity market and, if appropriate, suggest ways in which these programs might be improved.

- **Information Requirements for Assessing Power Supply Adequacy and Market Performance** -- The 2000-2001 electricity situation highlighted the need for timely information for assessing both power supply adequacy and reliability, and market performance. Some information that used to be readily available is now closely held. The Council proposes to evaluate the data needed to perform its planning and market assessment functions, and to investigate and make recommendations on how best to obtain such data if it is not currently available.

- **Fish Operations and Power** -- During the 2000-2001 electricity crisis, tradeoffs were made between hydro operations for fish and operations for power. These tradeoffs were important in maintaining an adequate power supply but came at some cost to the survival of juvenile salmon and steelhead. If many of the issues described above can be successfully resolved, the power system should be better able to provide the operations desired for fish even in low water years or times of financial crisis while the region also enjoys a more reliable power system. The Council' s 2002 mainstem amendments to the Fish and Wildlife Program are intended to lead to river operations that provide for both fish recovery and enhancement and an adequate, efficient, economical and reliable power system. However, conflicts are likely to always exist. There remain incentives to deviate from prescribed fish operations when supplies are tight and prices soar. The Council proposes to investigate operational strategies and potential incentives to minimize impacts on fish recovery from deviations from prescribed fish operations and the options available to mitigate these impacts.

- **Transmission and an Adequate, Efficient, Economic and Reliable Power System –** Transmission policy and planning have become even more critical to the goal of an adequate, efficient, economic and reliable power system since the restructuring of the electricity industry to achieve functional separation of transmission and generation. The issue is how the mix of independent power developers, transmission owners, load serving entities, and consumers make coherent decisions about what to build and where to build it in a vast interconnected system. How these decisions are made can have a significant

effect on power system costs, reliability, and the environment. While many of the issues are being addressed in the RTO West process, it will be some time before the Regional Transmission Operation (RTO) is in place if ever. In the meantime, Bonneville and others will be making decisions about transmission policy and planning. Consequently, the Council proposes to address alternatives with respect transmission pricing, planning, and policy as they affect the Council's mission of an adequate, efficient, economical and reliable power system.

- **Value of and Barriers to Resource Diversity --** The new generation that is under construction or in the development process in the region is heavily weighted toward natural gas-fueled combustion turbine technologies. Some observers have raised the concern that the Northwest and, even more so, the West Coast, is becoming overly dependent on natural gas and that the region should strive to increase the diversity of resources being added to the system. The Council proposes to assess the benefits of resource diversity and the potential barriers to increasing it. These include the issues associated with integrating intermittent resources into the system and pricing, transmission and distribution system issues raised by alternative resources and distributed resources. The plan will evaluate the prospects for achieving benefits from diversity, intermittent resources and distributed generation. We will attempt to identify barriers to the achievement of benefits and assess approaches to resolving the issues.

- **Future Role and Obligations of the Bonneville Power Administration --** The Bonneville Power Administration is legally obligated to serve the loads placed on it by public agencies at cost, even if it must acquire additional resources to do so. Many believe that in a competitive wholesale power market, this obligation exposes the Northwest to some risk of losing continued preferential access to the output of the Federal Columbia River Power System (FCRPS). In addition, it distorts the market for new resources both from the standpoint of Bonneville's large presence in the market and the price signals sent to its customers. However, if Bonneville were unable to acquire additional resources, some means of allocating its existing resources among competing interests would have to be found. There are currently discussions ongoing among different customer groups that are focused on the question of allocation of existing Bonneville power in the post-2006 rate period and to some degree Bonneville's role in resource acquisition. If these discussions bear fruit, the Council would analyze the proposal or proposals to develop the pros and cons with respect to resource development, power system adequacy, reliability, cost, market dynamics and the ability of the region to retain the benefits of the federal system. The purpose of this analysis would be to help the public and regional leaders reach decisions about the appropriateness of the proposals. In the absence of such proposals, the plan will evaluate alternative roles and practices for Bonneville and develop as fully as possible the pros and cons associated with the alternatives.

- **Global Climate Change Risks to the Power System --** A preponderance of scientific opinion asserts that the earth is warming and that this warming is largely

the result of increased production of carbon dioxide and other greenhouse gasses due to human activities. Because of the widespread use of fossil fuels to produce electricity, the electric power industry is a principal contributor to the growing atmospheric concentration of carbon dioxide and will be affected by any initiatives to reduce carbon emissions. Furthermore, the production of electricity from hydropower, so important in the Northwest, may be affected by climate change if historical precipitation patterns change. The Council proposes to review the status of the global climate change issue, including the current understanding of possible effects on the Northwest hydropower system, the effects of possible greenhouse gas emissions control policies on the relative cost-effectiveness of resources available to the Northwest, and the value of strategies to address climate change impacts.

While these issues have been presented as discrete, many are clearly highly interrelated. The plan will analyze these interrelationships. Background on the issues and the Council's proposed treatment of them is described in more detail in following sections.

Opportunities for Public Comment

The Council is interested in comment on this issue paper. This comment will help define the issues agenda addressed in the Fifth Power Plan. Specifically, the Council would appreciate comment on the following questions:

1. Are the issues described in this paper important to be addressed in the Fifth Power Plan? If not, why not?
2. Are the issues described accurately? If not, how should they be described?
3. Are the ways in which the Council proposes to address these issues appropriate? If not, how should they be addressed?
4. Are there other issues not included here that should be addressed in the Fifth Power Plan and, if so, what are they?
5. How should consideration of these issues be sequenced? Should some be addressed before others?

Please submit comments on this issue paper and, specifically to the above questions, by the close of business Friday, March 15, 2002. Public comments also will be accepted at the Council's March 6, 2002, meeting in Eugene, Oregon. Please address all comments to Mark Walker, Director, Public Affairs, Northwest Power Planning Council, 851 S.W . Sixth Avenue, Suite 1100, Portland, Oregon, 97204. Comments will also be accepted via e-mail at comments@nwppc.org. Please indicate that you are commenting on Council document 2002-01.

Adequate Incentives for Development of New Generation

A competitive wholesale electricity market has a far different set of incentives and rewards for investing in new generation than did the regulated environment. An issue that has concerned the Council for some time is whether competitive wholesale markets as currently structured are likely to provide the level of power supply adequacy and reliability desired by most consumers.

How is the Development Decision Currently Made?

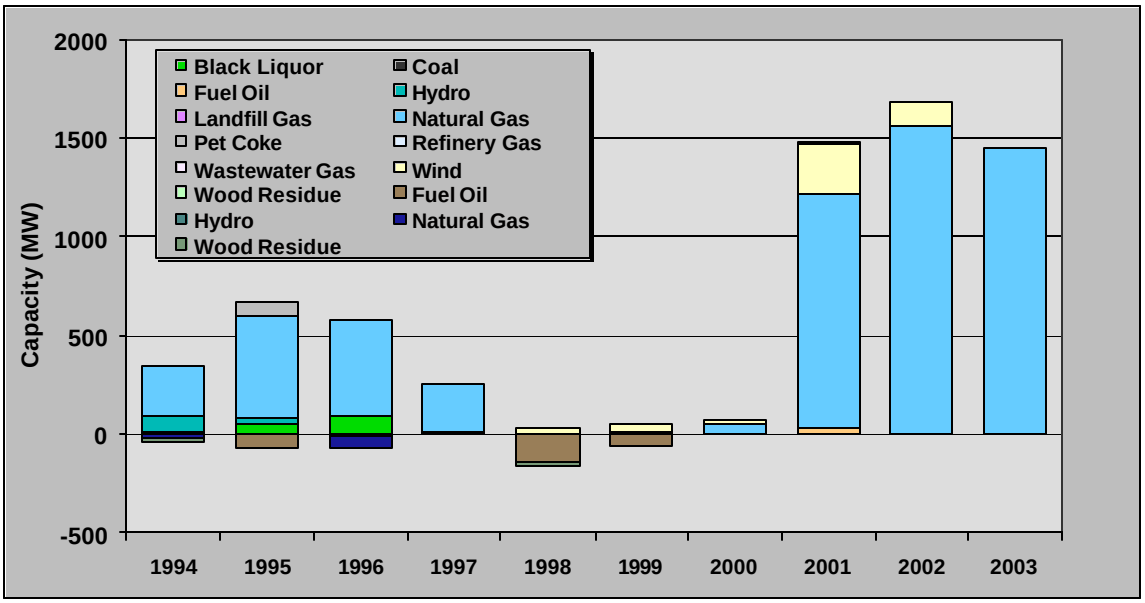
Most, although not all, new generation is being developed by independent developers. Of a total of 6,679 megawatts developed between 1994 and 2003, 4,735 megawatts (71 percent) is owned by independent generating companies. 1,629 megawatts (24 percent) is "conventional" investor- or publicly-owned utility generation. The remaining 315 megawatts is industrial. Of the 13,000 megawatts that have been permitted or are currently in the permitting process, independent power producers sponsor 93 percent.

Simplistically, the decision to build new generation on the part of an independent developer operating in a competitive market depends on a combination of the developers expectations about future spot market prices and the willingness of potential customers to enter into long-term power purchase contracts. If the combination of these factors is such that the developer believes investment criteria can be satisfied and financing obtained, the development will proceed. This calculation is fraught with risk under any circumstance. Slowdowns in the economy and milder than normal weather both pose risks to the developer. Here in the Northwest in particular, and, to a lesser extent, in the rest of the West, the risk is compounded by the uncertainty introduced by the hydroelectric system. The annual generation of the hydroelectric system can be almost plus or minus 4,000 average megawatts about the mean of 16,000 average megawatts in a Northwest system where annual average loads are approximately 22,000 average megawatts. Thus, a period of near-average or better water conditions could hold down prices and destroy the profitability of a power plant. Conversely, a low-water year or two can result in large profits. This added element of risk could adversely affect the amount and timing of investment and, therefore, the adequacy and reliability of the power supply.

Recent Experience

Figure 1 shows the pattern of generation development in the Northwest from 1994 through 2003. The data for 2002 and 2003 are the generation that is currently under construction and scheduled to be completed in those years

Figure 1 – Generation Development in the Northwest



As these data show, there was little investment in new capacity in the early years of restructuring. During the mid to late 1990s, prices were low as large capacity margins were worked off and several good hydropower years added to supply. Regulatory uncertainty (e.g., will there be retail competition or not?) and environmental concerns probably contributed to a reluctance to make commitments to generation, but the overwhelming factor was that prices were too low to support new development, even with steady growth in demand.

In the summer of 2000 and carrying on through much of 2001, poor hydro conditions revealed the underlying tightening capacity margins. This unmasked the shortcomings in California's market design and led to the rolling blackouts, high prices and volatility of 2000-2001. These high prices also triggered tremendous development activity. Figure 1 shows approximately 4,500 megawatts of capacity coming online in the Northwest from 2001 through 2003. This is a small fraction of the 31,000 megawatts of capacity reportedly under construction within the area of the Western Systems Coordinating Council.[1] This development, plus a return to more normal hydropower conditions and the effect of the slowed economy, has already meant a return to low market prices. On the one hand, this is good news for consumers. On the other, this may set us up for another period of volatility, high prices and short supplies in a few years if further development is put on hold.[2]

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[1] *Data Base of Proposed Generation Within the Western Systems Coordinating Council*, California Energy Commission, available at: http://www.energy.ca.gov/electricity/wscc_proposed_generation.html

[2] ***Simulation Scenarios for the Western Electricity Market*** *-A Discussion Paper for the California Energy Commission Workshop on Alternative Market Structures for California*, Prof. Andrew Ford, Washington State University. Available at: http://www.wsu.edu/~forda/FordCECPaper.pdf

Volatility is normal in most commodity markets. Marketers, retailers and large consumers typically deal with it through longer-term bilateral contracts that limit exposure to price volatility and through the use of price hedging instruments. Spot market volatility plays an important role in market corrections and in creating risk mitigation products to shift volatility risks from consumers to parties that wish to take more risk.

An issue for electricity markets is that inadequate investment in generation and conservation may lead to not just price volatility, but also actual electricity supply shortage and interruptions and the attendant economic disruptions. This risk arises from the instantaneous nature of supply-demand balance in electricity markets, the limited ability to store electricity, and a mismatch between the short time it takes to trigger a period of volatility (e.g. the transition period from a wet year to a dry year) and the longer time it takes to develop new generation.

Because of these factors, we believe it is important to examine the options available to moderate volatility and potential supply-demand imbalances in the electricity market.

What are some of the options?

Some of the options might include:

- Do nothing and let the mechanisms for hedging the risk of volatility develop. The premiums paid for such mechanisms can support the development of resources to guarantee supply and, as a consequence, moderate volatility.
- Provide some form of capacity payment to provide an incentive for a greater level of investment in generation. There are several potential designs for a capacity payment, each with its strengths and weaknesses. Such a mechanism also requires some entity of sufficient scope to implement the payment and recover the costs.
- Empower some entity to construct resources to ensure maintenance of a particular capacity margin.
- Establish a regulatory requirement on load serving entities to maintain a certain capacity margin.

It is the Council's intent to try to examine mechanisms like these for their effect on prices, system cost, and reliability.

Increasing the Price-Responsiveness of Demand

The role of price responsiveness in disciplining the market

In most commodity markets, consumers' responses to changes in price serve to discipline prices. If prices get too high, consumers find substitutes, use the product more efficiently, shift the use to periods when it is less expensive or curtail the activity that uses the product. It can be argued that electricity is different in that it is a necessity of modern life and there is a limited ability to substitute for it. On the other hand, we are all aware of opportunities to reduce our use of electricity, use it more efficiently or shift our

use to different periods. Price-responsive demand yields benefits directly to those who are able to reduce their power costs. It also yields benefits more broadly. Through the interaction of supply and demand, price-responsive demand can reduce the market-clearing price of power. For example, some studies have shown that wholesale prices can decline by a factor of 10 from high-price levels, so that a reduction of peak demand by 2.5 percent at a high-price hour can result in a wholesale price decline of 25 percent.[3]

There were a number of factors that contributed to the Western electricity market upheaval in 2000 and early 2001, not the least of which was the design of the California market and the market behaviors that design engendered. However, the Council and most other analysts agree that the crisis was heightened and prolonged by the lack of response of electricity demand to the growing shortage and increasing price of electricity. This lack of demand response resulted from the isolation of consumers from the market price of electricity. In California, this was because retail rates were frozen while stranded costs were recovered. In other parts of the West, it was a result of a continuing mix of regulated retail markets with little attention to what is needed in order to allow the competitive wholesale market to work effectively.

As with the increase in prices, there are a number of factors that contributed to the dramatic reductions in power prices in the summer of 2001. A major factor was response of demand to prices, albeit much delayed. Here in the Northwest, this was primarily from buyouts of the aluminum industry loads. In total, this amounted to over 2,200 megawatts. Unfortunately, it took quite some time to get all these load reductions in place, allowing very high prices to persist for several months. It is possible that if these load reductions could have been put in place more rapidly, the high prices could have been attenuated more rapidly. Now that last years high prices have worked there way into retail rates, many utilities of the region are now seeing their demands respond to prices. Unfortunately, it is too late to affect the wholesale power prices that made it necessary to raise rates in the first place. If the region is to avoid similar consequences in the future, now is the time to begin to put in place the mechanisms to increase the responsiveness of retail demand to wholesale prices.

Options for achieving price responsiveness in a mixed market

We believe there are several opportunities for increasing the price responsiveness of demand even in the context of the mixed power market we think will persist in this region. They include:

- Real-time pricing for those who are capable of managing their loads. There are many primarily larger customers who are capable of managing their use of electricity in response to prices. There are clear benefits to being on the market when prices are low. If these customers can manage their consumption when prices are high, they could experience overall benefits. While it is typically thought that this is limited to larger industrial customers or industries with

[3] Braithwait, Steven, Christensen Associates, Lessons from California, The Role of Demand Response; Institute for Regulatory Policy Studies, May 17, 2001. In the case of California circa 2000-2001 this could have saved California consumers $700 million in summer wholesale costs.

substitute fuel or self-generation capability, it may also include larger commercial buildings, particularly those with sophisticated energy management systems.

- Alternative rate designs. Most consumers probably do not want all their electricity use exposed to the market and the volatility that can entail. They might, however, benefit from alternative rate designs where a base amount of consumption is charged at regulated rates and everything over that is at the market rate.
- Expanded and more routine load buybacks such as Demand Exchange™. The flip side of market pricing is the opportunity to receive a market price-based payment in return for reducing load. This is the concept behind the Demand Exchange programs run successfully by Portland General Electric, Bonneville and others. The load-serving entity makes an offer to the customer on a day-ahead basis to pay for load reduction at a rate based on a share of the savings from not paying the market price for that power. The customer is free to accept or reject the offer. If the customer accepts, it is paid on the basis of delivered load reduction. While this has been primarily limited to very large industrial customers, there may be the opportunity to expand this approach
- An explicit role for the Direct Service Industries (DSIs) in supporting reliability. Most of the load reduction achieved over the last year was from the Direct Service Industries, primarily aluminum smelters. The question of future service to the DSIs from Bonneville beyond the current contract period is very much an issue. A consideration in the resolution of that issue may be the reliability and price mitigation benefits that may be derived from the ability to displace DSI load under certain conditions.

Prerequisites – metering and information

There are some necessary preconditions for significant expansion of mechanisms for achieving price-responsive demand. Primary among these are metering and information. Metering that can resolve actual consumption on the time scales of interest is essential. This will require investment in new technology, but it is an investment that will need to be made. This investment will yield benefits beyond reliability and price mitigation (e.g., automated meter reading can reduce billing costs) and set the stage for the next generation of electricity services.

Similarly, information about market prices on the same time scales is important. This may prove to be more difficult. There is not at present a formal day-ahead or real-time energy market in the Northwest that can provide price transparency to all market participants. The Federal Energy Regulatory Commission staff has recently released a discussion paper laying out its vision of what is required for a well-functioning wholesale power market.[3] Included is a voluntary day-ahead market, noting that such a market would, among other things, facilitate demand responsiveness. The FERC staff envisions this as a function of a Regional Transmission Organization (RTO). It is not clear what the resolution of the RTO question will be in the Northwest or whether an RTO, if

[3] *Concept Discussion Paper for an Electric Industry Transmission and Market Rule*, staff of the Federal Energy Regulatory Commission, December 17, 2001

formed, will incorporate a day-ahead energy market. Absent such a market, there are a number of market indices that provide on- and off-peak period prices that might be used. However, because there can be significant variation in prices from hour to hour, intra-day prices would be much preferred.

The Council believes that increasing the responsiveness of demand to wholesale prices is important and intends to evaluate the alternatives discussed above or other alternatives for increasing the price-responsiveness of demand. The analysis would address the effects on system cost, reliability and prices.

Achieving Economically Efficient Investment in Efficiency

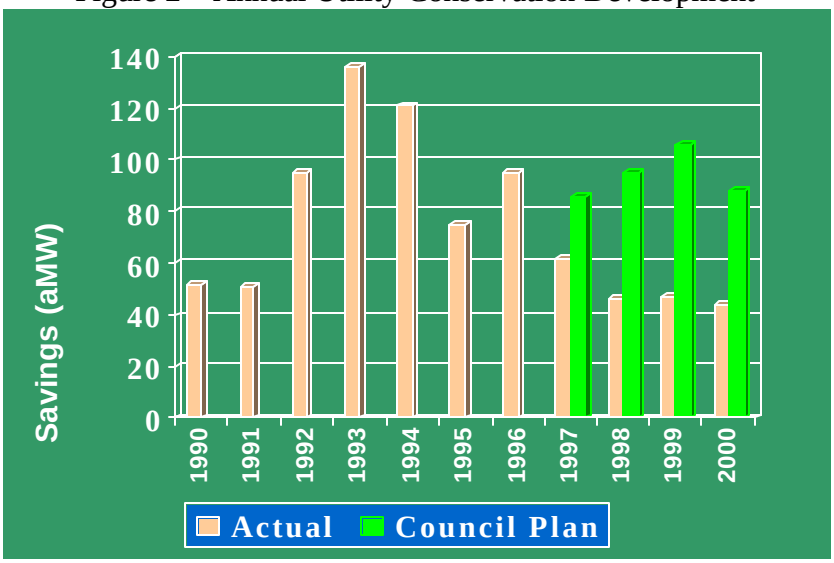
The Conservation Roller Coaster

Just as investment in generation withered in the late 1990s, investment in conservation was also well below the level the Council had determined to be cost effecting in its Fourth Power Plan (Figure 2). Of course, the performance of individual utilities varies widely. Some pursued conservation aggressively while others did not. There are many reasons for the aggregate fall-off in development including, for example, 1) the uncertainty surrounding the direction of industry restructuring and the concern that investment in efficiency could become a stranded cost, 2) Bonneville's concerns about being competitive in the wholesale market and 3) the low market prices that made the front-loaded investment in efficiency look unnecessary.

For many years, the Council asserted that one of the benefits of conservation was its flexibility – it could be "ramped up" and "ramped down" as needs dictated. However, many believe that the flexibility is overrated. Much of the conservation industry is made up of local contractors for whom ramping up and ramping down is problematic. In many instances these local businesses are also the primary marketing element for conservation programs. Their inability to present a consistent picture to their customers hampers their marketing efforts.

The prospect for continued volatility in electricity prices also suggests a rethinking of the flexibility of conservation implementation. In this environment, it may be that sustained investment in conservation at long-term cost-effectiveness levels makes more sense than ramping up and down with the latest swing in electricity prices. For example, the cost-effective conservation that was not done in the late 1990s and 2000 would have almost entirely paid for itself at the market prices that existed between June of 2000 and June of 2001 and would have had on average, 13 years of useful life remaining.

Figure 2 – Annual Utility Conservation Development



Evaluation of Sustained Investment vs. Market Price-Driven Investment

To evaluate a sustained investment in conservation, alternative investment scenarios will be evaluated against a number of future electricity price futures incorporating different timing and levels of price volatility. The effects on total system cost, prices and reliability will be evaluated.

Options for Implementing Sustained Investment

If sustained investment in conservation is justified, there are a number of alternative ways in which it might be done, several of which are being tested here in the Northwest. They include the different forms of public benefits charges being tried in Montana and Oregon and "tariff riders" being employed by several investor-owned utilities. There are probably others. The Council will assess the strengths and weaknesses of different approaches and, if appropriate, suggest ways in which these programs might be improved.

Information Requirements for Assessing Power Supply Adequacy and Market Performance

The changing electricity markets have also changed the focus of the Council's planning work. In the past, the Council's focus was on long-term resource needs and composition. Recently, the Council's focus has shifted to shorter-term adequacy and reliability assessment and assessment of the performance of electricity markets. To some extent, these changes in focus are also under way at other regulatory and oversight agencies. These changes entail different data and information needs than in the past. In assessing the problems in electricity markets over the last couple of years, the Council has found that the data that is needed to adequately evaluate markets for adequacy and reliability is not readily available. Even the data that has traditionally been used to assess longer-term

market trends is becoming less available and reliable since the electricity markets have begun restructuring.

For example, information on electricity consumption is typically collected from individual utilities reporting to agencies that compile the data into estimates of consumption by sector (residential, commercial, industrial, etc.) on an annual basis. This data is becoming less comprehensive as independent electricity marketers serve some large loads. In any event, the availability of this data lags at least a year behind current information. More current monthly and hourly data on electricity loads is not amenable to sectoral or geographic analysis. Thus it is difficult to analyze many of the basic determinants and trends in demand and how demand might be affected by emergency actions during an electricity shortage.

Increasingly, electricity adequacy and reliability are issues for the entire western interconnected power system, not just the region. However, most sources do not organize data on this basis. The Western Systems Coordinating Council (WSCC) does, but there are difficulties with the availability, scope and accuracy of the WSCC data. Electric reliability agencies like WSCC are being transformed to function more appropriately in today's electricity markets, and there may be opportunity to shape the data collection role of these organizations to facilitate market assessment and analysis and to provide information that will enhance competition in the market.

As a part of the power plan, the Council intends to evaluate the data needed to perform its planning and market assessment functions, and to investigate how best to obtain such data if it is not currently available.

Fish Operations and Power

During 2000-2001, fish assistance programs and power system reliability came into conflict. Decisions were made to risk compromising the survival of juvenile salmon and steelhead by reducing or eliminating spill in order to ensure adequate supplies of power and to manage the economic impact of the high market prices of power. If many of the issues described above can be successfully resolved, the power system should be better able to provide the operations desired for fish even in low water years or times of financial crisis while the region also enjoys a more reliable power system. The Council, in its 2002 mainstem amendments to the fish and wildlife program, intends to identify operations that are effective for fish and to begin to describe what changes will be required in the power supply system to ensure operations for fish can be provided in nearly all circumstances. During that process, the Council will be weighing the benefits to fish from alternative main stem operations (the timing, quantities and locations of flow and spill) against the effects on the power system. This is intended to lead to more cost-effective river operations.

But conflicts between the value of hydro operations for fish and for power will probably always exist to some degree. A significant problem is that the dollar value of power operations is easily quantifiable whereas the value of the fish operations to meeting

recovery goals is not. There remain incentives to deviate from prescribed fish operations when power supplies become tight and prices soar.

It may be possible, through careful consideration of the relative priorities of different operations for fish and power, to better manage the operational interaction to minimize the adverse effects for fish while achieving increases in power production and storage during power emergencies. Some argue, however, that fish operations should be viewed as firm environmental compliance requirement similar to air and water quality standards. Otherwise continued financial incentives to maximize power operations will overcome the incentives to operate for fish, particularly under financial or power emergencies. This would suggest penalties for deviations from prescribed fish operations. Alternatively, it may be possible to structure a system of sharing of the monetary benefits of deviations from prescribed fish operations to permit mitigation of the effects on fish.

The Council proposes to investigate both operational strategies and potential incentives to minimize impact on fish from deviations from prescribed fish operations and the options available to mitigate these impacts.

Transmission and an Adequate, Efficient, Economical and Reliable Power System

Perhaps as a consequence of the functional separation of transmission and power, transmission policy and planning has become even more critical to achieving an adequate, efficient, economical and reliable power supply than in the past. It is no longer a question of a vertically integrated utility determining how best to serve its loads and building the mix of generation, transmission and demand side solutions required. The issue is how independent power developers, transmission owners, load serving entities and even consumers make coherent decisions about what to build and where to build in a vast interconnected system. Those decisions can have significant consequences in terms of the costs to consumers of the region, the distribution of those costs among various parties, the adequacy and reliability of the power supply, and the quality of the environmental.

Many of these issues are being addressed in the context of the development of the filing with FERC for the formation of RTO West. That filing, however, will not end consideration of these issues. In addition, Bonneville will be confronted with these issues as it considers upgrades to its transmission system and establishes new transmission rates that will take place before an RTO is in operation.

Consequently, the Council proposes to address transmission policy and planning issues as they affect the Council's mission of assuring an adequate, efficient, economical and reliable power supply. The bookends of the ongoing debate are a market approach which relies on creating a system of price signals to influence the choices between a "wires"(i.e. building transmission) and "non-wires" (e.g. load-center generation, demand management and efficiency) solutions to specific load/resource issues; and a planning approach in which a central authority somehow makes those tradeoffs and implements

solutions. Given the reality of the mixed market system in which we are in, the answer may lie somewhere between.

Specific questions the Council may want to address include:

- What is the Council's position on traditional postage stamp rates vs. locational pricing?
- How do you make the right trade-offs between adding generation or Demand-Side Management (DSM)/efficiency improvements to reduce the need for transmission investment or making the transmission investment?
- How can least cost planning processes be implemented in an institutionally disaggregated world?
- If transmission expansion relies mostly on market signals and responses, do we need a backstop if markets fail? How would we know a market failure?
- How do you deal with the relative environmental difficulties of siting generation closer to load and siting large transmission lines?
- Should the transmission system be built out until there is no congestion (that is, until all requests for transmission service can be met without jeopardizing system security)? If not, what is the right level of congestion to accept on the transmission system?
- Who should pay for relieving transmission congestion? Everybody? Those who caused it? Those who benefit from its relief? If not everybody, who decides and what is the payment mechanism?
- Should the Council make recommendations or decisions about generation location? How should it arrive at those recommendations or decisions? How would they be implemented in a disaggregated world?
- What is the role of local economic development in transmission decisions? Does it make a difference who pays for the transmission?

Value of and Barriers to Resource Diversity

Current Trends

Figure 2 shows the approximate current status of generating resource development in the Northwest.

Figure 2 – Northwest Generating Resource Development

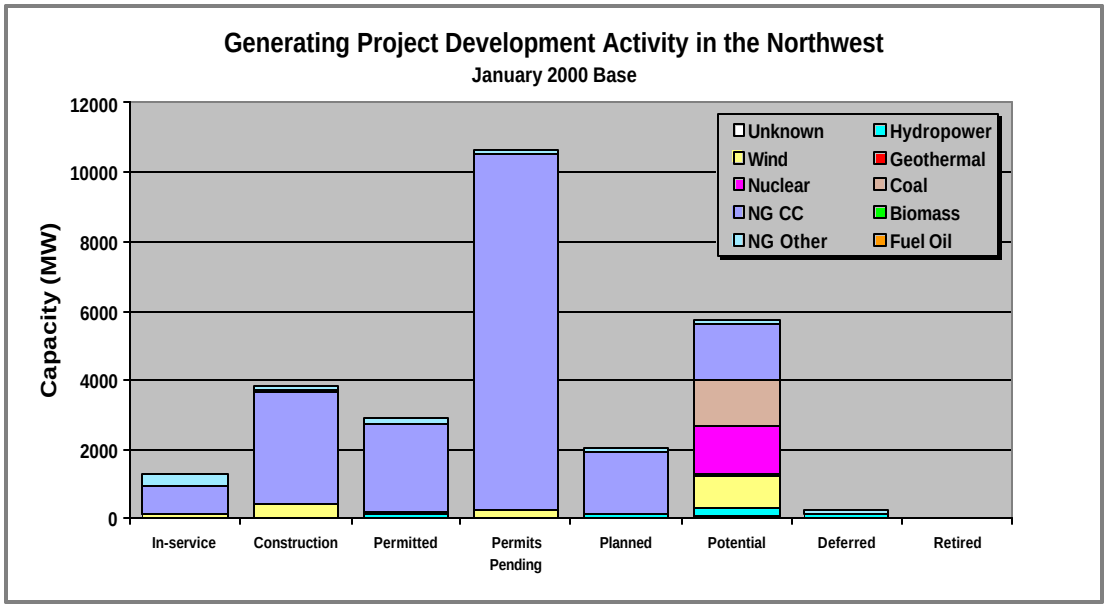
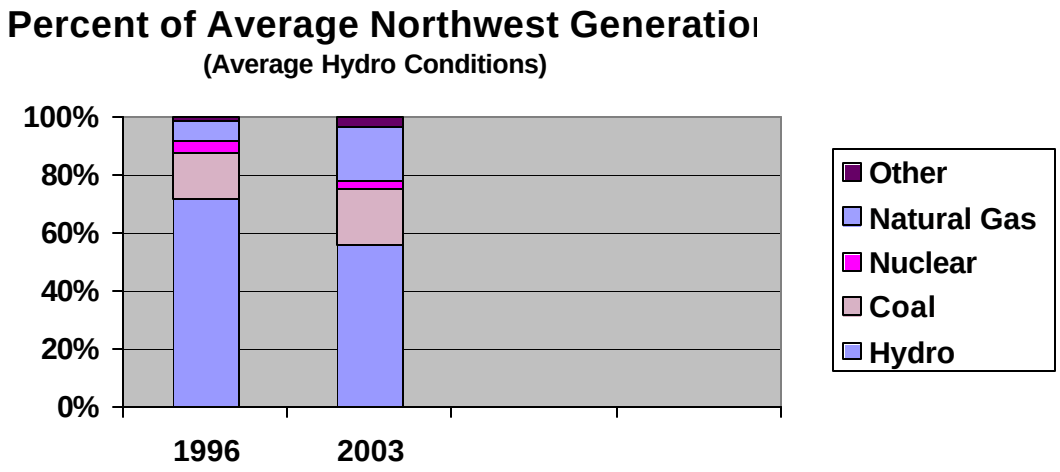


Figure 2 indicates that the great majority of the generation that has recently entered service, is under construction, is permitted, is in the permitting process or is planned is fueled by natural gas. Most of the units are combined cycle units with a few single cycle units as well. The major exception is an unprecedented but relatively modest amount of wind generation currently under construction and in the permitting process. There are "potential" projects fueled by coal and nuclear fuels as well as additional wind, but these are not far along in the process.

Figure 3 shows the shares of Northwest generation for the major fuel types in 1996 and projected for 2003.

Figure 3 – Shares of Northwest Generation



As this figure shows, the share of generation fueled by natural gas is expected to more than double by 2003. In many respects, this represents a more diverse resource set than existed in the past. In addition, the Council has long recognized the economic flexibility of natural gas-fired generation technologies in a competitive electricity market, especially one with a large share of precipitation-dependent hydropower generation. However, if the development pattern in the future reflects the pattern in Figure 2, we might expect natural gas-fueled generation to supplant coal by a significant margin within the time horizon of the Fifth Power Plan. Viewed from the perspective of the WSCC, 47 percent of the generating capacity in the West is projected to be gas-fired by 2010.[4]

Growing reliance on natural gas as an electricity generation fuel has also raised issues of whether conversion of electric space and water heating to directly use natural gas is a more energy efficient and economically efficient use of natural gas. While previous Council analysis has established that fuel conversions are neither a resource under the Act nor a conservation measure, there may be situations where fuel conversion is still a desirable course of action for the region. The Council will address this issue in the power plan and determine appropriate actions, if any, in the context of other conservation and resource decisions.

Value of Resource Diversity

Whether the rapidly increasing role of natural gas-fired generation technologies is a cause for concern is an open question. Resource diversity is not an end in itself. The question is whether or not greater diversity yields benefits. The benefits that diversity might deliver are like the benefits of a diverse investment portfolio – if one segment of the portfolio goes sour, hopefully other segments will hold their own or even compensate for the poor performing one.

There are several kinds of risk associated with a lack of diversity in new resource additions that could be evaluated. They include:

- Fuel price/volatility risk – the effects of differential fuel price escalation rates and/or differential price volatility on the overall relative costs of resources. Fuel price risks can typically be passed through to consumers.
- Fuel supply risk -- the risk of fuel supply interruptions.
- Environmental cost (regulatory) risk – the risk associated with the potential internalization of environmental costs. An example is the risk of the internalization of climate change risks through market mechanisms like a carbon tax or regulations on emissions.
- Fixed cost or investment risk. From a market perspective, this is one of the risks that investors may take in hopes of earning a return on their investment. In a competitive market, it is more difficult to pass this risk on to consumers. The current preponderance of technologies with low fixed costs in the new generation mix suggests that this is a risk that investors seek to minimize. From a societal or central planning perspective, fixed cost risk represents the risk that societal

[4] 10-Year Coordinated Plan Summary 2001-2010, Western Systems Coordinating Council, August 2001

resources may be tied up in less productive activities. The questions are whose role is it to take investment risk, and what is the best sharing of the role of investment risk-taker?

- Performance risk – the risks associated with common cause equipment failure.

The analytical question is whether consideration of these risks is likely to change the relative cost-effectiveness of different resource types.

Opportunities for and Barriers to Resource Diversity

If there are significant benefits to a more diverse set of new resources, where are the opportunities for development of those resources, and are there infrastructure, policy or regulatory barriers that prevent those opportunities from being realized?

Transmission

As noted in the section on transmission, transmission considerations can affect resource decisions in a number of ways.

Transmission investment may be a necessary adjunct to investment in certain resource types that are by their nature located far from Northwest load centers, such as some wind generation. It may be a desirable investment as part of an overall economic decision, such as a choice to locate a coal plant at the mine mouth rather than locating it closer to loads and hauling the coal by rail, or the choice to locate a gas plant near a pipeline that is distant from loads rather than near one that is closer to loads because the former pipeline provides cheaper gas.

There are also transmission operating considerations, such as scheduling requirements or imbalance market penalties, may have disproportionate effects on some resource types, like wind or other non-controllable resources, compared to more traditional utility resources.

Transmission investment can be postponed or avoided entirely by investment in end-use efficiency improvements, demand-side management programs or small-scale distributed generation at the end use. Because of the varying locations of transmission constraints at the present time, some of these programs or small-scale resources may have different values, depending on where they are implemented or located.

The Council proposes in its power plan to specifically examine the transmission issues raised by alternative resources. For example, are there instances where investments in transmission combined with existing or alternative resources would be the most cost-effective means of meeting demand for electricity, and are there transmission pricing or other policies that are preventing those investments? At the same time, the Council will also look at the value of distributed resources, including smaller-scale generation, end-use efficiency improvements and demand-side management, in reducing or delaying transmission investments.

Integrating Intermittent Renewable Resources into the System

The output of wind, solar and some small hydropower is a function of the intermittent availability of the primary energy resource and may vary significantly and unpredictably on a sub-hourly basis. Other system resources may need to be dispatched to compensate for these variations in output. Several issues are associated with the effects of intermittency. Issues currently receiving attention include "imbalance charges," and, more recently fixed-capacity access charges. Regarding imbalance charges, operators of intermittent facilities (or organizations taking or wholesaling the output of these facilities) may be required to pay for the cost of dispatching resources to compensate for the intermittent output. Provided that the cost of compensation is a fair representation of actual costs, this is a reasonable component of the cost of providing power from these sources. However, in addition to the cost of dispatching compensating resources, penalties may be assessed for deviation in output exceeding prescribed values. Though implemented to curtail market gaming by the operators of dispatchable resources, these penalties could be applied to in such a way as to be large enough to significantly impact the economic competitiveness of intermittent resources.

Other issues associated with resource intermittency include establishing transmission charges proportional to the transmission costs imposed by the resource, and determining the true cost, and how that cost might vary as intermittent supplies increase, of serving imbalance.

Other than consideration of the effects on cost-effectiveness of the seasonal variation of wind resources, issues associated with resource intermittency have not been assessed in previous power plans. The expected near-term development of intermittent resources was not sufficient to warrant extensive analysis. With increasing development of intermittent resources and the prospect of additional development driven by state public benefits charges, Bonneville's renewables initiatives and various "green" power products, the issues associated with integration of intermittent resources have taken on greater importance. The Council proposes to assess these issues to the extent possible and to issue recommendations where appropriate. Because of the relationship of many of these issues to the transmission system, the Council may work in conjunction with Bonneville to address certain of these issues.

Distributed Resources – reliability, transmission and distribution

The concept of distributed resources, in its broadest sense, seeks to take better advantage of locating generating facilities or investments in DSM. Locating new generation or DSM near loads can reduce the electrical losses and economic and environmental costs of transmission and distribution. Thermal generation located near loads creates cogeneration opportunities, with the prospects of improving the efficiency of energy use and the economic and environmental cost of serving electrical and thermal loads. Distributed generation can also improve system reliability by providing smaller-scale local sources of power.

Distributed resource benefits can be provided by a wide range of resources, technologies and applications, including many that are commercially available. Industrial

cogeneration, for example, is a distributed generation application that has been in use since the initial commercialization of electric power. At one extreme, the siting of large combined-cycle plants nearer to loads can offset long distance transmission costs and losses. At the other extreme, micro-turbine and fuel cell technologies under development are expected to lead to affordable "power plants in the closet" that could bring the benefits of cogeneration to residential customers and defer or offset transmission and distribution system costs. The same can be true of investments in efficiency and load management.

Technology development, by reducing the cost, size, and environmental impact of generating facilities, and by automating facility operation, is continually broadening the potential applications for distributed generation. At the same time, rapidly developing technologies such as direct digital control are providing new opportunities for demand-side management. Formidable institutional barriers remain, however. Many of the economic advantages of distributed resources only appear if the prospective owner is able to share in the transmission and distribution benefits. Similarly, seasonal and time-of-day electricity (and fuel) price signals or alternatives (such as buy-back arrangements) are required to achieve economically optimum design and location of distributed resources. Interconnection standards can also be a significant barrier to distributed generation. Because it is likely infeasible to evaluate, control and monitor the environmental impacts and electrical interconnection of micro-scale generation, there is a need to adopt standard design and installation practices.

In its Fifth Power Plan the Council proposes to assess the potential benefits of distributed resources to the region and the prospects for achieving these benefits. We will attempt to identify barriers to the achievement of these benefits and approaches to resolving these issues.

The Role of The Bonneville Power Administration in Resource Development

The primary motivation for the development of the Northwest Power Act in the late 1970s was to authorize the acquisition of new resources by the Bonneville Power Administration. The predominant generating technologies of the day were large scale, very capital-intensive coal and nuclear power plants. Bonneville had backed the financing of three of the five Washington Public Power Supply System nuclear power plants through a mechanism called net billing. That mechanism had, however, been stretched to its limits. If Bonneville was to be involved in the development of additional resources, the authority of Bonneville would have to be expanded. The benefits of Bonneville involvement, such as the appearance of federal backing of a resource and the ability of Bonneville to spread the costs of new resources broadly around the region, were sufficient to cause utility and industry groups to unite in support of this expansion of Bonneville's authority. The Northwest Power Planning Council was created, in large measure, to serve as a check and balance by the Northwest states on Bonneville's acquisition authority.

It can be argued that many of the conditions that led to the passage of the Northwest Power Act and the expansion of Bonneville's acquisition authority no longer obtain. In a competitive wholesale power market, no one appears to be particularly interested in taking on the fixed cost risk of large coal or nuclear power plants. That being the case, the rationale for Bonneville involvement in resource acquisition is much diminished.

There are other reasons to question the need for and value of Bonneville involvement in resource acquisition. They include:

- Bonneville involvement in resource acquisition can expose Bonneville and ultimately the United States Treasury to risk. Bonneville is required by law to meet the requirements of those public agencies that place load on Bonneville. The customers are required to purchase the power only for the length of the power sales contracts. The length of these contracts is typically less than the term of financing new generating resources. In the mid-nineties, Bonneville experienced an exodus of customers because their rates, driven largely by their fixed cost obligations, were temporarily above market prices. This could happen again, particularly if Bonneville were to undertake significant long-term resource acquisitions. This could expose Bonneville and the Northwest to significant political risk if Bonneville were unable to meet its obligations to the Treasury.
- Bonneville can and does attempt to limit its acquisitions to short terms coincident with their contractual obligations. This, however, means that they do not know what their obligations will be until a relatively short time before a new contract period begins. This can force Bonneville into the market in a relatively large way in order to secure resources to meet its obligations. This is not an enviable position. Some also argue that in these circumstances, Bonneville is such a large presence that it seriously distorts the market.
- The pricing of Bonneville's power also distorts the market. Bonneville is required by law to sell its firm power to regional customers at cost. Historically, Bonneville has chosen to meld the cost of more expensive new resources with the lower cost Federal Columbia River Power System resources. The result is a melded cost that is lower than the cost of new generating resources and some new efficiency resources as well. As a consequence, Bonneville's utility customers do not see the full cost of new resources and have diminished incentive to invest in new resources themselves or promote the more efficient use of electricity. Many believe that Bonneville could charge different prices for the power from different resources so long as the prices charged were based on the cost of the respective resources (e.g., an existing resources block and a new resources block). This has been termed a "tiered rate." Overall, the cost to a customer would not be greater than with melded rates, although the marginal rate would reflect the incremental cost of new power. Bonneville has made one attempt to implement such a system but eventually abandoned the idea in the face of customer opposition.

There are several alternatives that have been discussed over the years:

- Maintain the status quo. Bonneville and the region have managed to operate within this system up to now. In short, "If it ain't broke, don't fix it."
- Implement a tiered rate system as described above.
- Bonneville could act as an agent for acquisition of new resources for its customers, but those customers would pay the full cost of those resources and accept the risk associated with them. This was proposed by the Comprehensive Review of the Northwest Energy System in 1996.[5] Alternatively, some other form of cost and risk sharing could be devised.
- Bonneville could merely act as an agent for the sale of the power only from existing federal resources and not develop new resources. Customers would be on their own for requirements above "their share" of the existing federal resources. The existing resources could be sold as traditional firm power products (with Bonneville marketing the non-firm power) or through a "slice" product where the customer gets its "share" of the output of the system, both firm and non-firm. This has the added advantage of dispersing control of the non-firm power and, thus, limiting the ability of one player to exercise market power through its control of non-firm power while also reducing the presence of the federal government in the competitive new resource development market.

There are numerous issues associated with any of these alternatives or others that may be proposed. They include whether Bonneville should be obligated to meet load growth and, if so, how. Another question is, what happens to Bonneville's role in the development of conservation and renewable resources if Bonneville is no longer responsible for meeting growing loads in the region? Is it reasonable for Bonneville to have responsibility for the development of some kinds of resources and not others?

Perhaps the most significant barrier to any move from the status quo is the fact that most alternatives require an allocation of the existing low-cost resources within the region. Such an allocation would be contentious because of the high value of the existing system. It may create the perception of winners and losers within the region. But it may ultimately be a more stable solution than the status quo.

There are currently ongoing discussions among different customer groups that are focused on the question of allocation of existing Bonneville power in the post-2006 rate period and beyond and Bonneville's role in resource acquisition. If these discussions bear fruit, the Council would analyze the proposal or proposals to develop the pros and cons with respect to resource development, power system adequacy, reliability, cost, market dynamics and the ability of the region to retain the benefits of the federal system. The purpose of this analysis would be to help the public and regional leaders reach decisions about the appropriateness of the proposals. In the absence of such proposals, the Council intends to engage the region on these issues and develop the pros and cons associated with the alternatives as fully as possible.

[5] *Comprehensive Review of the Northwest Energy System*, December 12, 1996, p. 15. Available at: http://www.nwcouncil.org/library/1996/cr96-26.htm

Global Climate Change Risks

A preponderance of scientific opinion asserts that the earth is warming and that this warming is largely the result of increased production of carbon dioxide and other greenhouse gasses due to human activities. In addition, it is now generally asserted that some level of global climate change is inevitable. While some effects of climate change, such as longer growing seasons in certain regions, may be positive, others may be negative. For example, some expect adverse consequences from effects including sea-level rise, changes in precipitation patterns and storm activity and consequent runoff patterns, changes in the distribution of infectious diseases and pests, and effects on the distribution and health of forest and other natural ecosystems.

Because of the widespread use of fossil fuels to produce electricity, the electric power industry is a principal contributor to the growing atmospheric concentration of carbon dioxide. Furthermore, the production of electricity from hydropower, so important in the Northwest, may be affected by climate change if historical precipitation patterns change. Therefore, any effort to control and adapt to climate change must involve the electric power industry.

The status of the climate change issue and the effect of possible carbon dioxide control measures on the value of conservation and renewable resources were assessed in the Fourth Power Plan. That plan set forth several recommendations regarding climate change, principally a stronger emphasis on conservation and general recommendations regarding the design of approaches to greenhouse gas control.

In the new power plan, the Council proposes to review the status of the global climate change issue, including the current understanding of possible effects on the Northwest hydropower system and the effects of possible greenhouse gas emissions control policies on the relative cost-effectiveness of resources available to the Northwest.