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January 12, 2004

MEMORANDUM

TO: Council Members

FROM: Dick Watson

SUBJECT: Draft Introduction to the Fifth Power Plan

Attached is a draft of Chapter 1 of the Fifth Power Plan, the introduction. This draft contains suggested edits from Power Committee members in red-line format. These edits will be discussed by the Committee next week. The final draft may differ somewhat from what is presented here.

The objective of the introduction is to put the Fifth Power Plan in context: to describe the factors that are driving our thinking about this power plan; to lay out a vision for the Northwest power system; and describe the primary areas of focus for the power plan.

The introduction begins by noting the parallels between this power plan and the Council's first power plan. Both come on the heels of a major crisis in the Northwest system that affected the industry and region's economy significantly. It is our intent that both will have influenced power system planning and policy the Northwest in positive ways. The introduction goes on to briefly describe the Western Electricity Crisis of 2000-2001, the factors that contributed to it and how the region responded to it. The chapter goes on to describe a vision for the Northwest power system and lays out the focus for this power plan in terms the development of planning methods and resolution of policy issues that will help achieve that vision.

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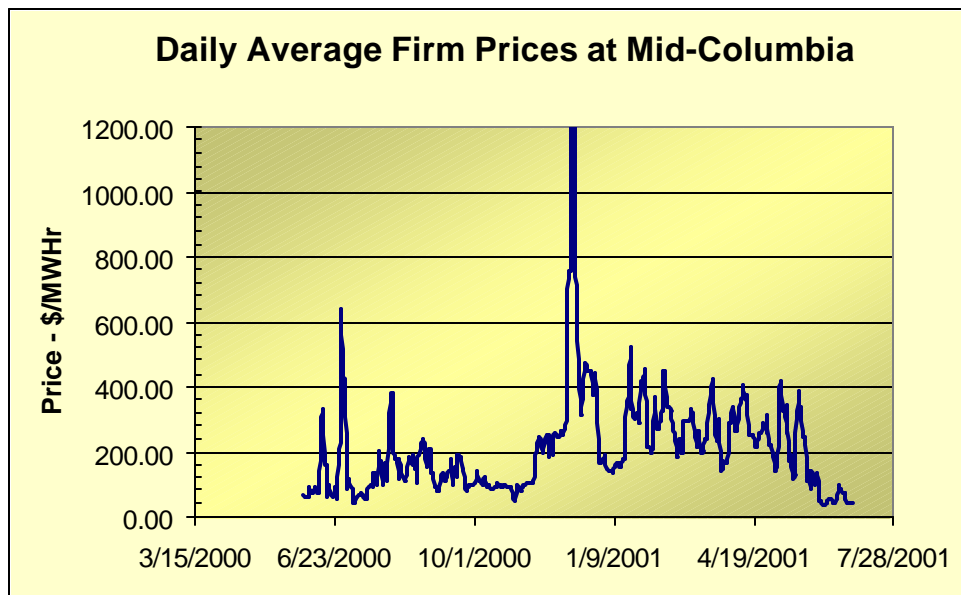
Introduction to the 5th Power Plan

Note: Oregon suggests starting with the “Vision” and “Focus” Sections (pp. 9& 10) and following with an abbreviated discussion of the Western Electricity Crisis and the Causal factors

The Council’s first plan, adopted in 1983, was developed in the aftermath of the region’s ill-considered effort to construct several large thermal power plants. Although few of these power plants were completed, their costs resulted in a 66-percent real increase in retail rates in the region. This caused demand to plummet and caused economic hardship for many in the region. In response to this experience, the Council’s first plan brought innovations to electricity system planning. These included recognition of the price elasticity of demand in forecasting and methods for assessing and managing the risks associated with capital-intensive, long lead-time generation. It also furthered electricity policy innovations such as the treatment of conservation, the more efficient use of electricity, as a resource comparable to generation.

The Fifth Power Plan has many parallels. It comes on the heels of the 2000-2001 Western Electricity Crisis. This crisis manifested itself in the threat of blackouts and extremely high wholesale power prices (Figure 1-1) that persisted for almost a year.

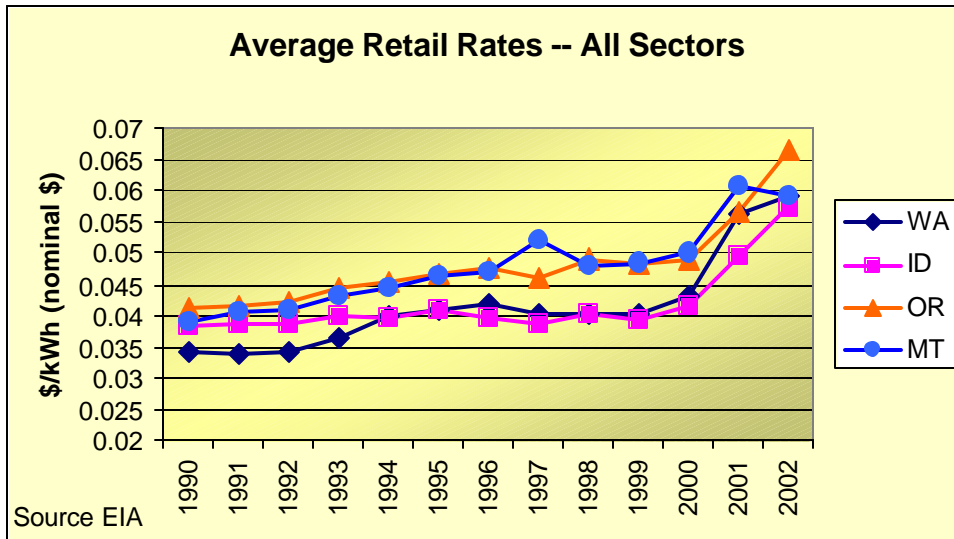
Figure 1-1



(EX\price data\mid-c spot prices)

The high wholesale rates eventually affected retail rates, causing average retail rates in the region to increase by 25 to 50 percent. Many utilities entered into long-term contracts for power supply at high prices at the height of the crisis. As a consequence, although wholesale prices have returned to normal levels, retail rates have not yet returned to pre-crisis levels (Figure 1-2).

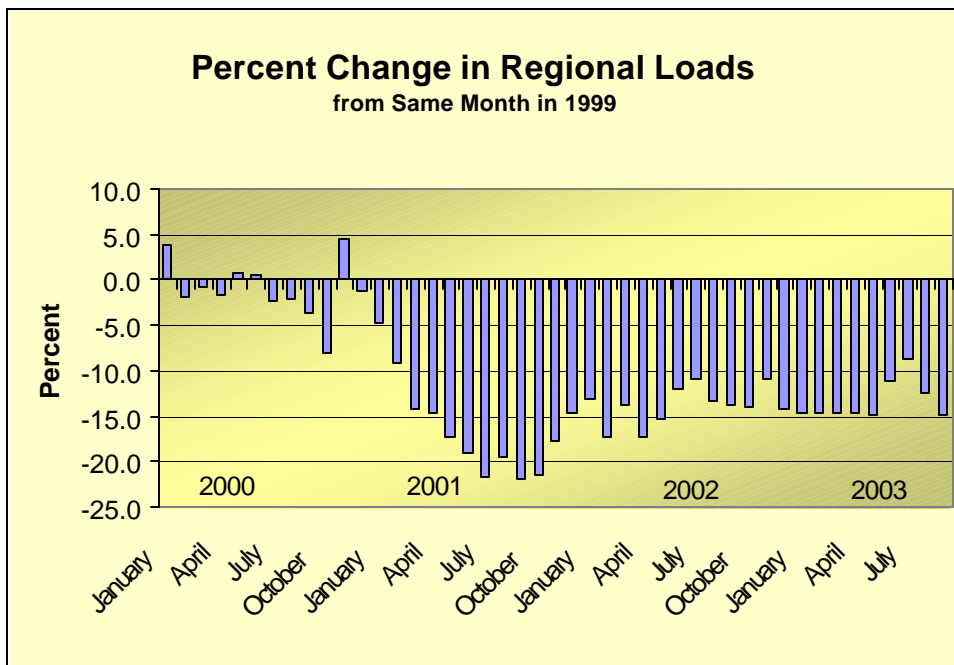
Figure 1-2



(EX\Fifthplan\elec.prices19902002)

Similarly, demand remains well below pre-crisis levels (Figure 1-3). Most of this is due to the fact that much of the electricity-intensive aluminum industry remains shut down. However, other industries and economic activities have also been affected.

Figure 1-3



(TMEX\loadtracker6)

The challenges facing the Fifth Plan are similar to those that faced the first plan. They are to build on the lessons of the recent past and to provide leadership in planning and policy that will help assure the region an adequate, efficient, economic and reliable power supply in the years ahead. [A third challenge is that of developing plans that are capable](#)

of being adapted to the rapidly changing circumstances of the power industry. Change has been and is likely to continue to be more rapid than the cycle for complete revisions of the power plan. If the Council's plans are to provide useful guidance, they must adapt more rapidly to changing conditions. (Idaho)

What Caused the Western Electricity Crisis?

The Western Electricity Crisis has been referred to as the “perfect storm” – the result of the confluence of a number of adverse trends and events. It was triggered by the second worst water year in the Northwest’s hydrological record and was greatly exacerbated by a deeply flawed electricity market design in California and opportunism by some of the participants in that market. And many believe it was prolonged by the reluctance of the Federal Energy Regulatory Commission to impose West-wide price caps.

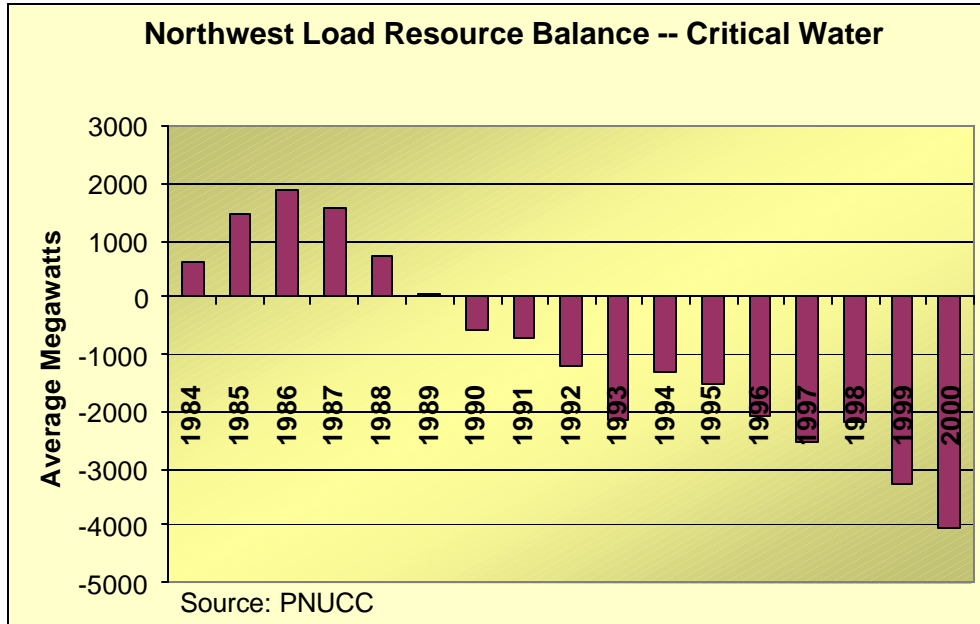
Alternative for the preceding paragraph:

The Western Electricity Crisis has been referred to as the “perfect storm” – the result of the confluence of a number of adverse trends and events. It was triggered by a deeply flawed electricity market design in California and opportunism by some of the participants in that market and was greatly exacerbated by the second worst water year in the Northwest’s hydrological record. And many believe it was prolonged by the reluctance of the Federal Energy Regulatory Commission to impose West-wide price caps. (Washington)

The poor hydro conditions resulted in almost 4,000 average megawatts less hydroelectric energy available than in an average year and even less compared to the relatively wet years of 1995-1999. The reduced hydro generation affected not only the Northwest but also California and the Desert Southwest. Net exports from the Northwest Power Pool Area for the May through September period averaged 2,700 average megawatts less in 2000 and 2001 than in the preceding three years.

However, the poor hydro conditions and the flawed California market are unlikely to have triggered the Western Electricity Crisis had it not been for the extremely tight resource situation in the Northwest and West leading into 2000. Here in the Northwest, the in-region critical water load-resource balance was increasingly negative (loads greater than regional resources) throughout the 1990s (Figure 1-4). By the year 2000, the deficit had reached 4,000 average megawatts.

Figure 1-4



(ex\ fifthplan\ PNUCCbalance)

During most of the late 1990s, the development of generation in the Northwest and, for that matter, the rest of the West, was effectively at a standstill. Similarly, utility investment in conservation during that period was less than half the cost-effective levels identified by the Council.

Concerned by the growing deficits, the Council undertook a study of regional power supply adequacy. That study, released in early 2000, estimated that the probability of being unable to fully serve Northwest load would climb to 24 percent by 2003, even when accounting for the ability to import power in the winter and to draft reservoirs beyond normal limits in emergencies. The analysis also indicated that 3,000 megawatts of new resources would be necessary to bring the loss of load probability down to the acceptable industry criterion of 5 percent.¹ What the report failed to emphasize was that the probable leading indicator of such resource scarcity would be price volatility. The prices of 2000-2001 brought that lesson home very clearly.

Contributing Factors

Neither the Council's study nor any of the other indicators of growing resource inadequacy stimulated a rush to develop new resources. While there was some under development prior to the crisis, it was not enough nor did it come on line soon enough to avert the crisis. Why did the Northwest and the rest of the West allow loads and resources to get so far out of balance?

Naive Faith in "The Market"

One explanation is the infatuation with "the market" that was prevalent in the late '90s. Why should a load-serving entity take it upon itself to build new resources or enter into long-term contracts when everyone is saying that the invisible hand of the competitive

¹ [Northwest Power Supply: Adequacy/Reliability Study Phase I Report](#), March 2000.

market will take care of it? A long period of low spot market prices seemed to validate this view. However, it should have been clear that the market was not taking care of it. Deficits continued to grow, but very little was being built. Wholesale prices in the years immediately preceding the summer of 2000 were generally below what it would take for a new generator to fully recover its costs, in part because of greater than average hydro production during that period. Few independent power producers were willing to undertake the risk of building a plant without having a significant portion of a plant's capability committed to long-term contracts. This was particularly so in the Northwest where good hydro conditions can depress market prices for extended periods. Some other areas that had opened up generation to competition recognized that energy prices were unlikely to support development of needed capacity unless you were willing to accept periods of extreme high prices. They implemented some form of capacity payment in response. However, these approaches had not been without their own problems, and no such mechanisms were introduced in the West.

Fear of Retail Competition and Stranded Costs

Another factor keeping utilities from making commitments to new resources was fear of retail competition. During the mid-to-late 1990s, there was a great deal of discussion regarding retail competition. Some states, such as Montana and, on a more limited basis, Oregon, opened their retail markets to competition. Others were considering it and there was speculation that Congress might impose retail competition. In the face of these developments, utilities were concerned that if they were forced to open their service territories to competition, they might lose customers to competitors and their investments in new resources would be "stranded," i.e., the utility would not be able to recover their costs of new resources or long-term contracts. Consideration of the growing deficits should have suggested that a reasonable level of investment in new resources would be not become stranded. Nonetheless, concerns about retail competition and stranded costs undoubtedly played some part in retarding resource development.

Uncertainty Regarding the Role of Bonneville

Another contributing factor was uncertainty with regard to the role Bonneville would play in serving future Northwest loads. Most utility and DSI contracts with Bonneville were to expire in October of 2001. Decisions about the signing of new contracts for subsequent service did not begin until 2000. This meant that both Bonneville and its customers were uncertain about who would have the responsibility for acquiring new resources until the Western electricity crisis was practically upon us. In the end, Bonneville found itself in the position of having to acquire 3,300 megawatts in a relatively short time during a period of extremely high prices. Had there not been the uncertainty, Bonneville or the utilities may have taken steps to acquire resources earlier that would have lessened the impacts of 2000-2001.

Failure of Planning

Finally, it seems clear that planning in the '90s, including that of the Council, failed to fully appreciate and factor into its decisions the risks facing the industry. In particular, these included the risks associated with reliance on a potentially volatile wholesale market and risks associated with gas-fired generation that depends on the also volatile

natural gas market. If planning had done a better job of reflecting the risks and their potential impacts, might load-serving entities have taken action to mitigate those risks? [While the Council did forecast inadequate reserves by February, 2000, it was too late to elicit much of a response from the region. \(Washington\)](#)

The Response to the Crisis

Ultimately, Northwest utilities, independent developers, businesses, governments and citizens responded to the electricity crisis with ingenuity and effectiveness. There were three primary responses: new generation, both small scale and larger conventional generation; load reduction through both efficiency improvements and, primarily, curtailments; and changes in the operations of the hydroelectric system.

Generation

By December of 2001, almost 1,300 megawatts of new permanent generation had entered service, approximately 1,100 megawatts of which were gas-fired combustion turbines. Another almost 3,800 megawatts was under construction, almost 2,900 megawatts were permitted, and over 10,000 megawatts were in the permitting process. The great majority were gas-fired plants, and most of those were combined-cycle units. However, there were several hundred megawatts of wind power developed as well. The developers were primarily Independent Power Producers (IPPs). This pattern was seen throughout the West.

One of the surprises was the amount and speed with which smaller scale generation appeared in the region. This generation primarily came in the form of trailer or skid-mounted reciprocating engine generator sets and small gas turbines generators. Between the beginning of the crisis and December 2001, over 700 megawatts of temporary generation came into service in the region. More was planned. Utilities and industries that were exposed to market prices and speculative developers undertook these projects. The power from these generators was relatively expensive but certainly less expensive than the market prices of that time. Typically this generation was also more polluting than larger scale generation. With the fall in market prices in the summer of 2001, much of the temporary generation was retired. Of the 700 megawatts that was put in service, over 180 megawatts was “retired” by December of 2001 and almost all was retired by December 2002.

At the present time, there are approximately 3,500 megawatts of new capacity that has come on line in the Northwest since January of 2000, another 1,000 megawatts is under construction, and almost 1,200 megawatts is partially complete, although construction has been suspended. The great majority of this is gas-fired. While the amount of new generation is impressive, most of it effectively “missed the party.” By the time the generation became operational, prices had fallen and along with them, the profits anticipated by the developers. At present there are hundreds of megawatts of under-utilized new generating capacity in the region, most developed and owned by independent power producers. The good news is that the capital risk associated with this capacity is borne by the investors rather than the consumers of the region. The bad news

is that the credit ratings of independent power producers have declined precipitously. The industry is not dead but it has been severely wounded.

Load Reduction

Demand for electricity in the region was eventually reduced by as much as 20 percent or about 4,000 average megawatts by the summer of 2001. This load reduction was accomplished through two means: efficiency and, primarily, curtailment.

In 1999, Northwest utilities implemented 37 average mega watts of efficiency improvements in their customers' homes, offices, stores, factories, farms and so on. This was a little more than one third of what the Council estimated to be cost-effective in the fourth power plan. Although high wholesale prices began hitting in May and June of 2000, annual savings for 2000 were only increased by about a third as it took some time to ramp up efforts. However, for 2001, efficiency savings increased to 150 average megawatts. Much of the savings came as a result of rebates on efficient compact fluorescent lights. Over 9 million were sold in the Northwest in 2001. Fortunately, the groundwork for this program had largely been laid in the preceding years so that the program could be rolled out relatively quickly. It's not clear that we could do that again.

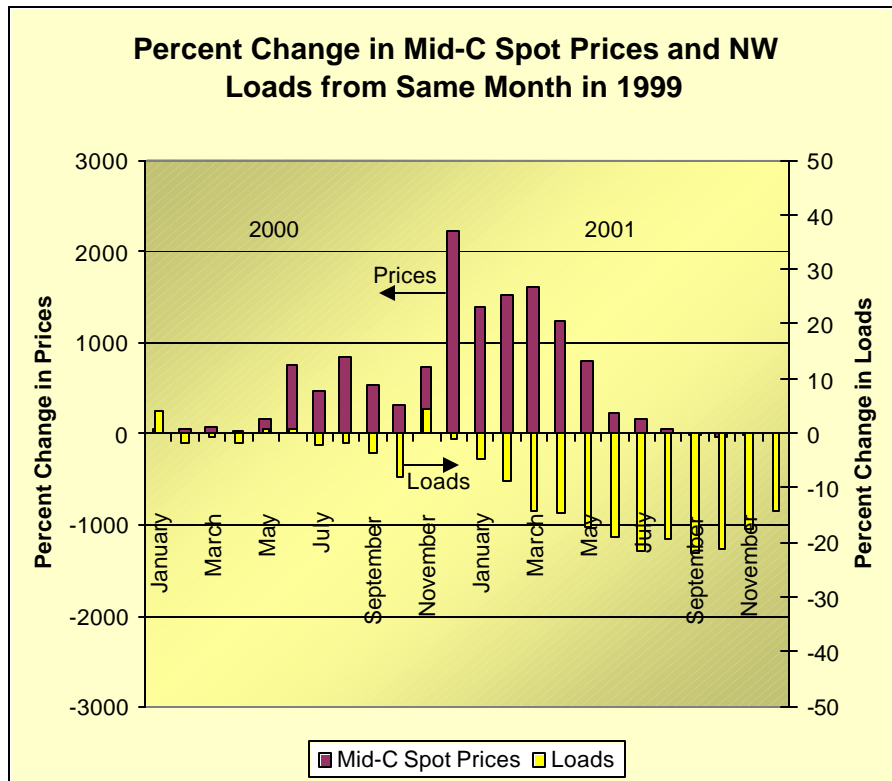
While the efficiency response was impressive, curtailment made up the great majority of the load reduction. Curtailment means a reduction in electricity use unrelated to the efficiency of the facility, equipment or process. It can be accomplished through a reduction or cessation in the electricity-using activity (e.g., making sure unnecessary lights are turned off, only running one shift in a factory or shutting down entirely) or by switching to a different source of electricity (installing self-generation) or a different energy source altogether (e.g., switching to direct use of natural gas). All three methods were employed in 2000-2001.

Curtailment was accomplished through a number of different inducements. These included appeals to the public-spiritedness of consumers by governors and other public figures, price signals, and utility "buyback" offers – offers by utilities to pay for reduced consumption. The governors of the Northwest states raised the visibility of the severity of the electricity situation and made public appeals for cutbacks. Some industrial customers exposed to market prices responded in a variety of ways to the sharp increases in wholesale prices, including fuel switching, self-generation, cutbacks and shutdowns, albeit at some significant economic expense. Sixty-three percent of the load reductions came about through various forms of buybacks, over 90 percent of which came from the aluminum industry. In the residential sector, programs like "20-20" and its variants offered ratepayers a percentage reduction in their bill for reducing their consumption by the same percentage relative to the same period in the previous year. None of these load reductions came cheap, but they were cheaper than the alternative of paying the market price for the electricity.

As impressive as the load reductions were, they came too late to avoid several months of extreme wholesale prices. As shown on Figure 1-5, load reduction did not really begin

taking effect in a significant way until more than 7 months after the onset of wholesale prices that were several hundred percent higher than normal. Had there been

Figure 1-5



(q:\dw\ex\ fifthplan)

a more rapid response of loads to wholesale prices, it might have partially mitigated the high wholesale prices that the region was experiencing. Similarly, had investment in conservation continued at cost-effective levels throughout the '90s there would have been at least a couple hundred megawatts less load exposed to the high prices.

Hydro Operations

The third leg of the stool in response to the electricity crisis was changes to the operation of the hydroelectric system to increase generation. The most significant change was reduction in by-pass spill at the John Day, The Dalles, and Bonneville projects. . By-pass spill (running water over a dam's spillways instead of through the turbines) is intended to reduce injury and mortality of out-migrating juvenile salmon and steelhead. However, from a power supply standpoint, spill is energy lost. Most of the spill reduction took place in 2001. In total, reducing spill called for in NOAA Fisheries' 2000 Biological Opinion (BiOp) added an additional 4,500 megawatt-months to the region's energy supply, much of that coming in late spring and early summer when power prices were still at extremely high levels. It also allowed storing additional water in Canadian reservoirs in case poor water conditions continued on into the winter of 2001-2002.

The use of spill reduction also highlighted the conflict between fish and power. Some viewed it as an example of the power system being willing to violate fish operations instead of making the needed investments in an adequate power supply. Others viewed it as a reasonable and prudent step given the high cost and poorly demonstrated biological effectiveness of spill. The debate continues today.

The Challenges Going Forward

It is tempting to believe that the factors that led to and prolonged the Western Electricity Crisis are no longer of concern. Have we learned our lesson? Certainly the possibility of additional jurisdictions moving to retail competition is much diminished if not eliminated. There is also a renewed enthusiasm on the part of many utilities and their regulators for the vertically integrated utility with the utility owning generation and a diminished reliance on “the market.” Similarly, many utilities now have experience with demand management programs that could serve them in good stead should another crisis begin to emerge.

In many respects these are positive developments that represent a retreat from excesses of the late ‘90s. However, we believe it would be a mistake to think that it could not happen again. It seems likely that we will have ample resources for several years. Combine this with a few years of good water and the resulting low market prices could make the lessons of the past few years fade unless those lessons have been built into the structure of our electricity system.

It would also be a mistake to think we can or should turn our back entirely on “the market.” A well-functioning market ~~is necessary to can allow the~~ provide for an efficient balancing of loads and resources over time. The fact that we are part of a seasonally diverse Western grid means that some level of reliance on the market is going to be advantageous. [In theory, such coordination does not require anything like an open market in electricity. For many years BPA developed a number of bi-lateral seasonal exchanges that worked perfectly well. It is only as the number of actors increased that coordination through markets became more efficient than bi-lateral arrangements. And, as we saw in 2001, in emergencies, governments rely on BPA’s ability to act unilaterally in providing power (and presumably in buying it as well) to meet immediate needs. (Washington)] -In addition, the existence of a viable independent generation sector provides a valuable benchmark against which the actions of a vertically integrated utility can be judged. Competition in electricity generation can, ~~with proper attention to the details under the right conditions~~, result in greater efficiency, more innovation, and a better allocation of investment risk to those who make electricity generation decisions.

It is likely we will continue to see a mix of vertically integrated and competitive elements in regional power supply for the foreseeable future. However, in many respects this system ~~is immature and incomplete~~, lacking many of the elements necessary for it to function effectively. The challenge for this power plan is to provide insights into what will make such a system function effectively and equitably not only now, when the experience of 2000-2001 is fresh in our minds, but in the longer term. (Washington)

Vision for the Northwest Power System

Our vision is a well-functioning (adequate, economical, efficient, reliable) electrical system comprised of a mix of independent and utility-owned generation, regulated transmission and distribution, and an effective consumer demand response mechanism. It is a system in which efficiency and renewable resources compete on an equal footing with conventional generation and that environmental considerations are given proper weight in resource decisions. It is a system that recognizes the risk inherent in the power industry and that plans and implements actions in ways that effectively manage that risk. The characteristics of that system are:

- The region puts in place resource adequacy monitoring and planning functions.
- Resource planning includes robust assessment of risk and the options for risk mitigation.
- There are clearly defined responsibilities and accountability for resource adequacy, reliable power system operation, and transmission system expansion.
- The wholesale power market is transparent, with open transmission access and fair rules for all participants, including the demand side of the market.
- There are reasonably consistent wholesale power market and transmission access rules across the integrated electrical grid.
- There is active market oversight and monitoring to ensure efficient operation and prevent market power abuse and to ensure accountability of market participants to the consumers ultimately served by those markets.
- The system preserves state authority and accountability over retail electricity markets to ensure fair and reasonable consumer prices for monopoly customers.
- The region continues to pursue and acquire cost-effective conservation and high efficiency resources through regional, Bonneville, utility and state programs that supplement competitive market incentives where necessary.
- Electricity pricing and regulation provide adequate incentives for efficient utilization and expansion of the region's generating resources and transmission system.
- Electricity pricing and regulation provide incentives for efficient uses of electricity by consumers, promote cost effective demand-side measures, including customer-owned generation as alternatives to transmission system expansion, and do not create barriers to cost effective distributed generation or renewable resources.
- The region fulfills its fish and wildlife protection and mitigation responsibilities as they relate to the hydroelectric system in ways that are effective, efficient and equitable.
- A sustainable role is defined for Bonneville in which it markets the existing Federal Columbia River Power System resources on an allocation basis, provides equitable benefits to the [residential and farm customers of the \(Oregon\)](#) region's

investor-owned utilities, and meets additional load growth only through (1) conservation, (2) bilateral incrementally priced contracts with individual customers or groups of customers, (3) power freed up by ending any DSI allocations done on an interim basis, or any turn-back of public utility allocations.

Focus for the Fifth Plan

The Fifth Plan can help the region achieve the vision described above. The challenge for the Fifth Power Plan is two-fold. The first relates the Council's traditional power planning role. It is to develop more robust planning methods for assessing and managing the risks inherent in the industry structure and to use these methods to develop resource strategies that will meet the region's electricity needs at lowest cost with acceptable risk. The second and related challenge is to provide insights into the resolution of some of the key issues affecting the industry in the Northwest that are impediments to achieving the vision. These issues include at least the following:

- Determining what constitutes resource adequacy and identifying the incentives (regulatory or financial) for assuring resource adequacy;
- Contributing to improving the way we plan and pay for transmission system expansion and how we ensure transmission is operated reliably, efficiently and equitably;
- Identifying the necessary and sufficient steps to enable effective demand side participation in the market;
- Identifying the means of sustaining investment in [cost-effect conservation and renewable resources; conservation; \(Oregon\)](#)
- Determining the value of resource diversity for the region and the means of achieving it;
- Determining how to meet the requirements for power and fish recovery effectively, efficiently and equitably; and
- Finally – helping define the future role of the Bonneville Power Administration in power supply. Experience of the last few years suggests that Bonneville is, by nature of the requirements and constraints under which it operates, ill suited to managing the financial and political risks of a large role in resource development. An alternative is required that limits Bonneville's risk exposure in resource development while still ensuring that cost-effective conservation and renewable energy and fish recovery goals continue to be met.