COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION
729 N.E. Oregon, Suite 200, Portland, Oregon 97232
Telephone (503) 238-0667
Fax (503) 235-4228

**DRAFT**

# Energy Vision for the Columbia River

**Prepared by**

**Tom Foley Consultants**

**And**

**Columbia River Inter-Tribal Fish Commission**
**729 NE Oregon, Suite 200**
**Portland, OR  97232**
**503-238-0667**
**www.critfc.org**

# TABLE OF CONTENTS

# I. INTRODUCTION

The Columbia River Inter-Tribal Fish Commission (CRITFC) was created in 1977 by the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Nation. The governing body of CRITFC is composed of the fish and wildlife committees of these tribes. These tribes secured, by treaty, rights to take fish that pass their usual and accustomed fishing places, which have been confirmed by numerous federal court decisions. [1]

In the Pacific Northwest, development and operation of the Columbia River system primarily for power over the last several decades have reduced salmon and other migratory fish stocks to the point where many stocks are at the brink of extinction. Historically, the Columbia Basin was the world's largest salmon producing river sustaining the lives of Indian people for countless generations. Now the river supports the world's largest hydroelectric system and the cultures and economies of Columbia River treaty tribes have been seriously diminished as a result.

Whenever the Northwest faces a power crisis, concerns about Columbia River salmon are put on the back burner until the crisis passes. Arguments are made that the region or the federal government cannot let people do without, or pay higher costs for, electricity; businesses must not suffer losses or fail, etc. However, it is possible to plan now to <u>avert future crises</u>, to provide for both an affordable and reliable energy system and harvestable runs of salmon that will support both commercial and tribal harvests. If the region does not develop a strategy to protect the environment by creating a robust energy system, someone will be at risk. In our unplanned response to the latest crisis, tribes have been left vulnerable to emergency power system operations that further erode the natural resources upon which they rely. We believe that appropriate planning of system resources can leave us with a robust system that can withstand most unknown future events.

This document highlights critical concerns with the existing electric energy system in the Northwest and defines a systematic approach to address these concerns. After establishing this context, it discusses the unique position of tribes in terms of their own energy needs and their ability to contribute to regional solutions. This discussion reflects observations of the Council of Energy Resource Tribes, which coordinates with tribes across the United States in addressing tribal energy needs.

[1] E.g. Sohappy v. Smith, 302 F.Supp. 899 (D.Or. 1969), aff'd, United States v. Oregon, 529 F.2d 570 (9th Cir. 1976); Washington v. Washington State Commercial Passenger Fishing Vessel Ass'n, 443 U.S. 658 (1979); United States v. Winans, 198 U.S. 371 (1905); Confederated Tribes of the Umatilla Indian Reservation v. Alexander, 440 F.Supp. 553 (D.Or. 1977).

The tribes' energy vision includes alternatives, including a strong reliance on natural-gas fired resources, that will take pressure off the river, benefit fish and wildlife, stabilize and lower long-term rates, and generally leave the region's resource portfolio in a much safer and healthier position for ratepayers and the environment. The resource base tribes envision will be better able to withstand surprises. Additionally, because the tribal vision decreases dependence on hydroelectric power from federal dams, the region will receive less pressure from political forces outside of the region to acquire for themselves the output of the dams.

This energy vision develops a set of resources that can be developed to meet future needs in a wise and economic manner while taking pressure off of the Columbia River hydroelectric system. It also identifies how to free up the funds required to make these important changes.

Tribal governments will take the leadership in achieving the energy vision we describe in this paper. We will develop resources on reservations and other tribal lands to meet this vision. Moreover, we will share our vision with other sovereign governments in the region and in Washington D.C. to explain how our plan meets the joint goals of Indian Country and its neighbors.

The Commission's member tribes are poised to implement this vision. Three of the Commission's member tribes are contemplating development of new generation facilities on tribal lands. For instance, the Confederated Tribes of the Umatilla Indian Reservation and the Eugene Water and Electric Board (EWEB) plan to site and build a 500 MWe gas-fired plant in eastern Oregon. This plant will be strategically placed within the region's transmission grid. The Yakama Nation has formed its own utility, Yakama Power, and is considering short-term and long-term energy resources acquisitions. Warm Springs Power Enterprises, a tribally chartered business enterprise of the Confederated Tribes of the Warm Springs Reservation of Oregon, owns major hydroelectric generating facilities and is considering additional energy resource development on or near the Warm Springs Reservation. Major federal and private electric power transmission lines and natural gas pipelines cross reservation properties under tribal rights of way agreements.

## II. SUMMARY

We have defined a set of strategies and resources that will serve loads more cheaply than they are served today, provide better protection against unforeseen events, and are much healthier for fish and wildlife resources of the region. In addition, we show below, how this vision can be met without raising rates in the Northwest.

Our vision, and the portfolio of new resources that can achieve that vision, are shown below in the Table of Resource Options. These resources will enable removal of Snake River dams and provide the economic coverage to achieve a normative flow of the Columbia River.

| Table of Resource Options | |
|---|---|
| Resources | Comments |
| Return the Columbia River to a more normative flow regime. | The power will be replaced with strategically located generators, including distributed generators, and conservation. Capital to pay for these resources will be made available by reduced need to invest in transmission and distribution (T&D). |
| Breach the dams on the Snake River | The power will be replaced with strategically located generators, including distributed generators, and conservation. Capital to pay for these resources will be made available by reduced need to invest in T&D |
| Strategically placed gas-fired generation | T&D systems are constrained. Strategically locating central station generators when needed to serve load is important. It is too expensive to build resources without regard for how they affect the system. |
| Wind Generators | Wind resources produce power at competitive per kWh price, have few environmental concerns, and provide insurance against unknown fuel costs and environmental costs. Constraints within the T&D system require an upfront expenditure to secure space on the lines. But, because the power generated cannot be accurately predicted in advance wind developers may pay for transmission that cannot be used. Without a deep and liquid market for exchange of transmission rights, wind is harmed. Adopting our energy vision relieves T&D congestion and makes wind even more viable than it is today. |

| | |
|---|---|
| Distributed Generation (DG):<br>1. Fuel cells<br>2. Varying sizes of small gas-fired units<br>3. Solar photovoltaic<br>4. Net metered small renewable resources | The electricity system in use today uses capital very inefficiently. The capacity factor of the system is about 43%, and 35% of all capital in place (G, T, &D) is there to serve loads that occur less than 5% of the time. Moving generation closer to loads will eliminate much of the planned costs for expanding the T&D system, which are very large. Further, it is cheaper to transport fuels to DG close to loads than it is to transport the equivalent amount of electricity. In addition, generation closer to loads allows for the use of otherwise wasted heat, a byproduct of combustion. |
| Load management:<br>1. Smart "appliances."<br>2. Load dispatch<br>III. Pricing to reflect value of T&D and energy at specific times | Similar to distributed generation, load management options will take the "peakiness" out of the system. Both DG and load management will eliminate the need to serve peak loads using the hydropower system, with large gains in lower T&D costs and in saved fish and wildlife. |
| Efficiency improvements:<br>1. Designed to save both energy and capacity<br>2. Commercial<br>3. Industrial<br>4. Residential and Small farms<br>5. Irrigation | Efficiency improvements save energy and capacity in all end-using applications. They save energy at costs that are often far less than the delivered cost of power, produce little or no pollution, and can be installed in infinitely small quantities. |
| Strategic Pricing of Retail Power: | Loads that occur when the system is at peak are much more costly to serve than are off-peak loads. Yet, most utilities do not capture this difference in rates. Doing so would reduce peaks and the associated strain on all capacity employed throughout the system. Proper prices would smooth the way for the strategies and resources that help us reach our vision. |

# III. BACKGROUND

Utilities have historically built resources that were perceived to be the cheapest at the time decisions were made. This has resulted in a lack of diversification and the risks associated with such an outcome. There has been an ongoing cycle of building only the "darling" resource of the moment, only to find the advantages do not last. In the past, we relied predominantly on coal plants before environmental problems, including concerns with global warming, siting of transmission lines, and long-haul trains halted their rapid development. We then focused on nuclear generation. But the long construction lead-time, cost overruns, advances in natural gas-fired technology, and environmental risks stopped nuclear development. The consequences of the decisions to build nuclear plants in this region because of their perceived low costs are well known, and the effects of the exorbitant costs linger. The region incurred billions of dollars of costs, with little power generated to show for it.

Advances in gas-fired technology and the availability of cheap natural gas have made nuclear plants economically obsolete,[2] and for the last decade gas-fired plants have been the resource of choice.. But part of today's energy crisis is caused by the rapid excursion of natural gas prices in recent years. Not surprisingly, natural gas prices tend to rise in parallel with and drive electricity prices.

Other resources, like wind, that represent a good hedge against high natural gas prices, against environmental damages, and against global warming concerns were ignored because they cost a little more. Furthermore, resources that do not rely on transmission and distribution such as distributed generation, load management, pricing strategies, etc., have been ignored.

Virtually none of the utility executives who have presided over this development would take this approach with their own investment portfolios. They might take some risk by investing in growth stocks, but they would hedge that risk with lower yielding but safer investments such as Treasury bills and state and municipal bonds. They would manage their investment risks to the best of their ability, and protection against unforeseen events would be a significant part of their strategy. Unfortunately, the electric system has not been developed in a similar fashion. The tribes believe that it is time to do so.

The current operation of the power system, using the hydropower system to serve peak loads, is extremely costly. Transmission and distribution costs alone at peak make using the river in this way a bad idea. In this energy vision, we offer far less costly ways to do so. In fact, making this change will free capital earmarked for transmission and

[2] Unfortunately, owing to the long lead-times required to plan and construct nuclear plants, economic obsolescence of nuclear plants occurred in some cases before construction was completed.

distribution investment and fish and wildlife mitigation. This freed capital can be used to achieve our vision for the electricity system. These changes will help us to make up for the hydropower generation lost when the Lower Snake dams are removed and the Columbia River system is returned to its normative state.

If we are successful in achieving a more normative river flow, we will save additional and considerable capital that has been budgeted to continue mitigation activities. These monies also can be put into achieving the energy vision articulated below.

## A. The Columbia River Basin Hydropower System

The Columbia and Snake Rivers are the backbone of the region's electricity system, and are an important part of the West Coast energy system. Power generated from these rivers has been so cheap to electricity users and such a dominant part of the power system that it has been used without restraint to provide energy, capacity, ancillary services, system stability, etc. However, the low dollar cost of hydropower does not include in it the huge economic and cultural costs that have been incurred by tribes who based their living on the resources, including fish and water quality, the rivers had provided for tens of thousands of years. The costs to tribes represent a classic case of "negative externalities." Because these non-market resources have not been disciplined by prices, they have been abused as if their cost were zero and their availability limitless. They are not. Using them in such a way is simply bad economics. More importantly it does not recognize the obligations that the United States carries with regard to the Commission's member tribes.

By habit or failure to analyze and take appropriate action, the region has continued to use the river to supply energy services in a manner that harms fish and water quality. Energycan be supplied more cheaply through other technologies and operational strategies. As an example, we will show below that using the river to supply peaking power dramatically harms fish and is more costly to ratepayers than other options.

A lot of money has been---and will continue to be --- expended on technological "fixes" to compensate for the losses to fish and wildlife attributed to dams. However "Despite decades of effort, the present condition of most populations in the Columbia River Basin demonstrates the failure of technological methods to substitute for lost ecosystem functions. Normative conditions, which provide critical habitat functions in the natural-cultural landscape, must be restored, not mitigated."[3] Adopting the strategies laid out in this paper will free those dollars for use in achieving this energy vision.

[3] Independent Scientific Group *Return to the River,* Northwest Power Planning Council, 1998.

## B. Columbia Basin Salmon Resources

Columbia Basin salmon production has declined dramatically in recent years. Thirty-eight populations throughout the basin are at less than half their former abundance and show statistically significant declining trends over a fifteen-year period. Of these, sixty six percent are found in the Snake River, eighteen percent in the mid-Columbia area, and sixteen percent in the lower Columbia above Bonneville Dam. Eighty-seven percent of the declining populations are spring chinook and thirteen percent are fall chinook. The loss of these stocks has decimated the tribal and commercial fisheries of the Northwest. Many other populations also exhibit recent declining trends in abundance.

The Columbia River Basin is one of the most dammed river systems in the world. Since the construction of the first dams on the Willamette and Spokane rivers in the late 1800s, a total of 136 dams for hydropower and other purposes have been built in the basin. The impounded portions of these rivers have undergone significant environmental change from their free-flowing ecology to biological and physical conditions associated with standing bodies of water. The migrations of juvenile salmon through the impounded mainstem sections of the Columbia and Snake are significantly affected as a result of the dams. For instance, juvenile salmon originating in the Lochsa River in Nez Perce Tribe's ceded area in central Idaho must traverse eight hydroelectric projects and approximately 300 miles of impounded river before reaching the Pacific Ocean.

Estimates of cumulative mortality from the effects of hydropower development and operation range from thirty five percent to ninety six percent in the juvenile life stage. Reductions in smolt-to-adult survival have coincided with increased numbers of dams, turbines, increased storage capacity, decreased spill, and decreased flow. Attempts to isolate and quantify the magnitude of mortality resulting from various components of the hydrosystem are difficult because the sources of mortality do not operate independently from one another on affected salmon populations. Nonetheless, numerous studies have addressed major impacts, e.g., water flow, turbines, water quality, spill, transportation, and structural barriers, regarding juvenile passage through the hydroelectric system. Additional studies are underway that attempt to distinguish hydrosystem impacts to salmon life histories from other impacts.

Operation of the Columbia River system primarily for power has caused the extinction of some fish stocks. The tribes have worked to change the flow of the river back to a fish-healthy natural flow regime, and we have focused on strategies to allow passage of smolts and returning adults through the maze of man-made barriers that make up the hydropower system that threatens the survival of the fish. These changes must be made to ensure that endangered species continue to exist and rebuild to harvestable levels. To achieve these changes we need to take regional action to make modifications to the regional electricity system.

Therefore, in this paper we broaden our focus to include the entire regional power system. We offer a vision of a power system that would protect fish and wildlife, while achieving a low-cost, reliable power system. The energy plan we envision will enable us to achieve the necessary changes in river flows and man-made structures, while having minimal effects on the cost of electricity. Many of our recommendations will lower the cost of delivered power, reduce the risks of higher future energy costs, and improve fish survival.

## C. Tribal Roles in the Northwest's Energy Future

### 1. The Columbia River Treaty Tribes

In 1855, the United States entered into treaties with the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Nation to ensure the mutual peace and security of our peoples.[4] For the four tribes' cession of millions of acres, the United States promised to protect and honor the rights and resources the tribes reserved to themselves under those treaties. Those resources, among them our most treasured resource, the salmon, are being destroyed largely by hydroelectric projects on the Columbia and Snake Rivers.

The Columbia River Treaty Tribes have suffered from the effect of hydropower operations for many decades. Our lands have been diminished by hydropower. Our cultural resources have been diminished by hydropower. Our fisheries have been diminished by hydropower. Our very way of life has been diminished by hydropower. The Columbia River Treaty Tribes signed treaties in 1855 by which the United States agreed to secure the right to take fish at all usual and accustomed fishing stations. The fishing right means more than the right of Indians to hang a net in an empty river. The Columbia River Treaty Tribes have adopted a salmon recovery plan entitled *Wy-Kan-Ush-Mi Wa-Kish-Wit*, the *Spirit of the Salmon,* that comprehensively describes the actions that must be taken to restore fish and wildlife and make progress toward meeting the tribes' reserved Treaty rights.[5]

The Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Nation are the only tribes in the Columbia basin to have reserved rights to anadromous fish in 1855 treaties with the United States. The people of these tribes have always shared a common understanding – that their very existence depends on the respectful enjoyment of the Columbia River Basin's vast land and water resources. Indeed, their very souls and spirits were and are inextricably tied to the natural

---

[4]Treaty with the Yakama Tribe, June 9, 1855, 12 Stat. 951; Treaty with the Tribes of Middle Oregon, June 25, 1855, 12 Stat. 963; Treaty with the Umatilla Tribe, June 9, 1855, 12 Stat. 945; Treaty with the Nez Perce Tribe, June 11, 1855, 12 Stat. 957.

[5] A copy of *Spirit of the Salmon* can be viewed at www.critfc.org.

world and its myriad inhabitants. Among those inhabitants, none were more important than the teeming millions of anadromous fish enriching the basin's rivers and streams.

The Nez Perce homeland once consisted of 13 million acres in what is now Idaho, Oregon, and Washington. The original land base included significant portions of six different drainages. Today, the reservation consists of 750,000 acres, of which thirteen percent is owned by the tribe. The tribes' enrolled membership measures about 3,000.

When the leaders of the Walla Walla, Cayuse, and Umatilla peoples signed a treaty with the United States in 1855, they ceded 6.4 million acres of homeland in what is now northeastern Oregon and southeastern Washington. Today the three-tribe confederation numbers 1,500. Of the 172,000-acre reservation, almost half of which is owned by non-Indians, includes significant portions of the Umatilla River watershed.

A 640,000-acre reservation in north central Oregon is home to a confederation of three tribes: the Warm Springs, Wasco, and Paiute tribes. In their 1855 treaty, 10 million acres of aboriginal lands were ceded to the United States. Today, the enrolled membership of all three tribes totals nearly 3,000. Most members reside on the reservation.

The Yakama Indian Reservation measures 1.2 million acres today. In the 1855 treaty with the Yakama, 14 bands and tribes ceded 11.5 million acres to the United States. The reservation includes portions of the Klickitat and Yakima Rivers. The Yakama tribal members number about 8,400.

## 2. The Tribes' Salmon Restoration Plan

As a blue print for restoring Columbia River salmon and Indian fisheries, the member tribes of the Columbia River Inter-Tribal Fish Commission published Wy-Kan-Ush-Mi Wa-Kish-Wit (Spirit of the Salmon Plan) in 1996. A cornerstone of the plan is the restoration of a normative river ecosystem capable of supporting productive physical and biological processes that affect anadromous fish species.

The Columbia River power system is a fundamental component of the energy infrastructure of the Northwest, and restoring the river to a normative flow will affect the power system at large. In this paper we broaden our focus to include the entire power system in the region. Here, we develop the basic elements of a regional energy vision that will enable us to relieve the pressures of regional energy demands on the Columbia River and achieve the necessary changes in river flows and man-made structures required to achieve the goals of Wy-Kan-Ush-Mi Wa-Kish-Wit, and restore our historic resources. The tribes believe that these changes can be made without increasing the cost of electricity or significant changes in the allocation of these costs. Because our energy vision incorporates a robust portfolio of diverse resources and identifies inefficiencies that can be eliminated from the energy system, we believe that our recommendations will lower the long-term cost of delivered power, and will reduce the risks of higher future energy costs. We also believe that these measures will be essential to restore anadromous fish in the Columbia Basin.

We understand that restoring the Columbia River to a more normative condition will require significant changes to the Northwest's energy supply and delivery systems and how energy is used. Regulatory changes in the electric industry, actual and anticipated load growth, and market conditions are already forcing the region's energy system to undergo massive changes. As load continues to grow, the hydropower system will become a less dominant resource in the mix of regional resources. The time is ripe to undertake the fixes recommended in this paper.

## 3. The Energy Interests of the Tribes

Tribes, dealing with incomes levels far lower and unemployment rates far higher than the regional average, are looking for increased economic opportunities in their communities. Tribal people also desire relief from high electricity prices and inefficient buildings and appliances.[6] The confluence of national and Tribal needs, coupled with new energy markets and technical advances, creates a potential for economic development on Indian lands that can benefit multiple parties. Electricity and energy-efficiency projects consistent with the vision would deliver significant socioeconomic benefits to Tribal members.

Tribes can enhance the value of their energy resources by using sovereign nation status to control development. There is a resonant relationship between Tribal control and Tribal economic growth, with progress on one front enabling progress on the other. By controlling development, Tribes can set goals and direct efforts that support local needs. Moreover, the development of indigenous resources can help meet the demand for additional energy supply in major load centers, such as California and the Pacific Northwest. In these areas energy supplies are constrained, reliability is compromised, prices are highly escalated from the norm of previous years, and tribal natural resources, such as salmon, are being unnecessarily impacted.

Tribes can reverse historic patterns of remote decision-making and loss of cultural integrity by using their federally mandated and sovereign authority to build, plan and market energy development, consistent with their own natural resources management needs. When Tribes take charge, a new class of projects can be undertaken on Indian lands that will benefit Tribal members directly.

[6] Relative to the U.S. population as a whole, Tribal citizens spend more of their income on electricity, have the highest percentage of homes without electricity, have the least control over the quality of electric service, and are experiencing dramatic population growth rates (between two and three times the national average). The challenge confronting Indian Tribes and government policy-makers is to devise concrete policies and programs to rectify this situation.

There are well known economic advantages to developing resources on tribally owned lands. For example, it has been estimated that a 250 MWe plant built in Washington State on tribally owned land would have a net present value savings over building anywhere else in the state of over $100 million.[7] These benefits result from lower cost of financing and state tax savings, including taxes that would have to be paid on natural gas purchases if the plant were built outside off of tribally owned land. Permitting would be subject to Tribal and Federal laws.

# IV. ANALYSIS OF COLUMBIA BASIN SALMON AND NORTHWEST ENERGY SYSTEM MEASURES

The Columbia River is an integral part of the region's and West Coast's power system. The river has been assumed to be so cheap to end users and such a dominant part of the power system that it has been used without restraint to provide energy, capacity, ancillary services, system stability, etc. However, the low dollar cost of hydropower does not include in it the huge economic and cultural costs that have been incurred by tribes who based their living on the resources, including fish, the river has provided throughout their long histories. These costs represent a clear and classic case of negative externalities. Because use of these non-market resources have not been disciplined by prices, they have been used and abused as if their cost were zero and their availability limitless. They are not. Using them in such a way is simply bad economics.

In addition, in part because of habit, we have continued to use the river to supply energy services that harm fish and that can be supplied cheaper through other technologies and operational strategies. As an example, we will show below that using the river to supply peaking power dramatically harms fish and is much more costly <u>to bill payers</u> than other options. We will examine how the river is used to meet regional power needs, and we will compare all of the costs of doing so to other readily available alternatives.

[7] Private analyses of prospective developers.

Hydroelectric systems are valued in large part because of their ability to respond to immediate demand; there is very little lead-time needed to call on power production from dams as there is from other generation sources. As a result of ramping the Columbia and Snake Rivers up and down to follow the "peakiness" of Northwest electric loads, huge impacts are incurred by fish and wildlife populations. The Hanford Reach of the Columbia River contains the only remaining healthy run of salmon in the Columbia Basin largely due to its free-flowing nature. However, as a result of the Priest Rapids Hydroelectric Project above the Reach and the McNary Dam below the Reach, flows through the Reach are altered radically to serve peak load. During spawning and rearing periods this year, more than 1.6 million salmon smolts were killed when their redds were uncovered or smolts were stranded in pools as flows were dropped to save water for later peaks, or redds were scoured out when higher than normal flows were used to meet high peak loads. In the Snake River this summer, in order to meet peak load, the federal hydro operators decided to go to zero nighttime flows in the Lower Snake during critical adult fall chinook and steelhead runs over tribal and fishery agency objections. All juveniles were taken out of the river and transported in barges or trucks downriver, a decision that will have a disastrous outcome on adult returns for that year-class. Because there was no flow, adults struggled to find direction to their natal streams. As a result of these and other actions, this year-class of salmon will be severely depressed at a time when salmon populations are near extinction.

## A. Salmon Friendly Operational Regimes for the Columbia River

This section forms an important part of the basis of our study. In it, we compare the energy production of the river under the 2000 BiOp plan to the energy production of the river under CRITFC's preferred plan. The difference between the plans are the target loads that must be served by new resources. We propose to serve these loads with little or no additional costs to the power system. The energy plan adopted in this report will serve all of the loads in the region more reliably, and at no additional cost.

The Commission's member tribes have recommended to National Marine Fisheries Service (NMFS) a river operations regime (flows and spills) for the Columbia and Snake Rivers that is preferred to that contained in the 2000 BiOp. As a starting point to our vision it will be useful to examine the differences. Table 1 displays power production by month under the 2000 BiOp and the CRITFC recommended flows and spills.[8] Our challenge is to create non-river resource options to fill in the holes created in power production in some months, while not increasing prices significantly. As evident in Table 1, CRITFC-recommended operations increase power production in September, October, and June, while decreasing production in all other months.

**Table 1. Power and Rate Differences Between 2000 BiOp and CRITFC Preferred River**

| | 2000 BIOP MWh | CRITFC MWh | BPA BASE ($/MWh) | | Adjusted Rate: ($/MWh) | | Rate Differential ($/MWh) | |
|---|---|---|---|---|---|---|---|---|
| | | | HLH | LLH | HLH | LLH | HLH | LLH |
| **Sep** | 6,397,02 | 6,506,20 | 22.94 | 18.79 | 22.55 | 18.47 | -0.39 | -0.32 |
| **Oct** | 7,695,29 | 7,893,02 | 16.27 | 11.76 | 15.85 | 11.46 | -0.42 | -0.30 |
| **Nov** | 8,734,20 | 8,109,66 | 22.00 | 17.71 | 23.57 | 18.98 | 1.57 | 1.27 |
| **Dec** | 9,587,98 | 9,025,49 | 22.65 | 17.37 | 23.98 | 18.39 | 1.33 | 1.02 |
| **Jan** | 11,074,57 | 8,440,47 | 20.12 | 14.14 | 24.91 | 17.50 | 4.79 | 3.36 |
| **Feb** | 9,102,11 | 7,964,36 | 18.58 | 13.14 | 20.90 | 14.78 | 2.32 | 1.64 |
| **Mar** | 9,549,79 | 9,444,55 | 16.83 | 11.42 | 17.02 | 11.55 | 0.19 | 0.13 |
| **Apr1** | 4,884,04 | 4,354,57 | 13.18 | 8.82 | 14.61 | 9.78 | 1.43 | 0.96 |
| **Apr2** | 5,177,85 | 4,829,90 | 13.18 | 8.82 | 14.07 | 9.41 | 0.89 | 0.59 |
| **May** | 12,599,29 | 12,522,16 | 13.13 | 7.25 | 13.21 | 7.29 | 0.08 | 0.04 |
| **Jun** | 12,589,34 | 12,818,34 | 16.45 | 8.80 | 16.15 | 8.64 | -0.30 | -0.16 |
| **Jul** | 11,013,41 | 9,717,38 | 21.63 | 14.69 | 24.18 | 16.42 | 2.55 | 1.73 |
| **Aug1** | 4,931,76 | 4,371,40 | 32.02 | 17.93 | 35.66 | 19.97 | 3.64 | 2.04 |
| **Aug2** | 4,226,60 | 3,565,94 | 32.02 | 17.93 | 37.03 | 20.73 | 5.01 | 2.80 |
| **Ttl./Avg.** | 117,563,31 | 109,563,50 | 19.31 | 13.05 | 22.30 | 15.07 | 2.99 | 2.02 |

8 From John Fazio, NWPPC, based on GENESYS runs.

When generation is reduced, the region must address the reductions in power supply and BPA must address revenue impacts. In Table 1, we show the rate increases that would be needed to keep BPA's monthly revenues constant with the new flow regime.[9] The weighted average rate increase over the year would be 2.99 mills/kWh during high-load hours (HLH) and 2.02 mills/kWh during low-load hours (LLH). Later we will identify the resource mix that will supply the lost power. Others will likely own these resources, and their costs will not necessarily flow through BPA's wholesale rates.

The MWh reduction that would occur with the CRITFC operations regime can be determined from the bottom line of Table 1. The reduction is 8.0 million MWh, or 970 aMW per year.

In addition to the CRITFC operations regime for the Columbia River shown in Table 2, the tribal vision includes removal of the Snake dams. The reduction in power from eliminating those dams is shown in Table 2. They produce about 1,100 AMW. When they are removed, the region would have to replace about 1,000 AMW, because of offsetting adjustments throughout the system.

*Table 2 . Output of Lower Snake River Dams*

| **Period** | **Output (MWh)** | **Period** | **Output (MWh)** | AMW |
|---|---|---|---|---|
| September | 427,622 | April 1 | 476,676 | |
| October | 518,970 | April 2 | 507,492 | |
| November | 403,531 | May | 1,295,929 | |
| December | 652,905 | June | 1,251,662 | |
| January | 794,071 | July | 863,561 | |
| February | 689,018 | August 1 | 301,037 | |
| March | 999,207 | August 2 | 271,248 | |
| | | Annual | 9,452,929 | 1079 AMW |

The Natural Resources Defense Council (NRDC)[10] has analyzed the costs of eliminating the four Lower Snake River Dams. The goal of NRDC's report was to determine if the dams could be removed and their output replaced at a reasonable price with minimal impact on the amount of climate change gasses emitted to the atmosphere. That report found that residential electric bills would increase by less than $2 per month if the dams were removed and the power replaced with clean resources, mainly conservation, gas-fired resources, and wind-driven central power plants. The study assumed an average monthly residence would use 1,000 kWh, and that it could be done with a rate increase of about 2 mills/kWh.

9 We assume here that BPA continues to sell the hydropower system at its costs, and other providers make up the shortfall in power, as we discuss later in this report. The costs for those resources are discussed below.

In summary, to replace lost power from the Snake River dams and the changed flow of the Columbia River, our plan will have to replace the equivalent of about 2000 aMW of power. To keep BPA's revenues for the hydropower system intact, BPA's preferred rate would have to increase by approximately 5.3 mills/kWh.[11] In addition, 2000 aMW of power will have to be developed to serve regional loads.

## B. Energy System Measures to Achieve a Salmon Friendly River

"Despite decades of effort, the present condition of most (fish) populations in the Columbia River Basin demonstrates the failure of technological methods to substitute for lost ecosystem functions. Normative conditions, which provide critical habitat functions in the natural-cultural landscape, must be restored, not mitigated."[12]

### 1. The Costs Associated with Using the Hydropower System to Serve Hourly and Seasonal Peak Loads

The ability to ramp the hydropower system up and down easily, increasing and decreasing power output instantaneously, has resulted in its being used to serve peak loads. Unfortunately, when the hydropower system is used in this way, it often conflicts with the needs of salmon. When river elevations are lowered, salmon redds are dried out and smolts stranded on riverbanks with no ability to get back to the river. When water velocities are reduced juvenile and adult salmon migrations are impacted by the cumulative effects of delays at critical life stages (e.g. smoltification), elevated temperatures, increased exposure to predators, and disorientation. In both instances, the result is fewer fish and more emphasis, with the attendant costs, on mitigation. This dewatering of the river harms fish from approximately mid-November through mid-June. The winter months, however, are the Northwest's peak load season. A conflict exists, but as we will demonstrate below, it exists unnecessarily.

Proponents of using the hydropower system to follow peak loads argue that it is the lowest-cost option to do so, and that the fish killed in the process is an acceptable tradeoff. However, it is a myth that using the hydropower system in this way is a low-cost way to meet peak loads.[13] Serving peak loads from any central station, distant plant

---

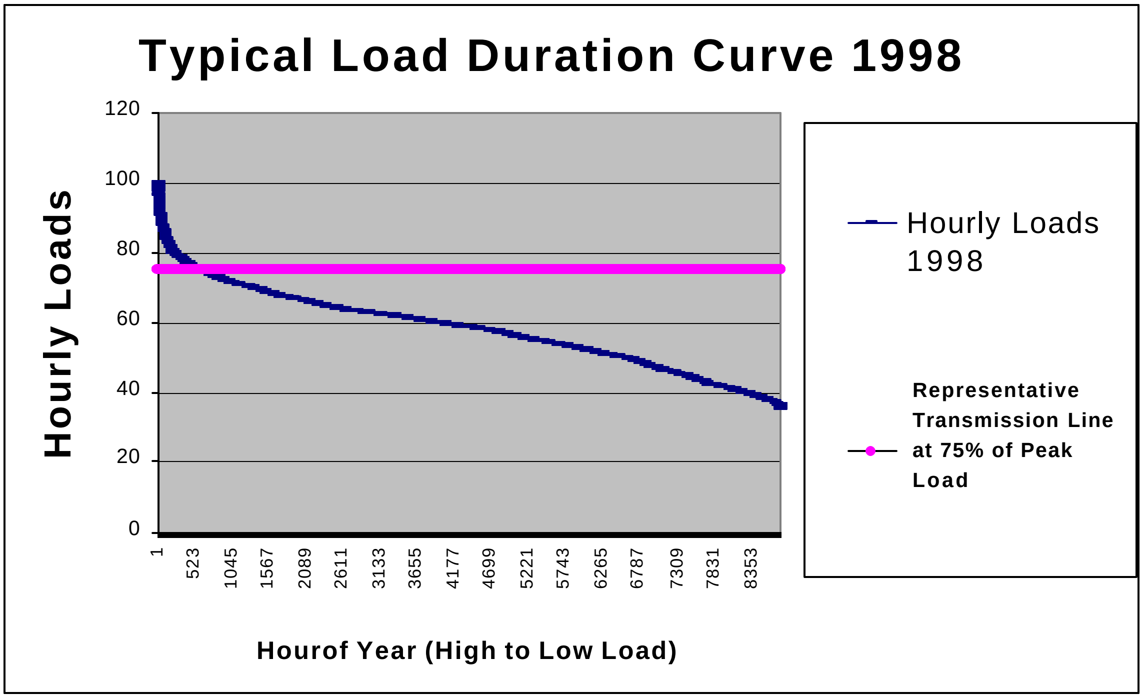
[10] "Going With The Flow: Replacing Energy From Four Snake River Dams" (April 2000)

[11] This estimate comes from an estimated increase of 2 (LLH) to 2.99 (HLH) mills to maintain BPA's revenue from a Columbia operating at a more normative flow regime, doubling it to account for the nearly identical loss from removing the Snake River dams, and using a 65/35 split between LLH and HLH.

[12] Independent Scientific Group *Return to the River*

[13] The myth has been perpetuated by average cost pricing of T&D. That is, all loads pay the same price for T&D, regardless of whether the T&D system is partially or fully loaded at time of use.

(including hydropower) is expensive; we believe it to be far more expensive than other similarly reliable ways to meet peak loads. Even without considering the huge costs imposed on fish and wildlife from raising and lowering river levels to serve peak loads, alternative means of serving peak loads are cheaper than using hydropower and incurring the associated transmission and distribution (T&D) costs. The tribes believe that it is irresponsible to habitually use the river to serve peaks.




Consider Chart 1, which contains a load duration curve for a typical utility in the Northwest. The load duration curve is a simple structure that shows all 8,760 hourly loads for one year. The hourly loads are sorted from highest to lowest load hour the highest load hour to the left of the Chart and the lowest load hour to the right. An arbitrary line has been drawn horizontally at 75% of the peak hourly load. To serve power needs in a conventional power system, a utility has to build or contract for transmission to serve its highest load, and it also must have an adequate distribution system to meet that peak load. A typical rate for transmission in this region ranges from $15-$25/Kw/year. That is, if you need to transmit a kW from a generator to load you have to pay $15-$25 per year, regardless of how many hours you transmit that kW. If you transmit for only one hour the cost is $15-$25/kWh.

Distribution costs are estimated to be three times transmission costs. Thus, the total cost of transmission and distribution can range from $60-$100/kW/year. Given this information, consider the line in Chart 1 at 75% of peak load. Loads at this level and above occur about 400 hours per year. If the cost of T&D to simply deliver energy to that portion of load at 75% of peak is $60-$100, then the per kWh cost is 15-25 cents! This does not include the cost of energy that in today's market can be above $1 per kWh at peak.[14] At the peak hour of the year (extreme left edge of the graph) the delivery cost is $60-$100 per **kWh!**[15] There are many cheaper ways to serve the loads above the arbitrarily selected level of 75% of peak load than to buy power and transmit it at these costs from distant generators.

In summary, we incur high costs and kill fish at the same time by using the hydropower system to meet peak loads. Not only is it extremely costly to the power system to serve peak loads in this way, but it is also devastating to each stage of the salmonid life cycle as well as other aquatic processes on which salmonids depend.

### 2. Lower Cost Methods to Serve Peak Load than Using the River

The Northwest can serve or flatten peak loads more efficiently than current practice. There are several resource options that will be far less expensive than using the hydropower system to meet peak loads. Some, like load management, have little or no cost. Each of these resources will take pressure off of the T&D system as well as the river system.[16]

Suppose we could lower peak loads to 75% of peak load. We would not have to eliminate them overnight because the transmission system, albeit stressed, has and can continue to serve regional loads at today's levels. We could reduce peak loads on the transmission system gradually. We could design the reduction to be fast enough to negate transmission investment upgrades driven by the need to serve peak loads, while making sure that our approach is well conceived and implemented correctly.

---

[14] In the mid-West it has reached $7/kWh.

[15] Some will argue that T&D costs are sunk, and the variable costs are zero. There are two reasons why this is not the case. First, for non-transmission owning utilities, transmission costs are not sunk. Second, all T&D owners have planned expenditures at some time in the future. The planned expenditures have not been occurred, and delaying them, perhaps indefinitely, is worth a lot of money.

[16] It is well known that the transmission system is experiencing constraints. Considerable investment is needed in a business-as-usual scenario.

On a regional basis, the capital earmarked for T&D upgrades should be available to invest in alternative technologies to serve peak loads. The savings should be committed to load management, conservation, clean distributed generators to serve those loads, and clean gas-fired or renewable resources sited strategically within the T&D system. These plants and strategies would be used to serve peak loads and to serve off-peak loads whenever market prices exceeded the variable operating costs of operating the specific plants and implementing the load management strategies.

The magnitude of planned T&D investments that could be eliminated or delayed is significant. A rough estimate of the book value of transmission used to serve regional load is about $8.5 billion. BPA's transmission system purchased with low cost federal debt has about $4.5 billion remaining, for example. Let's assume that replacement cost of the regional system is twice the book value, or $17 billion. Since the region's transmission system is now constrained during many hours, new investment will be needed to serve loads if load shapes do not change. We would need to invest about 1% of the total value of the system per year to keep up with load growth.[17] Thus, about $170 million per year will have to be invested to add to the transmission system. If we did not need that investment, we could use the money to build the peak-clipping options described above. Let's take a rough, but conservative estimate of the cost of "plants" needed to eliminate peak loads, and assume that $1,000 per kWe will do that. At current interest rates, annual debt service for a $1,000 per kWe new plant would be about $100/kWe, or $100,000 per MWe. The $170 million saved annually on transmission alone would pay the debt service on 1,700 MWe of new "plant."

Book value of distribution systems in the region has roughly been estimated as three times that of transmission. Many of the actions we include in our plan will also save distribution investments. Distribution investments are often very costly because they entail digging up city streets. Not only do we incur large capital costs, but also the social costs associated with time lost in traffic jams and other displacements can be greater still. The savings from deferring investments would be great, and would allow for even more generation to be built, if necessary. Assume we could get another 1,700 MWe paid for through avoided investment in distribution. We could have as much as 3,400 MWe of plant built at no net cost to the region.[18] Moreover, since this plant would be close to the load it serves, it would be more reliable and more efficient because of the ability to use waste heat and the lack of transmission and distribution system line losses.

Above, we estimated a loss of about 1,000 aMW from breeching the Lower Snake River dams and another 1,000 aMW from restoring the Columbia River to its natural flow levels. The 3,400 MWe of new distributed resources would go a long way towards making up the losses from the hydropower system. These and other resources and strategies that make up our vision are addressed below.

[17] Bonneville has scheduled over $2 billion between 2002 and 2006.

[18] It is important to note that we are talking about regional costs and benefits. Different players may be the savers and the investors, but ratepayers will be the big gainers.

### a) Load management

Load management, as the term is used here, refers to behavioral changes in how energy is used-- turning off lights, lowering thermostats, shifting some electricity using functions to off-peak hours, etc. The changes can be achieved through manual means or through the use of automated equipment using sophisticated computers and controls. For example, weather and market prices can be used as inputs into automated computer driven equipment that allows for automatic adjustments and more efficient use of energy.

Load management can be broken down further into programmatic activity driven by utilities and market driven changes spurred by electricity rates that recognize the true cost of serving loads.

#### (1) Programmatic Load Management

Utilities entered the current energy crisis with little or no experience with programmatic efforts to affect the behavioral side of energy use. Because of the immediate need to reduce purchases, especially on peak hours, utilities have been buying back power from some of its larger customers. Today BPA and other utilities are asking its customers not to use power because of high market prices, and are buying the power back at a multiple of what it was sold for. Direct Service Industries, possessing contracts enabling them to resell power, have closed down production and are making large profits by selling power purchased from BPA at about $23/MWh at market prices of up to $1,000/MWh. Buyback can only be a near-term solution, because it essentially pays people not to produce. This is a recipe for high inflation;incomes are maintained, but no product is being produced.

However necessary this type of program may be during the present crisis, it is achieving only what could have been achieved more smoothly with better-designed prices to end-using customers. With better-designed rates, new technology would have been put in place, product would still be produced, and the stress on the river and the transmission and distribution systems would have lessened.

With better foresight and more time to plan, utilities might have worked with customers to install load management equipment that could be operated by the utility from a distance, or on request from the utility to shed load. Contract terms could have included lower rates for more utility control of loads, or might have contained a fixed percentage of credit for each kWh not consumed. The size of the credits would be based on market prices and flexibility.

Other more innovative approaches to programmatic load management would almost certainly be developed.

### (2) <u>Price Driven Load Management</u>

The cost of supplying power changes diurnally and seasonally--sometimes dramatically. This fact is reflected in BPA's proposed 2001 power rates, which change from HLHs to LLHs and by month of the year. However, BPA's prices, which are designed only to recapture its costs, do not approach the cost of power on the market. We are not proposing that BPA or any utility in the region change their rates in the near term to reflect market costs. Perhaps with a ten year weaning program this should be done, but not now. We do believe that BPA's rates should reflect its and others <u>true cost</u> of serving loads. We believe strongly that the rates BPA has proposed for the next rate periods do not reflect the true cost of serving loads. The next few sections of the paper, which look at the individual elements of the cost of delivered power, lay out our reasoning and suggest changes to BPA's rates to address this fundamental economic problem.

#### b) Energy Costs

The market cost of power has been fluctuating dramatically over the last two years. Recently, market costs of power were hovering around $200/MWh and up, or about 20 cents per kWh. In the spring of 2001, futures for summer power were selling for 50 cents/kWh. Utilities, including BPA, were buying power at 20-50 cents/ kWh and selling power to end users at less than 2.5 cents per kWh. The tribes are not proposing that rates immediately be raised or lowered to the level of today's market prices. That would create havoc. The tribes believe that a transition program must be put into place to eventually bring retail and wholesale prices of power into alignment. If we accomplished this transition over the next 5-10 years, market prices wouldbe much lower than they are today. Many of the resources we discussed above and below would have been installed by customers to serve part of their own loads, and other technologies not yet foreseeable will probably have come into existence to supply power at competitive costs to markets.

#### c) Transmission and Distribution Costs

T&D costs have two components. One is the capital cost of the installations, and the second is the cost imposed by congestion on the grid. At many times of the day, season, and year, constraints exist on parts of the T&D system. Historically, BPA and other utilities have dispatched resources to move power around those constraints, and the costs of doing this have been melded into an average transmission cost which has been melded into an average total power cost.

The end user has not paid the true cost of using either the transmission or distribution systems. As we noted above, the cost of T&D to serve peak loads is enormous, but no end-user sees that cost. If the true costs of transmission capital and congestion were charged to end users, much of the crisis we are experiencing would have been averted; peak loads would have been lowered. From an economic perspective, too much transmission is built to serve peak loads that are greater than they would have been if users paid the true price of delivering that power.

Today, there are calls for more transmission construction. If one assumes that the trend toward deregulated markets continues, investors who build additional transmission will be at risk. Much of that new investment could easily be stranded when real-time prices are charged to users of power. This fate would also fall to new central station generation that relies on those wires to get its product to market.

#### d) Costs to Fisheries

BPA's rates include the costs of fish ladders, bypass screens, hatcheries, and other technological measures that have been deployed to mitigate fish damages. The rates do not include the value of damages done to the fisheries. If they did, the rates would be high indeed. BPA's prices should include some element of fish damages. One way to start is to raise rates to help pay for the return of the river to a normative flow regime.

As a public utility, BPA could modify its rates to include non-market costs to fish and wildlife. The externalities related to hydropower operation in the Northwest are so severe and so unique to fish, wildlife, and tribal cultures, it is reasonable to focus an externality charge on this resource. With correct pricing to address all costs, operation of the river will move towards its natural flow as people adjust to the more accurate prices by adopting load management techniques and relying on conservation and generating resources closer to the load. The anticipated actions by end-users will take pressure off of the river and the transmission system.

#### e) Other Environmental Externalities

Much attention has been focused on the environmental adders that should be attached to energy costs to account for externalities that are not priced in the market. Typically, the adders, where they have been applied, have been used only when comparing two or more resources. They have been used as tiebreakers.[19] With the advent of deregulation, even this weak focus on externalities has waned.

In an unregulated market for power it is difficult to attach a per kWh charge to account for externalities. But there are other, perhaps more effective, mechanisms that have been employed. We examine these mechanisms below in the section entitled Trading Mechanisms.

## 3. Conservation

Conservation will save energy and lower peak loads. These measures will reduce pressure on the river and the T&D systems, and will be cheaper than the delivered cost of power using conventional means. There are many opportunities to save. We will highlight a few of them here.

---

[19] Thus, if the <u>near-term</u> costs of a dirty resource were far less than the clean resource, the dirty one got built, and nobody paid the external costs.

Insulation in walls will save more energy when temperatures are severe, when loads are peaking in the Northwest and/or prices are peaking on the West Coast. Many housing units on tribal lands could benefit from increased insulation and more efficient heating units. The net result would be more comfort, lower power costs, and lower T&D costs.

Efficient lighting measures save more energy on hot summer days when prices on the West Coast are peaking, because the reduced waste heat from efficient lights reduces the stress on air conditioning systems. In the winter, efficient lights save more energy because of the greater number of hours of darkness. Thus, efficient lights make sense year round.

In bulk, compact fluorescent lights (CFLs) can sell for as little as $5 per bulb and save 50 watts of power over each of the 10,000 hours of their expected lives. That calculates out to about 1.5 cents per kWh saved. Using the same assumptions, 20 lights operating throughout the peak period would provide 1 kWe of capacity and would cost $100, with no fuel costs. Combined-cycle-gas-fired generators cost from $350 to $650 per kWe, depending on whether they are single or combined-cycle plants.

More efficient appliances save energy while also reducing air conditioning loads. Like efficient lighting, they give a double benefit. For example, Energy Star refrigerators replacing 15-year-old refrigerators will save typically about 630 kWh/year and .072 kWe of on-peak capacity.[20] Replacing one million of these older refrigerators would save 72 MWe, on peak. There are several million refrigerators in the Northwest that are 15 years old or older.

Industrial conservation measures are harder to specify, because of the uniqueness of each industrial process. Nonetheless, some of the biggest potential gains come from industrial customers. When industrial customers are planning system changes in their plants, it is especially important to have programs at the ready that can be customized to meet the needs of customers and save energy for the customers and the region.

Commercial buildings are also a source of great potential savings. Energy efficient lighting and appliances, of course, are a source of savings. But the biggest gains are related to heating, air-conditioning, and ventilation systems, which as a group are referred to as HVAC. Because these systems are complicated, they need continuing attention to remain efficient and tuned to the tasks for which they are designed. New buildings should all go through a building certification process to assure that they are operating as they were designed to, and to assure that the operation is efficient. One particular source of energy savings in commercial buildings is using outside air for cooling when the outside temperature falls below air-conditioning thermostat settings.

[20] Energy Star is a certification program conducted by EPA to help consumers make choices about efficient appliances.

We have mentioned a few opportunities for saving energy. Other agencies, the Northwest Power Planning Council, the Northwest Energy Efficiency Alliance, the state energy offices, all have ready programs and details on opportunities to save energy. We incorporate their energy conservation programs into our energy vision by reference.

## 4. Strategic Plant Siting

Often plants have been sited distant from load because of a local fuel source, in the case of mine-mouth coal plants, or because it was easier to site plants in rural communities. These plants were and are dependent on transmission to move power to population/load centers. Today's gas-fired generators are smaller, more efficient and cleaner than plants of the past. Small gas turbines are quiet and clean, and can be sited near industrial loads. Fuel cells using a variety of fuels may be available for residential, commercial, and industrial use in the next decade or sooner. And, solar photovoltaic panels, serving a dual purpose of siding or roofing for buildings and power generation, may be ideal for reducing peak loads.

Under the category of strategically cited plants, we first look at distributed generation, which typically constitutes small plants sited on the customers' side of the meter, followed by other generation sited within the grid. This category of plant is designed to provide low-cost power and to lower the cost of transmitting power by limiting the amount of transmission congestion.

### a) Distributed Generation

Distributed generation (DG) sited within industrial complexes and residential and commercial buildings will take pressure off of the T&D system, the hydropower system, and fish and wildlife. Interconnection standards will have to be devised by utilities that allow for the safe operation of these local generators. DG will have to be deployed in sufficient numbers to eliminate the need for backup generation and T&D capacity. Generation sited closer to loads will allow for the use of waste heat from the generation process to be utilized for process heat, space heating, or hot water heating. Today, most of this heat is wasted. Using the waste heat will increase efficiencies of conversion from a best of fifty percent for central station generators to eighty five percent. There is no reason why distributed generation will not be a big player in the power system within a few years. Currently, there are no technological barriers to distributed generation that cannot be overcome. All that is needed now is the resolve to make it happen. With the appropriate numbers and locations of distributed generation, we can achieve transmission capacity savings, and increase the conversion efficiencies from fuels to usable energy.

For the longer term (perhaps 10 years), consider fuel cells that are now being manufactured to power camping equipment and cell phones. It is a small step from here to having each appliance with its own generator, and having the wiring in buildings as the only distribution system.

### b) Conventional Generation Strategically Placed within the Grid

The transmission system is under stress and is congested along many of its pathways. We have delayed investments over the last decade to keep electricity rates artificially low. Currently, congestion is managed by using more costly generators at times to serve loads downstream of the constraint. With strategic siting of new, efficient plants the cost of congestion can be lowered. As with distributed generation above, it may be cheaper to strategically site new plants than to build transmission upgrades to solve congestion.

## 5. Trading Mechanisms to Limit Environmental Concerns

As stated above, in an unregulated market for power it is difficult to attach a per kWh charge to account for externalities. But there are other, perhaps more effective, mechanisms that have been employed.

The most well known trading mechanism to control pollution is the United States $SO_2$ emission reduction program, operated through Title IV of the Clean Air Act. Administered by the U.S. Environmental Protection Agency, the primary goal of the program is to reduce annual $SO_2$ emissions by 10 million tons below 1980 levels over the life of the program. The Act also calls for a 2 million ton reduction in oxides of nitrogen ($NO_X$) emissions by 2000. The $SO_2$ and $NO_X$ programs together constitute the EPA's Acid Rain Program.

In brief, the scheme involves distributing permits to $SO_2$ emitters that allow them to emit a certain amount of $SO_2$. Permits may be bought, sold or banked. Emitters wishing to emit more than the level of their permits must purchase permits from other permit holders or else reduce their emissions. At the end of each year, each emitter must hold an amount of permits at least equal to its annual emissions of $SO_2$. Phase I began in 1995 and includes 263 units at 110 mostly coal burning electric utility plants. These are generally relatively large, high emitting plants. An additional 182 units have joined as substitution or compensating units, making 445 affected units. Phase II begins in 2000 and tightens restriction on Phase 1 plants and sets restrictions on smaller, cleaner plants fired by coal, oil and gas.

Oregon has taken a different approach for limiting $CO_2$ emissions. Plants are limited to a set level of $CO_2$ emissions. Above that, generation owners either have to mitigate for the excess emissions, or pay a deemed sum per unit of excess emissions into a non-profit Climate Trust. The trust will then embark on programs to limit $CO_2$ emissions in the cheapest way available. The Climate Trust in Oregon has just issued a request for proposal (RFP) in search of $CO_2$ mitigation measures. The dollar total of the RFP is $5.5 million.

The Bonneville Environmental Foundation will soon be entering into an agreement with BPA on an innovative way to limit environmental problems. The "Green Tags" program will let government agencies and corporations purchase the green power attributes of qualifying wind, geothermal, solar or biomass resources. Purchasers receive renewables credits toward their requirements for reduction of carbon dioxide and other greenhouse gas emissions. BEF will market Green Tags to large retail purchasers, government agencies, corporations and others. The proceeds will go toward creating additional revenue to expand renewable resource development.

To achieve our vision we will look for additional innovative opportunities such as these to both clean up pollution and to protect fish and wildlife.

## 6. The Effect of the Tribal Vision on Rates

We believe that our vision can be achieved with little or no rate increase, and provide better protection against future rate increases. A key part of the tribal vision is the removal of the Snake River dams, and the return of the Columbia River to a more normative flow regime. Both of these actions together will remove 2,000 a MW from the system and will require BPA to raise rates by about 5 mills/kWh on its reduced core resources. This rough estimate is consistent with the NRDC estimate that removal of the Snake River dams alone would require about a 2-mills/kWh increase. Savings identified below will offset these increases.

Capital Cost Savings. BPA plans to invest over $2 billion on transmission over the next five years to enable it to accommodate a part of the 28,000 MWe of new generation hookup inquiries it has received. Measured by replacement value, we estimate that distribution utilities served by BPA have roughly $50 billion of investment in their systems. To enable the utilities to keep up with load growth, and serve it as they have historically, i.e., from centrally located generation, will require an annual cumulative investment in distribution system of $500 million per year (i.e., 1% per year investment to keep up with say a 2% peak load growth), or $2.5 billion over the next five years. Instead of making this investment in wires, our vision would use this capital to pay for strategically placed gas-fired generators to relieve transmission congestion and for clean, distributed generation to minimize the needs for transmission and distribution upgrades.[21] The savings in capital targeted at wires would be about $4.5 billion over 5 years.

[21] Implicit in this assumption is that capital can be moved from one component to another. We understand that BPA cannot switch its capital from transmission to building distributed generation. Nonetheless, the region's ratepayers will be footing the bill for these resources regardless of where the capital comes from. Our vision tries to incorporate the best use of capital for the region and its citizens.

Most of the capital budgets for fish and wildlife on the Snake River and in the Columbia River Basin would be eliminated. The Corp's budget on the lower Snake River dams includes about $400 million for fish mitigation not yet expended and that will be the responsibility of BPA's ratepayers. Environmental investment needed to conform to the Clean Water Act in the Columbia River Basin will be around $500 million. Removing the lower Snake River dams and achieving more normative flow regime on the Columbia would eliminate the need for most of that investment.

Part of this capital savings will be used to pay for the distributed generation we would employ to offset the loss of hydropower.[22] We noted above that $340 million per year would be sufficient to pay the capital cost of the distributed generation. That would leave about $160 million per year to offset rate increases. At an assumed load for BPA of 8,500 aMW, $160 million dollars of savings would lower rates by 2.1 mills/kWh.

Savings From Reduced T&D Losses. If we replace the 2,000 aMW of power lost from the dams with 2,000 aMW of distributed generation we will save losses that are estimated to be about 10% of total power transmitted or about 200 aMW. At a market price of $50/MWh (a reasonable estimate of power costs over the next 5-10 years), the savings would be $87.6 million/year, or 1.2 mills/kWh if we assume a BPA load of 8,500 aMW.[23] At today's prices the savings would more than cover the cost of dam removal.

Other Savings. We have identified 3.3 mills/kWh of savings to make up for the 5-mills/kWh cost of dam removal. We will achieve other cost reductions by pursuing low or zero cost load management options, many of which have gone unidentified because of the peculiarities of electricity rate schedules. That is, end-users rarely get a signal as to the real value of the generation, transmission, and distribution services they are using. Uncovering and exploiting the values in load management will bring vast savings to customers and to many of their serving utilities.

Conservation measures embodied in new appliances, retrofits of buildings, lights, motors, etc. are far cheaper than power generated at central station plants and shipped over wires, especially at times of peak loads.

The tribes are confident that these changes in aggregate will have the net effect of lowering costs in the near term and significantly lowering cost in the long-term.

---

[22] It has been estimated that over 600 MWe of Gen sets have or will soon be installed to prepare for this summer's anticipated shortages. Ignoring the fact that these are the worst possible option for generation, we will gain experience on the region's ability to handle distributed generation at this level.

[23] At today's prices of up to $500/MWh, the savings would be $876 million/year, or 1.1 cents/kWh.

# V. A DIVERSIFIED ENERGY PORTFOLIO TO MEET THE REGION'S ENERGY NEEDS AND RESTORE COLUMBIA RIVER SALMON

The tribes are confident that if we were to achieve this vision, the quality of life for the regions' citizens would improve. We also know that it will not be achieved without convincing key regional players such as BPA and the Northwest Power Planning Council that it is superior to the current system. We will ask them to use their vastly superior resources and unsurpassed technical resources to analyze the efficacy of our vision to meet Tribal and regional needs. We will do our part in implementing the resources that make up our vision, and we will do our part politically in presenting and supporting our vision to and with other decision makers throughout the country.

We have defined a set of strategies and resources that will <u>serve loads more cheaply than they are served today, provide better protection against unforeseen events, and are much healthier for fish and wildlife resources of the region</u>. In addition, we showed above how we believe that this vision can be met without raising rates in the Northwest. In fact, over the long-term we believe that our vision contains a more robust set of resources and will lead to lower prices for power.

Our vision and the portfolio of new resources that can achieve our vision are described briefly below.

<u>**Return the Columbia River to a more normative flow regime.**</u> Achieving this part of the vision will remove capital costs targeted at fish and wildlife in the basin.

<u>**Breach the dams on the Snake River.**</u> Achieving this part of the vision will save about $400 million from the Corp's budget. It will also reduce power output in the basin by 1,000 aMW. The power will be replaced with strategically located generators, including distributed generators, conservation and load management. Capital to pay for these resources will be made available by reduced need to invest in T&D.

<u>**Strategically placed gas-fired generation**</u>. Transmission and distribution systems are constrained. Strategically locating central station generators when and where needed to serve load is important. It is too expensive to build resources without regard for how they affect the system. Savings will derive from minimizing transmission investment or non-economic dispatch of resources to serve loads.

<u>**Wind Generators.**</u> Wind resources produce power at a competitive per kWh price, have few environmental concerns, and provide insurance against unknown fuel costs and environmental costs. However, constraints within the T&D system require an upfront commitment to secure space on the lines before wind generators know whether the wind will blow. Because the power generated cannot be accurately predicted in advance, wind

developers may pay for transmission that cannot be used. Without a deep and liquid market for exchange of transmission rights, wind is harmed.[24] Adopting our energy vision relieves T&D congestion buy decreasing the stress on the system from peak loads, and makes wind even more viable than it is today.

**Distributed Generation (DG).** The electricity system in use today uses capital inefficiently. It is by far the largest industrial user of capital in the country. The next highest industry has in place about 50% of the capital investment of the electric utility industry. The capacity factor of the system is about 43%, and 35% of all capital in place (G, T, &D) is there to serve loads that occur less than 5% of the time. Moving some generation closer to loads will eliminate much of the planned costs for expanding the T&D system. These costs are large. Further, it is cheaper to transport fuels to DG close to loads than it is to transport the equivalent amount of electricity. Transportation gains of gas over electricity come from fewer losses in conversion, fewer losses in transmission, and in lower capital costs. In addition, generation closer to loads allows for the use of otherwise wasted heat, a byproduct of combustion. We have not attempted to account for this potentially large savings. Distributed resources included in our plan are:

- Fuel cells
- Varying sizes of small gas-fired units.
- Solar photovoltaic.
- Net metered small renewable resources.
- Small wind farms, a la the Danish experience.

**Load management**. Load management is perhaps the most important near-term activity for relieving congestion and for managing exposure to rogue electricity markets. With proper pricing strategies, load management would happen as a matter of course. But until such time end users see more representative market prices for power and T&D, programmatic load management represents a major opportunity. Similar to distributed generation, load management options will take the "peakiness" out of the system. Both DG and load management will eliminate the need to serve peak loads using the hydropower system, with large gains in lower T&D costs and in saved fish and wildlife.

**Efficiency improvements.** Efficiency improvements save energy and capacity in all end-using applications. They save energy at costs that are often far less than the delivered cost of power, produce little or no pollution, and can be installed in infinitely small quantities. Weather related measures save more under extreme weather conditions than under normal conditions. And measures embedded in appliance standards and building standards save more during economic boom times when more of these items are purchased. They continue to be a most robust, cost-effective way to "produce" power from our scarce resources. They are designed to save both energy and capacity.

[24] We have not specifically addressed this issue in this vision paper. However, it is important for wind developers. It is an ongoing issue as the region develops its Regional Transmission Organization (RTO West)

**Strategic Pricing of Retail Power.** Loads that occur when the system is at peak are much more costly to serve than are off-peak loads. Yet, most utilities do not capture this cost difference in rates. Doing so would reduce peaks and the associated strain on all capacity employed throughout the system. Proper prices would smooth the way for the strategies and resources that help us reach our vision.

If we achieve this vision, the regions' citizens will be better off. It will not be achieved without support from key regional players such as BPA and the Northwest Power Planning Council. We will ask them to support our vision to meet Tribal and regional needs.

This report defines a set of strategies and resources that will serve loads more cheaply than they are served today, provide better protection against unforeseen events, and are much healthier for fish and wildlife resources of the region. In addition, this vision can be met without raising rates in the Northwest. In fact, over the long-term we believe that our vision contains a more robust set of resources and will lead to lower prices for power.

# VI. RECOMMENDATIONS

## Generation and Load Management

1. Bonneville Power Administration (BPA) shall fund a minimum of one hundred megawatts of pilot projects of distributed generation (DG) resources development over the next two years (2002 - 2003). BPA shall design the projects to be dispatched remotely. This will serve peak loads and protect fish spill.

2. BPA shall acquire one thousand megawatts of peak reduction over the next ten years, based, in part, on the results of the DG pilot project referenced in Recommendation # 1, referenced above. Peak reduction can come from a diverse set of technologies and strategies, including DG, load management, and conservation. These combined activities should consider capital savings as an important management objective. The BPA Administrator shall also establish a Conservation Business Line, independent from the Transmission Business Line (TBL) and Power Business Line (PBL) so that BPA's conservation efforts can focus on avoided transmission and power costs.

3. BPA shall acquire one thousand megawatts of generating capacity as ancillary reserves to assure that a potential lack of regional energy resources do not constrain fish operations. Outside of potential spill times, the plants could be called upon as needed, but the plants could only be run in emergencies to allow for spill, when spill would otherwise be endangered.

## Power Pricing

4. BPA should adopt pricing policies for its energy sales that reflect true costs to fish and market conditions. Over the next ten years BPA should also begin to transition to market-based rates. BPA must protect fish during the transition of energy markets.

5. The Federal Energy Regulatory Commission (FERC) should adopt temporary price caps or terminate market-rate authority for Duke, et al. per the motion of the California Independent System Operator (ISO), if necessary to allow the Northwest to purchase energy at affordable rates. This was envisioned in the 1996 Northwest Power Planning Council's Energy Plan. Moreover, FERC should permit the FCRPS to reliably meet the operations recommended by the Tribes. Ultimately, better price signals will improve efficiency. We recommend a measured move with certainty to real-cost pricing over a ten-year weaning period. Price caps could be relaxed gradually, but with certainty, over the weaning period.

6. The Council should encourage, and RTO West should adopt, uniform mandatory interconnection standards for all transmission utilities to assure interconnection of generating resources. This would allow development of the resources needed to relieve pressure on the Columbia River, including distributed generation and other strategically placed resources. Current transmission interconnection standards vary from investor-owned utilities to public utility districts to cooperatives. The current inability to interconnect poses difficulties for siting new generation in areas where peaking problems occur.

7. The Council should encourage, and RTO West should develop, liquid markets for constrained transmission. This will facilitate the adoption of peak reduction measures to uncover the value of constrained transmission paths.

8. Fish Operations will be submitted as a hard constraint to the PNCA. Emergency limitations on fish operations will occur only when Northwest energy reserves fall below 1.5%, the equivalent of a stage three emergency in California.

## Emergency Measures

9. We recommend that the Program contain the following attached definition of emergency (italicized). Deviations from operational requirements for anadromous fish should only be allowed in the event of an actual emergency.

- ***Definition of an Emergency****:*

***"e·mer·gen·cy*** *(i mur'jen se), n., pl.* ***–cies****. a sudden, urgent, usually unforeseen occurrence or occasion requiring immediate action."*

*Random House College Dictionary, 1980*

*It is appropriate to define emergencies as they apply to the operation of the FCRPS. Emergencies are a unique situation which have the potential for many types of impacts. These generally require some type of action or response to minimize or eliminate impacts. An emergency may involve the need to operate the FCRPS outside of the requirements contained in the Biological Opinions or the associated Records of Decision (ROD) issued by the operating agencies.*

*However, it is important to distinguish emergencies from "planned risks." In operating a complex system such as the FCRPS, federal managers assume certain risks every day. Future conditions are uncertain. Operational decisions rely on predictions, forecasts and probabilities. If an extreme circumstance occurs, it is not necessarily an emergency even though it was sudden and urgent, and required the taking of an immediate action.*

*For this protocol, emergencies are categorized into three types. They are restricted to power-type emergencies only. We describe each type below and illustrate with examples.*

1) **Generation Emergency** *– the actual insufficiency of electrical generation to satisfy electrical demand or load in a particular geographical area, as measured by the real-time drop of reserves to a level of less than 1.5% of actual loads, equivalent to a stage three emergency in the ISO.*

   *For example, a generation emergency may be caused by an unanticipated loss of a generating resource – a project/unit forced outage; or by a restriction in the amount of water available for project discharge – reducing on-site generation; or by a loss of electrical transmission capability used to import electricity into a particular geographic area – a transmission line restriction or shutdown.*

2) **Transmission Emergency** *– the potential or actual loss or limitation in the ability to move electricity from the site of generation to the actual consumer or end-user.*

   *For example, a transmission line may fail, shut down or otherwise be unavailable to transmit any electrical energy – a line outage. Or a physical condition may exist that prevents or limits effective and reliable transmission—insufficient reactive power (VARs) to overcome the inherent losses in long-distance transmission; or a temporary limitation on transmission line capability that restricts the export of electricity – which causes a generation surplus in one area, thus reducing overall generation levels but causes a shortage in another area as noted above in the description for a generation emergency.*

3) ***Other Emergency** – the existence or result of extenuating circumstances which fall outside the range of normal operations, was unanticipated, and may have resulted in catastrophic impact, physical damage or failure to part of the physical power system.*

   For example, all natural disasters fall under this category of emergency – earthquakes, floods, and fires; or human caused failures – ship or barge strandings, facility failures (e.g., locks, gates, outlets, etc.), chemical spills into the river, train derailments impacting the river and terrorist acts; or overriding circumstances or needs that require operations to exceed normal limits such as a police investigation, a rescue operation, and a project operation specifically designed to prevent damage to or protect other parts of the FCRPS.

10. In the event that emergencies constrain fish operations, the value of the energy produced from this operation will be paid into an account at BPA to be expended within one year of accrual for fish and wildlife mitigation.