

Sounding Board

Columbia Generating Station (WNP-2)

Background Material for Meeting on February 11, 2004

Background:

Columbia Generating Station (Columbia) is a 1,120-megawatt boiling water reactor owned by Energy Northwest. It is located on the Department of Energy's Hanford Reservation near Richland, Washington. Columbia began commercial operation in December 1984.

Bonneville Power Administration (BPA) purchases 100% of Columbia's power and pays for the power per the Project and Net Billing agreements based on the funding needed. The operations and maintenance costs (O&M) are the costs to operate the plant such as capital, fuel, operating and maintenance costs. BPA also adds Decommissioning Trust Fund contributions and NEIL insurance costs to arrive at total O&M costs. Per the Project and Net Billing agreements, Energy Northwest prepares an Annual Budget for Columbia. Energy Northwest reviews the budget internally then presents it to the Energy Northwest Executive Board for their approval and to BPA for its non-disapproval. Energy Northwest also prepares a Long Range Forecast that BPA uses as the basis for out year estimates.

BPA's goal for Columbia is that it be operated in a safe, reliable, and cost-effective manner such that its performance is in the top quartile of the industry relative to its peers on a sustained basis.

Prior to 1994, Energy Northwest experienced high operating costs as shown on the Chart 1 below. Columbia made dramatic cuts to reduce costs and has also improved its generation. However, costs to operate Columbia have recently begun to increase and are approximating cost levels that occurred in the mid 1990's. Charts 1 and 2 below show the historical and forecasted O&M costs and the cost of power.

Chart 1

Columbia Generating Station O&M

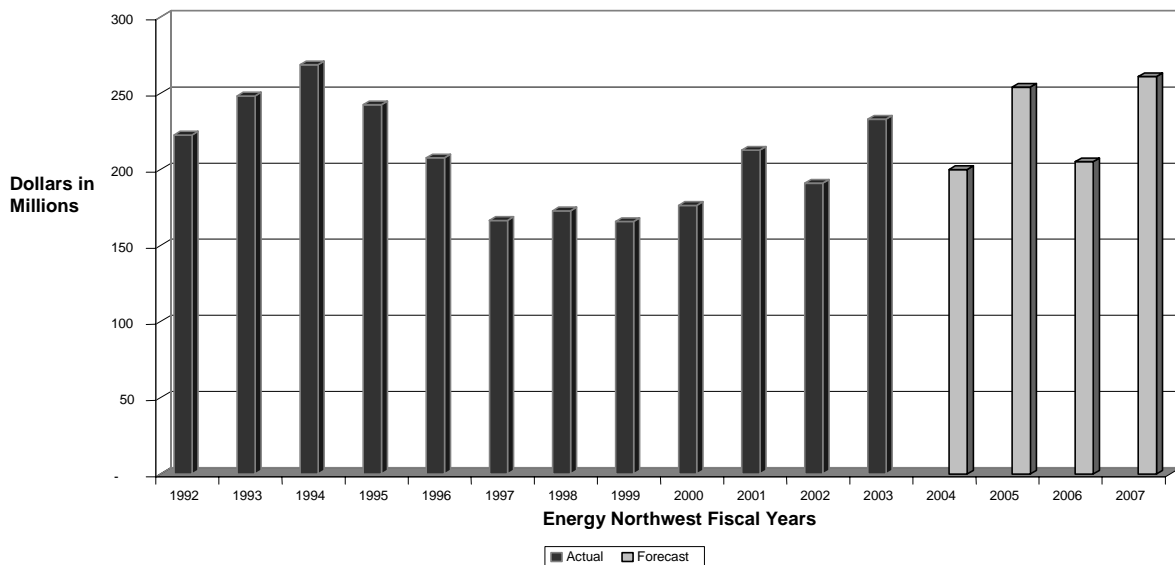


Chart 2
Columbia Generating Station
Cost of Power

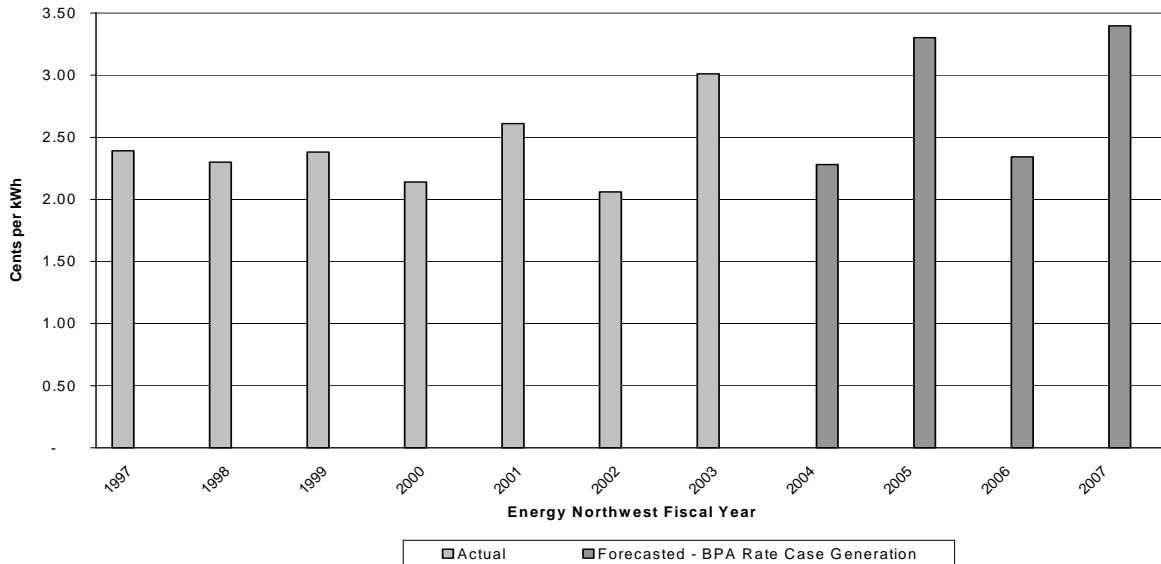


Chart 3 shows the actual generation history for Columbia. It also shows the budgeted generation on a historic and Energy Northwest forecasted basis. BPA’s Rate Case assumed generation is used for the 2004 through 2007 generation forecast.

Chart 3
Columbia Generating Station
Generation in GWhs

	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04	FY05	FY06
CGS Budget Generation	7,633	7,667	7,844	7,800	7,944	7,762	8,486	9,478	8,574	9,627	8,240	9,679
CGS Actual Generation	6,863	7,703	6,961	7,502	7,245	8,260	7,996	9,262	7,738	-	-	-
Rate Case Estimated Generation	6,263	6,544	7,192	7,376	7,376	7,402	7,691	8,760	7,683	8,784	7,683	8,760

Notes:

CGS actual generation includes economic dispatch credit.

Rate case estimates are based on predicted actual generation and do not include economic dispatch credit.

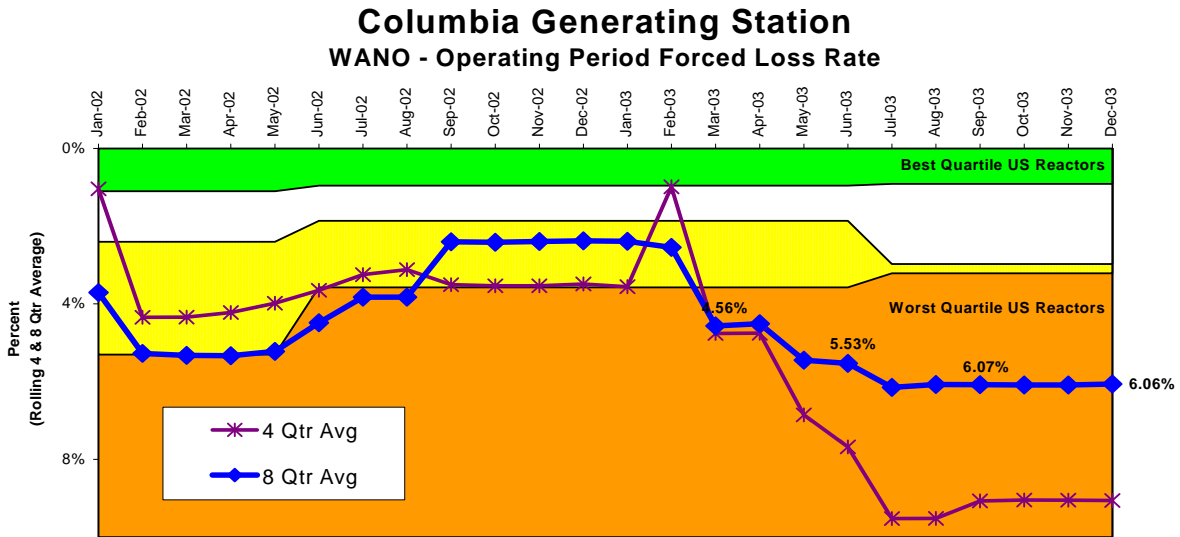
CGS completed its first two-year cycle and attempts at estimating its actual generation in future years is difficult due to the limited database.

GCS actual generation has in most years lagged budgeted generation.

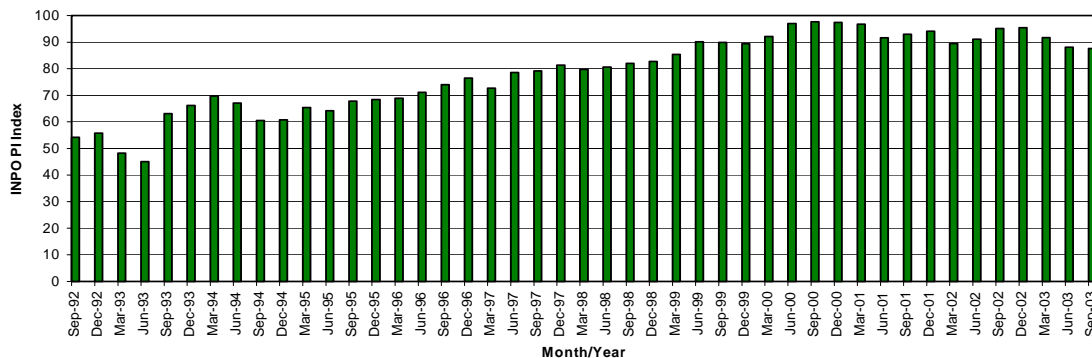
Columbia's operational performance has been challenged by equipment problems in the past year. While the plant had its longest continuous run in 2002-2003 (369 days), it has subsequently experienced three forced outages and an extended refueling outage. This resulted in actual generation being well below budgeted generation in FY 2003, although above the rate case generation assumption. Columbia's refueling outage performance has not been consistent with the 37-day average (2000 through 2003) achieved in the industry. The last two refueling outages lasted 44 and 50 days with an average over the last five years of over 52 days. Only one refueling outage, and the shortest in Columbia's history (36 days), has come in under the target for that outage.

Regulatory ratings have also decreased with a number of WANO (World Association of Nuclear Operators) and INPO (Institute of Nuclear Power Operations) indicators now in the lowest industry quartile for the plant. Chart 4 shows the four and eight quarter averages for Columbia's forced loss rate compared to the industry. The INPO Performance Indicator Index, a composite of 10 key indicators, is shown below in Chart 5.

Chart 4



**Chart 5
Columbia Generating Station
INPO Performance Indicator Index
3rd Quarter 1992 - 3rd Quarter 2003**



Energy Northwest agrees that performance at Columbia has declined in part due to equipment problems and initiated a program in July 2003 called the Quest for Excellence (QFE) as an improvement initiative. The purpose of the program is to close the gap between Columbia's performance and the characteristics of the plants that are achieving operational excellence. The vision for QFE is to develop a culture of continuous improvement leading to sustained operational excellence as demonstrated by being a top industry performer. The areas that the effort is focusing on include nuclear safety, industrial safety, capability factor, equipment reliability, and budget performance. Energy Northwest hopes to improve in its outage and work management effectiveness; problem identification and resolution; and the accuracy and completeness of staff work. Implementation of the recommendations will take two years and progress against the plan will be tracked using external and internal feedback.

Energy Northwest also initiated a new Long Range Plan (LRP) development process in late 2003. A manager has been assigned to this project and the effort is taking a more in depth look at future projects and costs at Columbia. This is a more thorough process than previous long range plans and has involved plant and engineering staff assessments of Columbia's needs and priorities. The LRP includes ten years of operating cost and generation projections. In order to achieve and maintain high capacity factors, the Energy Northwest staff is also looking at significant capital and maintenance needs for the next 20 years as part of the plan. The first official version of the Long Range Plan will be distributed in June 2004. It will be a living document that will be revised and issued every six months.

Final Proposal Estimate:

BPA uses the Energy Northwest forecasted data to estimate future years costs. Regional costs are adjusted to reflect funding needs and then converted into BPA fiscal years. Columbia O&M forecasts have been updated several times and are summarized in Chart 6 below.

**Chart 6
Columbia Generating Station – O&M Costs
BPA Fiscal Years
Dollars in Millions**

	2002²	2003	2004	2005	2006
Pre Financial Choices (August 2002)	168.1	248.4	233.0	289.1	223.0
SN CRAC	168.1	221.0	204.1	252.4	206.2
Final Proposal	168.1	209.0	216.9	251.7	211.0
Start of Year budget			221.7	251.7	211.0

The Pre-Financial Choices estimate was based on the Energy Northwest June 2002 Long Range Forecast for Columbia and included a plant performance incentive fee, condenser replacement and the previous fuel procurement strategy.

The SN CRAC Trigger Case assumed that Energy Northwest's commitment to reduce budgets by \$5M each FY would be met along with additional reductions of \$2.5M and \$5M in non-outage and outage years respectively. It also assumes that the condenser replacement has been deferred out of the current rate period, a change in fuel procurement strategy is implemented, and there is no plant performance incentive fee.

The Final Proposal estimate was calculated based on Energy Northwest's FY 2004 Annual Budget and June 2002 Long Range Forecast for Columbia. It assumes that \$5M and \$15M of capital will be debt financed in non-outage and outage years respectively. It also assumes that Energy Northwest's commitment of \$5M in reductions and BPA's additional reductions of \$2.5M in a non-outage year and \$5M in an outage year will not be met. The estimate is also based on the assumption that the condenser replacement will either not be done in the current rate case or it will be debt financed.

Finally, the estimate was updated at the start of the fiscal year (SOY) for BPA's FY 2004 to reflect the latest available information. The FY 2004 estimate was increased by \$4.8 million to reflect anticipated increases in security costs, miscellaneous project costs, and spent fuel storage costs.

Columbia has completed its transition from an annual refueling and maintenance outage cycle to a 24-month outage cycle. An outage is conducted every other year during the spring run off. Outage years are 2003 and 2005. Non-outage years are 2002, 2004 and 2006. This accounts for the significant differences in budget totals from year to year.

Cost Drivers:

Columbia's long-range forecasts over the last several years have reflected increasing annual operating costs due to programs and issues now included in forecasts that were not anticipated in 1997.

Columbia is nearing 20 years of age and is facing component obsolescence in some of its systems. Much of the plant equipment was designed and manufactured in the 1960's and 1970's. Replacements can be difficult if not impossible to find.

NRC security requirements due to the 911 event have created a large unanticipated cost impact. In response to all the compensatory measures and other NRC orders, staffing has increased which added over \$4 million dollars to the annual budget. Also capital improvements estimated at over \$12.7 million will need to be spent to meet the NRC orders.

The following items are the major O&M cost drivers:

- Plant equipment obsolescence problems
- Plant equipment overhauls
- Outage costs greater than anticipated
- Fuel corrosion problem
- In service inspections deferred from previous outages
- Addition of plant reliability programs
- Security increases due to 9/11

- Implementation of Hydrogen Water Chemistry to prevent Intergranular stress corrosion of the reactor vessel
- Independent spent fuel storage capital and operation costs
- Jet pump vibration and cleaning

Other drivers affecting O&M:

- Increased employee health costs
- Employee recruitment and retention costs
- Employee incentive programs

The following items are considered the major Capital cost drivers:

- Capital requirements greater than previously forecasted
- Condenser replacement forecasted in FY 2005 (deferred to FY 2008 and FY 2009 in later budget forecasts)

Other items contributing to increases in O&M include escalation and termination of litigation settlement credits. The Rate Case assumed Columbia would not have any inflation escalation. The Final Proposal estimates include inflation. The Rate Case included a reduction for litigation settlement credits spread over time and ending in 2003; however, this settlement was re-negotiated, and all credits were received in the previous rate period.

Energy Northwest identified and implemented two actions to reduce cash requirements through FY 2006. These opportunities involved revising the Nuclear Fuel Plan strategy to use up the current fuel inventory in the near term and to delay the replacement of the main condenser out of the current rate period. The use of fuel inventory reduces costs in the current rate period but will cause cash requirements to increase in FY 2007 through 2011. When it is determined that condenser replacement work needs to be accomplished (now projected for FY 2008-2009) it is highly likely that this work will be debt financed and not affect Columbia O&M costs. Very recent plant experience has prompted reconsideration of this delay.

Energy Northwest also achieved a budget under run in FY 2002 of approximately \$5.4M and committed to \$5M in reductions per year in the FY 2004 through 2006 budgets. This reduction was not achieved in the approved Columbia FY 2004 budget. Energy Northwest's FY 2005 budget target of \$248 million includes a \$5M reduction.

There are several recent cost challenges and issues that have been identified which are not factored into any of the estimates in Chart 6. BPA and Energy Northwest are currently investigating operating license renewal and a power up rate to Columbia. Columbia's current operating license will expire in 2023. License renewal will extend the operating life to 2043. The reactor power up rate has the potential to increase plant output by up to 169 megawatts. Both of these efforts will increase Columbia's capital and O&M costs. The recent discovery of a shorted turn on the rotor of the main generator also has the potential to increase costs. It is anticipated that a decision on replacement of the rotor will be made in the near future and while replacement may not occur until 2007, some procurement/repair costs could appear in the current rate case period.

Consequences of cost cuts/tradeoffs:

The work and projects Energy Northwest has included in its budgets and forecasts are designed to maintain the safe and reliable operation of Columbia. Reductions in maintenance and capital projects may impact Columbia's availability and reliability, and may have serious consequences for BPA. If Columbia were not available during key times of the year, replacement power costs would have a significant cost impact.

Much of the work Energy Northwest completed in the FY 2003 outage and has planned for the FY 2005 outage has been delayed from previous years due to cost reduction pressures. Continued delays or deferral of this work could affect the reliability of Columbia.

Financing of Capital Projects:

Capital projects at Columbia have historically been expensed in the BPA budget. Recently, a decision was made to finance approximately \$32 million of costs for the Independent Spent Fuel Storage Installation project (ISFSI). Nine million dollars worth of smaller capital addition projects were financed in FY 2004 and plans have been made to finance other capital additions in FYs 2005, and 2006. These actions decrease near term costs but increase long-term debt service requirements.

BPA and Energy Northwest also discussed the possibility of financing nuclear fuel purchases for Columbia. This option was not exercised but remains a possibility for future consideration.

Benchmarking Efforts:

Over the years, both Energy Northwest and BPA have conducted benchmarking to calibrate Columbia's costs relative to the nuclear industry. There have been five recent benchmarking studies which present sometimes inconsistent or conflicting data. Some of the efforts have indicated that Columbia's costs are above the median in relationship to the nuclear industry and Columbia's peers while other studies indicate that Columbia costs are consistent with the selected peer group. These efforts suggest that there may be areas where improvements and changes could be made in order to gain efficiencies and reduce overall costs. Following is a summary of the recent efforts.

In 2002, the Energy Northwest Executive Board reviewed the Energy Northwest nuclear program to consider other management or ownership alternatives for Columbia, examine recent and current performance of Columbia relative to other nuclear plants and seek ways to further improve Columbia's performance (The White Paper). The White Paper concluded that the disadvantages and potential risks in retaining a third party manager or selling the plant outweighed any speculative benefits. In regards to costs, the White Paper noted that the future costs of Columbia's power should be kept as low as possible without compromising safety or long-term reliability and referenced benchmarking efforts being conducted by Energy Northwest staff to compare Columbia's performance against other nuclear plants. Based on the staff's efforts, the Executive Board concluded that Columbia's cost of power is comparable to that of other single-unit plants and noted that they expected the senior management team to continuously scrutinize Columbia's budget and operations, including benchmarking.

The White Paper included a table showing the adjusted long range forecast (LRF) based on Energy Northwest's actions to reduce fuel inventory, defer the condenser replacement, and BPA Power Business Line

achieve \$5 million in reductions in each of FYs 2004 through 2006. These projections are shown below in Chart 7 and can be compared directly to the costs shown by Energy Northwest fiscal years on Chart 1.

Chart 7
Columbia Generating Station Costs
Energy Northwest FYs
Dollars in Millions

	FY03	FY04	FY05	FY06
Adjusted LRF	\$233.8	\$190.5	\$244.9	\$196.4

In FY 2003 actual costs were at the budgeted level. The FY 2004 budget approved by the Executive Board in April 2003 totaled \$199.7 million. Energy Northwest’s current estimate for FY 2004 is approximately \$19 million higher than the approved budget and an amended budget finalizing the amount needed is currently under review and may be presented to the Executive Board for approval as early as April. Major components of this increase include increases in project costs (\$2.3 million), accelerated spent fuel cask loading (\$1.3 million); security mandated costs (\$9.7 million) and GE tax issues (\$5.6 million worst case). The FY 2005 budget is also in its development stage and will be presented to the Executive Board and Participants Review Board in March.

As noted above, Energy Northwest has conducted benchmarking during the last two years to determine appropriate levels for Columbia's operating costs and staffing. The initial effort focused on five single unit plants which achieved high plant reliability over a six-year period and whose production costs were consistently low. Data from the selected plants was obtained and analyzed for the following areas; O&M, capital, fuel, total costs and net generation. Based on the analysis, cost of power targets were developed for Columbia. The analysis was presented to Energy Northwest senior management but the validity of the data used was questioned and the report was never finalized. Another effort was initiated to expand the study and validate the data.

This second effort has focused on obtaining and analyzing staffing and cost data from the selected single unit plants. Members of the team participated in site visits to three of the selected plants. The goal was to understand the data and to make valid comparisons of Columbia to the selected plants. The report focused on 2002, which was a non-outage year for Columbia. This effort concluded that Columbia’s overall costs for 2002 were in line with the selected plants but that capital costs were lower. It was noted that generation was also lower than the comparison plants.

BPA’s Contract Generating Resources group contracted to update a 1999 benchmarking study based on total nuclear industry data. The effort reviewed the data and compared expected costs for Columbia in certain areas such as capital investments, and operations and maintenance to other nuclear plants using multiple linear regressions. Per this benchmarking, Columbia’s costs in recent years compare favorably with the nuclear industry, but average fiscal year 2003 through 2006 costs are increasing and exceed the projected benchmark. This information has been presented to Energy Northwest senior management and its Executive Board, each of which expressed some concerns about the validity of the data. Included below

are several charts from this BPA benchmarking effort, illustrating Columbia's comparative performance. These charts have not been updated to reflect 2003 actual data.

Chart 8 shows that Columbia in 1995 was significantly over its expected cost of power. Cost of power decreased and for 1997 through 2000 was under the benchmark. The chart also shows that 2001, an outage year and the projected 2003 cost of power, also an outage year, are significantly above the benchmark. The benchmark is the expected value of Columbia's performance based on the performance of the other U.S. nuclear plants. The major driver of these increases is the increase in operations and maintenance costs. It should be noted that the cost of power shown here is calculated without indirect charges and is thus not directly comparable to the cost of power referenced in chart 2.

Chart 8
Total Plant Costs Less Indirects
Mills/KWh

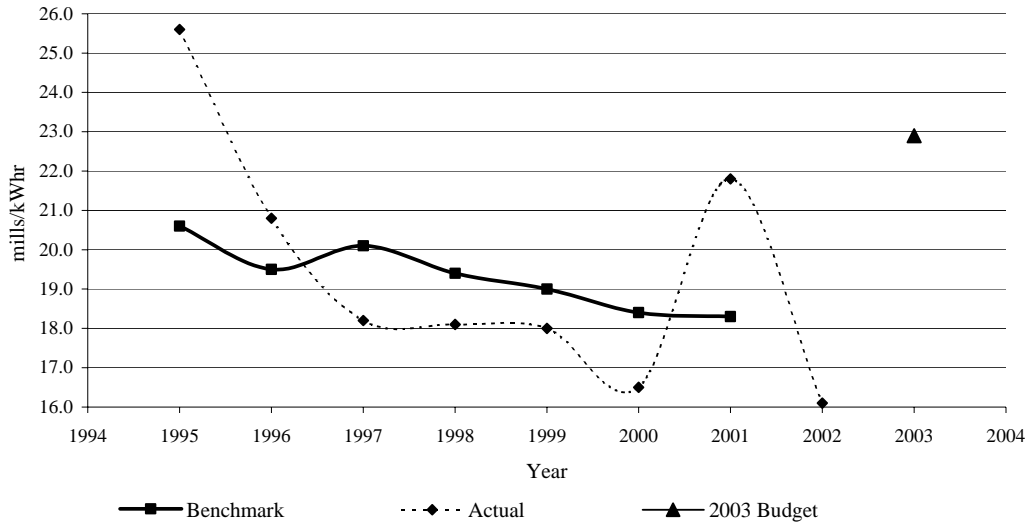


Chart 9 shows a fairly steady increase in capacity factor with Columbia well above the benchmark for fiscal year 2002. The actual capacity factor for fiscal year 2003 was significantly below the benchmark and the budget target due to the forced outages that occurred in that year.

Chart 9
Capacity Factor

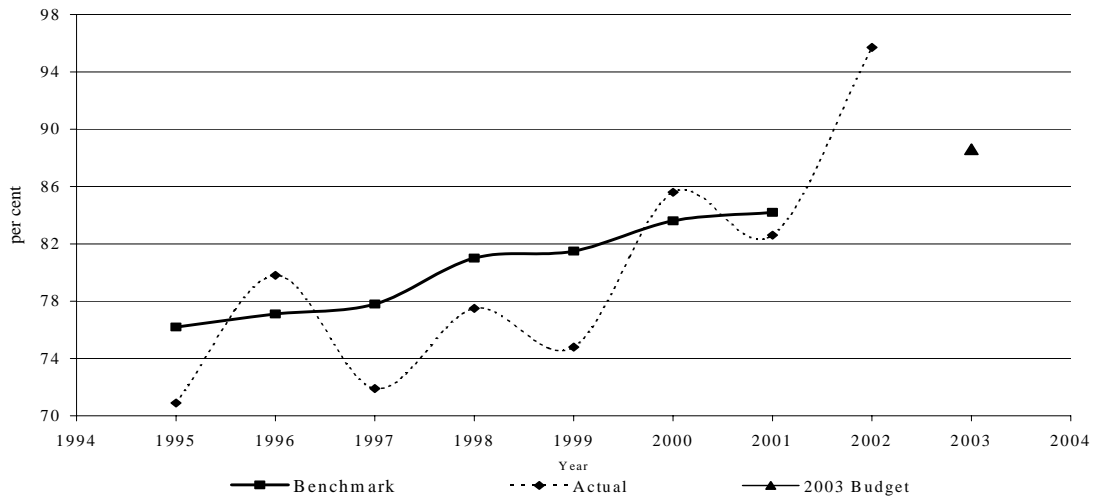
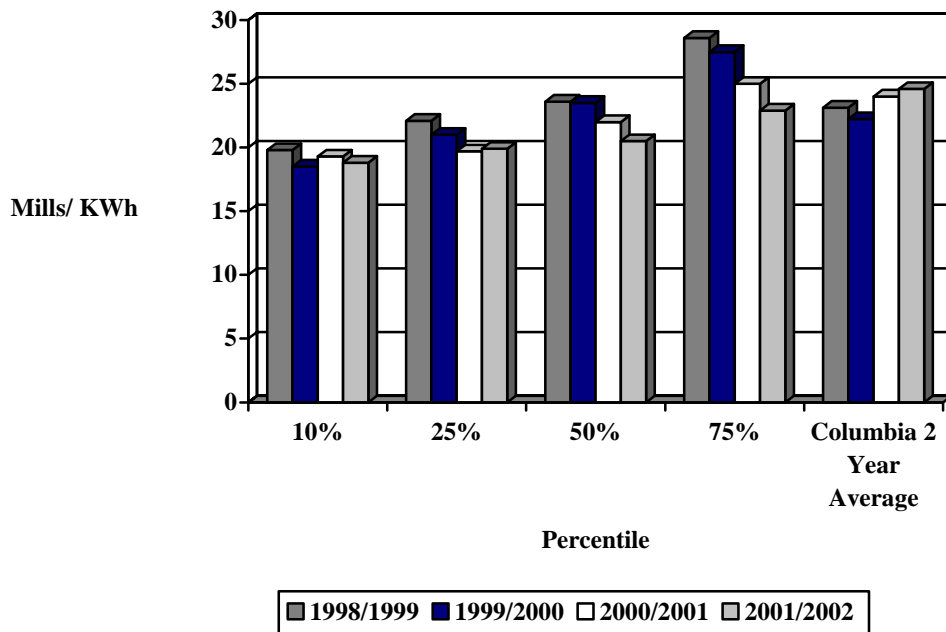


Chart 10 below shows Columbia’s cost of power relative to its peers that were selected as part of the Memorandum of Agreement (MOA) performance incentive fee targets. The chart shows that the industry group has continued to improve their two-year cost of power averages over the last 5 years (two year averages are chosen to account for plants having refueling outages in different years). Columbia has been a median performer, and has not achieved the goal of top quartile (top 25%) performance for cost of power.

Chart 10
Comparison of Industry Cost of Power Percentiles
Two-Year Averages



As a result of the multiple benchmarking efforts, which at times draw differing conclusions and fuel the debate about the validity of data, BPA has embarked on an effort to develop its own internal cost of power target for Columbia. This effort will take into account the five benchmarking efforts to date and is focused on developing a target that we believe is reasonably achievable without impacting the safety, reliability and long term viability of Columbia Generating Station.

Conclusion:

Energy Northwest was successful at making significant reductions in Columbia's budgets in the mid 1990's when it was recognized that costs were dramatically escalating. These reductions resulted in Columbia's total direct plant costs being among the best in the industry.

However, the long-range forecasts for Columbia over the last several years have been rising, as O&M, capital and nuclear fuel costs increase due to such needs as replacement of obsolescent equipment, major maintenance activities addressing projects deferred over the last 3 to 5 years, additional costs for spent fuel storage, security costs to implement measures required by NRC since September 11th, and escalation.

Energy Northwest has offered a number of actions that reduced the projected budgets for the existing rate period and BPA has incorporated some of these into our latest projections. The impact of these reductions is being challenged however and may be negated by new cost challenges facing Energy Northwest. Energy Northwest is implementing activity based cost management in FY 2005. This new cost management approach will enhance Columbia's future ability to benchmark nuclear industry costs using the Standard Nuclear Performance Model. Improved resource allocation and cost reporting are also expected benefits.

BPA will develop a reasonable benchmark target for Columbia based on the benchmarking studies conducted to date. This target will be compared to the new Columbia Long Range Plan currently under development. BPA then plans to have discussions concerning this target with Energy Northwest.