

**PUBLIC UTILITY COMMISSION OF OREGON
STAFF REPORT
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REGULAR X CONSENT _____ EFFECTIVE DATE _____ N/A _____

DATE: July 22, 2005

TO: Public Utility Commission

FROM: Lisa Schwartz

THROUGH: Lee Sparling, Ed Busch and Jack Breen III

SUBJECT: PACIFICORP: (Docket No. LC 39) Acknowledgment of 2004 Integrated Resource Plan.

SUMMARY RECOMMENDATION:

Staff recommends that the Commission acknowledge with agreed-upon modifications PacifiCorp's 2004 Integrated Resource Plan (IRP), with one exception, by adoption of the attached proposed order. Further, staff recommends that the Commission require four analytical improvements for the company's next IRP or Action Plan.

The exception: Procurement of a 600 MW high capacity factor resource in or delivered to Utah by the summer of 2011 is not acknowledged, including acquisition of a new coal unit.

Requirements for the next IRP or Action Plan:

1. Conduct an economic analysis of achievable Class 1 and Class 2 DSM measures in PacifiCorp's service area over the IRP study period and assess how the company's base and planned programs compare with the cost-effective amounts determined in the study.
2. Determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options.
3. Analyze planning margin cost-risk tradeoffs within stochastic modeling of portfolios. If feasible, analyze the cost-risk tradeoff of all portfolios at

various planning margins. If not feasible, build all portfolios to a set planning margin, test them stochastically, and adjust top-performing portfolios to higher and lower planning margins for further stochastic evaluation. Evaluate loss of load probability, expected unserved energy and worst-case unserved energy, as well as Class 3 DSM alternatives for meeting unserved energy. Evaluate alternatives for determining the expected annual peak demand for determining the planning margin — for example, planning to the average of the eight-hour super-peak period.

4. Evaluate within portfolio modeling the potential for reducing costs and risks of generation and transmission by including high-efficiency CHP resources and aggregated dispatchable customer standby generation of various sizes within load-growth areas. Evaluate the potential value of CHP resources in deferring a major distribution system investment associated with load growth, assuming physical assurance of load shedding when the generator goes off line, up to the number of hours required to defer the investment.

DISCUSSION:

PacifiCorp filed its 2004 Integrated Resource Plan (IRP or plan) on January 20, 2005. The filing is in accordance with Commission Order No. 89-507 that directs all energy utilities to prepare least-cost plans every two years.

According to PacifiCorp's estimates, its system becomes capacity-deficit beginning fiscal year (FY) 2009, with the gap growing to about 2,800 megawatts (MW) by FY 2015.¹ PacifiCorp states that the eastern side of its system will be capacity-deficit during peak hours in the summer beginning in FY 2009. The company's projected deficit grows to about 1,800 MW by FY 2015. The off-peak hours are energy-surplus for 10 years without any resource additions.

The western side of PacifiCorp's system is capacity-sufficient through FY 2011. PacifiCorp expects the *capacity* deficit to grow to about 1,000 MW in FY 2015. The West is *energy*-deficit in the *off*-peak period until the expiration of the BPA peaking contract in FY 2012, when the region becomes short during both on- and off-peak hours.

¹ PacifiCorp's fiscal year runs from April 1 to March 31. For example, FY 2009 runs from April 1, 2008 to March 31, 2009. The projected load/resource gap includes a proposed planning margin of 15%, based on the peak hour obligation.

PacifiCorp's preferred strategy calls for the following resources from FY 2005 to 2015:

- 2,629 MW of thermal generation capacity, consisting of two coal plants and two natural gas plants in the East, and one natural gas plant in the West
- 177 MW of direct load control (Class 1 demand-side management) resources split between the West and East sides

All portfolios evaluated for the IRP, including the preferred portfolio, include "Planned Resources" that PacifiCorp has firmly decided to acquire:

- Up to 450 average megawatts of conservation resources
- 1,400 MW of renewable resources
- Up to 1,200 MW of shaped capacity resources on a rolling annual basis
- 100 MW of known Qualifying Facilities on the East side

PacifiCorp requests acknowledgment of the Action Plan for its preferred portfolio — Portfolio E with demand-side management (DSM). The Action Plan includes activities for any decision the company intends to make in the next two to four years. The resource types evaluated in the IRP and included in the Action Plan are proxy resources representing the fuel type and operating characteristics that PacifiCorp deems to best fit the deficit position. The company states that it will determine the actual type of resource to acquire during the procurement process.

The two largest resources in the Action Plan are:

- A 550 MW "flexible" resource in or delivered to Utah by the summer of 2009. The resource evaluated in the IRP is a natural gas-fired combined-cycle combustion turbine.
- A 600 MW "high capacity factor" resource in or delivered to Utah by the summer of 2011. The resource evaluated in the IRP is a pulverized coal plant.

Public Input Process

The public involvement process included eight public input meetings beginning December 11, 2003, and four technical workshops. PacifiCorp distributed a draft of its plan for comment by participants in November 2004 before submitting its final plan to the Commission on January 20, 2005 — two years after the Company filed its 2003 IRP.

The Commission held a Special Public Meeting on PacifiCorp's plan on April 25, 2005. On or before May 23, 2005, the Citizens' Utility Board (CUB), the Oregon Department of Energy (ODOE), Renewable Northwest Project (RNP), Northwest Energy Coalition (NVEC), and the Hydropower Reform Coalition/WaterWatch of Oregon submitted written comments on the IRP to the Commission and parties. PacifiCorp filed a reply to parties' comments on June 6, 2005.

Staff circulated to Parties its comments, recommendations and a draft proposed order on June 27, 2005. Parties filed reply comments by July 13, 2005.

Parties' Recommendations for Acknowledgment

CUB recommends that the Commission not acknowledge a new coal plant at this time. CUB further recommends the Commission ask the Company how it would proceed on a path that included more peak-load shaving programs and no new coal-fired generation.

ODOE recommends at a minimum that the Commission not acknowledge acquisition of new coal plants pending completion of the following analyses:

- Risk analyses comparing a portfolio that has renewable resources beyond the 1,400 MW in the Action Plan with portfolios that have new coal plants
- Analysis of potential excess costs if PacifiCorp builds a coal plant without the option to sequester carbon dioxide (CO₂) and then faces an immediate or delayed requirement to reduce emissions below 2000 levels
- Analysis of the costs of alternative long-run strategies to respond to a binding and declining cap on PacifiCorp's existing CO₂ emissions through 2050
- Site-specific analyses of Integrated Gasification Combined-Cycle (IGCC) with sequestration at various sites
- An analysis of the transmission needed to integrate sufficient renewable and gas-fired resources to meet load growth through 2025 or, alternatively, plans including IGCC plants with a carbon sequestration option or compressed air storage for shaping wind resources, if these options have lower costs or risks

ODOE recommends a portfolio with more renewable resources, backstopped by new natural-gas plants and more demand response programs.

NWEC recommends that the Commission not acknowledge the 2004 IRP — especially acquisition of two conventional coal plants — without reviewing an analysis of a portfolio with far more renewable resources such as the Company tested in its 2003 IRP, without a higher assumed CO₂ adder, and without a value for optionality including consideration of constraints that coal plants pose for integrating wind resources. NWEC supports the comments filed in this docket by CUB, ODOE and RNP.

RNP supports acknowledgment of the 2004 IRP with the exception of a coal plant. RNP urges the Commission to send a strong message to the company about making its renewable resource acquisitions a priority. RNP supports the comments filed in this docket by CUB, ODOE and NWEC.

Reply to Staff's Comments, Recommendations, and Draft Proposed Order and Staff's Response

PacifiCorp. PacifiCorp raised two general objections and suggested several specific modifications to the draft proposed order. General objections are discussed here; "Parties' Comments" includes additional discussion of specific issues. Staff incorporated in its final recommendations the company's changes to previously agreed-upon modifications.

First, PacifiCorp asserts that the Commission may not condition acknowledgment of the IRP at hand on the company performing additional analyses in the next planning cycle, as recommended by staff (recommendations 4, 7, 9 and 11). However, PacifiCorp recognizes the Commission's authority to direct the company to perform additional analyses in the next planning cycle, via an acknowledgment order for a current IRP.² PacifiCorp notes in its reply comments that the Commission has previously provided such direction.³ At the same time, the company makes a distinction between such direction and acknowledging a current IRP on the condition that the company complies with that direction.⁴

² See PacifiCorp's Response to Staff's Draft Proposed Order, July 13, 2005, at 3-4.

³ *Ibid.* See footnotes 4-6. Another example is Order No. 04-375, acknowledging Portland General Electric's most recent IRP. In that order, the Commission stated (at 11), "As for its 2005 IRP, PGE should model dispatchable demand response resources (such as direct load control and demand buybacks) as portfolio options that compete with supply-side options."

⁴ In Order No. 04-375, the Commission conditioned its acknowledgment of Portland General Electric's IRP Final Action Plan on three additional action items. However, the company agreed to these conditions.

Certainly, the Commission has the authority to direct an electric company to perform additional analyses for the next planning cycle. In fact, this is a necessary and important feature of acknowledgment orders. Otherwise, the Commission's integrated resource planning guidelines would have to be far more prescriptive and would require frequent updating.

However, staff agrees with PacifiCorp's distinction that such direction should not constitute a condition for acknowledgment for the IRP at hand. Therefore, staff has removed references to conditions in the final proposed order and includes staff recommendations 4, 7, 9 and 11 as the Commission's direction for additional analyses that should be conducted in the next IRP cycle.

Second, PacifiCorp asserts that because staff recommendations 4, 7, 9 and 11 relate to issues pending in Docket UM 1056, the Commission should not adopt them at this time, "even as refinements in the planning process."⁵

Staff cannot imagine that in resolving issues in UM 1056, the Commission would not determine "that these issues can and should be considered in the next IRP."⁶ Further, staff disagrees with PacifiCorp's suggestion that staff's additional analyses for the next IRP specify the parameters to such an extent that they would "predetermine how best to model and analyze these issues."⁷

Moreover, staff believes the appropriate venue for recommending incremental improvements in IRP analysis are the acknowledgment orders for individual IRP filings, not in the broad IRP guidelines that will be determined through UM 1056 and which are intended to last over many planning cycles.

Specifically, staff recommendation 4 would require the company to conduct an economic analysis of achievable Class 1 and Class 2 DSM measures in its service area over the IRP study period and assess how the company's base and planned programs compare with the cost-effective amounts determined in the study.

Adding Class 1 and Class 2 DSM measures to PacifiCorp's preferred Portfolio E reduced deterministic present value revenue requirements (PVRR) by about \$134 million (1.0%), reduced stochastic average PVRR by about \$852 million

⁵ PacifiCorp's Response to Staff's Draft Proposed Order at 5.

⁶ *Ibid*, at 6.

⁷ *Ibid*.

(6.4%), and reduced upper tail (worst-case) stochastic PVRR by some \$805 million (4.6%).⁸

“Consideration of all known resources for meeting the utility’s load, including ... those which focus on conservation and load management, the ‘demand side,’” already is a requirement of least-cost planning.⁹ Staff does not believe that the Commission’s forthcoming order in UM 1056 would undo this requirement or lay out a new requirement that would contradict it.

Further, the DSM assessment staff recommends for PacifiCorp’s next planning cycle is not something staff envisions would be done for each and every IRP. Rather, staff recommends it in this instance because of Utah’s current high rate of load growth, the lag between the company’s last such assessment (in 2001) and the next IRP filing, and to ensure that the company is considering the most cost-effective resources to meet its projected large and growing load/resource gap. Staff’s recommendation does not specify the parameters for the DSM analysis.

Staff recommendation 7 would require the company to determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options. While guidelines resulting from the UM 1056 investigation may include a similar requirement, previous Commission orders already establish the need for such analysis.¹⁰ Staff notes in its comments that such an evaluation may require stochastic modeling to incorporate market prices beyond those forecasted under normal conditions, which certainly occur when energy supplies are tight. However, staff’s recommendation does not specify how the company should perform the modeling.

Staff recommendation 9 would require the company to analyze the cost-risk tradeoff of portfolios at various planning margins, along with an evaluation of loss of load probability and unserved energy. It also would require consideration of

⁸ Deterministic values are from Table E.1 in the IRP Technical Appendix. Stochastic values are from PacifiCorp’s responses to staff Data Requests 14-16.

⁹ See Order No. 89-507 at 2.

¹⁰ Order No. 89-507 states (at 10), “...rate design should be treated as a potential demand-side resource.” Order No. 03-408 (Appendix A at 1) states, “The utilities’ Integrated Resource Plans should evaluate demand response programs on par with other options for meeting energy and capacity needs.”

demand response alternatives for meeting unserved energy as well as alternatives to planning for the single peak hour of the year.

If IRP accomplishes anything, it is a determination of the need for and timing of resources to meet forecasted loads and a planning margin. It is in IRP acknowledgment orders where the Commission comments on whether it finds the utility's planning margin to be appropriate. Because information and technical capability related to planning margin analysis changes over time, the Commission's order in UM 1056 will likely set only minimum analytical requirements. Unless and until regional requirements are set, staff recommends that the Commission consider incremental improvements for planning margin analysis for the next planning cycle in IRP acknowledgment orders.

Finally, staff recommendation 11 would require in the next planning cycle that the company improve its analysis of high-efficiency combined heat and power (CHP) resources and aggregated dispatchable customer standby generation. These resources have the potential to reduce the costs and risks of generation and transmission, as well as distribution. In the current IRP, the company only performed stress tests for these resources, on Portfolio E only, and only on the West side of its system.

Recommendation 11 also would require a small step toward truly integrated planning by evaluating potential savings of reliable CHP resources in deferring just one major distribution system investment associated with load growth. Without considering these potential savings, much of the benefit of CHP resources to the company's system is left unanalyzed. The fact that IRP and distribution planning at the utility are separately performed functions does not justify incomplete analysis of all known resources. Consideration of avoided distribution system costs — a key benefit of well-located, reliable CHP resources — would provide a more accurate accounting of their potential value.

Other parties. CUB recommends that the Commission adopt staff's proposed draft order with additional language on what non-acknowledgment means, discussed below under "Coal plant in summer 2011." NWEAC and ODOE concur with CUB on the need for such an addition.

NWEAC "strongly supports" staff's draft proposed order with two additional requirements for the next IRP or Action Plan. First, NWEAC recommends that PacifiCorp should adopt a value for optionality (or penalty for long-term resource commitments) in its analysis of resources. ODOE agrees and recommends that the Commission require for the next IRP that PacifiCorp develop or adopt a

method to assess the risk-reduction value of short lead-time and smaller-sized resources.

Throughout this proceeding, NWEA, ODOE and others have raised concerns about whether the value of short-term resources and the risks of long-term resources have been sufficiently accounted for. Among the uncertainties and risks that parties raised in this proceeding are loads, climate change and the regulatory response, natural gas prices and the potential for liquefied natural gas to stabilize prices, and technology change including the potential for IGCC and carbon sequestration technologies to mitigate regulatory cost risks associated with coal plants.

ODOE points out that renewable resources, conservation, demand response resources and natural gas-fired plants have lower risks of overbuilding than coal plants because they have shorter lead times. As examples, ODOE states that absent the need for major transmission upgrades, renewable resource projects can be on-line in a year, and natural gas-fired plants can be on-line within two years, while coal plants require six years or more.

ODOE points out that resources with shorter lead times allow flexibility if load growth halts or turns negative. ODOE cites the Northwest's experience in the early 1980s when loads fell and unneeded coal and nuclear plants resulted in billions of dollars of unnecessary costs. To illustrate current uncertainty in load growth, ODOE cites Commission statistics showing that PacifiCorp's annual Oregon sales fell 14.8% from 2000 to 2003. ODOE also cites facts to support its concern that the U.S. economy is entering a period of great uncertainty.

ODOE cites the modeling methods employed by the Northwest Power and Conservation Council that capture the value of short lead-time resources. Unlike PacifiCorp's model, the Council's model allows generation construction decisions to adjust to unanticipated changes in load growth. The only flexibilities allowed in PacifiCorp's stochastic risk simulations relate to plant operation and market purchases and sales. In contrast, the Council's modeling shows that short lead-time resources significantly reduce the risk of overbuilding and under-building. ODOE notes that these models are commercially available or are open source models available from the Council.

ODOE believes the Commission should acknowledge long lead-time resources only if PacifiCorp demonstrates the risk of overbuilding or under-building is outweighed by other cost and risk reduction benefits.

Staff shares these concerns. However, we do not believe the potential solutions for addressing the value of optionality have been sufficiently vetted in this docket so that the Commission can issue a meaningful requirement for the next planning cycle. Staff expects issues such as lead time and resource size to be more fully addressed in UM 1056 under Issues 3 and 4. In part, these issues address the following: "How should the utilities evaluate and compare resource portfolios comprised of resources of different fuel types and technologies, and different durations?" and "What principles and metrics should the utilities use to weigh other types of risks...?"

NWEC also recommends that PacifiCorp analyze the health impacts and costs of its proposed resources, especially coal plants, and include those costs in its analyses. Specifically, NWEC suggests that the company use estimates of the incremental health costs of air pollutants as estimates of the future costs of emission allowances for sulfur dioxide, nitrogen oxides and mercury. NWEC believes these values represent the likely stringency of future air pollution regulation.

NWEC first raised this issue in reply comments, noting that the Ontario government decided to close the province's coal plants because of premature deaths attributable to air pollution from the plants. While NWEC says it does not seek to introduce into the docket a report on this subject, it notes that the cost considerations of such health impacts have not been studied in the IRP. NWEC states this is one more reason not to acknowledge the company's proposed conventional coal plant. NWEC recommends that the health impacts of resources be included in future IRPs.

Because of the introduction of this issue so late in the proceeding, staff recommends that parties discuss the health impacts of resources on the long-term public interest, including externalities that could become ratepayer costs in the future, in UM 1056. Issue 5 in that docket asks in part, "How should the utility assess whether its integrated resource plan is in the long-term public interest?" Parties also can address health impact costs under Issue 15, which parties have requested be expanded to include all environmental adders addressed in Order No. 93-695.

ODOE supports staff's proposed modifications to PacifiCorp's Action Plan, including recommendations 4, 7, 9 and 11, which the company opposes. ODOE agrees with staff that PacifiCorp has not sufficiently analyzed Class 1, 2 and 3 DSM. ODOE also agrees that the company has not properly assessed the value of Class 3 DSM in meeting peak needs, in its analysis of planning margin and in

its stochastic analysis. Finally, ODOE agrees that PacifiCorp's IRP has not adequately analyzed CHP resources and aggregated dispatchable customer standby generation.

In addition to addressing optionality, ODOE recommends that the Commission adopt staff's draft proposed order with two other requirements:

- The Commission should direct PacifiCorp for the next planning cycle to include demand response resources as peaking resources when it assesses capacity margins.
- The Commission should clarify the financial risks PacifiCorp might face if it pursues a coal plant for 2011.

Staff's addresses these proposed additions by topic under "Parties' Comments."

RNP supports staff's recommendation that the Commission not acknowledge the acquisition of a new coal resource at this time, as well as staff's recommendation that PacifiCorp continue its assessment of IGCC technology in terms of location, cost, technology risk and performance. Staff addresses RNP's specific comments regarding renewable resources below.

Parties' Comments

Following are specific issues raised in this proceeding, particularly as they relate to the draft proposed order, as well as staff's recommendations. The final proposed order provides additional information.

Load forecast. PacifiCorp does not believe that scenario analysis indicating performance of portfolios in the event load deviates significantly from projections provides any added value. Further, PacifiCorp states that considering load variability in isolation "can yield contradictory and perhaps misleading conclusions regarding the PVRR impact of load growth on various portfolios...." In addition, the company is concerned that "additional load-related scenario analysis would complicate the portfolio evaluation process rather than inform it."¹¹ PacifiCorp also reasserts that the IRP and resource procurement processes can adjust as required if the load forecast changes dramatically.

Staff agrees that the company's stochastic analysis of portfolios under varying loads, natural gas and power prices, hydro availability and unplanned outages incorporates an assessment of lower- and higher-than-expected loads (assuming

¹¹ PacifiCorp's Response to Staff's Draft Proposed Order at 7.

the *Commission* believes that load variability in the stochastic simulations encompasses suitably high and low extremes). That is why staff asked the following in Data Request No. 1:

Please provide the PVRR for each portfolio for which the Company performed stochastic analysis using the following load iterations (as illustrated on p. 102 of the Technical Appendix):

- a. the 25th percentile level of 2011 loads
- b. the minimum level of 2011 loads

PacifiCorp responded that it was unable to retrieve this type of data from its stochastic results. In consultation with the company, staff modified its request so that it could review a scenario analysis based on an hourly load forecast that was significantly lower than the company's base forecast, representing a potential overbuild situation.

In the final proposed order, staff clarifies its recommendation that future IRPs should include 1) average results for worst-case load growth in stochastic model runs or 2) scenario analysis of a future representative of significantly lower load growth than the company's base-case forecast.

Staff believes it may be difficult for the company to adjust its resource procurement process if loads deviate significantly from forecasts and the company is acquiring a large resource with a lead time of six to eight years. Analysis of possible overbuilding scenarios provides information on comparative performance of various portfolios.

Planning margin. PacifiCorp reasserts the basis for its 15% planning margin, including:

- Results of its loss of load probability (LOLP) study
- An analysis of the cost-risk tradeoff of higher levels of reliability, based on assumed costs to customers of unserved energy and a simplified modeling assumption that the cost of single-cycle combustion turbines represents the cost of reducing unserved energy
- LOLP and planning margin rules-of-thumb used by some utilities and reliability organizations
- Planning margin stress-tests on Reference Portfolio A which, according to the company, highlight that on a stochastic basis the range of planning margins tested is economically similar

The company states that demand response programs are "helpful to reliability" and may reduce the need to procure resources. However, the company believes that Class 3 DSM resources are non-firm and cannot be relied on for long-term system capacity and reliability planning purposes.

PacifiCorp asserts that Staff's recommendation to assess in the next planning cycle the cost-risk tradeoff for a variety of planning margin levels is "unnecessary." The company states, "Reserve Planning Margin is a control area or system metric based on a LOLP study of that specific system; it is not a variable that changes with each portfolio being evaluated to meet future system needs." The company further states that it "has no way to model stochastically the Planning Margin within its existing model, and is not aware of a model that can perform this type of analysis."¹²

PacifiCorp recommends the following Commission disposition for planning margin:

While the Commission agrees that the assumed costs to customers of unserved energy and costs for reducing it are disputable, there is no basis to judge 15% as being an unreasonable planning margin given PacifiCorp's IRP analysis and its consistency with current industry practice. The Commission expects to revisit PacifiCorp's Planning Margin analysis approach subsequent to the outcome of the UM 1056 proceeding and in light of regional adequacy standards being investigated and developed.

ODOE believes that PacifiCorp's planning margin analysis is "fundamentally flawed" because the company failed to analyze what ODOE considers the least-cost peaking resource: demand response programs (Class 1, 3 and 4 DSM). ODOE notes that demand response resources are not included in PacifiCorp's estimates of the cost of peaking capacity or the cost of unserved energy. ODOE asserts that benefit-cost analyses such as PacifiCorp's "bathtub curve" analysis must include all significant measures on either the cost side or the benefit side. ODOE cites the Commission's order for PacifiCorp's 2003 IRP, which directed the company for its next IRP to include in the portfolios those Class 1, 3 and 4 DSM resources that are least cost. ODOE recommends that the Commission direct PacifiCorp for the next planning cycle to include all demand response resources as capacity (peaking) resources when assessing the appropriate capacity margin. ODOE points out that this would lower the cost of reducing LOLP.

¹² *Ibid* at 10.

Staff believes ODOE's suggested addition already is incorporated in the proposed order. First, staff recommends that the Commission direct PacifiCorp for the next IRP to conduct its planning margin analysis on actual portfolios it is testing, not as a sidebar analysis using the addition of only single-cycle combustion turbines. Second, staff recommends that the company fully incorporate Class 1 (load control) DSM resources into portfolio modeling by conducting an economic assessment of potential Class 1 DSM over the planning period and fully analyzing their risk reduction benefits, not just the reduction in deterministic costs. Third, staff recommends that the Commission direct that PacifiCorp's planning margin analysis evaluate Class 3 DSM alternatives for meeting unserved energy.

Staff notes that LOLP is just one metric in the analysis of the appropriate planning margin. The company recognizes two other key metrics in its IRP: (1) expected unserved energy, which indicates the magnitude of possible outages and (2) the tradeoff between higher reliability and higher cost.

PacifiCorp correctly observes that these metrics ultimately are *economic* choices. In Appendix N in the IRP, the company describes how it examined a range of LOLPs by examining the total system costs associated with the addition of only single-cycle combustion turbines to reach each LOLP level.

Moreover, PacifiCorp points out in the IRP that the choice of resources, including the size and reliability of each technology, affects the reliability of the system.¹³ The company further states, "The underlying assumptions, system size, average unit size and outage rate, resource mix, and actual modeling approach used can cause differences in the resulting reserve Planning Margin."¹⁴ Therefore, the company recognizes that the optimal level for reliability metrics is a function of the resource makeup of the system. In particular, if a portfolio consists of something other than single-cycle combustion turbines, it stands to reason that the values for these reliability metrics will be something other than what the company determined in its planning margin study.

Planning margin is the *consequence* of resource decisions necessary to provide an acceptable level of risk at least cost. It should not be an *input* to that selection. Further, the analysis should be performed on the actual portfolios being

¹³ See Figures N-1 through N-4 in the IRP Technical Appendix.

¹⁴ PacifiCorp's Response to Staff's Draft Proposed Order at 9.

considered, which are comprised of resources mostly (or entirely) other than single-cycle combustion turbines.¹⁵

Contrary to PacifiCorp's assertion, staff is not asking the company to randomly select planning margins through stochastic analysis. Rather, staff is recommending that the Commission require the company to perform stochastic analysis on *all* portfolios at various planning margins — for example, 12%, 15% and 18%. Or, if model run-time makes it infeasible to perform this analysis on all portfolios, staff recommends that such analysis focus on the *top-performing* portfolios.

Such an analysis in the current IRP, for example, would have allowed the Commission to compare on behalf of ratepayers the performance of PacifiCorp's preferred Portfolio E at a 15% margin and Portfolio E at a 12% margin. Similarly, if the Commission finds that Portfolio M represents the best combination of cost and risk rather than Portfolio E, the Commission could have compared the performance of Portfolio M at a 15% margin and Portfolio M at a 12% margin.

Where a reliability organization doesn't have access to detailed economic information, deemed LOLP and reserve margins are used as rules of thumb. Where a utility has detailed economic information, however, it is far preferable to use that information to analyze the planning margin metrics using the actual resources in the utility's system, including those being contemplated as additions.

PacifiCorp plans to use its new Capacity Expansion Model as the primary means for selecting its preferred portfolio in the next planning cycle. The model picks the "optimal" portfolio based on the inputs provided. However, the company still will need to develop other portfolios for analysis — for example, a portfolio with more renewable resources and a portfolio with advanced coal technology. Because the Commission may have a different view than the company on which portfolio, and which planning margin, is best for ratepayers, at a minimum all top-performing portfolios should be tested at various planning margin levels.

Staff also recommends that the company evaluate the basis for its peak obligation in analyzing the appropriate planning margin. PacifiCorp asserts that staff did not specify in the draft order how the company should manage demand above the super-peak average load — if that serves as the basis for its peak obligation, rather than the single peak hour of the year. Staff's comments and proposed order clearly indicate that demand response resources such as interruptible contracts and the Energy Exchange could be used to fill such a gap.

¹⁵ PacifiCorp's preferred Portfolio E includes no single-cycle combustion turbines.

These resources have far lower total costs than owned or contracted supply-side resources, or market purchases during periods of high demand. Further, the resource costs the company would avoid may enable sizable buyback payments to Utah customers and achieve results similar to Oregon's experience with the Energy Exchange.

Demand-side management. PacifiCorp has committed to acquiring cost-effective conservation at levels beyond the originally proposed 200 MWa cap above the base case, as approved by each state's Commission.

The company also agreed for the next planning cycle to refine its already improved analysis of load control (Class 1 DSM) resources. First, the company will develop supply curves for various types of Class 1 DSM resources and allow the portfolio model to choose them. Second, and importantly, the company will analyze their risk reduction benefits. As stated above, the DSM resources PacifiCorp selected in the current IRP significantly reduced the risk of the company's preferred portfolio.

However, the company did not agree to staff's recommendation that for the next planning cycle it conduct an economic assessment of achievable conservation and load control resources throughout its service area. The company asserts that because DSM costs are *situs* to each state, each state Commission must decide whether to fund such a study. The company further believes that the issue should be addressed in the context of multi-state, IRP public input meetings and in the UM 1056 docket.

Staff believes that the company cannot know whether it is evaluating "all known resources" without such a study for the next planning cycle, given the significant changes in electricity costs, loads, and DSM technology since it last sponsored such a DSM assessment, in 2001.

PacifiCorp also disagrees with staff's recommendation to determine expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options.¹⁶ The company characterizes its experience with the Energy Exchange program as "inconsistent" and "unpredictable." Further, the company states that price elasticity based on Oregon's experience with the program in 2001 occurred at prices well above forecasted market prices, and the IRP model fills capacity needs using normal

¹⁶ PacifiCorp's Response to Staff's Draft Proposed Order incorrectly quotes staff's recommendation on pp. 12 and 21.

market conditions. The company also states that the Energy Exchange "intermittently fills short-term needs."¹⁷

Staff would characterize the single peak hour of the year, for example, as a short-term need. Staff explains above, and in its comments and proposed order, the importance of planning to use Class 3 DSM resources for meeting needs during the very real occurrences when market prices are higher than assumed in deterministic portfolio modeling, as well as for increasing reliability at the lowest possible cost. Staff explained that stochastic analysis incorporating market price excursions may be necessary to reveal the value of Class 3 DSM resources.

Non-hydro renewable resources. PacifiCorp agrees to model wind resources in a manner comparable to other supply-side options for the next IRP, including amounts higher and lower than the current 1,400 MW target, a holdover from the 2003 planning cycle. The company also plans to refine its capacity contribution methodology for wind, as well as investigate the relationship between portfolio composition and the cost and feasibility of integrating wind resources.

In addition, PacifiCorp agrees to execute an agreement with the Energy Trust of Oregon to reserve funds for the above-market costs of renewable resource projects and enable timely completion of resource agreements upon extension of the federal production tax credit.

The company suggests that the disposition on non-hydro renewable resources be changed to say the Commission "would expect the Company to have at least met its early target" toward the 1,400 MW included in its 2003 IRP. Based on responses to the company's renewable resources RFP and parties' comments in this docket, staff's proposed Commission disposition reads, "we would expect the Company might have exceeded, rather than fallen short of, its early target."

RNP appreciates staff's proposed language but would go further by directing the company to make renewable resource acquisitions a priority. RNP does not accept the company's assertion that an unpredictable federal production tax credit is a considerable obstacle to acquiring renewable resource projects, noting that utilities often sign contracts contingent on extension of the tax credit. RNP also disagrees with PacifiCorp's reliance on turbine prices and availability for its lack of progress in acquiring renewable resources. RNP concedes that wind turbine prices increased in the first quarter of 2005 and there currently is a scarcity of turbines for U.S. projects. However, RNP notes that this was not the case during 2004. The company issued its renewable resources RFP in February

¹⁷ PacifiCorp's Response to Staff's Draft Proposed Order at 12.

2004, and bids were due in March. Therefore, RNP points out, the company had nine months to contract for projects that had access to 2004 turbine prices.

RNP believes the real reason for lack of progress on the renewable resources RFP is that it was not made a priority within the company. RNP points toward the company's acquisition of more than 1,000 MW of gas resources in the same time period. RNP reasserts that it is not appropriate to obtain these fossil-fuel resources without also making real progress on the company's acknowledged target for renewable resources.

In response to PacifiCorp's comment that its 10-year planning target should not exceed 1,400 MW until the company has additional experience with substantial wind capacity in its system, RNP notes that the company already has experience integrating some 500 MW of wind on its system, including a few projects serving its retail customers. Further, RNP points out that the company cannot add to its experience if it does not acquire substantially more wind resources. While supporting the direction in the proposed order that the company should refine its analysis of renewable resources for the next IRP, RNP cautions against focusing on analysis rather than acquisition.

ODOE believes PacifiCorp customers would have a better balance of risks and expected costs with more development of renewable resources and deferral of the coal plant planned for 2011. ODOE asserts that PacifiCorp's goal of serving 7% of load on an energy basis with renewable resources by 2014 is inadequate considering that the company now projects natural gas prices that are 40% higher than assumed in its base-case analysis, the risk of high CO₂ regulatory costs, and the large amounts of renewable resources at reasonable costs bid into the company's RFP.

ODOE views as unfair PacifiCorp's comparison of its 1,400 MW goal with the sum of renewable resources planned to date by Portland General Electric, Puget Sound Energy, Idaho Power and Avista. ODOE points out that these utilities do not plan to stop acquiring renewable resources; they simply haven't planned acquisitions beyond the next several years. ODOE notes that Puget Sound Energy has already signed letters of intent for nearly 400 MW of wind and is on the path to exceed its goal. ODOE also calls on PacifiCorp's transmission and generation divisions to be more active in regional organizations that are addressing transmission and integration issues affecting wind resources.

Potential CO₂ regulatory costs. PacifiCorp asserts that staff appears to contradict itself when, on the one hand, we agree that the company should continue to use

its own assumptions about future regulatory costs of CO₂ emissions in base-case analyses, while on the other hand we believe PacifiCorp does not sufficiently weigh the risk of higher CO₂ regulatory costs in line with current scientific and economic analyses of climate change.

RNP continues to believe that PacifiCorp's base-case CO₂ value is too low. RNP therefore disagrees with staff that the company should continue to use its own assumptions about future CO₂ regulatory costs. RNP believes the Commission should provide more direction regarding the appropriate CO₂ adder. RNP notes the recent decision by the California Public Utilities Commission, cited in the attached proposed order, adopting imputed costs for CO₂ emissions to be used by the utilities in long-term planning and procurement.

In its reply comments, ODOE states that CO₂ allowances in Europe on July 8, 2005, were trading at an equivalent of \$31.43/short ton. ODOE recognizes that short-run constraints on available allowances following implementation of the Kyoto Protocol may be responsible for the dramatic rise in prices from last year. However, ODOE believes recent trading data indicate that the long-run costs of CO₂ offsets may be well above PacifiCorp's assumed \$8.38/ton (2010\$).

CUB and NVEC similarly believe that the carbon adder in PacifiCorp's base case is too low.

Staff believes that the sensitivity analyses required by Order No. 93-695 provide the Commission with sufficient information to indicate how portfolios may perform under potential CO₂ regulatory scenarios such that a Commission requirement for a specific base-case adder may be unnecessary. Staff notes that this issue will be addressed in Docket UM 1056 under Issue 15: "Should the Commission update the type of CO₂ risk analysis required by Order No. 93-695, including the cost adder values? Should utilities be required to assign an imputed cost for CO₂ in IRPs?" Staff will further consider this issue in that proceeding.

Coal plant in summer 2011. PacifiCorp disagrees with staff's recommendation that the Commission not acknowledge Action Item 8, acquisition of 600 MW high capacity-factor resource in summer 2011, and to explicitly not acknowledge a coal plant by that date.

PacifiCorp asserts that staff is using "selective inconsistency" to "prevent construction of the least cost resource in CY 2011 – a coal plant."¹⁸ The company notes that staff did not mention concerns about the company's planning margin

¹⁸ PacifiCorp's Response to Staff's Draft Proposed Order at 14.

determination in relation to the proposed 2009 resource. The company states that a lower planning margin "should delay the CY 2009 resource and potentially affect the timing of other action items."

Staff agrees with this statement, and the Commission may wish to take that into account in proceedings related to the 2009 resource. At the same time, staff finds it unlikely that the company's analysis is so amiss that one of the two large resources in its Action Plan is not needed in the 2009-2011 timeframe. Further, load forecasts are less accurate farther out in the future. Therefore, staff has greater concerns related to forecasting risk for yet another large plant that is scheduled six years out.

While PacifiCorp believes there is a need for another large thermal resource in summer 2011, the company agrees with staff and CUB on the importance of evaluating transmission options as part of portfolio analysis. The company states:

[H]owever, transmission could be an alternative to bridging the gap between loads and resource either in the short or long term.... PacifiCorp realizes that targeted transmission expansion opportunities could provide flexibility to deliver additional power from existing resources, procurement of power with shorter-term commitments, or access to low cost resources in remote locations (i.e., Power River Basin Coal, wind, or both). The flexibility associated with these types of transmission expansion opportunities could postpone the need for acquiring a long-term, supply side resource close to the load center. PacifiCorp is committed to evaluating transmission alternatives and pursuing those alternatives that appear to be cost-effective.

PacifiCorp points out that in the draft proposed order, staff incorrectly compared Portfolio E's results with the coal plant delay scenarios the company performed on the "Preferred Portfolio." Staff did not realize that the stochastic results the company provided in response to staff's requested scenarios were for Portfolio E *with DSM*. Staff corrected the comparison in the final proposed order.¹⁹ The average stochastic costs are about the same for a one-, two- or three-year delay, compared to a summer 2011 on-line date.²⁰ Delaying the resource slightly increases estimated worst-case results under the assumed planning margin.

¹⁹ The IRP does not present results of stochastic analysis on the company's final Preferred Portfolio – Portfolio E with DSM. Staff obtained these results via data request.

²⁰ Average costs are slightly *lower* when the coal plant is delayed two or three years, compared to a summer 2011 on-line date.

In its reply comments, under "Long Lead Time for Coal Resources," PacifiCorp cites less expensive Total Resource Costs (TRC) for a pulverized coal plant vs. a natural gas-fired plant. Such an analysis is useful when comparing two plants operated as base-load units. However, PacifiCorp's resource gap on the East side is primarily a peaking problem, not a base-load problem. Unlike the TRC analysis, the company's deterministic and stochastic analyses consider operating characteristics of gas and coal resources in response to retail loads in estimating costs.

However, none of the analyses in the current IRP addresses the value of short vs. long lead-time resources. Combined-cycle gas plants can be built in a far shorter time, have lower sunk and lower capacity costs,²¹ and with more flexible operating characteristics are better able to meet peaking needs, compared to a coal plant. In addition, the company's TRC, deterministic and stochastic analyses do not consider the risk of CO₂ regulatory costs higher than the company's assumed \$8/ton value.

PacifiCorp suggests that the Commission's disposition for Action Item 8 state:

The Commission needs further evidence to support the addition of a coal plant in the CY 2011 time frame. Therefore, before PacifiCorp makes a final decision to procure a coal plant it should either file a Resource Rate Plan under ORS 757.212 or address the resource consistent with the guidelines from the final commission order in Docket UM 1182. As an alternative to procuring coal in the CY 2011 time frame, the Company should evaluate transmission expansion alternatives to bridge the gap before large resource decisions can be agreed.

Further, the company recommends that its proposed 2011 resource be acknowledged as follows:

The need for a resource in or delivered to Utah by the summer of 2011 is acknowledged, but not a specific resource size, type of unit, or procurement date. Prior to the selection of a coal plant as the preferred resource for the 2011 time period, PacifiCorp will file a Resource Rate Plan under ORS 757.212 or address the resource consistent with the guidelines from the final commission order in

²¹ See "Annual Pmt" and Fixed Cost-Total columns in Table C.28 of the IRP Technical Appendix.

Docket UM 1182. PacifiCorp will evaluate transmission alternatives to fill the need in this time period (Implementation Action 8).

Staff views PacifiCorp's proposed disposition and modified action item as *carte blanche* to procure a resource regardless of a demonstration of need in the Commission's planning process. In our comments and proposed order, staff provides abundant evidence showing that PacifiCorp has not proven the need by summer 2011 for yet another large thermal resource.

Further, the Justice Department has identified serious legal flaws with the yet untested Resource Rate Plan provided under ORS 757.212.²² Also, we don't know when the Commission will issue its order in the competitive bidding docket (UM 1182). Given the six-year lead time for a coal plant, plus another 12 to 18 months for an RFP process to address recently enacted requirements in Utah, the order issuance date may not meet PacifiCorp's timeframe. Moreover, staff does not see how either process would establish the *need* for the resource. That is what Integrated Resource Planning is for.

CUB recommends that if the Commission does not acknowledge a coal plant by summer 2011, it clarify the significance of this decision. CUB therefore recommended the following addition to the draft proposed order:

While the Commission has specifically not acknowledged a new coal unit in this IRP, it does not mean that PacifiCorp may not choose to invest in a new coal unit and seek cost recovery in a future rate case. If that situation were to arise, the Commission has at its disposal several tools to allow cost recovery in a manner that is consistent with this order and which appropriately allocate the costs and risks between shareholders and ratepayers. Such tools could include a finding that the coal unit is imprudent, and no recovery is allowed; an imputation of a zero or low CO₂-emitting resource in place of the coal plant; or an allowance for cost recovery of CO₂ regulation up to, but no more than, \$8/ton of CO₂. As the IRP is not a ratemaking process, we decline at this stage to identify the Commission's response to a future rate case application.

²² Memorandum from Stephanie Andrus, Oregon Department of Justice, to Kathryn Logan, Mike Grant, Maury Galbraith, Lisa Schwartz, and Lee Sparling, October 2, 2003. This memorandum was distributed at a subsequent UM 1066 workshop.

NWEC is concerned that PacifiCorp may not sufficiently consider the risk of cost recovery in the type of plant the company decides to acquire. NWEC believes PacifiCorp may not think the result of a poor resource decision will affect it, but will simply be recovered in rates. NWEC states, "we *want* the consideration of risks to materially affect its resource decisions."²³ If a conventional coal plant the company builds becomes uneconomical due to future carbon regulation or technology improvements, NWEC will argue in a future rate case that the company should be denied recovery if evidence of those risks presented now is ignored. NWEC urges the Commission to "make it clear that PacifiCorp should disabuse itself of the notion that it will get recovery later if it ignores risks."²⁴

Similarly, ODOE recommends that the Commission clarify the financial risks PacifiCorp faces with its proposed 2011 coal plant if CO₂ regulatory costs rise about \$8.38/ton (2010\$) during the 40-year amortization period or if load growth falters between now and 2011. ODOE notes parties' comments that dismiss the company's long-run forecast of CO₂ regulatory costs, and that no party other than PacifiCorp recommends the Commission acknowledge the proposed coal plant.

The final proposed order states that the company must first prove the resource need and then, if the company builds a coal plant to meet that need, the Commission could allow cost recovery based on the resource that was the prudent choice at the time the resource decision is made:

If in the future PacifiCorp: 1) demonstrates the need for a large supply-side resource in summer 2011 or a later date; 2) chooses to invest in a new coal plant to meet this need; and 3) does not demonstrate to this Commission that a coal plant is the prudent resource choice, we have at our disposal several tools to allow cost recovery in a manner that is consistent with this order and which appropriately allocate the costs and risks between shareholders and ratepayers.

For example, in place of the coal plant, the Commission could impute the cost of a zero or low CO₂-emitting resource if we find that is the prudent resource action at the time the company needs to make the resource commitment. As the IRP is not a ratemaking process, we decline at this time to identify the Commission's response to a future rate case application.

²³ Reply Comments of the NW Energy Coalition, July 12, 2005, at 1. Emphasis in original.

²⁴ *Ibid* at 2.

CUB restates its conclusion that while PacifiCorp's base-case carbon adder is politically feasible now, it does not begin to represent the potential far-reaching costs of carbon emissions in light of the scientific and economic analyses of climate change that are currently available. CUB states that a serious accounting of carbon risk indicates that Portfolio M, the all-gas portfolio, is the least costly under the company's other base-case assumptions.

CUB echoes staff's request for further assessment of IGCC coal and sequestration technologies in the company's next IRP. PacifiCorp supports this recommendation. The company has commissioned a detailed study of this resource to determine its viability.

Hydropower resources. In response to comments from Hydropower Reform Coalition and WaterWatch of Oregon, staff recommends that in future IRPs PacifiCorp analyze environmental impacts of pumped storage technology if it becomes a viable resource. The company agrees to do so.

Staff recommended in the draft proposed order that the company consider the potential cost and risk benefits for customers of dam removal when it is considering relicensing alternatives. PacifiCorp disagreed that the company should commit to doing so during the IRP process or otherwise. The company states that there is no federal requirement to conduct dam removal or decommissioning studies. The company states that it is required only to analyze the costs, benefits and environmental impacts of the proposed project as part of obtaining a new generating license, though FERC may request information about decommissioning.

Staff intended its recommendation to refer to the relicensing process, not the IRP process, because we believe relicensing is the appropriate forum for considering such matters. Therefore, staff has removed this recommendation from the Commission disposition in the proposed order and clarifies its comments elsewhere.

Distributed generation. PacifiCorp disagrees with staff and other parties that the lack of analysis of combined heat and power (CHP) resources in the IRP represents a regulatory barrier. The company states that IRP modeling can be performed with any "theoretical" amount of CHP in the portfolios. The company views the issue as "forecasting a feasible and dependable amount of CHP capacity suitable for long term resource planning,"²⁵ because the company

²⁵ PacifiCorp's Response to Staff's Draft Proposed Order at 18.

cannot predict whether customers will invest in such facilities. The company reasserts that CHP projects are typically not dispatchable, do not contribute to peak capacity needs, and typically provide only energy to the system on a long term planning basis. The company goes further by stating that relying on CHP facilities is a risk to maintaining planning reserve margins because they can be removed from service based on customer economics.

Finally, PacifiCorp asserts that considering CHP's potential for distribution asset deferral is beyond the current scope of an IRP. In addition, because this issue is being considered in UM 1056, the company states that it is beyond the scope of the Commission's acknowledgment review for the current IRP.

CUB states that it is the utility's responsibility to assess all generation options, including CHP, and to create a diverse, least-cost integrated portfolio of resources. Therefore, CUB believes that the Commission should encourage, if not pressure, the utilities, to identify and include in their portfolios efficient CHP opportunities and acquire acknowledged CHP resources. CUB also believes utility acquisition of CHP resources will take pressure off the Energy Trust to fund CHP facilities, allowing the Trust to maintain funding levels for the energy efficiency assumed in the utility's IRP.

Staff's addresses these issues earlier in this report and in the proposed order.

Transmission. As discussed above, PacifiCorp agrees with staff and CUB that additional analysis could be done to address the relative costs and risks of transmission investments that enable access to shorter-term market purchases or lower-cost generation alternatives. PacifiCorp agreed with staff's proposed addition to the Action Plan related to this issue.

Staff's Final Recommendations

Based on staff's review of PacifiCorp's 2004 IRP and the comments received, staff recommends that the Commission acknowledge the IRP with one exception, seven agreed-upon modifications to the Action Plan, and four requirements for the next planning cycle. The exception is Action Item 8: Procure a 600 MW high capacity factor resource in or delivered to Utah by the summer of 2011. Staff recommends that the construction of a second large thermal resource in or delivered to Utah by the summer of 2011 not be acknowledged, including acquisition of a new coal unit.

Following are the agreed-upon modifications to the Action Plan, incorporating changes to items 1, 2 and 3 suggested by PacifiCorp in its response to staff's draft proposed order:

Revised Action Item

1. Use decrement values to assess cost-effective bids in DSM RFP(s). Acquire the base DSM (PacifiCorp and ETO combined) of 250 MWa and 200 MWa or more of additional Class 2 DSM found cost-effective through RFP or in-house programs, up to the levels required to serve load growth, and as approved by each State's Commission. (Action Item 2)

Additional Action Items

2. Execute an agreement with the Energy Trust of Oregon by October 1, 2005, to reserve funds for the above-market costs of renewable resources that benefit Oregon ratepayers and enable timely completion of resource agreements upon extension of the federal production tax credit.
3. For the next IRP or Action Plan, analyze renewable resources in a manner comparable to other supply-side options, including testing cost and risk metrics for portfolios with amounts higher and lower than current targets, further refine wind's capacity contribution, and consider the effect of fuel type for thermal resource additions on the Company's cost to integrate wind resources.
4. For the next IRP or Action Plan, develop supply curves for various types of Class 1 DSM resources, model them as portfolio options that compete with supply-side options, and analyze cost and risk reduction benefits. Evaluate this approach for Class 2 DSM resources and recommend whether this approach is preferable to the current decrement approach.
5. For the next IRP or Action Plan, assume existing interruptible contracts continue unless they are not renegotiable or other resources would provide better value.
6. For the next IRP or Action Plan, assess IGCC technology in a location potentially suitable for CO₂ sequestration, including cost, commercialization status, technology risk, and comparative performance under future uncertainties including market prices and CO₂ regulation.
7. For the next IRP or Action Plan, analyze the costs and risks of portfolios that include various combinations of additional transmission to reach resources

that are shorter term or lower cost, along with new generating resources and their associated transmission.

The Company does not agree to modify its Action Plan pursuant to staff's other recommendations. We recommend the Commission require these items for the next planning cycle:

1. Conduct an economic analysis of achievable Class 1 and Class 2 DSM measures in PacifiCorp's service area over the IRP study period and assess how the company's base and planned programs compare with the cost-effective amounts determined in the study.
2. Determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options.
3. Analyze planning margin cost-risk tradeoffs within stochastic modeling of portfolios. If feasible, analyze the cost-risk tradeoff of all portfolios at various planning margins. If not feasible, build all portfolios to a set planning margin, test them stochastically, and adjust top-performing portfolios to higher and lower planning margins for further stochastic evaluation. Evaluate loss of load probability, expected unserved energy and worst-case unserved energy, as well as Class 3 DSM alternatives for meeting unserved energy. Evaluate alternatives for determining the expected annual peak demand for determining the planning margin — for example, planning to the average of the eight-hour super-peak period.
4. Evaluate within portfolio modeling the potential for reducing costs and risks of generation and transmission by including high-efficiency CHP resources and aggregated dispatchable customer standby generation of various sizes within load-growth areas. Evaluate the potential value of CHP resources in deferring a major distribution system investment associated with load growth, assuming physical assurance of load shedding when the generator goes off line, up to the number of hours required to defer the investment.

PROPOSED COMMISSION MOTION:

PacifiCorp's 2004 Integrated Resource Plan with agreed-upon modifications be acknowledged with one exception by adoption of the attached proposed order. The exception: Procurement of a 600 MW high capacity factor resource in or

delivered to Utah by the summer of 2011 is not acknowledged, including acquisition of a new coal unit. For the next IRP or Action Plan, the company must:

1. Conduct an economic analysis of achievable Class 1 and Class 2 DSM measures in PacifiCorp's service area over the IRP study period and assess how the company's base and planned programs compare with the cost-effective amounts determined in the study.
2. Determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options.
3. Analyze planning margin cost-risk tradeoffs within stochastic modeling of portfolios. If feasible, analyze the cost-risk tradeoff of all portfolios at various planning margins. If not feasible, build all portfolios to a set planning margin, test them stochastically, and adjust top-performing portfolios to higher and lower planning margins for further stochastic evaluation. Evaluate loss of load probability, expected unserved energy and worst-case unserved energy, as well as Class 3 DSM alternatives for meeting unserved energy. Evaluate alternatives for determining the expected annual peak demand for determining the planning margin — for example, planning to the average of the eight-hour super-peak period.
4. Evaluate within portfolio modeling the potential for reducing costs and risks of generation and transmission by including high-efficiency CHP resources and aggregated dispatchable customer standby generation of various sizes within load-growth areas. Evaluate the potential value of CHP resources in deferring a major distribution system investment associated with load growth, assuming physical assurance of load shedding when the generator goes off line, up to the number of hours required to defer the investment.

ORDER NO.

ENTERED

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

LC 39

In the Matter of)	
)	PROPOSED ORDER
PACIFICORP)	
)	
2004 Integrated Resource Plan.		

DISPOSITION: PLAN ACKNOWLEDGED WITH EXCEPTION,
AGREED-UPON MODIFICATIONS, AND REQUIREMENTS FOR
NEXT PLANNING CYCLE

INTRODUCTION

On January 20, 2005, PacifiCorp, dba Pacific Power & Light Company (PacifiCorp or the Company) filed its Integrated Resource Plan (IRP). This filing is in accordance with Public Utility Commission of Oregon (Commission) Order No. 89-507, which requires all regulated energy utilities operating in Oregon to engage in least-cost resource planning.

Requirements for Least-Cost Planning

The Commission requires regulated energy utilities to prepare least-cost plans every two years. Utilities must involve both the Commission and the public in their least-cost planning process, and prior to resource decision-making. Substantively, the Commission requires that energy utilities: (1) evaluate resources on a consistent and comparable basis; (2) consider uncertainty; (3) make the primary goal of the process a resource plan that is least cost to the utility and its ratepayers and consistent with the long-run public interest; and (4) create a plan that is consistent with the energy policy of the state of Oregon stated at ORS 469.010. *See* Order No. 89-507.

Order No. 89-507 also specifies that the Commission will “acknowledge” least-cost plans that satisfy the procedural and substantive requirements, and that seem reasonable at the time acknowledgment is given.

PacifiCorp satisfied Oregon's procedural requirements relating to its planning process. In the analysis below, the Commission identifies specific portions of PacifiCorp's filed IRP that did not satisfy all of Oregon's substantive least-cost planning requirements or that did not seem reasonable in light of current circumstances after review of the Company's analysis and the Parties' comments. However, PacifiCorp has agreed to modify its plan to address most of the identified concerns. The Commission concludes that PacifiCorp's IRP, with agreed-upon modifications, satisfies Oregon's least-cost planning requirements and appears reasonable in light of current circumstances with one exception and requirements for the next IRP or Action Plan described below. Accordingly, the plan with agreed-upon modifications is acknowledged with one exception and with requirements for the next planning cycle.

PacifiCorp

PacifiCorp serves some 1.6 million customers in six Western states: Oregon, Utah, Wyoming, Washington, Idaho and California. For the fiscal year (FY) ending March 31, 2004, the Company sold 48,679 gigawatt-hours (GWh) of electricity to retail consumers in its service territory and 13,407 GWh of electricity to wholesale customers.

PacifiCorp owns or has interests in 71 generating plants with net plant capability totaling 7,987 megawatts (MW). For the FY ending March 31, 2004, 68.4% of the Company's energy requirements were supplied by 11 coal plants, 5.4% from 54 hydroelectric plants, 0.2% from one wind plant, and 4.1% from four natural gas plants and one geothermal plant. Short-term and long-term contracts and spot market purchases supplied the remaining 22% of the Company's energy needs.

PacifiCorp developed its long-term load/resource balance during the period March 2004 through May 2004. The Company's load forecast *implicitly* includes the continuing effects of historical Class 2 demand-side management (DSM). For the period 1993 through FY 2004, the amount was 198 average megawatts (MWa). In addition, the Company assumes for its base-case that conservation will reduce loads at the generation level by 250 MWa during the period FY 2005-2014, with a peak effect of 323 MW. This amount is *explicitly* included in the Company's load forecast. It is composed of the Energy Trust's contribution for Oregon, totaling 86 MWa, and a 147 MWa expansion of PacifiCorp's existing conservation programs to other states by 2014.

PacifiCorp expects loads to grow by 2.7% per year on average in the eastern portion of its service territory (Utah, Idaho and Wyoming), and 1.1% in the western portion (Oregon, Washington and California) through FY 2015. The Company forecasts *peak* load to grow on average 3.8% per year in the East and 1.5% per year in the West. Among the six states in its service area, the Company estimates *average annual growth* over the next 10 years at 1.0% in Oregon and 3.5% in Utah, with summer coincident system peak loads growing in these states at 1.3% and 4.6%, respectively.

According to PacifiCorp's estimates, the system becomes capacity-deficit beginning FY 2009, with the gap growing to about 2,800 MW by FY 2015. The majority

of additions are needed in the eastern portion of the system. The gap in PacifiCorp West is a result of a financial and energy problem; the gap in PacifiCorp East is a transmission and capacity problem.

The western side of PacifiCorp's system is capacity-sufficient until FY 2011. The capacity deficit grows to about 1,000 MW in FY 2015. However, the West is energy-deficit in the off-peak period until the expiration of the BPA peaking contract in FY 2012, when the region becomes short during both on- and off-peak hours.

The eastern side of PacifiCorp's system is capacity-deficit during peak hours in the summer beginning in FY 2009. The deficit grows to about 1,800 MW by FY 2015. The off-peak hours are energy-surplus for 10 years without any resource additions.

PacifiCorp's Preferred Resource Strategy

Based on the analysis described below, PacifiCorp selected Portfolio E with DSM as its preferred course of action. Portfolio E with DSM calls for the following resources from FY 2005 to 2015:

- 2,629 MW of thermal generation capacity, consisting of two coal plants and two natural gas plants in the East, and one natural gas plant in the West
- 177 MW of Class 1 DSM (direct load control) resources split between the West and East sides

All portfolios evaluated, including the preferred portfolio, include "Planned Resources" that PacifiCorp has firmly decided to acquire:

- Up to 450 MWa of Class 2 DSM (conservation) resources
- 1,400 MW of renewable resources
- Up to 1,200 MW of shaped capacity resources on a rolling annual basis
- 100 MW of known Qualifying Facilities on the East side

Implementation Actions for PacifiCorp's Preferred Portfolio

The Company requests acknowledgment for the following Action Plan for its preferred portfolio. The Action Plan includes activities for any decision the Company intends to make in the next two to four years. The resource types evaluated in the IRP are considered to be proxy resources representing the fuel type and operating characteristics that PacifiCorp deems to best fit the deficit position. PacifiCorp will determine the actual type of resource to acquire during the procurement process. Size is rounded to the nearest 50 MW.

1. Continue to aggressively pursue cost-effective renewable resources through current and future RFP(s)
 - Size: 1,400 MW
 - Resource evaluated in IRP: Wind

- Timing: FY 2006-2015
 - Location: System
2. Use decrement values to assess cost-effective bids in DSM RFP(s). Acquire the base DSM (PacifiCorp and ETO combined) of 250 MWa and up to an additional 200 MWa if cost-effective programs can be found through the RFP process.
 - Size: 450 MWa
 - Resource evaluated in IRP: 100 MW decrements of Class 2 DSM (conservation) at various load shapes
 - Timing: FY 2006-2015
 - Location: System
 3. Include Combined Heat and Power (CHP) as eligible resources in supply-side RFPs.
 - Size: n/a
 - Resource evaluated in IRP: Two 45-MW units using National Renewable Energy Laboratory (NREL) cost estimates
 - Timing: FY 2010 (summer of 2009) and FY 2012 (summer of 2011)
 - Location: System
 4. Include a provision for Standby Generators in supply-side RFPs. Investigate, with Air Quality Officials, the viability of this resource option.
 - Size: n/a
 - Resource evaluated in IRP: 75 MW in Utah
 - Timing: FY 2010 (summer of 2009) and FY 2012 (summer of 2011)
 - Location: Utah
 5. Procure cost-effective summer load control program in Utah by the summer of 2008.
 - Size: 50 MW
 - Resource evaluated in IRP: Irrigation load control
 - Timing: FY 2009 (summer of 2008)
 - Location: Utah
 6. Procure cost-effective summer load control program in Oregon, Washington, and/or California by the summer of 2008.
 - Size: 50 MW
 - Resource evaluated in IRP: Irrigation load control
 - Timing: FY 2009 (summer of 2008)
 - Location: Oregon/Washington/California
 7. Procure a flexible resource in or delivered to Utah by the summer of 2009.
 - Size: 550 MW
 - Resource evaluated in IRP: Flexible, natural gas-fired combined-cycle combustion turbine

- Timing: FY 2010 (summer of 2009)
 - Location: Utah
8. Procure a high capacity factor resource in or delivered to Utah by the summer of 2011.
 - Size: 600 MW
 - Resource evaluated in IRP: Pulverized coal plant
 - Timing: FY 2012 (summer of 2011)
 - Location: Utah
 9. Continue to work with other regional entities to develop Grid West. Continue to actively participate in regional transmission initiatives (e.g., RMATS, NTAC).
 - Size: n/a
 - Resource evaluated in IRP: Transmission from Wyoming to Utah
 - Timing: FY 2013 and beyond
 - Location: System
 10. Incorporate Capacity Expansion Model into portfolio and scenario analysis.
 - Size: n/a
 - Resource evaluated in IRP: n/a
 - Timing: 2006 IRP
 - Location: n/a

PacifiCorp intends to issue an RFP in 2005 for a natural gas-fired plant to be completed by summer 2009 and an RFP in 2006-07 for a coal plant to be in service by summer 2011. Both plants are for the East side of the system. PacifiCorp also plans to issue RFPs to meet 2006 conservation needs outside of Oregon and to acquire load control resources system-wide from 2006 through 2008.

DISCUSSION

Procedural Requirements

Energy utilities must file least-cost plans every two years and involve the Commission and the public in its planning process. *See* Order No. 89-507 at 3. The Commission finds PacifiCorp satisfied these procedural requirements.

PacifiCorp filed this plan approximately two years after filing its previous Integrated Resource Plan. The Company's filing was timely under Order No. 89-507.

The public involvement process included eight public input meetings beginning December 11, 2003, and four technical workshops. PacifiCorp distributed a draft of its plan for comment by participants in November 2004 before submitting its final plan to the Commission on January 20, 2005.

The Commission held a Special Public Meeting regarding PacifiCorp's plan on April 25, 2005. On or before May 23, 2005, the Citizens' Utility Board (CUB), the Oregon Department of Energy (ODOE), Renewable Northwest Project (RNP), Northwest Energy Coalition (NWECC), and the Hydropower Reform Coalition/WaterWatch of Oregon submitted written comments to the Commission and Parties regarding the IRP. PacifiCorp filed a reply to Parties' comments on June 6, 2005. Staff circulated to Parties its comments, recommendations and a draft proposed order on June 27, 2005.

Parties filed reply comments on July 13, 2005. Staff issued its final recommendations and proposed order on July 27, 2005. The Commission held a second Special Public Meeting on August 1, 2005.

Substantive Requirements

Evaluating resources on a consistent and comparable basis. PacifiCorp's modeling simulated the integration of new resource alternatives with its existing generation and transmission assets. The model uses hourly data for loads, market prices and shaping of hydroelectric resources, considers purchases and sales at four market trading hubs, and takes into account transmission paths and constraints to provide a detailed examination of the economic and operational performance of resource alternatives.

Base-Case Assumptions. The Company modeled on a system-wide basis with the following assumptions for a 20-year study period — April 1, 2005, to March 31, 2025:

- Where possible, new resources are modeled as specific assets.
- Inflation rates not established by external sources are based on the following annual rates:
 - CY 2004-2010 – 2.02%
 - CY 2011-2020 – 2.94%
 - CY 2021-2030 – 3.48%
- Long-term purchases and sales contracts are not renewed, including the following:
 - The West Valley lease expires May 31, 2008.
 - The 400 MW power purchase agreement with TransAlta Energy Marketing expires in FY 2008.
 - The 575 MW BPA peaking contract expires in FY 2012.
 - 127 MWa of interruptible contracts in Utah expire in December 2006.
- Resources are served by firm transmission. There are no changes in transmission rights except those resulting from contractual obligations and transfer capability made available through modeled transmission additions.

- Portfolios are built to match load growth plus a 15% planning margin.
- Loads grow on average 2.1% per year. The East side grows at 2.7% per year on average and the West side at 1.1% through 2015.
- Wind resources contribute to the reserve margin at 20% of their nameplate rating, based on a study performed for the IRP.
- No loads leave PacifiCorp's system over the study period as a result of direct access in Oregon.
- Natural gas prices are based on blending PacifiCorp's near-term forecasts as of June 30, 2004, with a long-term forecast dated May 11, 2004, derived from external sources, primarily PIRA Energy Group. The Company developed two hourly forecasts for natural gas prices: one for the East side (Opal market hub) and one for the West side (an average of prices at Sumas, Stanfield and Opal).
- Delivered coal costs for Wyoming and Utah are based on PacifiCorp's estimates.
- Hourly wholesale electricity prices as of June 30, 2004, for the Mid-Columbia, California-Oregon Border, Four Corners and Palo Verde market hubs are based on near-term forward prices from the market and long-term fundamental price scenarios simulated in the Company's MIDAS model.
- The federal production tax credit will continue at \$18/MWh for the first 10 years of operation for wind and closed-loop biomass projects.
- New wind and biomass plants provide a green tag value of \$5/MWh for the first five years of production.
- A perfect cap-and-trade regime exists such that there will be a purchaser for all pollutant emissions at the following prices:
 - Sulfur dioxide - \$877/ton in 2010
 - Nitrogen oxides - \$2,105/ton in 2010
 - Mercury - \$40,934/lb in 2010
 - Carbon dioxide (CO₂) - \$8/ton (2008\$) – In recognition of the timing uncertainty of CO₂ regulation, costs are phased in at \$4.19/ton in CY 2010 (representing a 50% probability of an \$8.38/ton allowance cost in 2010\$), increase to \$8.80/ton by CY 2012, and grow at inflation thereafter.
- “Existing Resources” are those currently in operation or for which procurement contracts have been signed as of May 1, 2004, such as the Currant Creek and Lake Side natural gas plants.
- All portfolios include the following resources:

- 450 MWa of conservation including the Energy Trust’s contribution
 - 1,400 MW of renewable resources
 - 100 MW of known Qualifying Facilities on the East side with non-firm pricing contracts (no capacity contribution is assumed)
- Up to 1,200 MW of market purchases on a rolling annual basis. Seasonal transactions are available from one to three years (or more) in advance based on historical operational data and PacifiCorp’s forward market view. Transactions include 500 MW of annual 7x24 products on the West side, and on the East side 500 MW of heavy-load hour (HLH) products at Four Corners and 200 MW of HLH products at Mona, both in the third quarter.

Portfolios Tested. Each portfolio specifies the types of resource additions and when and where they would be added, including the estimated cost of transmission upgrades needed to get the power from the new generating resources to PacifiCorp's system. The Company used a “Reference Portfolio” (Portfolio A) to develop eight new portfolios and analyze the effects of resource type, timing and location:

- Portfolio A
 - Dry-cooling natural gas-fired combined-cycle combustion turbine (CCCT) in the East - FY 2009
 - Pulverized coal plant in Utah - FY 2011
 - Dry-cooling natural gas-fired CCCT in the West - FY 2013
 - Single-cycle combustion turbine (SCCT) in the West - FY 2013
 - Wet-cooling natural gas-fired CCCT in the East - FY 2014
 - Integrated Gasification Combined-Cycle (IGCC) coal plant in Wyoming - FY 2015
- Portfolio B – Replace FY 2011 pulverized coal plant with CCCT
- Portfolio C – Replace FY 2009 CCCT with SCCTs
- Portfolio D – Defer Utah pulverized coal from FY 2011 to FY 2014 and move up natural gas CCCT from FY 2014 to FY 2011
- Portfolio E – Replace FY 2015 IGCC with Wyoming pulverized coal plant
- Portfolio F – Substitute FY 2011 Utah pulverized coal plant with a Wyoming plant
- Portfolio G – Build two FY 2013 SCCTs on the East side instead of the West side
- Portfolio H – Replace FY 2014 CCCT with compressed air energy storage
- Portfolio I – Replace FY 2014 CCCT with hydro pumped storage

PacifiCorp then developed a second round of portfolios to reduce present value revenue requirements (PVR), provide a representative set of portfolios for risk analysis, and test portfolios recommended by PacifiCorp staff and public participants in the IRP process:

- Portfolio J – Portfolio B, with Wyoming pulverized coal replacing IGCC
- Portfolio K - Portfolio C, with Wyoming pulverized coal replacing IGCC

- Portfolio L - Portfolio D, with Wyoming pulverized coal replacing IGCC
- Portfolio M – All natural-gas CCCTs
- Portfolio N - All natural-gas SCCTs and CCCTs
- Portfolio O – Substitute an IGCC plant for the Utah FY 2011 pulverized coal plant
- Portfolio P - Constructed by the Capacity Expansion Model; substitutes a natural-gas SCCT in FY 2014 and a natural-gas CCCT in FY 2015 for the FY 2015 Wyoming pulverized coal plant
- Portfolio Q – Development of two PacifiCorp-owned 345 kV transmission lines to transport power to northern Utah, along with an additional pulverized coal plant in Wyoming

Altogether, PacifiCorp tested 17 portfolio options for meeting its projected resource requirements, plus the stress cases described below. A simulation of each portfolio calculated the operating costs of the new system (portfolio additions plus existing resources) under a common set of assumptions about the future, described above. PacifiCorp then combined operating costs with the capital costs of new resources to determine the present value revenue requirements (PVRR) of each portfolio, which is the sum of year-by-year revenue requirements after accounting for the time-value of money.

Next, the Company screened each portfolio against other performance measures, including capital costs, pollutant emissions, market sales and purchases, unit capacity factors, and system transfers between East and West.

Demand-Side Management Resources. The Company divides DSM into four categories:

- Class 1 - Dispatchable load control of end uses such as air conditioning, water heating, space heating, lighting and irrigation during peak hours
- Class 2 – Conservation, providing long-term energy reductions
- Class 3 – Price-responsive load reduction as a result of short-term price signals, including time-varying pricing, interruptible contracts and the Energy Exchange demand buy-back program
- Class 4 – Energy and capacity reductions achieved through behavioral responses to programs such as Power Forward in Utah, achieving up to 70 MW of load reduction through public appeals to cut back usage during peak hours on critical load days

For Class 1 DSM resources, the Company’s base case includes 125 MW of load control by 2006 — maintaining the Idaho irrigation program at current levels (35 MW) and increasing air conditioning control to 90 MW.

New this planning process, PacifiCorp modeled potential direct load-control programs as resources that could compete with supply-side options. The Company did not determine the types and amounts of new load control resources in its full portfolio modeling. Rather, the Company used its new Capacity Expansion Model to select among

eight proxy programs. The amounts evaluated were limited to 100 MW each. The Company then added to its preferred Portfolio E the selected load-control resources and analyzed the benefits of resource deferral. Three resources were deferred as a result of adding direct load control resources, reducing the PVRR of Portfolio E by \$134 million:

- The Utah gas-fired CCCT was deferred from FY 2009 to FY 2010.
- The Utah pulverized coal plant was deferred from FY 2011 to FY 2012.
- The West-side gas-fired SCCTs were deferred from FY 2014 to beyond the period covered by the Action Plan.

Based on this modeling, the Company plans to add a total of 40 MW of load control beyond the base case assumptions on the East side and 40 MW on the West side by FY 2009. The preferred portfolio includes an additional 40 MW of load reduction each on the East and West sides of the system by FY 2014. The total amount of Class 1 programs assumed in the IRP is 302 MW over 10 years — 125 MW in the base case, plus 177 MW of new resources if found to be cost-effective.

Next, the Company performed a “decrement analysis” on its preferred Portfolio E with Class 1 DSM resources to further improve the PVRR. The decrement analysis estimated the reduced system operating costs from a range of Class 2 DSM (conservation) programs. The Company ran the IRP model with and without eight 100 MW conservation decrements to the load forecast on the East and West sides shaped to the following loads: residential cooling, commercial cooling, commercial lighting, and total control area. The decrements began in FY 2009.

Based on the decrement analysis, the Company plans to acquire an additional 200 MWa of conservation resources outside Oregon if found to be cost-effective through RFPs. The Company agreed with Staff’s recommendation to acquire more than 200 MWa of conservation above the base amount through RFPs or in-house programs if cost-effective and as approved by each State’s Commission. To determine cost-effectiveness, the Company plans to re-run its decrement analysis with updated gas and electricity price forecasts.

PacifiCorp did not model Class 3 DSM programs in the IRP. At its May 2005 public input meeting, however, the Company stated that it will allow load curtailment (i.e., interruptible loads) of 25 MW or larger to bid into its RFP for 2009 resources.

Uncertainty. PacifiCorp performed risk analysis on the seven portfolios with the lowest PVRR under the Company’s base-case assumptions. In least-cost order, they are portfolios M, P, K, E, L, N and J. The Company also performed risk analysis on Portfolio Q, the costliest portfolio, because it represented a transmission expansion scenario (with a third coal plant), as well as the 12% and 18% planning margin stress cases.

PacifiCorp sorts future risks and uncertainties into three categories: paradigm, stochastic and scenario risk.

Paradigm risks represent radical changes. PacifiCorp addressed the potential impact of paradigm risks in a qualitative, rather than quantitative, manner. The Company discussed the possible impacts of major changes in market structure or regulatory requirements, such as customers choosing alternative suppliers in states allowing direct access and changes in transmission operation and control resulting from formation of a regional transmission organization. Other examples of paradigm risks include changes in state or federal mandates, such as establishment of a renewable portfolio standard and innovative emissions regulation.

The Company also discusses how it would handle a significant change in loads or resources (IRP at 190):

Material shifts in either loads or resources could affect the timing and size of major resource additions. Examples of significant changes that could occur include a large loss of load under retail competition (OR SB1149), the dramatic reduction in load from a large end-use customer or customers or a terrorist event that could impact the economy. Another example includes a substantial increase in the power that is sold to PacifiCorp from Qualifying Facilities which could result in a decrease in the need for a new resource and could change the timing and/or mix of the planned resources.

Possible paths PacifiCorp could take if a major shift in either the loads or resources would occur include:

- Delay or accelerate resource procurement(s)
- Reassess the amount and timing of the need

Stochastic risk is quantifiable as a known fluctuation around an expected value. PacifiCorp quantified the variability of five risks: (1) retail load, (2) natural gas prices, (3) electricity prices, (4) hydroelectric generation and (5) thermal unit outages. PacifiCorp then used Monte Carlo simulation to model the performance of top-performing and representative portfolios in 100 model runs. The simulation allows PacifiCorp to address the asymmetric nature of these risks as well as the interactions among them.

Portfolio E outperformed the other portfolios on most measures of stochastic risk:

- Portfolio E had the lowest average stochastic cost (stochastic variable costs plus the deterministic fixed cost) based on the 100 model runs.
- Portfolio E had the second lowest standard deviation and variance, following Portfolio Q, based on the 100 model runs.
- Portfolio E had the second lowest average risk based on the difference between the average stochastic cost and the deterministic cost, following Portfolio Q.
- Portfolio E was among the four portfolios with the best “upper tail” results, based on the average of the five worst model runs. Portfolios E, Q, K and L have statistically equal upper tail average costs.

- Portfolio E was among the five portfolios (along with portfolios K, L, Q and the 12% planning margin case) with the least risk relative to cost, based on two types of cost-risk tradeoff: (1) deterministic PVRR (costs under the Company’s base-case assumptions) vs. the average upper-tail (worst case) results and (2) average stochastic cost vs. the standard deviation of stochastic costs.

PacifiCorp also performed a “spark spread” stochastic analysis that allowed only natural gas and electricity prices to move randomly along with thermal plant outages; loads and hydro generation remained constant. The purpose of this analysis is to measure the impact of volatility due primarily to price fluctuations. Due to natural gas price volatility, portfolios with fuel diversity in capacity additions such as Portfolio E exhibited less risk than all-gas portfolios M and N. Portfolio Q, with significant new transmission providing greater market access along with three new coal plants, also performed well in the stochastic analyses.

Scenario risks represent abrupt changes in risk factors. PacifiCorp performed a high natural gas price analysis and various CO₂ allowance cost analyses on all-gas portfolios M and N, which had the lowest deterministic costs, as well as portfolios E, K, L and Q, which performed well in the stochastic analyses.

The “high gas” scenario tested the portfolios’ sensitivity to a large fundamental increase in natural gas prices. The Company used as the basis an updated PIRA Energy Group forecast, which the Company planned to use in its December 31, 2004, official price forecast for CY 2005 to 2015. This update is on average \$2.27/MMBtu higher at Henry Hub than PacifiCorp’s base-case forecast. The Company increased this updated forecast by 10% to create a higher sensitivity case. In addition, a real escalation adjustment reflects the possibility of gas demand outpacing gains in production in the long term. The Company developed a “high gas” power price forecast in the MIDAS model for the scenario analysis.

Under the high gas case, the PVRR of all portfolios increased between 6% and 13% and market transactions were exercised more fully. All-gas Portfolio M was the most significantly affected, moving from least-cost to sixth place. Portfolios E, K and Q, with the least amount of natural gas generation, performed best.

At its May 2005 public input meeting, PacifiCorp stated that its current natural gas price forecast for the 20-year planning period is about 40% higher, and its Mid-Columbia electricity price forecast is about 17% higher, than the base-case forecasts used in the IRP.

In compliance with Commission Order No. 93-695, PacifiCorp performed scenario analysis on the following CO₂ regulatory cost adders (2010\$):

- \$0
- \$14.90 (\$10 in 1990\$)

- \$37.25 (\$25 in 1990\$)
- \$59.60 (\$40 in 1990\$)

As in its base case, PacifiCorp assumed for each analysis that the adder begins in 2010 with a 50% likelihood of occurrence, with the allowance fully implemented in 2012 and growing at inflation thereafter. The Company also assumed a maximum allowable amount of emissions system-wide fixed at 2000 levels and a perfect cap-and-trade system.

Three variables are modified in response to changing CO₂ allowance costs: electric market clearing prices, natural gas prices and allowance costs for other pollutants. The analysis provides deterministic, rather than stochastic, results.

PacifiCorp concludes that there is little impact to PVRR or differentiation in portfolio performance at its base-case assumption of an \$8.38/ton (2010\$) allowance cost. Significant differences occur, however, at the low- and high-end allowance cases.

Portfolio Q, with major transmission additions and a third coal plant, had the lowest PVRR in a scenario with no carbon regulation. All natural-gas Portfolio M was the least-cost portfolio for all other cases, including the Company's base-case allowance. Portfolio M generates substantial emissions credits by reducing existing coal operations and running new and existing gas plants more. At the same time, this portfolio is most significantly affected by the high fuel prices resulting from high CO₂ adders in the \$37.25/ton and \$59.60/ton cases.

At a regulatory cost of \$33/ton CO₂ (1990\$), PacifiCorp estimates that an IGCC plant with CO₂ capture and sequestration is cost-effective, compared to a supercritical pulverized coal plant without it.

Primary goal must be least-cost/consistent with long-run public interest.

PacifiCorp tested 17 portfolios plus six stress cases consisting of a variety of resources. The portfolios were designed to meet the Company's forecasted loads and a 15% planning reserve margin.

Planning reserve margin is a way to balance the tradeoff between resource adequacy and cost. It represents the difference between a control area's expected annual peak capability (including long-term firm wholesale purchases) and its expected annual peak demand (retail sales plus long-term firm wholesale sales), expressed as a percentage of the expected annual peak demand.

PacifiCorp conducted a separate planning margin study for the 2004 IRP. First, the Company built loads and resources for a sample year (FY 2009) to several levels of planning margin for the system peak hour. Then, the Company stressed variables such as unit forced outage, hydro availability and weather-caused load variations in 100 runs using the MARKETSYM hourly model.

A loss of load hour is where demand exceeds supply, but provides no indication of magnitude or duration of the outage. Unserved energy is the amount of obligation not served over a period of time. “Expected” unserved energy is the *average* unserved energy over 100 model runs when systems are stressed stochastically.

To estimate the cost of unserved energy, the Company used a weighted average of interruption costs by customer class, based on 1990 estimates from the Electric Power Research Institute (EPRI) for Pacific Gas & Electric (PG&E). PacifiCorp used the capital cost of a natural gas-fired SCCT, at \$72/kW/year, to estimate the cost of reducing unserved energy for each planning margin level. The model also could call on other supplies in the Western Electricity Coordinating Council (WECC) region, up to firm transmission rights.

PacifiCorp compared the lower costs of expected unserved energy with the costs of the additional resources needed to achieve each planning margin tested. The Company concluded that a 15% planning margin, which represents a loss of load probability of two days (48 hours) in 10 years, strikes a balance between reliability and cost. The Company deemed this level as minimizing total costs, including the capital costs of new resources plus the cost of unserved energy. Setting the margin above 15% did not provide a significant increase in system reliability, but would cost significantly more.

Least-Cost Portfolio. PacifiCorp's examination of what is "least-cost" is based in part on its calculation of PVRR of each portfolio using a discounted cash-flow model. In addition to assessing and comparing the capital and operating costs of each portfolio, PacifiCorp identified risk factors such as volatility of fuel and spot market prices, current and potential federal regulations, and load fluctuations. The Company assessed cost variability of the resource scenarios and impacts on rates.

In addition, the Company evaluated trade-offs among the portfolios, such as PVRR versus risk. Further, PacifiCorp evaluated scenarios that indicate the potential long-run costs of its resource choices, including possible shifts in societal values such as enactment of regulations for CO₂ emissions. Ultimately, PacifiCorp selected what it thought was the best resource portfolio, considering PVRR and other analyses, as the basis for preparing the Action Plan.

Portfolio M, the all natural-gas portfolio, was the least-cost portfolio under PacifiCorp's base-case assumptions. The PVRR for Portfolio M is \$29 million, or about 0.2%, lower than Portfolio E. Other portfolios performing well in this “deterministic” analysis were Portfolios P, K, L, N and J and the 12% planning margin case.

Based largely on the stochastic risk analysis described above, PacifiCorp chose Portfolio E, with a combination of natural gas and coal plants, as its “least cost, risk informed” portfolio. Portfolio K, with SCCTs instead of a CCCT added in FY 2009, had a nearly identical cost and risk profile compared to Portfolio E.

PacifiCorp chose Portfolio E over Portfolio K because of the Company's operating experience with CCCTs, potential to share common plant facilities and spare parts with other CCCTs in Utah, better heat rate and lower emission rates. On balance, PacifiCorp found the advantages of SCCT technologies, including greater dispatch, build flexibility and lower capital cost, did not outweigh the advantages of a CCCT for the FY 2009 East-side resource.

Reducing PVRR of the Preferred Portfolio. After selecting Portfolio E, the Company performed load control analysis and conservation decrement analysis to evaluate the cost-effectiveness of potential new DSM programs, as described above. The Company also performed *stress tests* on Portfolio E to assess the following potential improvements:

- *Planning margins that are lower and higher than the 15% level used in developing the portfolios (12% and 18%).*
- *Replacement of market purchases with CCCT plants in FY 2009 and FY 2013. This stress case demonstrated that the shaped market transactions included in the Action Plan are significantly more cost-effective than building or buying long-term assets.*
- *Procurement of an IGCC resource in FY 2011, instead of a pulverized coal plant. This stress case was based on more recent information on technology and cost, compared to the IGCC portfolios initially studied. Capital costs and fixed O&M costs are higher, but availability increased from 75% to 90%. While the PVRR of the early IGCC portfolio is slightly lower than Portfolio O, which is based on older information, it is still \$222 million higher than Portfolio E. For perspective, however, the early IGCC portfolio translates into an average annual rate increase of about 2.7% for FY 2006 to 2016, which PacifiCorp considers not significantly different than the customer impact results for other portfolios.*
- *Procurement of 90 MW of combined heat and power (CHP) resources on the West side in FY 2013. With the assumption that these resources are firm, this stress case eliminated the need for a 97 MW SCCT in the West and lowered the PVRR by \$37 million.*
- *Procurement of 75 MW of customer-owned dispatchable standby generation. For this stress case, PacifiCorp assumed it could acquire control of 25% of the approximately 300 MW of existing standby generators in its Utah service area by FY 2009. These are typically backup diesel generators at large commercial and industrial facilities. This stress case delayed by one year each a natural gas plant and a coal plant. The stress case also assumed PacifiCorp could acquire 40 MW of standby generation in the West, avoiding one 97 MW SCCT. Compared to Portfolio E, the PVRR for this portfolio is \$60 million*

lower, with a reduction in capital costs of almost \$130 million. PacifiCorp expresses concern, however, about air quality restrictions in Salt Lake City.

The Company did not make any changes to Portfolio E based on these stress tests. However, the Action Plan includes CHP and standby generation as eligible resources for supply-side RFPs.

Consistency with Oregon's energy policy. Oregon's overall energy policy is stated in ORS 469.010. The policy states, in part, "[i]t is the goal of Oregon to promote the efficient use of energy resources and to develop permanently sustainable energy resources." The IRP promotes the efficient use of energy resources through DSM Action Plan items. The Action Plan also includes acquisition of 1,400 MW of renewable resources.

Parties' Comments

As discussed above, in the months preceding this order, ODOE, CUB, RNP, NWECA, Hydropower Reform Coalition/WaterWatch of Oregon, Staff and PacifiCorp filed written comments regarding the Company's IRP. Further, the Parties had opportunity for oral presentations to the Commission at two Special Public Meetings, on April 25 and August 1, 2005. Following is the Commission's discussion of issues raised by the Parties, concluding with their overall recommendations, as well as the Commission's disposition.

Load forecast. Staff notes that for representative and top-performing portfolios, PacifiCorp tested retail load fluctuations stochastically in combination with other key variables. According to the Company, retail load varied in the model from 0.5% to 2.9% of the forecasted load growth rate.

Staff believes scenario risk analysis of load forecast error is useful in understanding the potential performance of portfolios in the event loads deviate significantly from projections. Therefore, Staff asked PacifiCorp to provide PVRR values from the stochastic model runs representing low and worst-case load growth. The Company stated that it was unable to retrieve this type of data from its stochastic model results. Therefore, Staff asked the Company to develop a new hourly load forecast that is two standard deviations lower than the Company's base-case assumption. Using that new forecast, Staff asked the Company to provide the deterministic PVRR of the portfolios for which the Company performed other scenario analysis. No portfolios were changed; only operational changes resulting from reduced load requirements were simulated in the hourly dispatch model. This scenario provides an indication of the relative performance of portfolios when loads turn out lower than the Company forecasted and, therefore, the system is overbuilt in hindsight.

According to PacifiCorp, a growth rate two standard deviations lower represents load growth at 0.4%, compared to the assumed 1.3% growth rate, and a total load that is 93.4% of the Company's base-case forecast. For comparison, the difference in loads

between the base case and Staff's lower load scenario is roughly equivalent to the difference between the Medium and Medium Low demand forecasts for the Northwest Power and Conservation Council's Fifth Power Plan. However, the Council's Medium Low forecast is closer to one standard deviation, than two standard deviations, from the Medium forecast.

Staff notes that the deterministic PVRR of all portfolios is lower under its load scenario, presumably the result of increased sales and reduced fuel and other O&M costs. Staff points out that PacifiCorp's preferred Portfolio E performs the worst of the six portfolios evaluated under the lower load scenario, and all-gas Portfolio M moves from least-cost among the 17 portfolios tested in the IRP to third place among the six portfolios PacifiCorp included in scenario analysis.

Portfolio Q, which expands transmission into Wyoming to allow greater access to shorter-term market transactions and includes a third coal plant, moves from the worst-performing of all 17 portfolios in the IRP to the least costly of the six portfolios tested. Because no portfolio in the IRP isolates the effect of building only transmission facilities, Staff states that it cannot tell whether the improved PVRR of Portfolio Q in the reduced load scenario is the result of more market transactions, fuel type (more coal and less natural gas), or a combination of these and other factors. *See* PacifiCorp's Response to Staff Data Request No. 1.

PacifiCorp does not believe that scenario analysis indicating performance of portfolios in the event load deviates significantly from projections provides any added value. Further, PacifiCorp states that considering load variability in isolation "can yield contradictory and perhaps misleading conclusions regarding the PVRR impact of load growth on various portfolios...." In addition, the Company is concerned that "additional load-related scenario analysis would complicate the portfolio evaluation process rather than inform it." *See* PacifiCorp's Response to Staff's Draft Proposed Order at 7. PacifiCorp asserts that the IRP and resource procurement processes can adjust as required if the load forecast changes dramatically.

Staff believes it may be difficult for the Company to adjust its resource procurement process if loads deviate significantly from forecasts and the Company is acquiring a large resource with a lead time of six to eight years. Staff recommends that future IRPs include: 1) results for worst-case load growth in stochastic model runs *or* 2) scenario analysis of a future representative of significantly lower load growth than the Company's base-case forecast.

Regarding the effect of restructuring on loads, Staff agrees with PacifiCorp that it should continue at this time to plan to serve the entire forecasted load in its Oregon service territory on a long-term basis given the level of participation in direct access to date and customers' ability to return to cost of service rates each year. Staff believes this issue should be revisited if direct access participation increases significantly, if the Company adopts and has sizable participation in a tariff similar to Portland General

Electric's five-year opt-out program, or if customers participate in a permanent opt-out tariff as envisioned in Commission Order No. 05-133.

Commission disposition: The Commission expects consideration of different futures through risk analysis in IRPs, including the risk that retail loads could vary significantly above or below forecasts along with fluctuations of other variables. Load variability in stochastic simulations of portfolios should encompass suitably high and low extremes.

IRPs should provide PVRR results of futures that are representative of significant deviations from projected load growth, including growth well below the Company's base load-growth forecast. If that is not feasible using the results of the Company's stochastic analysis, the IRP should include the results of scenario analyses of such futures.

Planning reserve margin. CUB suggests that a planning margin lower than 15% would be justified if it could help defer a coal plant, as described under "Coal plant," below.

PacifiCorp asserts that changing the planning margin for the purpose of avoiding investment in one type of technology or fuel type is inappropriate. Moreover, the Company states it decides technology and fuel type in the procurement process.

In support of its selected planning margin, the Company lists the factors it considered, including its obligation to provide reliable low-cost power, WECC reserve requirements, a stochastic system dispatch analysis of planning margin impacts on reliability, a cost-risk tradeoff analysis for various planning margin levels, deterministic cost analysis of 12% and 18% planning margin cases, the economic implications of physical short exposure to markets, industry standard reliability thresholds, and planning margin assumptions made by other Western utilities. The Company opines that until there is clarity regarding possible resource adequacy standards under development by regional organizations, there is no compelling reason for it to change its methodology for determining the optimal planning margin.

PacifiCorp recommends that even if the assumed costs to customers of unserved energy and costs for reducing it are disputable, there is no basis to judge 15% as being an unreasonable planning margin given PacifiCorp's IRP analysis and its consistency with current industry practice. PacifiCorp further notes that planning margin is an issue in Docket UM 1056 and regional adequacy standards are being investigated and developed.

The Company states that demand response programs are "helpful to reliability" and may reduce the need to procure resources. However, the Company believes that Class 3 DSM resources are non-firm and cannot be relied on for long-term system capacity and reliability planning purposes.

ODOE believes that PacifiCorp's planning margin analysis is "fundamentally flawed" because the Company failed to analyze what ODOE considers the least-cost

peaking resource: demand response programs (Class 1, 3 and 4 DSM). ODOE notes that demand response resources are not included in PacifiCorp's estimates of the cost of peaking capacity or the cost of unserved energy. ODOE asserts that benefit-cost analyses such as PacifiCorp's "bathtub curve" analysis must include all significant measures on either the cost side or the benefit side. ODOE recommends that the Commission direct PacifiCorp for the next planning cycle to include all demand response resources as capacity (peaking) resources when assessing the appropriate capacity margin. ODOE points out that this would lower the cost of reducing loss of load probability (LOLP).

Staff is not convinced that the benefits of the Company's proposed 15% planning margin outweigh the costs. Staff notes that the 12% planning margin stress case portfolio had a PVRR about \$140 million, or 1%, lower than Portfolio E which like other portfolios assumes a 15% planning margin. The all-in stochastic cost for the 12% stress case was only 0.2% higher compared to Portfolio E, with an upper tail PVRR (average of five worst results) just 1.2% higher. Staff further notes that production and fixed costs for the 12% stress case are significantly lower than for Portfolio E, although total variable costs are higher due to greater market purchases and lower sales revenues.

Staff recognizes that based on PacifiCorp's analysis, the LOLP for a 12% planning margin would be about four days in 10 years. However, Staff points out that the actual planning margins for the 12% stress case would be higher most years, presumably the result of large, lumpy resource additions and planning to the single peak hour of the year: 15% in FY 2006-2008 and 2011, 14% for FY 2009 and FY 2014, and 13% for FY 2012; it would dip to 12% only in FY 2010, FY 2013 and FY 2015. *See* IRP Technical Appendix at 83.

Further, Staff states that the *actual* planning margin is expected to be 15% only during FY 2006-2008 and 2015. The planning margin is expected to reach 16% in FY 2010 and 2012-2013, 18% in 2014, and climb as high as 19% in 2009 and 2011. *See* IRP Technical Appendix at 82.

Staff is skeptical of the unserved energy costs PacifiCorp used in its planning margin analysis. Staff expresses concern that they may be out-of-date, they are not from PacifiCorp's service area, and they are very high. They come from a 1990 EPRI study for PG&E in California, and range from \$5,210/MWh for agricultural customers to \$6,590/MWh for residential customers and from \$15,290/MWh for large industrial customers to \$44,910/MWh for small commercial customers. PacifiCorp took the weighted average of these numbers, \$24,000/MWh, and used that value to ultimately represent unserved energy costs.

Staff notes that the recent Statewide Pricing Pilot in California shows that residential customers are willing to curtail loads at prices far lower than the interruption costs PacifiCorp used in the IRP study. Similarly, ODOE notes "...there are many customers willing to voluntarily reduce their use at prices well below 100 times normal retail prices. PacifiCorp did not consider a serious 'buy back' program to assure reliability in a resource short situation." *See* ODOE Opening Comments at 17.

Staff points out that even at these high assumed interruption costs for customers, the “bathtub chart” curve for residential and agricultural customers bottoms out at a planning margin of about 12%. *See* IRP Technical Appendix at 221. Staff indicates that voluntary load reductions from customer classes with the lowest interruption costs should be taken into account in estimating the costs of reducing unserved energy.

Further, Staff states that some demand response resources, such as interruptible contracts and the Energy Exchange program, have lower fixed costs than SCCTs, which served as the basis for the Company’s estimated cost of reducing unserved energy. Such programs could make a planning margin higher than 12% more attractive, but these DSM resources were not included anywhere in the planning margin or portfolio analyses.

Staff points out that in July 2004 the Commission acknowledged for Portland General Electric’s IRP a planning margin of 12%, consisting of 6% operating reserves as required by WECC and an additional 6% planning reserve, all under average hydro conditions. *See* Order No. 04-375.

Staff notes that the planning margin was determined on the basis of meeting the single peak hour of the year. Staff asked the Company to reproduce its system and East side coincident capacity charts if instead of planning to the coincident peak hour for the Eastern control area the Company planned to the “super-peak” period — the average of the eight super-peak hours. Staff points toward data showing planning reserve capacity could be reduced by some 200 MW in FY 2011 and FY 2012, for example, if the Company planned to the super-peak period instead of the single peak hour of the year. *See* PacifiCorp’s Response to Staff Data Request No. 4.

Staff points out that demand response resources such as interruptible contracts and the Energy Exchange could be used to fill such a gap between the single peak hour of the year and the average load in the eight super-peak hours. Demand response resources have far lower total costs than owned or contracted supply-side resources, or market purchases during periods of high demand.

Staff asked the Company what would be the resulting preferred portfolio and its PVRR if the Company planned to the average of the super-peak period instead of the single peak hour. The revised obligation amount had no impact on the timing of the capacity additions in Portfolio E. The Company therefore constructed an alternative portfolio, assuming the FY 2010 CCCT is replaced by SCCTs with a lower overall amount of capacity — 174 MW in FY 2010 and another 174 MW in FY 2011. The deterministic PVRR of the revised portfolio is \$100 million less than Portfolio E. *See* PacifiCorp’s Response to Staff Data Request No. 5.

Staff advises that the planning margin be an analysis *variable* in the modeling of all portfolios. Staff asserts that the methodology used by the Northwest Planning and Conservation Council in its Fifth Power Plan to analyze the appropriate planning margin is superior to PacifiCorp’s methodology. The Council assesses the cost-risk tradeoff of

various planning margins *within* its portfolio modeling. In contrast, PacifiCorp predetermined the planning margin for all portfolios in a sidebar analysis (15%), then conducted stress tests of two other levels (12% and 18%) based on the initial Reference Portfolio A, which was not among the top-performing portfolios.

Staff states that where a reliability organization does not have access to detailed economic information, deemed LOLP and reserve margins are used as rules of thumb. Where a utility has detailed economic information, however, Staff states that this information should be used to analyze the planning margin metrics. That information includes the actual resources in the utility's system as well as those being contemplated as additions. Staff points out that PacifiCorp's planning margin analysis used only single-cycle combustion turbines as system additions, and the Company's preferred Portfolio E includes no such additions.

Staff notes that LOLP is just one metric in the analysis of the appropriate planning margin. The Company recognizes two other key metrics in its IRP: (1) expected unserved energy, which indicates the magnitude of possible outages and (2) the tradeoff between higher reliability and higher cost.

Staff points out that PacifiCorp recognizes these metrics ultimately are *economic* choices because it examined the total system costs associated with each LOLP level and stated that the optimal level for reliability metrics is a function of the resource makeup of the system. Staff points out that if a portfolio consists of something other than single-cycle combustion turbines, actual reliability metrics will be different than what the Company determined in its planning margin study.

Staff recommends that for the next IRP or Action Plan brought forward for the Commission's acknowledgment, PacifiCorp determine the appropriate planning margin by analyzing the cost-risk tradeoff of various planning margins *within* stochastic modeling of portfolios, rather than as a separate analysis as in the 2004 IRP. Ideally, Staff recommends that the Company analyze the cost-risk tradeoff of *all* portfolios at various planning margins. At a minimum, Staff recommends that the Company initially build all portfolios to a set planning margin, test them stochastically, and adjust top-performing portfolios to higher and lower planning margins for further stochastic evaluation. Staff also recommends that the Company evaluate loss of load probability, expected unserved energy and worst-case unserved energy, as well as Class 3 DSM alternatives for meeting unserved energy.

Staff further recommends that the Company evaluate alternatives for determining the expected annual peak demand — for example, planning to the average of the eight-hour super-peak period, instead of the single peak hour of the year.

Commission disposition: PacifiCorp's IRP analysis does not satisfy that its proposed 15% planning margin is appropriate. The 12% planning margin stress-case portfolio is less costly on a deterministic basis, and its expected stochastic cost and upper tail cost are similar to Portfolio E which includes a 15% planning margin. The assumed

costs to customers of unserved energy, and the cost for reducing it, are disputable. Further, under PacifiCorp's proposed implementation, the actual planning margin for its preferred portfolio during most of the planning cycle will be higher than 15%. Moreover, the Company did not analyze the cost-risk tradeoff of various planning margins within stochastic modeling of actual portfolios. PacifiCorp's proposed planning reserve margin of 15% is not acknowledged.

For its next IRP or Action Plan, PacifiCorp should determine the appropriate planning margin by analyzing the cost-risk tradeoff within stochastic modeling of portfolios. In particular, the Company should assess the cost-risk tradeoff of each portfolio at various planning margins, or explain why it cannot do so. In that case, the Company should at a minimum build all portfolios to a set planning margin, test them stochastically, and adjust top-performing portfolios to higher and lower planning margins for further stochastic evaluation. The Company also should evaluate loss of load probability, expected unserved energy and worst-case unserved energy, as well as Class 3 DSM alternatives for meeting unserved energy. Further, the Company should evaluate alternatives for determining the expected annual peak demand — for example, planning to the average of the eight-hour super-peak period, instead of the single peak hour of the year.

Demand-side management. CUB asserts that the primary driver behind the “presented urgency to make a coal investment decision ... is growth in load in Utah.... The IRP has not satisfied us that all possible measures have been, or will be, taken to aggressively address the real problem by reducing the Company's East-Side peak load.” See CUB Opening Comments at 13.

CUB maintains that PacifiCorp has known for a decade that Utah's load growth, including its peak loads, are cost drivers. While the average annual growth of Oregon's contribution to PacifiCorp's system coincident peak has been negative over the past 13 years, Utah's contribution has grown an average of 6.2% each year, CUB states. See IRP Technical Appendix, Table I.4. CUB notes PacifiCorp's forecast that over the next 10 years, Oregon's contribution to system coincident peak load will increase by an average of 1.3% per year, while Utah's contribution will grow by 4.6% per year. See IRP Technical Appendix, Table I.5.

On an energy basis, CUB points out that Utah's load growth has outstripped Oregon's by nearly 10 times over the last 13 years, and PacifiCorp expects Utah's load growth rate to outpace Oregon's by a factor of three from 2006 to 2015. See IRP Technical Appendix, Table I.3.

CUB states, “During the Energy Crisis, PacifiCorp felt the sting of having less resource available to serve load, in part because of the remarkably aggressive rate of Utah load growth. We wonder if this rush to add base-load coal is both a too-late reaction to serving Utah's inexorable load growth, and an overreaction to it through massive base-load additions.” See CUB Opening Comments at 14.

CUB acknowledges that the Company's IRP begins to address the East side peaking problem, but notes that of the nine activities PacifiCorp identifies that are reducing peak loads on the East side today, load reductions for four of them are not included in the IRP analysis and reductions from 261 MW of interruptible contracts are not included after expiration of current contracts. *See* PacifiCorp's Response to CUB Data Request No. 4. CUB opines that the Company should assume for planning purposes that reductions from interruptible contracts continue, and take actions to ensure they do.

CUB wonders if PacifiCorp is sufficiently aggressive in its pursuit of load reductions for air conditioning, irrigation and industrial loads. CUB maintains, "If the Company does not rely on its DSM programs in its IRP, then the IRP will include enough resources such that the Company won't need those DSM programs." *See* CUB Opening Comments at 15.

Staff notes that adding Class 1 and Class 2 DSM measures to PacifiCorp's preferred Portfolio E reduced deterministic present value revenue requirements (PVRR) by about \$134 million (1.0%), reduced stochastic average PVRR by about \$852 million (6.4%), and reduced upper tail (worst-case) stochastic PVRR by some \$805 million (4.6%). PacifiCorp did not perform analysis of the risk reduction benefits of DSM resources for the 2004 IRP; Staff obtained these values by data request. *See* Table E.1 in the IRP Technical Appendix for deterministic values, and PacifiCorp's responses to Staff Data Request No. 14-16 for stochastic values.

PacifiCorp states that it is aggressively pursuing DSM, noting a 60% increase in Class 2 DSM from 2002 to its goal for FY 2006, including Energy Trust programs. Further, Class 1 DSM resources have grown from zero in 2002 to over 90 MW in summer 2005 in the East. PacifiCorp plans to increase this level to more than 150 MW by 2008, and the Action Plan envisions a larger build-out over the planning period. Including its 261 MW of existing customer curtailment agreements in the East, PacifiCorp states that the net peak effect of existing and planned DSM over the next 10 years is 866 MW. The IRP analysis assumes existing curtailable agreements expire in December 2006.

Conservation (Class 2 DSM). NWECC generally supports PacifiCorp's evaluation of DSM resources. However, NWECC criticizes the Company's analysis of cost-effective conservation opportunities. The Company first identifies a preferred portfolio and then runs a decrement analysis on that portfolio to identify how much conservation is cost-effective. NWECC maintains that the approach means that the risk reduction benefits of conservation are not analyzed, because all risk analysis is performed *before* the decrement analysis. Therefore, NWECC states, this approach under-estimates the potential value of conservation as a tool for mitigating fuel price and environmental regulatory risks to ratepayers.

NWECC points out that the low-cost DSM investments PacifiCorp identified in the decrement analysis delay the need for East and West supply-side resources and reduce costs to customers.

PacifiCorp responds that it followed the general guidelines for decrement analysis as described by a 1995 report by the Tellus Institute. PacifiCorp states that the methodology captures the value of reduced fuel use and pollutant emissions for a large block of potential DSM, although small blocks may not capture these values because they may not register a change in PVRR.

Staff asked PacifiCorp for all information the Company relied on to determine the types of conservation programs that are cost-effective and the savings achievable through 2015. The Company provided a 2001 Tellus Institute study, *An Economic Analysis of Achievable New Demand-Side Management Opportunities in Utah*, prepared for an advisory group to the Utah Public Service Commission. The Company also reviewed the Council's Fifth Power Plan to get an indication of potential program areas. Further, the Company's 2003 RFP for DSM resources provided an indication of practical resource availability. The Company plans to update its decrement values using updated market prices and its IRP methodology to assess cost-effective bids in future DSM RFPs.

Regarding NWECC's concern that PacifiCorp's sideboard decrement analysis of conservation does not appropriately credit conservation for reducing risk, Staff points out that analysis in the Council's Fifth Power Plan showed risk reduction as a significant benefit of conservation resources.

Staff recommends that the Company acquire all conservation found to be cost-effective up to the levels required to serve load growth, whether through RFPs or in-house programs, and not apply what it views as an artificial cap of 200 MWa for those additional programs. PacifiCorp agreed with Staff's proposed modification to Action Item 2: Use decrement values to assess cost-effective bids in DSM RFP(s). Acquire the base DSM (PacifiCorp and ETO combined) of 250 MWa and 200 MWa or more of additional Class 2 DSM found cost-effective through RFP or in-house programs, up to the levels required to serve load growth, and as approved by each State's Commission.

Staff also recommends that for the next IRP or Action Plan brought forward for the Commission's acknowledgment, PacifiCorp conduct an economic analysis of achievable Class 1 and Class 2 DSM measures in its service area over the IRP study period and assess how the Company's base and planned programs compare with the cost-effective amounts determined in the study. The Company asserts that because DSM costs are *situs* to each state, each State Commission must decide whether to fund such a study. The Company further believes that the issue should be addressed in the context of multi-state, IRP public input meetings and in the UM 1056 docket.

Further, Staff recommends that for the next IRP or Action Plan, PacifiCorp develop supply curves for various types of Class 2 DSM resources and evaluate whether modeling them as portfolio options that compete with supply-side options — including an analysis of the risk reduction benefits — is preferable to the current decrement approach. PacifiCorp agreed to modify its Action Plan to address this recommendation.

Dispatchable Load Control (Class 1 DSM). As context for its comments, Staff highlights Docket No. UM 1093, where the Commission ordered that “The utilities’ Integrated Resource Plans should evaluate demand response programs on par with other options for meeting energy and capacity needs.” See Order No. 03-408, Appendix A at 1.

Staff commends PacifiCorp’s Class 1 DSM analysis in the 2004 IRP as a good first step toward treating demand response resources on par with supply-side resources. Staff notes that the Company found that Class 1 resources are highly cost-effective, reducing PVRR of Portfolio E by \$139 million for a present-value cost of only \$4.6 million. See IRP at 167. Staff believes that the cost-effectiveness of the identified resources suggests that there likely are more Class 1 DSM resources available that would be attractive at costs above this level. Staff notes that the Company’s evaluation of Class 1 resources was conducted as a sidebar analysis, and only on the Company’s preferred portfolio, rather than *within* portfolio modeling.

Staff recommends that the Company use RFP results and in-house analyses to develop supply curves for a wide variety of Class 1 resources spanning a range of costs. Staff further recommends that for the next IRP or Action Plan, PacifiCorp not place firm constraints on the amount of Class 1 DSM resources modeled and test them only in the preferred portfolio, but instead test various amounts and types in portfolio modeling as resources that compete with generating resources and evaluate the cost and risk reduction benefits.

Price Responsive Load Reduction (Class 3 DSM). Staff criticizes the Company for performing no modeling of Class 3 DSM programs in the IRP and including no peak reductions from such programs in its analysis. Staff notes the following statements: “The load reductions observed through implementation of these programs at PacifiCorp are neither predictable, consistent or persistent,” and “These types of programs are not included in this IRP as a long-term reliable resource....” See IRP at 31 and 82.

Staff points out that long-term pricing programs at other utilities show persistent load reductions during peak periods and help avoid the need for new power plants. Staff cites Georgia Power, whose two-part real-time pricing program has the highest level of participation and is the most extensively analyzed program in the U.S. As of 2002, the program had 1,500 participants and provided a peak load reduction of 1,000 MW. See Oregon Public Utility Commission Staff, *Demand Response Programs for Oregon Utilities*, presented at the Commission’s June 3, 2003, public meeting.

Staff sent a letter to PacifiCorp on August 3, 2004, advising the Company of Staff’s view on including Class 3 programs in IRP modeling: “Including the result of such programs in the load forecast as the reductions occur is insufficient. Only portfolio modeling can accurately advise the Company of the cost-effectiveness of such programs for critical peak and other hours of the year, relative to other resource options.” PacifiCorp responded in a letter on August 25, 2004: “[T]he Company’s demand buy-back programs cannot be modeled as a firm long-term resource because the programs are designed more as a short-term tactic to manage significant price increases.... Customer

curtailment only occurs if the prices are very high and the customer has flexibility in the production of their product.” Staff similarly criticized the approach in its written comments on the draft 2004 IRP.

Staff believes the Company’s evaluation of Class 3 DSM programs falls short of the mandates in Commission Order No. 89-507 that least-cost planning “...requires consideration of all known resources for meeting the utility’s load, including...those which focus on conservation and load management, the ‘demand side,’” and “...rate design should be treated as a potential demand-side resource.” *See* Order No. 89-507 at 2 and 10. Further, Staff highlights the Commission’s requirement in Docket No. UM 1093 to “...evaluate demand response programs on par with other options for meeting energy and capacity needs.” *See* Order No. 03-408, Appendix A at 1.

Moreover, Staff points out the Commission’s direction in its order on PacifiCorp’s 2003 IRP: “[T]he Commission will require for the next IRP or Action Plan Pacific brings forward for acknowledgment, that it assess Class 1, Class 3 and Class 4 DSM resources in Oregon and include in the portfolios those DSM resources that are least cost.” *See* Order No. 03-508 at 20.

Relying on prior Commission decisions, Staff states that potential new interruptible contracts and demand buybacks such as the Energy Exchange should be modeled as resources that compete with supply-side resources. Staff asserts that based on the Company’s extensive experience with the Energy Exchange in 2000 and 2001, the Company could determine a portion of this resource that can be treated as firm. For illustrative purposes, Staff explains that if customer participation varied from 30% to 60% of identified curtailable load at a market price of \$150/MWh, the Company could treat 30% of the identified curtailable load as firm at \$150/MWh. Spread over a sufficient number of participants, Staff asserts that the Company could reasonably estimate the probability of participation levels at somewhat lower prices, as well. Staff states that such analysis may need to be performed in stochastic modeling, because deterministic modeling assumes base-case market prices rather than price excursions.

Regarding *existing* interruptible contracts, Staff disagrees with the Company’s planning assumption that they would not be renegotiated upon expiration, or that there would be no other such contracts to take their place. The apparent result is that no interruptible contract capability is assumed in the IRP after the 127 MWa of Nucor and Monsanto contracts in Utah expire in December 2006. *See* IRP Technical Appendix at 41. Staff notes that renegotiation of these contracts would significantly reduce the need for additional new generating resources.

In addition, Staff cites comments on the IRP by the Utah Association of Energy Users: “[T]he IRP does not include any of the US Magnesium interruptible load as a resource, even though US Magnesium’s 85 MW load is subject to curtailment during the hottest peak hours of the summer and US Magnesium is required by contract and Commission order to assume the risk of both pricing and availability of market resources

during peak summer hours.” See Comments of the Utah Association of Energy Users at 20-21, Utah PSC Docket No. 05-2035-01.

Staff recommends that existing interruptible contracts be assumed to continue unless the Company for good reason believes they will not be renegotiable or other resources would provide better value. PacifiCorp agreed to adopt this recommendation for its Action Plan.

Staff further recommends that for the Company’s next IRP or Action Plan, PacifiCorp determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options. PacifiCorp does not agree to do so. The Company characterizes its experience with the Energy Exchange program as “inconsistent” and “unpredictable.” Further, the Company states that price elasticity based on Oregon’s experience with the program in 2001 occurred at prices well above forecasted market prices, and the IRP model fills capacity needs using normal market conditions.

Commission disposition: The Commission concurs with Staff’s assessment that PacifiCorp’s proposed acquisition of Class 2 DSM programs should not be capped based on the limited analysis in the IRP. Therefore, the Commission acknowledges the agreed-upon modification to Action Item 2: Use decrement values to assess cost-effective bids in DSM RFP(s). Acquire the base DSM (PacifiCorp and ETO combined) of 250 MWa and 200 MWa or more of additional Class 2 DSM found cost-effective through RFP or in-house programs, up to the levels required to serve load growth, and as approved by each State’s Commission.

In addition, for the next IRP or Action Plan brought forward for the Commission’s acknowledgment, PacifiCorp should:

- Conduct an economic analysis of achievable new Class 1 and Class 2 DSM measures in its service area over the IRP study period and assess how the Company’s base case and planned programs compare with the cost-effective amounts determined in the study.
- Develop supply curves for various types of Class 1 DSM resources, model them as portfolio options that compete with supply-side options, and analyze cost and risk reduction benefits. Evaluate this approach for Class 2 DSM resources and recommend whether this approach is preferable to the current decrement approach.
- Determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options.
- Assume that existing interruptible contracts will continue unless the Company for good reason believes they are not renegotiable or other resources would provide better value.

Non-hydro renewable resources. CUB criticizes the Company for failing to reexamine the amount of wind resources that is now cost-effective and appropriate. CUB acknowledges PacifiCorp's concern that wind resources beyond the 1,400 MW assumption PacifiCorp carried forward from its 2003 IRP could be difficult to integrate into its system. CUB states that wind integration requires flexible resources that can ramp up and down to take full advantage of whatever wind generation is available, and that choosing to add a significant amount of inflexible base-load coal would exacerbate PacifiCorp's integration concerns. CUB states that PacifiCorp not only failed to fully examine wind's potential, but in so doing selected a portfolio that hinders the integration of wind into its system.

Finally, CUB points toward the slow progress of the Company in meeting the renewable resource target identified in its 2003 IRP. While noting the difficulties with the on-again, off-again federal production tax credit, CUB states that it does not sense PacifiCorp's commitment to wind either in its current IRP or its generation portfolio.

ODOE states that the IRP includes little analysis of wind or other renewable resource additions beyond the 1,400 MW assumed as planned resources. ODOE states that the Company's decision to cap renewable resource acquisitions at 1,400 MW is based on forecasted wholesale electric prices. *See* IRP Technical Appendix at 145-146. ODOE believes this cap is inappropriate for two reasons:

- The projects in the supply curve come from only one RFP issued in 2004. The appropriate supply curve should be developed from multiple RFPs through 2012. They likely will offer more renewable resources than the additional 1,500 MW (beyond the 1,400 MW target) the Company identified through the first RFP at or below a 20% premium over forecasted prices, including estimated costs for transmission and integration. ODOE considers such a premium "modest" given what it views as the high risks of CO₂ adders above PacifiCorp's assumed level. Further, ODOE notes that this premium likely will decline over the next 10 years because of improvements in renewable resource technologies.
- The cap ignores the potential benefits of additional renewable resources in reducing exposure to the risks of high gas prices and CO₂ regulations beyond the base-case CO₂ adder. PacifiCorp conducted no analyses of these benefits, but should do so before acquiring other supply-side resources.

ODOE states that given the short lead times for many wind projects and PacifiCorp's ability to facilitate transmission, additional renewable resources beyond the 1,400 MW included in the Action Plan are possible and desirable. ODOE states that there appears to be time to build transmission to new renewable resources in lieu of building a coal plant and its associated transmission, and asserts that these actions should be in the Company's Action Plan.

ODOE notes that the Company's Action Plan calls for renewable resources providing 7% of its energy supply in FY 2015. *See* PacifiCorp's Response to Data Request No. 2 from the April 25, 2005, workshop. In contrast, ODOE cites Puget Sound Energy's goal to meet 10% of its electric energy sales with renewable resources in 2014, as well as Idaho Power's 11% goal for 2010. ODOE also cites Renewable Portfolio Standard requirements for five states in the Western Interconnection:

- California – 20% by 2017
- Nevada – 15% by 2013
- Colorado – 10% by 2015
- New Mexico – 10% by 2011
- Arizona – 1.1% by 2007 (60% of the target must come from solar resources)

ODOE asserts that PacifiCorp's uncertainty about whether it can integrate more than 1,400 MW of wind resources into its largely thermal system is the result of relying too heavily on inflexible coal plants or being overly cautious. ODOE points out that CCCTs are superior to pulverized coal plants in their ability to follow loads and shape intermittent renewable resources such as wind. Minimum times to full load are 54% quicker and ramp rates are 44% faster for 2x1 wet-cooled CCCTs compared to pulverized coal. *See* PacifiCorp's Responses to ODOE Data Request No. 2.1 and 2.2. ODOE cites this fact as an unanalyzed advantage of all-gas Portfolio M over Portfolio E.

RNP recommends that the Commission direct PacifiCorp to prioritize renewable resource acquisitions to meet the Company's 1,400 MW target — specifically, to dedicate resources to ensure continued progress in meeting this target. RNP states that the Company received more than 6,000 MW worth of bids in response to its renewable resources RFP, but thus far has acquired only one 64.5 MW project. That's in comparison to the 1,059 MW of natural gas resources procured through other RFPs, the group notes.

RNP opines that PacifiCorp has expeditiously acquired its planned fossil-fuel resources, but not its planned renewable resources. The group comments that “[a]n IRP action plan is a ‘package deal’ — it is not appropriate for the Company to only acquire the fossil resources in its action plan without also meeting its renewables target.” Further, the group expects PacifiCorp “to participate in regional activities affecting the development of renewable resources, and to creatively confront, analyze, and solve the problems that arise in acquiring renewable resources.” *See* RNP Comments at 2.

RNP points out successful acquisition of renewable resources by other utilities in the region, including Puget Sound Energy's purchase of the 150 MW Hopkins Ridge project under construction in Washington and a letter of intent to purchase the 230 MW Wild Horse wind project in that state. RNP also cites Northwestern Energy's contract for the 135-150 MW Judith Gap wind project in Montana and PGE's contract for a 75 MW expansion at the Klondike wind farm in Oregon.

RNP commends PacifiCorp for its wind capacity study for the IRP, which determined that wind resources contribute 20% of their nameplate capacity to the planning margin. RNP notes that this is a significant improvement from the 2003 IRP, which assumed that wind resources did not make any such contribution. RNP recommends that the Company should continue to study wind's capacity credit as it gains experience with wind acquisition in the coming years.

RNP states that it originally supported PacifiCorp's decision to maintain a 1,400 MW target for renewable resources during the 2004 planning cycle, unadjusted from its 2003 IRP target. RNP's position was in recognition of the Company wanting to learn more about integration and transmission issues so it could effectively model and plan for higher levels of renewable resources. RNP states that it now believes that the 2004 IRP analysis is deficient for not modeling portfolios with additional wind resources. The group points toward the bids the Company received for renewable resources. Of the 6,000 MW of bids received, 1,400 MW were at or below the forward price projections, and an additional 900 MW were 10% above the forward price curve. *See* Technical Appendix J. Considering the price stability and risk reduction benefits of renewable resources for an existing resource base heavily dependent on fossil fuels, RNP maintains that at a minimum this additional 900 MW of wind resources should have been modeled in the IRP. RNP opines that had more progress been made in acquiring renewable resources, we would not be faced with the urgency of moving forward on new coal resources.

NWEC also praises PacifiCorp's study on wind capacity credit. NWEC points toward results showing that wind contributes about the same capacity on an energy basis as a CCCT. For example, 20 MW of load can be served reliably with either 33 MW of a CCCT at 93% capacity factor or 100 MW of wind resources with a 33% capacity factor.

NWEC expresses concern, however, that the Company has not made much progress toward its 2003 IRP goal of 1,400 MW of renewable resources. NWEC states, "The IRP is a *portfolio* whose value was considered, and acknowledged, as a package. In our opinion, moving forward only with the fossil fuel portion of the plan is not in accordance with that acknowledgment." *See* NWEC Comments at 1.

NWEC expressed greater concern that the 2004 IRP did not seriously investigate the relative costs and risks of acquiring more wind resources than the 2003 IRP goal. In the earlier IRP, PacifiCorp analyzed a portfolio that included another 1,143 MW of wind plus 100 MW of geothermal resources. NWEC criticized PacifiCorp's rejection of that portfolio as too costly on the grounds that the resources were assigned no value for capacity or reducing fuel price risk, the green tag value was underestimated, and the Company did not consider how the additional renewable resources would reduce emissions from purchased power. According to NWEC, the current IRP's treatment of this issue is worse — it's missing.

NWEC cites the "extremely flat" supply curve for renewable resources based on the Company's RFP responses shown in Appendix J. NWEC states that the flat curve

indicates that the amount of renewable resources that is deemed cost-effective is highly dependent on assumptions about future electricity and gas prices, carbon costs, wind integration costs and other factors. NWECC recommends that such assumptions be modeled stochastically and under stress tests for higher natural gas costs and CO₂ adders.

NWECC points out another problem it sees with the IRP analysis: PacifiCorp has not taken into account the value of preserving its options. For example, the Company states that it may have difficulty integrating more than 1,400 MW of wind into its system, but then proposes to add more coal plants which NWECC believes will constrain its integration capability further. NWECC states that the Commission should weigh seriously how the Company's proposal to build coal plants will limit future options to add more wind resources if conditions warrant it. Coal-heavy portfolios should be penalized in the analysis because of this effect, NWECC states.

PacifiCorp responds to concerns that its modeling did not capture the impact of coal resources on wind integration. The Company states that its model includes minimum-up, minimum-down and ramp rate data by generating unit. PacifiCorp further notes that while resources with dynamic regulating reserve capability are necessary to accommodate wind resources, not all resources must have that capability. The Company expects to have sufficient regulating reserve resources to accommodate the 1,400 MW of projected wind additions regardless of the quantity and fuel type of base-load resources added to the system.

NWECC concludes that given the analysis in the 2004 IRP, it is "impossible" for the Commission to evaluate whether the higher expected cost for a portfolio with another 1,000 MW or so of renewable resources is worth its risk reduction benefits related to fuel price stability and emissions reductions, and that would lead to an uninformed decision regarding the Company's proposed Action Plan.

PacifiCorp notes that while Parties generally support PacifiCorp's efforts to improve the modeling of wind resources, most alleged deficiencies in their treatment in portfolio analysis. In response, PacifiCorp first points to a draft report from Lawrence Berkeley National Laboratory that shows the Company's 1,400 MW of renewable resources modeled in every portfolio is much higher than amounts modeled by all other utilities in the region. The Company states that the amount in its planned portfolio by 2014 is roughly equivalent on an energy basis to the final portfolio amounts of Puget Sound Energy, Idaho Power, Portland General Electric and Avista *combined*.

ODOE points out that these utilities do not plan to stop acquiring renewable resources; they simply haven't planned acquisitions beyond the next several years. ODOE notes that Puget Sound Energy has already signed letters of intent for nearly 400 MW of wind and is on the path to exceed its goal. ODOE also calls on PacifiCorp's transmission and generation divisions to be more active in regional organizations that are addressing transmission and integration issues affecting wind resources.

PacifiCorp acknowledges that the supply curve based on its renewable resources RFP does not indicate that 1,400 MW is a hard upper limit on cost-effectiveness. However, the Company maintains that this amount should remain the planning target until it obtains additional experience with substantial amounts of wind in its system and improves methods for estimating integration costs. The Company is investigating a potential modeling improvement for the next IRP that would estimate wind output stochastically, thus improving estimation of imbalance costs. PacifiCorp states that the Action Plan allows flexibility to substantially increase the level of wind resources procured over the 10-year planning period if the economics of wind projects makes it favorable to do so.

In response to PacifiCorp's assessment that its 10-year planning target should not exceed 1,400 MW until it has additional experience with substantial wind capacity in its system, RNP notes that the Company already has experience integrating some 500 MW of wind on its system, including a few projects serving its retail customers. Further, RNP points out that the Company cannot add to its experience if it does not acquire substantially more wind resources.

PacifiCorp states the following hurdles to its efforts to acquire renewable resources:

- Short and undependable extensions of the federal production tax credit
- Rising wind turbine prices due to higher steel prices and a weak dollar in relation to foreign currencies
- Lack of available turbines

PacifiCorp continues to negotiate with bidders and remains optimistic about the prospects for meeting its 2006 targets assuming the tax credit is extended by the end of 2005.

RNP does not believe an unpredictable federal production tax credit is a considerable obstacle to acquiring renewable resource projects, noting that utilities often sign contracts contingent on extension of the tax credit. RNP also disagrees with PacifiCorp's reliance on turbine prices and availability for its lack of progress in acquiring renewable resources. RNP points out that the Company had nine months following receipt of bids to contract for projects that had access to lower 2004 turbine prices. RNP believes the real reason for lack of progress on the renewable resources RFP is that it was not made a priority within the Company.

Staff highlights the Company's report at the May 2005 public input meeting that more than 1,800 MW of projects remain on the RFP short list, including more than 200 MW of projects with a 2006 on-line date. Staff points out that bids may not all prove viable, nor are they necessarily representative of resources that may become available in later years as prospecting for wind sites and technology improve over time.

Staff is concerned about the lack of analysis that would have shown the risk characteristics of a portfolio with more than 1,400 MW of renewable resources. Staff points out that wind resources, with no fuel costs, are not subject to fuel price volatility. In that respect Staff states they are similar but superior to coal resources, which historically have had limited price volatility but may in the future encounter greater volatility related to coal markets, fuel transportation and pollutant regulation.

In response to concerns about the slow progress in acquiring renewable resources and an on-again, off-again federal production tax credit, Staff recommends that PacifiCorp execute an agreement with the Energy Trust of Oregon by October 1, 2005, to reserve funds for the above-market costs of renewable resources that benefit Oregon ratepayers and enable timely completion of resource agreements upon its extension. Staff notes that Portland General Electric is in the process of developing such an agreement with the Energy Trust.

Staff further recommends that in its next IRP or Action Plan, PacifiCorp analyze renewable resources in a manner comparable to other supply-side options, including testing cost and risk metrics for portfolios with amounts higher and lower than current targets, further refine wind's capacity contribution, and consider the effect of fuel type for thermal resource additions on the Company's cost to integrate wind resources.

PacifiCorp agreed to amend its Action Plan to adopt both of these recommendations.

Commission disposition: We note that the Company has reached agreement to acquire only one renewable resource project, and that it did not meet its 2005 target of 100 MW. Further, we acknowledged PacifiCorp's 2003 IRP with the agreed-upon modification to the Action Plan that the Company would acquire renewable resources sooner than the yearly targets if economic to do so. Given the level of bids the Company shows in the IRP as potentially economic, we would expect the Company might have exceeded, rather than fallen short of, its early target.

The Commission agrees with RNP that the Company should devote sufficient resources to reach its renewable resources targets. The Commission declines, however, to direct how PacifiCorp should allocate resources, as RNP recommends.

PacifiCorp has cited the delay in renewing the federal production tax credit, and its short extension, as one of the problems affecting its acquisition of renewable resources. We therefore agree with Staff that the Company should execute an agreement with the Energy Trust of Oregon by October 1, 2005, to reserve funds for the above-market costs of renewable resources that benefit Oregon ratepayers and enable the Company to complete resource agreements quickly upon extension of the federal production tax credit.

In addition, for the next IRP or Action Plan brought forward for the Commission's acknowledgment, PacifiCorp should analyze renewable resources in a

manner comparable to other supply-side options, including testing cost and risk metrics for portfolios with amounts higher and lower than current targets, further refine wind's capacity contribution, and consider the effect of fuel type for thermal resource additions on the Company's cost to integrate wind resources.

Potential CO₂ regulatory costs. CUB maintains that PacifiCorp's assumed cost for meeting future CO₂ regulations is too low. CUB states that "...it cannot seriously be considered a realistic internalization of the potential regulatory response to carbon." *See* CUB Opening Comments at 8.

RNP opines that PacifiCorp's assumed \$8/ton CO₂ adder (2008\$) is on the lower end of the reasonable range of costs and cites base-case adders used by others:

- Idaho Power - \$12.30/ton beginning in 2008
- California Public Utilities Commission (CPUC) – An escalating cost of \$5/ton in the near term, \$12.50/ton by 2008 and \$17.50/ton by 2013. *See* CPUC Decision 05-04-024.

RNP disagrees that the Company should continue to use its own assumptions about future CO₂ regulatory costs. RNP believes the Commission should provide more direction regarding the appropriate CO₂ adder.

NWEC similarly points out other utilities and jurisdictions that have assumed higher CO₂ costs in the future. In addition to Idaho Power's and CPUC's values, NWEC cites Xcel Energy's agreement as part of a comprehensive settlement in its 2003 least-cost plan in Colorado to use a proxy cost value of \$9 per ton of CO₂ beginning in 2010 and escalating thereafter at 2.5%.

NWEC states that scientific consensus is moving toward the position that global climate change is more likely to cause much more serious impacts, and in a shorter period of time, than previously thought. NWEC points toward the strategy adopted by the Governor's Advisory Committee on Global Warming in December 2004, which calls for large reductions in CO₂ emissions, in recognition of the danger. NWEC opines that the CO₂ adder used in PacifiCorp's analysis seriously undervalues the risks. For example, NWEC states that even a 1% chance that the Greenland ice cap melts, or the Gulf Stream is disrupted, will have an expected value of damage much higher than represented by PacifiCorp's cost adder. NWEC asserts that it isn't simply a matter of whether or even how much shareholders will pay in future CO₂ mitigation costs in some future rate case. NWEC asserts that avoiding catastrophic impacts must be the first concern of the Commission.

NWEC points out that site cleanup costs traditionally have been included in both IRP analysis and rates. NWEC maintains that it has always been considered prudent for utilities to pay-as-they-go for mitigation and site cleanup, as well as to collect revenues in advance for estimated site restoration costs. NWEC explains that such rate treatment

avoids pushing out to future generations the costs for actions taken today, as well as inefficient price signals to consumers of the true costs of their energy use.

NWEC asserts that CO₂ emissions should be considered part of site cleanup, and that an after-the-fact cleanup strategy may be too costly and come too late to avoid serious climate impacts. Therefore, NWEC recommends that PacifiCorp acquire CO₂ offsets now — from the Climate Trust, for example. NWEC states that a Montana developer recently contracted with the Climate Trust to acquire CO₂ offsets for less than \$2.50/ton. NWEC asserts that it would be “imprudent” for the Company not to seek such offsets at this time, given that their cost in the future will likely be higher than \$8/ton.

ODOE maintains that “PacifiCorp’s base case CO₂ cost adder of \$8.38 per ton of CO₂ (2010\$) does not begin to capture the stringency of likely future constraints.” See ODOE Initial Comments at 1. ODOE cites mounting scientific evidence of climate change, studies indicating that high CO₂ adders are needed to stabilize CO₂ emissions to a level that would avoid catastrophic climate change, and regulatory momentum to address these concerns, discussed under “Coal plant,” below.

ODOE cites two other problems with PacifiCorp’s analysis of the potential impact of CO₂ regulatory costs. First, none of the Company’s scenario analyses considered a firm constraint on CO₂ emissions without an opportunity to trade for or buy offsets. ODOE states this could occur if a cap is imposed on short notice and transportation and other CO₂-emitting sectors are similarly regulated, or if allowance trading is not permitted. In such cases, PacifiCorp would be forced to cap its total CO₂ emissions.

ODOE calculates that in a scenario where CO₂ emissions allowances are not available or trading is not permitted, the *value* of new coal plants is \$12.36/MWh, compared to a *cost* of \$36.50/MWh. ODOE further concludes based on its calculations that if such a scenario occurs shortly after PacifiCorp completes construction of the 958 MW of coal plants in its preferred Portfolio E, the net present value of these plants would be *negative* \$2 billion. If only the 2011 coal plant is considered in the analysis, the cost under this scenario could be \$1.4 billion, according to ODOE. The calculations take into account the improved efficiency of the new coal plants, the retirement of existing coal plants that would be required to offset emissions from the new plants, reduced operational costs for the old coal plants, and the cost of low- or zero-CO₂ replacement resources. See spreadsheet attached to ODOE Initial Comments.

ODOE states that CO₂ allowances in Europe on July 8, 2005, were trading at an equivalent of \$31.43/short ton. ODOE recognizes that short-run constraints on available allowances following implementation of the Kyoto Protocol may be responsible for the dramatic rise in prices from last year. However, ODOE believes recent trading data indicate that the long-run costs of CO₂ offsets may be well above PacifiCorp’s assumed \$8.38/ton (2010\$).

Second, ODOE criticizes PacifiCorp’s assumption that a large supply of low-cost CO₂ offsets would be available if trading of emissions allowances is permitted. ODOE

notes that the Company does not indicate which sectors could supply them. ODOE points out that in addition to electricity generation, transportation and stationary fossil fuel are the other major sources of CO₂ emissions. ODOE asserts that neither sector shows promise of low-cost offsets as illustrated today by fairly flat petroleum consumption in Europe and Japan despite very high gasoline taxes. Further, ODOE maintains that biological sequestration – planting trees, for example – is unlikely to provide dependable CO₂ offsets given the temperature and precipitation changes expected to occur with global warming.

PacifiCorp responds to concerns about its \$8.38/ton base-case CO₂ adder (2010\$) being too low by explaining that it was developed after studying a number of policy and market analyses in the U.S. and overseas. The Company also cites recent developments that provide support, including a proposal by the National Commission on Energy Policy, a bipartisan group of energy leaders, for a national cap on CO₂ emissions that would reduce intensity by 2.4% to 2.8% and cap costs at \$7/ton CO₂ with escalation at 5% annually. PacifiCorp adds that Sen. Bingaman proposed inclusion of these provisions in the current energy bill, but the Company does not believe the proposal will pass this year.

The Company also cites analysis of the most recent cap-and-trade bill submitted by Senators McCain and Lieberman. The U.S. Energy Information Administration's analysis of the bill shows CO₂ allowance costs beginning at some \$15/ton in 2010, rising to \$45/ton in 2034. PacifiCorp does not believe this bill will pass in its current form.

PacifiCorp asserts that the uncertain timing of state and federal regulations, and available information on potential regulatory scenarios, provide further support for its CO₂ cost assumptions. The Company states that it incorporated a CO₂ adder in its base-case assumptions because it believes that is a prudent and necessary step for protecting customers from future risks of carbon constraints.

PacifiCorp addresses Parties' concerns that it did not adequately consider policy developments in Oregon related to climate change by stating that as a multi-state utility it objects to a statewide load-based cap due to the complexity and cost of the methodology that would be needed, and because it expects that the costs of an aggressive cap on emissions by a single state would be high. Further, the Company opines that there have been no specific policy recommendations on CO₂ regulation in the state that are amenable to base case or scenario analysis.

PacifiCorp states that it would be complex to segregate emissions reductions from a wide variety of activities throughout the Company and assign emissions and reductions across all states. The Company maintains that for the purpose of cost recovery, it would be challenging to isolate factors that increase and decrease CO₂ emissions, such as altering plant usage and making additional market purchases. Further, the Company states that it might invest in efforts to reduce *total* CO₂ emissions to meet a cap imposed by a single state, such as additional renewable resources. It foresees conflicts between states if implementation costs are borne solely by Oregon, but benefits accrue to all states

— higher gas prices leading to larger benefits from additional renewable resources, for example.

PacifiCorp believes the best information today points to regulatory regimes that institute national or regional caps and encourage trading of emissions allowances for economic efficiency. The Company cites national cap-and-trade policies including the 1990 amendments to the Clean Air Act which instituted a cap-and-trade program for sulfur dioxide; the Clear Air Interstate Rule, which created a regional cap-and-trade program in the East; and EPA's recent rulemaking creating a mercury cap-and-trade system.

PacifiCorp acknowledges that it is useful to consider a regulatory scenario that would not allow any emissions trading in order to understand the costs to reduce CO₂ internally. However, the Company does not believe it is reasonable to assume no trading as a base-case assumption.

PacifiCorp reports that it continues to monitor the market price of off-system CO₂ offsets and that the Climate Trust continues to find offsets in the range of \$2/ton to \$5/ton CO₂. The Company acknowledges the limitations of extrapolating from this information offset prices under unknown future regulatory regimes.

Staff believes that the sensitivity analyses required by Order No. 93-695 provide the Commission with an indication of how portfolios may perform under potential CO₂ regulatory scenarios such that a Commission requirement for a specific base-case adder may be unnecessary. Staff notes that this issue will be addressed in Docket UM 1056.

Staff does not at this time support NWECA's recommendation that PacifiCorp acquire CO₂ offsets today, such as those available from the Climate Trust. Staff believes it is a risky strategy to acquire CO₂ offsets from sectors unrelated to the electricity industry until it becomes clearer how CO₂ emissions would be regulated by the state or federal government.

Commission disposition: We agree with Staff that the sensitivity analyses required by Order No. 93-695 indicate how portfolios may perform under potential CO₂ regulation scenarios. We will review the issue further in Docket UM 1056. We also concur with Staff that it is premature to acquire CO₂ offsets, other than those which may be conveyed through Tradable Renewable Certificates associated with renewable resource acquisitions.

Coal plant. None of the Parties, including Staff, recommends that the Commission acknowledge acquisition of a coal-fired resource in the summer of 2011.

CUB states that PacifiCorp's IRP fails to adequately address the costs and risks associated with greenhouse gas emissions and climate change. CUB asks the Commission to consider carbon-intensive resources such as coal in light of the long-run public interest standard established in Order No. 89-507.

CUB asserts that the IRP suffers primarily from the following six flaws which lead the Company toward acquisition of coal resources:

- The Company's plan to add two more coal plants to its already coal-intensive system flies in the face of mounting scientific evidence demonstrating the occurrence and effects of climate change, as well as the response by Oregon, the U.S. and the international community.
- The difference between the expected PVRR of PacifiCorp's preferred portfolio and Portfolio M is negligible. Further, CUB states that PacifiCorp did not make a compelling case that the risk of gas price volatility is greater than the risk of CO₂ regulation or the cost of climate change.
- PacifiCorp is pulled toward coal plants because they serve as economic development for several states on the East side of the Company's system, and because the Company is comfortable with and knowledgeable about coal resources, skewing the IRP analysis qualitatively toward coal resources.
- The IRP's failure to reexamine the quantity of wind resources that the Company identified as economic in the 2003 IRP to determine if that amount remains adequate or appropriate may have skewed its modeling toward base-load coal plants, rather than more flexible gas-fired plants.
- The IRP has not satisfied that all possible measures have been or will be taken to aggressively address the problem of reducing Utah's load, especially its peak load.
- Given the likelihood of future regulation of CO₂ emissions, adding a more efficient coal plant may simply result in the retirement of a less-efficient coal plant, leaving ratepayers with yet another costly resource acquisition to close the load-resource gap and significantly increasing the cost of PacifiCorp's preferred portfolio.

CUB points out that a coal-heavy utility like PacifiCorp may be targeted for governmental and societal responses to atmospheric carbon loading and that under such a situation adding a coal plant would be costly to shareholders and customers. CUB calls failing to plan for such a possibility "imprudent in the extreme." *See* CUB Opening Comments at 3.

CUB cites evidence from the 2001 report of the Intergovernmental Panel on Climate Change, such as average global surface temperature projected to increase by 1.4°C to 5.8°C in the next 100 years and CO₂ emissions from fossil fuel-burning virtually certain to be the dominant influence on atmospheric CO₂ in the 21st century. CUB also cites what it calls a modest proposal, published in the August 13, 2004, edition of *Science*, to hold annual CO₂ emissions for the next 50 years at their current level of 7

billion tons. CUB notes that the proposal would stabilize CO₂ emissions at an estimated 500 parts per million (ppm), compared to the pre-industrial level of 280 ppm and current levels of 375 ppm. CUB reports that the authors offer a number of technology options related to electricity generation to achieve their goal, including substituting natural gas resources for coal, carbon capture and storage, and wind resources.

CUB also cites the recommendations of the Governor's Advisory Group on Global Warming:

- By 2010, arrest the growth of greenhouse gas emissions and begin to reduce them,
- By 2020, achieve a 10% reduction below 1990 greenhouse gas emission levels, and
- By 2050, achieve a climate stabilization emission level of at least 75% below 1990 levels.

CUB points out that these kinds of greenhouse gas reductions would require serious reductions in the energy sector. CUB states that the electricity industry represents 40% of CO₂ emissions in the U.S., that these emissions account for 25% of global CO₂ emissions, and therefore the electricity industry in the U.S. accounts for 10% of global CO₂ emissions.

Referring to ODOE's comments in this docket, CUB states that it is difficult to consider a 20% increase in PacifiCorp's CO₂ emissions through 2018 an acceptable level of risk for customers or see how the Company's strategy could meet the CO₂ reductions called for by the Governor's Advisory Group.

CUB notes the recommendation by the Advisory Group to examine the feasibility of and design a load-based greenhouse gas allowance standard, as well as PacifiCorp's assertion in the IRP that states enacting CO₂ regulations would bear the cost of regulation. CUB concludes that Oregon ratepayers should not be committed to additional coal resources until potential CO₂ regulations and accompanying costs are known.

CUB maintains that climate change is an essential consideration in any least-cost planning process. CUB cites the Commission's stated intent in Order No. 89-507 that the utilities' resource plans consider the ramifications of resource decisions on the long-run public interest. CUB points out that the order recognized that not all costs are quantifiable. CUB asserts that it is part of the Commission's intent to examine the costs of climate change not only on PacifiCorp's shareholders and ratepayers but on society as a whole, especially given the Company's contribution to CO₂ emissions with its current resource mix.

CUB maintains that computer modeling today cannot begin to adequately address the costs and risks of climate change, and that the small difference in expected PVRR between PacifiCorp's preferred portfolio and the all-gas portfolio is meaningless. CUB presumes that for PacifiCorp, the unknown risk of future gas price volatility is more

meaningful than the non-quantifiable risk of both climate change and the future regulatory response to CO₂ emissions.

CUB maintains that PacifiCorp did not make a compelling case that gas price risk is greater than the risk that CO₂ regulatory costs will be far higher than the Company assumes. CUB compares PacifiCorp's preferred portfolio with the all-gas portfolio, using various assumptions about plant lives, both high and base-case natural gas prices, and various CO₂ costs. Under the *high gas price* case with a CO₂ adder of \$14.90/ton, all-gas Portfolio M is only 2% to 4% more expensive than the preferred portfolio, depending on the assumed life of the plants. *See* PacifiCorp's responses to ODOE's Data Request No. 1.2. CUB calls the cost difference between these portfolios "mere background noise, especially given the mounting threat of climate change." *See* CUB Opening Comments at 9.

CUB opines that the Company should not consider adding a coal plant until it has fully utilized DSM and wind resources, and it should use the most efficient, cleanest coal resource commercially available designed for adding carbon capture and sequestration at a later date.

CUB expresses concern about the risks inherent with new technology such as IGCC, including the risk of stranded assets. CUB states that both IGCC and carbon sequestration technologies are not yet mature and therefore pose a cost risk. CUB cautions against rushing to invest in a coal resource in the near-term. Instead, CUB recommends aggressively managing Utah's growing load and waiting to first see if coal is necessary and, if so, for the technology to mature.

CUB cites Staff's requested scenario analysis of delaying by three years acquisition of the first coal plant in Portfolio E, noting that the PVRR decreases and the resulting planning margin drops below 12% in only one year. *See* PacifiCorp's response to OPUC Staff's Data Request No. 3. CUB states that a 12% planning margin represents 5.6 days of outages over 10 years based on data in IRP Technical Appendix at 221. CUB concludes, "Weighing the risks of climate change and carbon cost, against such a small magnitude of expected outage, makes PacifiCorp's choice to invest in more coal extremely difficult to justify." *See* CUB Opening Comments at 11.

CUB states that with CO₂ regulation on the horizon and given PacifiCorp's already carbon-intensive resource mix, the addition of a more efficient coal plant could result in the retirement of one of its existing coal plants. CUB concludes that a new coal plant might net only a small resource addition, requiring yet another costly resource acquisition to replace the retired plant.

CUB concedes that a new coal plant would not necessarily mean the retirement of an existing coal plant, but states "the possibly is moving, none too slowly, into the reasonable range of foreseeable futures.... [I]t is an outcome that would be enormously costly for ratepayers and shareholders alike. A non-coal resource investment is a far more

logical way to avoid the potential problem, by avoiding coal's significant addition to PacifiCorp's overall exposure to carbon-risk." See CUB Opening Comments at 17.

CUB opines that given estimated PVRR savings from deferring the coal plant, a lead time of seven or eight years, an aggressive peak-load shaving program in the East, and the option to site a single-cycle natural gas combustion turbine close to peak load, there's nothing to lose by waiting a few years before committing to a large investment in a coal plant. CUB recommends using the time to manage load, find a supply-side resource other than coal if load management does not suffice, and wait for further maturation of IGCC technology.

ODOE recognizes that if significant constraints are not placed on PacifiCorp's CO₂ emissions, new coal plants might be part of a least-cost and least-risk method of meeting load growth. However, ODOE asserts that PacifiCorp's base-case CO₂ adder is not representative of the cost of likely emissions constraints.

ODOE concludes that PacifiCorp's analysis in support of new coal plants rests on the assertion that they will reduce risk. ODOE maintains, "This alleged risk reduction benefit is an artifact of analyzing gas price risk inside a *stochastic* model, but only analyzing the risks of higher CO₂ adders as required by Order No. 93-695 in a separate scenario analysis." See ODOE Initial Comments at 1.

ODOE states that all-gas Portfolio M's average cost over the 100 stochastic model runs is greater than Portfolio E's by \$366 million because gas price risk is bounded by zero but almost unbounded at the high end. ODOE recognizes that Portfolio E's PVRR also has less variance. ODOE further notes that the PVRR for Portfolio E is \$104 million less than Portfolio M under a zero CO₂ adder. However, ODOE points out that this cost advantage is smaller than Portfolio M's \$132 million advantage under a \$14.90/ton CO₂ adder (\$10/ton in 1990\$). Further, Portfolio M has a PVRR advantage over Portfolio E by a factor of 3.6 to 6 under the two higher CO₂ adders tested.

Looking at the "high gas" scenario analysis, ODOE acknowledges that the PVRR for all-gas Portfolio M exceeds Portfolio E's by \$564 million under PacifiCorp's base-case CO₂ adder of \$8.38/ton. However, ODOE points out that the PVRR for Portfolio M is \$374 million lower at a CO₂ adder of \$37.25/ton, and \$623 million lower at \$59.60/ton. ODOE views this as an indication of similar risk levels for the two portfolios.

ODOE concludes that the reduced gas-price risk from building new coal plants in PacifiCorp's preferred Portfolio E is roughly comparable to its increased cost risk of likely CO₂ adders. ODOE asserts that had PacifiCorp conducted a complete stochastic analysis on the full range of CO₂ adders and natural gas prices, the PVRR variance of the two portfolios would have been similar. Further, ODOE maintains that if a portfolio with higher amounts of renewable resources had been studied in the IRP, it would likely be the portfolio with the least overall risk.

ODOE explains that the CO₂ reduction goals of the Governor's Advisory Group on Global Warming are based on stabilizing CO₂ concentration in the atmosphere this century at such a level. ODOE indicates that a reduction in worldwide emissions of more than 50% would be needed to halt net CO₂ additions to the atmosphere and stabilize CO₂ concentrations, and that would require coal plants to be replaced by zero- or low-CO₂ emission resources. ODOE estimates that substituting existing coal plants with wind plants or new IGCC plants, including CO₂ sequestration, yields a cost per ton of CO₂ removed of about \$32/ton to \$45/ton. Calculations were based on a cost of \$50/MWh to \$60/MWh for IGCC plants with sequestration or wind resources, and operating costs for existing coal plants of \$15/MWh to \$17.50/MWh (2004\$).

ODOE cites the Climate Stewardship Act of 2003 proposed by Senators McCain and Lieberman that would cap U.S. greenhouse gas emissions at 2000 levels from 2010 to 2015, then ratchet the cap down to 1990 levels beginning in 2016. ODOE notes the bill received 44 votes in 2004. ODOE cites a 2003 report by scientists at the Massachusetts Institute of Technology that estimates the bill would result in a CO₂ allowance cost of about \$20 to \$40 in 2010, rising to about \$30 to \$65 by 2020 (1997\$). *See* ODOE Initial Comments at 7.

ODOE states that the U.S. formally ratified the United Nations Framework Convention on Climate Change, with an objective to stabilize greenhouse gas concentrations in the atmosphere at a level that would "prevent dangerous anthropogenic interference with the climate system." *See* ODOE Initial Comments at 7, quoting from the Convention. ODOE cites recent study results in *Science*, published by the American Association for the Advancement of Science, indicating that a worldwide cost adder of \$41/ton CO₂ (2004\$) is needed before 2050 to reduce this danger below a 1% probability. ODOE points out that this adder level is based on the assumption that a 2.85°C change in climate would cause dangerous results. If instead the threshold is 1.92°C, the study indicates a CO₂ tax of \$109/ton CO₂ (2004\$) before 2050 would be needed to reduce the likelihood of dangerous interference with the climate to a 15% probability. ODOE cautions that even a 1% probability is greater than society normally tolerates for catastrophic outcomes.

ODOE indicates that these studies support the likelihood of adders equal to or above the \$40/ton CO₂ adder (1990\$) that Order No. 93-695 requires be analyzed. ODOE maintains that arguing stringent CO₂ adders or caps will never be implemented because of their impact on the economy ignores the possible political context if the climate continues to change in highly noticeable ways that threaten U.S. or European populations. Further, ODOE calculates that the highest CO₂ adder that the Commission requires be analyzed – \$40/ton (1990\$) – implies a doubling of wholesale electricity prices in 2023. ODOE puts that in the context of other significant price increases for fuel using data from the U.S. Energy Information Administration. Since 1995, wholesale natural gas prices have tripled and petroleum distillate prices have increased 250% in the U.S.

ODOE explains that because direct fossil fuel expenditures comprise about two-thirds of retail energy expenditures in the U.S., based on the most recent data available, doubling of wholesale petroleum and natural gas prices has a more significant impact on the U.S. economy than doubling of wholesale electric prices. ODOE estimates that a \$40/ton CO₂ adder would add 58 cents to the price of a gallon of gasoline (a 40% increase) and add \$3.49/MMBtu to natural gas prices (a 50% increase). ODOE does not find a high CO₂ scenario implausible on account of such fuel price increases, given recent price trends for these fuels and the resulting effect on the economy.

ODOE asserts that if PacifiCorp pursues new pulverized coal plants and future CO₂ emissions costs exceed the Company's assumed CO₂ adder of \$8.38/ton, the excess costs should be recovered from PacifiCorp's shareholders. ODOE strongly disagrees with PacifiCorp's statement (IRP at 67):

If a new generating plant were to become uneconomic to some degree as a result of government action regarding carbon emissions, that plant would not be imprudent. At this time, the potential costs of government actions regarding CO₂ emissions are highly uncertain.

ODOE replies that uncertainty is no excuse for inaction, or what it views as an assumed CO₂ adder that is several times lower than what will be required in coming decades to avoid catastrophic climate change. ODOE maintains that PacifiCorp should analyze the cost risks associated with changes in government policy needed to avoid dangerous anthropogenic interference with the climate system, rather than focusing on what seems politically possible today.

ODOE reports that Oregon's 2000 CO₂ emissions from fossil fuels were 17% above 1990 levels. ODOE further notes the Governor's stated intent to establish a task force to examine the feasibility of and develop a design for a load-based CO₂ allowance standard for potential legislative action in 2007.

ODOE states that PacifiCorp emits about 20% of Oregon's CO₂ emissions. ODOE notes that the Company's preferred portfolio represents a 20% growth of CO₂ emissions between 2005 and 2018. *See* PacifiCorp's Response to ODOE Data Request No. 1.3. ODOE concludes that PacifiCorp's Action Plan leaves it unprepared for possible changes in Oregon laws, and that the possibilities of a state or federal Renewable Portfolio Standard or CO₂ emissions caps have significant implications for PacifiCorp.

ODOE also expresses concern that because coal plants can't ramp up and down as quickly as gas plants, acquiring more coal will make it more difficult to integrate levels of wind beyond the 1,400 MW included in the Action Plan. In addition, ODOE notes that with their long lead time, coal plants do not allow flexibility if load growth halts or turns negative. ODOE cites the Northwest's experience in the early 1980s when loads fell and unneeded coal and nuclear plants resulted in billions of dollars of unnecessary costs. To illustrate current uncertainty in load growth, ODOE cites Commission statistics showing that PacifiCorp's annual Oregon sales fell 14.8% from 2000 to 2003. ODOE also cites

facts to support its concern that the U.S. economy is entering a period of great uncertainty. ODOE states that modeling by the Northwest Power and Conservation Council shows that short lead-time resources significantly reduce the risk of overbuilding and under-building.

ODOE states that IGCC technology may have merit, noting the IRP shows a cost premium over a pulverized coal plant of 24%. *See* IRP Technical Appendix at 67. Based on the Company's estimate that CO₂ sequestration would cost an additional \$10/ton CO₂, ODOE notes that an IGCC plant with sequestration would cost an estimated \$52.80/MWh (2004\$). ODOE recommends further analysis of the Hunter site to refine a cost breakeven point for IGCC with sequestration vs. pulverized coal, and to set a cutoff value for acquisition of renewable resources.

RNP states that there is increasing evidence that carbon emissions will be regulated in the U.S., and that it is only a matter of when that will occur. RNP concludes that it is "imprudent" for PacifiCorp to invest in another traditional coal-fired resource, particularly because so much of its resource portfolio is comprised of fossil-fuel resources. RNP instead recommends that PacifiCorp aggressively pursue renewable resources and DSM to delay the need for new coal resources, in order to allow the Company to continue to explore IGCC technology and for its costs and risks to decline.

NWEC recommends the Company acquire its lowest cost and most environmentally responsible resources, which the organization defines as energy efficiency and renewable resources, prior to acquisition of more fossil-fuel resources, especially conventional coal resources. NWEC states that air quality, water use and climate change issues all warrant tough scrutiny prior to fossil fuel development, especially before committing ratepayers to the large risk of investing in conventional coal plants that require 40 years of operation to amortize their costs.

NWEC states that the uncertainties ratepayers face over the next few years are large and not well-accounted for in the Company's analysis. These include advances in IGCC technology that could significantly reduce its costs, the prospect that Congress will enact significant economic incentives for IGCC, a strong likelihood of CO₂ caps or other regulation much higher than PacifiCorp's assumed CO₂ adder, advances in renewable resource technologies, and the potential for liquefied natural gas imports to reduce natural gas prices. NWEC concludes that these uncertainties warrant a high value for keeping the Company's options open, rather than closing them off with large long-term investments in conventional coal technology.

NWEC does not believe that the IRP methodology gives any value to optionality, and that neglecting this value is a serious drawback to the analysis. The organization recommends one way to indicate such value: Model *all* long-term resources as if they had to be amortized over a much shorter period. Such a method would simulate the possibility that the value of a resource would have to be severely discounted in the face of new technology or rapid regulatory or price shifts. For example, a coal plant would be amortized over 15 or 20 years, instead of its presumed 40-year life.

PacifiCorp expects that risks to cost recovery for a coal plant would be minimal given regulatory mechanisms, including the Multi-State Process, and past experience that once the costs of a new generating plant are shown to be prudent, there are not serious impediments to recovery of the costs in rates in the future. In addition, the Company states that cost recovery has been fairly constant across its spectrum of plants such that fuel type would not materially affect a decision about what type of plant to build. Further, the Company does not believe that commitment to a long-term resource of any type would preclude it from responding to developments in technology, policy or markets.

PacifiCorp believes that it has sufficiently captured the option value of deferring an investment in a coal plant through its stochastic risk analysis of a variety of portfolios. PacifiCorp opines that deferring a coal plant *increases* overall portfolio risk, primarily due to gas price volatility. The Company also points out that it analyzed switching the order of the second gas unit and the coal plant on the East side. The Company found no economic benefit of this deferral under a deterministic analysis.

Concerning the Parties' contention that PacifiCorp should postpone a coal plant decision and acquire alternative resources, the Company states its need to take prompt and focused steps to address the growing gap between its obligations and resources. The Company states that resource procurement must be concurrent with additional study of alternative resource options, without delay. Waiting to fully explore renewable resource, demand-side and distribution generation options would "imprudently impact" its ability to supply reliable, low cost power to its customers, according to PacifiCorp. Further, the Company asserts that using a coal-fired plant as a proxy high capacity factor resource in the IRP does not preclude consideration of other alternatives if they are appropriate for economic, risk management and system reliability reasons.

PacifiCorp disagrees with CUB that there would be little benefit if a new coal plant forced the retirement of an older, less-efficient coal plant under future CO₂ regulation. PacifiCorp's view is that replacement of older coal plants with newer coal plants could result in a net emissions reduction as well as avoiding costs required to keep the older units running.

PacifiCorp strongly disagrees that its IRP is skewed toward coal. The Company states that it determined its preferred portfolio using quantitative results from a rigorous analytical process, its resource planning experience and expert judgment. In addition to favorable stochastic analysis results, PacifiCorp cites less expensive Total Resource Costs for a pulverized coal plant vs. a natural gas-fired plant. Further, the Company states that 64% of the preferred portfolio's new thermal resources are natural gas.

PacifiCorp asserts that its risk analysis was not deficient for not directly weighing CO₂ cost risk against gas price risk in stochastic or scenario analysis. First, the Company states that selection of the preferred portfolio cannot be distilled down to a simple comparison of "extreme" CO₂ regulation and gas price risks. Rather, the Company made a qualitative assessment of risk using all of the risk metrics calculated. PacifiCorp views

this approach as necessary given the uncertainties in measuring resource portfolio risks and an insufficient basis to appropriately weight each risk metric in making decisions. The Company reiterates that the main conclusion of its stochastic analysis is simply that portfolios with fuel diversity in resource additions exhibited less risk than those that did not. Further, the Company explains that the purpose of its scenario analysis was to inform portfolio selection by indicating how alternative futures could affect costs.

Second, the Company contends it would be inappropriate to compare CO₂ regulation and gas price risks using the same technique given the disparate characteristics of these risks. PacifiCorp further states that it is inappropriate to conduct stochastic analysis on a full range of CO₂ risk adders because it cannot assign probabilities of occurrence with any degree of confidence. In addition, the Company cites its exclusion of all-gas Portfolio M and Portfolio Q, with three new coal plants, as evidence that the high gas price scenario was not given more weight than the high CO₂ cost scenarios. The Company points out that Portfolio Q scored well in many stochastic risk metrics, but was excluded by virtue of its poor results under testing for higher CO₂ allowance costs.

While PacifiCorp believes there is a need for another large thermal resource in summer 2011, the Company recognizes that transmission could bridge the gap between loads and resources in the short or long term. PacifiCorp states that transmission expansion could postpone the need to acquire a long-term, supply-side resource close to the load center. The Company plans to evaluate transmission alternatives that provide flexibility to deliver additional power from existing resources, procure power with shorter-term commitments, or provide access to low cost coal or wind resources in remote locations, and it will pursue those alternatives that are cost-effective.

PacifiCorp continues to investigate IGCC technology. The Company believes that the IGCC assumptions in the IRP are conservative and approximate probable risks due to such factors as site elevation, new technology, local labor costs and coal resources. PacifiCorp has recently contracted for a site-specific study to understand the cost impacts of installing an IGCC unit using Utah coal and operating at elevation.

Staff states that it is not convinced that a second large thermal resource, whether natural gas or coal, is needed on the East side by summer 2011. Staff points toward comments on planning margin, DSM, and analysis of renewable resources that relate to the assumed need for another large thermal resource. For example, Staff notes that the IRP is based on the planning margin never dipping below 15% in a single hour of any year, without consideration of any Class 3 DSM options for reducing unserved energy. Staff states that for the Company's preferred Portfolio E, the planning margin is expected to be 15% only during FY 2006-2008 and 2015; the Company expects the actual planning margin to reach 16% in FY 2010 and 2012-2013, 18% in 2014, and climb as high as 19% in 2009 and 2011. *See IRP Technical Appendix at 82.* Another example is the Company's planning assumption that the 261 MW of existing interruptible contracts do not continue after 2006 or would not be replaced by similar contracts.

Staff asked PacifiCorp to test three delay scenarios for the coal plant. *See* Staff Data Request No. 3. In doing so, Staff asked the Company to set the planning margin in the model to zero, then calculate the deterministic and stochastic PVRR values of the Company's preferred Portfolio E, as well as the level of unserved energy and the resulting planning margin. Staff also asked PacifiCorp for the numeric values for the average and worst case stochastic analyses because the IRP showed results only in bar charts and didn't present stochastic results for the final Preferred Portfolio (Portfolio E *with DSM*). *See* Staff Data Request No. 14-16. For comparison, Staff asked for the minimum, maximum and expected unserved energy for each year from FY 2006-2015 for Portfolio E as filed. *See* Staff Data Request No. 10.

Unserved energy values represent the sum of monthly amounts for the year. *Expected* unserved energy is the average for all 100 model runs; minimum and maximum values are from the two runs with the lowest and highest total unserved energy for the entire FY 2006-2015 study period.

Staff concludes the following based on PacifiCorp's responses:

- *Deterministic PVRR* – Delaying the coal plant one year reduces PVRR by \$34.8 million (0.3%), delaying it by two years reduces PVRR by \$53.8 million (0.4%), and delaying it by three years reduces PVRR by \$72.5 million (0.6%).
- *Stochastic average PVRR* (stochastic average variable cost plus deterministic fixed cost) - Delaying the coal plant, whether by one year, two years or three years, maintains about the same average PVRR based on 100 runs in a stochastic simulation of the Company's system under various futures. A one-year delay increases average PVRR by 0.03%, but a longer delay *reduces* average PVRR — by 0.04% for a two-year delay, and by 0.03% for a three-year delay.
- *Upper tail PVRR* (average of the five highest PVRR results in 100 runs) - Delaying the coal plant increases worst-case PVRR slightly: a one-year delay by about \$57 million (0.3%), a two-year delay by about \$134 million (0.8%), and a three-year delay by about \$162 million (1%).
- *Planning margin* – When the coal plant was delayed by *one year* in the model, the planning margin stayed at or above 15% for the next 10 years except in FY 2012, when the planning margin dipped to 12%. Delaying the coal plant by *two years* also reduced the planning margin below 15% in FY 2013, to 10%. Delaying the coal plant by *three years* reduced the planning margin a third year, in 2013, to 12%.
- *Unserved energy* - When the coal plant is delayed by *one year*, from summer 2011 to summer 2012, the expected amount of unserved energy in FY 2012 is 81,343 MWh. (Unserved energy over all model runs for that year ranged from

zero to 259,069 MWh.) When the coal plant is delayed two years, expected unserved energy is 80,257 MWh in FY 2012 and 112,293 MWh in FY 2013. When the coal plant is delayed three years, expected unserved energy is 81,343 MWh in FY 2012, 108,638 MWh in FY 2013, and 49,341 MWh in FY 2014.

For perspective, Staff compares these unserved energy amounts to the 75,135 MWh of expected unserved energy in FY 2007 for PacifiCorp's preferred Portfolio E *as filed*, with a range of 18,084 MWh to 188,113 MWh over all model runs.

Staff further compares these figures to results from PacifiCorp's Energy Exchange (Class 3 DSM) program for Oregon industrial customers from December 2000 to August 2001, where energy use reductions totaled more than 38,000 MWh. Staff also refers to PacifiCorp's agreements with three large Oregon customers for buybacks lasting longer than one week during the period March 2001 through September 2001. Customers reduced loads under the contracts by 61,385 MWh. Combined, these buyback reductions totaled about 99,000 MWh. *See Oregon Public Utility Commission Staff, Demand Response Programs for Oregon Utilities*, presented at the Commission's June 3, 2003, public meeting. Staff states that the avoided costs for deferring a coal plant may enable sizable buyback payments to Utah customers that could achieve results similar to Oregon's experience.

In addition, Staff states that the 20/20 Customer Challenge Program for residential and commercial customers reduced energy use by an estimated 97,650 MWh in Utah alone in the summer of 2001. The Company offered a 10 percent discount on monthly bills for customers using at least 10 percent less electricity compared to the same period during the prior year, and a 20 percent discount if they reduced electricity use by at least 20 percent. The program required no enrollment or special meters. *See Staff Exhibit 1, from Quantec, Customer Energy Challenge Report*, prepared for PacifiCorp, 2002.

Regarding the fuel type of the proposed summer 2011 East-side resource, Staff points out that all-gas Portfolio M is the least costly of all portfolios tested under PacifiCorp's base-case assumptions, with a PVRR about \$29 million (0.22%) less than the Company's preferred Portfolio E. *See IRP Technical Appendix, Table E.1*. Staff compares the all-in stochastic performance of the two portfolios as follows:

- The average stochastic cost (stochastic variable costs plus deterministic fixed costs) of Portfolio M is only 2.5%, or about \$331 million, higher than PacifiCorp's preferred Portfolio E.
- The "upper tail" cost, the average of the five highest PVRR results, is about 7% higher for Portfolio M than PacifiCorp's preferred portfolio.

Staff cautions relying on the upper tail values in the IRP because they are based on only five results out of a total of 100 model runs. Staff notes that the Northwest Power and Conservation Council's Fifth Power Plan uses a risk measure that is the average of the worst 10% results — some 75 results out of 750 iterations.

In response to PacifiCorp's use of Total Resource Cost analysis, Staff states it is useful when comparing two plants operated as base-load units. However, PacifiCorp's resource gap on the East side is primarily a peaking problem, not a base-load problem. Unlike the Total Resource Cost analysis, the Company's deterministic and stochastic analyses consider operating characteristics of resources in response to retail loads in estimating costs.

Staff points out that combined-cycle gas plants can be built in a far shorter time, have lower sunk and lower capacity costs, and with more flexible operating characteristics are better able to meet peaking needs, compared to a coal plant. In addition, the Company's Total Resource Cost, deterministic and stochastic analyses do not consider the risk of CO₂ regulatory costs higher than the Company's assumed \$8/ton value.

Staff expresses concern about the long lead time associated with coal plants, which increases planning risks related to load forecasts, technology, electricity and natural gas prices, and other factors. The Company's updated coal plant timeline shows it will take six years to permit and construct the next coal plant, regardless of whether the plant uses pulverized coal or IGCC technology. The Company notes that the RFP process now required by recently passed Utah Senate Bill 26 could add another 16 months to 18 months. *See* PacifiCorp's response to Data Request No. 1.7 of the Utah Committee of Consumer Services.

In addition, Staff notes that Portfolio E performed poorly in its requested scenario analysis where loads turn out two standard deviations lower than forecasted. Staff also notes that PacifiCorp did not examine whether a portfolio with renewable resources in excess of 1,400 MW would have a lower expected PVRR than Portfolio E. Renewable resources typically are in far smaller increments and typically have a far shorter lead time.

Moreover, Staff finds Parties' arguments that are founded on scientific and economic analyses of what CO₂ adder would likely be needed to avoid catastrophic climate change more persuasive than PacifiCorp's reliance on what CO₂ adder might be politically feasible in the near term. Staff finds that it is reasonable to conclude based on the evidence in this docket that the risk to ratepayers of a CO₂ adder higher than PacifiCorp assumed in its base case (\$8.38/ton CO₂ in 2010\$) is greater than the risk benefits of Portfolio E — primarily due to natural gas price volatility — estimated in the Company's stochastic analyses.

Staff notes that all-gas Portfolio M was the least-cost portfolio for all CO₂ allowance cases except a zero adder — including the Company's base-case CO₂ allowance. Staff further states that PacifiCorp's analysis relies on a 40-year amortization period for coal plants, which may not be tenable without the unplanned retirement of an existing coal plant or the addition of carbon sequestration.

Staff states its interest in IGCC technology as a resource with potentially more stable fuel prices than natural gas, with the ability to add sequestration more cost-effectively at a later date if carbon adders warrant and the facility is located where economic sequestration opportunities are available. Staff notes, however, that IGCC technology is just beginning to reach commercialization, and carbon sequestration is in its infancy. Staff recommends that both be more thoroughly investigated in the next IRP. PacifiCorp agreed to modify its Action Plan to do so.

Staff recommends that the Commission:

- Not acknowledge Action Item 8, acquisition of a 600 MW high capacity factor resource on the East side of the system by CY 2011
- Explicitly not acknowledge a new coal unit by CY 2011
- Direct PacifiCorp to assess in the next IRP or Action Plan brought forward for the Commission's acknowledgment IGCC technology in a location potentially suitable for CO₂ sequestration, including cost, commercialization status, technology risk, and comparative performance under future uncertainties including market prices and CO₂ regulation

Staff recommends that the Company continue environmental permitting and preparing detailed plans, including an economic review and justification for building or contracting for an additional thermal unit on the East side, and refining the level and type of resources needed and the procurement date.

Commission disposition: The Commission is not convinced that PacifiCorp's IRP makes the case for a second large thermal resource on the East side of the system by CY 2011. We rely particularly on comments regarding planning margin, omission of interruptible contracts, incomplete analysis of DSM opportunities and shortcomings in comparing DSM resources on par with supply-side options, failure to reexamine the potential risk reduction benefits of renewable resources above the 2003 IRP target under updated assumptions, and analysis of the coal plant delay scenarios coupled with reasonable measures that could be taken to avoid outages, including additional short-term purchases, wind resources and DSM programs, as well as acquisition of distributed resources. Therefore, the Commission does not acknowledge construction of a 600 MW high capacity factor resource in or delivered to Utah by CY 2011.

Further, the Commission explicitly does not acknowledge acquisition of a new coal plant at this time. Portfolio M, the all natural-gas portfolio, is less costly than PacifiCorp's preferred Portfolio E under the Company's base-case assumptions. The average all-in stochastic cost for all-gas Portfolio M is 2.5% more than PacifiCorp's preferred Portfolio E, but Portfolio M performs better under all CO₂ scenarios tested except a zero adder. We find that there is considerable risk to ratepayers of CO₂ regulatory costs significantly exceeding PacifiCorp's base-case assumption of \$8.38/ton (2010\$), and that those risks could well exceed the estimated risk reduction benefits of Portfolio E compared to Portfolio M attributable to gas price volatility. We also note the

poor performance of Portfolio E under a scenario with significantly lower load growth than forecasted.

In addition, the Commission does not find that PacifiCorp made the case that a coal plant is in the long-run public interest in light of mounting scientific evidence about the likely effects of CO₂ emissions on climate, the potential carbon allowances that might be required to avoid catastrophic impacts, and the momentum building toward regulatory action to limit CO₂ emissions.

If in the future PacifiCorp: 1) demonstrates the need for a large supply-side resource in summer 2011 or a later date; 2) chooses to invest in a new coal plant to meet this need; and 3) does not demonstrate to this Commission that a coal plant is the prudent resource choice, we have at our disposal several tools to allow cost recovery in a manner that is consistent with this order and which appropriately allocate the costs and risks between shareholders and ratepayers.

For example, in place of the coal plant, the Commission could impute the cost of a zero or low CO₂-emitting resource if we find that is the prudent resource action at the time the Company needs to make the resource commitment. As the IRP is not a ratemaking process, we decline at this time to identify the Commission's response to a future rate case application.

Hydropower resources. Joint comments by the Hydropower Reform Coalition and WaterWatch of Oregon raise issues related to dam management and licensing activities for PacifiCorp's 54 hydropower plants. In particular, these conservation groups comment that modification, enhancement, diminishment or retirement of these plants should be fully described in the IRP.

First, the groups express concerns about what they consider "pessimistic" and in some instances "inaccurate" characterization by PacifiCorp of its relicensing activities. For example, the groups assert that licensing activities take less time than the Company indicates in the plan, and that any delay may be the result of the relicensing applicant which may prefer to continue operating under the existing, less restrictive license. The groups also take issue with PacifiCorp's statement in the plan that FERC can require modifications to facilities that greatly reduce electricity production. The groups state that relicensing decreases project generation by only 1.6% on average, while capacity actually increases by an average of 4.6%.

PacifiCorp responds that while the Federal Power Act envisions a licensing process of five years, many projects take far longer. The Company cites FERC's development of a streamlined alternative to the traditional relicensing process to make the process less time-consuming and costly. The Company further cites FERC's statement that only one-third of projects undergoing traditional relicensing received a new license within five years. Finally, PacifiCorp cites examples of its own experiences with extended relicensing timelines.

Further, the groups opine that the reforms to the Federal Power Act that PacifiCorp supports will not, as the Company maintains, provide similar environmental enhancements. The groups criticize PacifiCorp's proposal which they assert would allow only the license applicant to challenge an agency's environmental conditions for relicensing, cutting out other interests.

PacifiCorp responds that the reforms the Company proposes would allow licensees to propose alternatives to agency-mandated environmental conditions so long as they provide greater operational efficiencies and the same level of environmental protection. The Company supports other stakeholders bringing forward proposals that meet these criteria.

Second, Hydropower Reform Coalition/WaterWatch of Oregon question data for projected generation losses and note what they view as inconsistencies in expected hydropower generation and capacity. They also call for PacifiCorp in future IRPs to consider the probability of dam removal when assessing the life of its hydropower assets. They further call for the Company to "weigh the relative size and age of its plants against the likely impacts of continued operation and the costs of modifying these facilities to comply with current environmental standards, and where costs outweigh the benefits, retire the facilities." *See* Hydropower Reform Coalition/WaterWatch of Oregon Comments at 6.

PacifiCorp responds that generation has declined as a result of operational constraints FERC imposes in new licenses and will continue to do so. For example, as part of relicensing for the North Umpqua project, the Company agreed to constraints that reduce generation by 8%. The Company further states that generation from owned hydro resources will decline over the next few years as several small plants are decommissioned, and the reconstruction of the Swift 2 hydro plant will not provide a corresponding increase in generation due to offsetting contract obligations. The Company provided licensing status of projects as of March 2005.

Staff believes that the Company should consider the potential cost and risk benefits for customers of dam removal when it is considering alternatives during the relicensing process. Staff believes that is the appropriate forum for considering such matters, rather than during the IRP process.

In its reply comments, PacifiCorp disagreed that the Company should commit during the IRP process or otherwise to such an analysis. The Company explains that there is no federal requirement to conduct dam removal or decommissioning studies. The Company states that it is required only to analyze the costs, benefits and environmental impacts of the proposed project as part of obtaining a new generating license, though FERC may request information about decommissioning. However, the Company stated in its earlier Responses to Oregon Party Comments that it is willing to consider dam removal if that would be the best outcome for its customers compared to relicensing alternatives.

Hydropower Reform Coalition/WaterWatch of Oregon also express concerns about pumped storage hydropower plants. Portfolio I modeled such a plant coming on-line in FY 2014. PacifiCorp did not choose this portfolio. It had the second highest deterministic PVRR of all portfolios and was not selected for risk analysis. The groups note that pumped storage plants may cause poor minimum river flows downstream, reservoir level fluctuation, and negative impacts on the river channel between the two reservoirs in arid areas such as Utah. The groups comment that if such plants are considered in the next IRP, the Company should provide information about ratepayer costs associated with environmental impacts and an analysis of construction and operation processes, such as acquiring water rights.

Staff recommends, and PacifiCorp agrees, that if pumped storage technology becomes a viable resource option in the future, PacifiCorp should analyze the associated environmental costs that ratepayers might incur.

Finally, Hydropower Reform Coalition/WaterWatch of Oregon expressed support for PacifiCorp's "hydro endowment." The groups state that an endowment could provide a way to isolate expenditures and ensure that capital is available for facility enhancements.

PacifiCorp responds that the "hydro endowment" referred to in the IRP is not an investment-income endowment structure as the groups suggest. Rather, it is a cost allocation method that "more directly assigns the costs of Company-owned hydroelectric resources and, to a substantial extent, hydro-based contracts with the Mid-Columbia utilities to the former Pacific Power states." See IRP at 39.

Commission disposition: If pumped storage technology becomes a viable resource option in the future, the Commission expects PacifiCorp to analyze the associated environmental costs that ratepayers might incur.

Distributed generation. NWECC calls for a more comprehensive treatment of CHP technology options. NWECC states that CHP can provide significant cost savings to ratepayers and reduced environmental impacts compared to conventional supply-side resources through the more efficient utilization of fuel inputs, typically natural gas, and avoidance of transmission costs.

NWECC expresses concern that the Company discounts the capacity contributions of CHP applications because their dispatch typically is not under the Company's direct control. NWECC sees this issue as comparable to those raised regarding how to model certain DSM resources and wind resources in the 2003 planning cycle. NWECC urges PacifiCorp as part of its Action Plan to perform more detailed modeling of CHP options in future IRPs.

In addition, NWECC cites a recent study for California indicating that solar photovoltaic (PV) systems can be cost-effective for areas with high summer-peaking loads, as is the case in Salt Lake City. The study estimated avoided distribution costs at

0.19¢/kWh to 2.95¢/kWh, and avoided transmission costs at 0.04¢/kWh to 0.72¢/kWh. *See California PUC Docket R.04-03-017.* NWECC recommends that PacifiCorp thoroughly investigate the use of solar to help address its Salt Lake City peaking problems.

CUB states that it is the utility's responsibility to assess all generation options, including CHP, and to create a diverse, least-cost integrated portfolio of resources. Therefore, CUB believes that the Commission should encourage, if not pressure, the utilities, to identify and include in their portfolios efficient CHP opportunities and acquire acknowledged CHP resources. CUB also believes utility acquisition of CHP resources will take pressure off the Energy Trust to fund CHP facilities, allowing the Trust to maintain funding levels for the energy efficiency assumed in the utility's IRP.

PacifiCorp states that it welcomes suggestions for modeling CHP for future IRPs but needs specific recommendations. PacifiCorp states that in evaluating any modeling suggestions, it would need to take into account that CHP units are sited based on customer economics and opportunities, that Qualifying Facilities would be included in the model at avoided costs, and that CHP resources can bid into supply-side RFPs.

The Company states that IRP modeling can be performed with any "theoretical" amount of CHP in the portfolios. The Company views the issue as "forecasting a feasible and dependable amount of CHP capacity suitable for long term resource planning," because the Company cannot predict whether customers will invest in such facilities. *See PacifiCorp's Response to Staff's Draft Proposed Order at 18.*

The Company states that CHP projects typically are not dispatchable, so they do not contribute to peak capacity needs and provide only energy to the system on a long term planning basis. The Company states that relying on CHP facilities is a risk to maintaining planning reserve margins because the facilities can be removed from service based on customer economics.

Finally, PacifiCorp asserts that considering CHP's potential for distribution asset deferral is beyond the current scope of an IRP. In addition, because this issue is being considered in Docket UM 1056, the Company states that it is beyond the scope of the Commission's acknowledgment review for the current IRP.

PacifiCorp states that the large capital costs associated with solar resources "would clearly result in a relatively uneconomic outcome for portfolios with significant PV solar resources." *See PacifiCorp's Responses to Oregon Party Comments at 19.* The Company notes that the costs for solar electric systems are listed in the IRP.

Staff notes that the nationwide CHP study in which PacifiCorp participated pursuant to its 2003 IRP Action Plan was limited to projects no larger than 10 MW and that CHP plants typically are larger than this. PacifiCorp concludes from the study that 100 MW of CHP projects are possible in its Utah service area over five years, comparable to two previous Utah studies that projected market potential at 100 MW to

150 MW. The Company also used the study to assess the CHP market in its Oregon service area at 45 MW over five years. Staff asserts that this number is very low, likely due to the 10 MW limit on project size, and that a single project could easily be larger than 45 MW.

In contrast, Staff states that a recent study prepared for U.S. Department of Energy estimated the additional economic potential in Oregon at 384 MW by 2025, without taking into account existing state incentives or any reduction in technology costs. In a scenario with incentives, reduced costs and other favorable conditions, the study estimated that 1,831 MW in additional systems could be installed in Oregon in the next 20 years. *See* OPUC Staff, *Distributed Generation in Oregon: Overview, Regulatory Barriers and Recommendations*, presented at the Commission's February 25, 2005, public meeting.

Staff notes that PacifiCorp's stress tests for the IRP for both CHP and dispatchable standby generation resources reduced the PVRR of PacifiCorp's preferred Portfolio E. Staff criticizes the IRP's approach to CHP resources because they are included in portfolio modeling only when the Company is confident a power purchase agreement for a particular project will transpire, unlike other types of resources.

At its May 2005 public input meeting, PacifiCorp reported that for its RFP for a CY 2009 East-side resource, distributed generation 3 MW or larger will be eligible to participate. In its June 17, 2005, response to questions at the meeting, the Company stated it intends to propose that the resources be under PacifiCorp's control, such as would be the case with customer standby generation.

Staff recommends that for the next IRP or Action Plan brought forward for the Commission's consideration, PacifiCorp evaluate within portfolio modeling the potential for reducing costs and risks of generation and transmission by including high-efficiency CHP resources and aggregated dispatchable customer standby generation of various sizes within load-growth areas. Staff further recommends that PacifiCorp evaluate the potential value of CHP resources in deferring a major distribution system investment associated with load growth, assuming physical assurance of load shedding when the generator goes off line, up to the number of hours required to defer the investment. PacifiCorp does not agree to do so.

Commission disposition: Among the ways the Commission plans to encourage utilities and customers to meet energy needs at the lowest possible cost and risk is to remove regulatory barriers to the use of distributed generation. The Commission views inadequate modeling of distributed resources in utility IRPs as one of these barriers.

For the next IRP or Action Plan brought forward for the Commission's consideration, PacifiCorp should include in its portfolio modeling high-efficiency CHP resources and aggregated dispatchable customer standby generation of various sizes within load-growth areas to evaluate the potential for reducing costs and risks of generation and transmission. Further, the Company should include in its modeling the

value of CHP resources in deferring a major distribution system investment associated with load growth, assuming physical assurance of load shedding when the generator goes off line, up to the number of hours required to defer the investment.

Transmission. CUB states that transmission constraints on the East side of PacifiCorp's system are an important reason to address Utah's load growth problem. Such constraints force long lead times in resource development to account for transmission siting and construction. CUB points out a possible flaw in the IRP: The analysis did not make clear whether a new transmission asset is valuable only when associated with a particular generating resource, or whether a transmission investment could delay a commitment to a new plant by relieving constraints and opening pathways to short-term market purchases.

CUB asked the Company to address the tradeoffs between building transmission to access shorter-term purchasing opportunities and building transmission to a dedicated resource. *See* CUB Data Request No. 3. In its response, the Company states, "PacifiCorp is open to evaluating purchases from remote new or existing resources via new transmission expansions as they could prove to be more cost effective than investing in new generation with associated transmission." CUB replies, "Given this response, we are not sure if Utah's load problem is causing us to build a coal plant, as the preferred portfolio assumes, or is causing us to fix a transmission problem in the absence of a coal plant." *See* CUB Opening Comments at 16.

Staff notes that the 2003 IRP analyzed a transmission-only portfolio which provided a comparison with other portfolios that included new generating resources along with associated transmission. Staff maintains that it cannot tell from the 2004 IRP whether some combination of additional transmission to enable additional short-term market transactions, along with new generating resources and their associated transmission, would have been a better choice than PacifiCorp's preferred portfolio.

Staff recommends that for the next IRP or Action Plan, PacifiCorp analyze the costs and risks of portfolios that include various combinations of additional transmission to reach resources that are shorter term or lower cost, along with new generating resources and their associated transmission. PacifiCorp agrees that additional analysis could be done to address the relative costs and risks of transmission investments that enable access to shorter-term market purchases or lower-cost generation alternatives. PacifiCorp agreed to Staff's proposed addition to the Action Plan related to this issue.

Commission disposition: We agree that the IRP does not sufficiently address the relative costs and risks of investing in transmission to enable more short-term market purchases, vs. meeting supply-side resource needs via long-term commitments with associated transmission costs. For the next IRP or Action Plan brought forward for the Commission's acknowledgment, PacifiCorp should analyze the costs and risks of portfolios that include various combinations of additional transmission to reach resources that are shorter term or lower cost, along with new generating resources and their associated transmission.

Overall recommendations. CUB recommends that the Commission not acknowledge a new coal plant at this time. CUB further recommends the Commission ask the Company how it would proceed on a path that included more peak-load shaving programs and no new coal-fired generation.

ODOE recommends at a minimum that the Commission not acknowledge acquisition of new coal plants pending completion of the following analyses:

- Risk analyses comparing a portfolio that has renewable resources beyond the 1,400 MW in the Action Plan with portfolios that have new coal plants
- Analysis of potential excess costs if PacifiCorp builds a coal plant without the option to sequester CO₂ and then faces an immediate or delayed requirement to reduce emissions below 2000 levels
- Analysis of the costs of alternative long-run strategies to respond to a binding and declining cap on PacifiCorp's existing CO₂ emissions through 2050
- Site-specific analyses of IGCC with sequestration at various sites
- An analysis of the transmission needed to integrate sufficient renewable and gas-fired resources to meet load growth through 2025 or, alternatively, plans including IGCC plants with a carbon sequestration option or compressed air storage for shaping wind resources, if these options have lower costs or risks

ODOE recommends a portfolio with more renewable resources, backstopped by new natural-gas plants and more demand response programs.

NWEC recommends that the Commission not acknowledge the 2004 IRP — especially the decision to acquire two conventional coal plants — without reviewing an analysis of a portfolio with far more renewable resources such as the Company tested in its 2003 IRP, without a higher assumed CO₂ adder, and without a value for keeping the Company's options open.

RNP recommends that the Commission direct PacifiCorp to prioritize renewable resource acquisitions and not acknowledge new coal-fired resources.

Staff recommends that the Commission acknowledge PacifiCorp's 2004 IRP with one exception and 11 modifications to the Action Plan. The exception is Action Item 8: Procure a 600 MW high capacity factor resource in or delivered to Utah by the summer of 2011. Staff recommends that the construction of a second large thermal resource in or delivered to Utah by CY 2011 not be acknowledged, including acquisition of a new coal unit. Staff's recommended modifications to the Action Plan are as follows:

Revised Implementation Action

1. Use decrement values to assess cost-effective bids in DSM RFP(s). Acquire the base DSM (PacifiCorp and ETO combined) of 250 MWa and 200 MWa or more of additional Class 2 DSM found cost-effective through RFP or in-house

programs, up to the levels required to serve load growth, and as approved by each State's Commission. (Action Item 2)

Additional Implementation Actions

2. Execute an agreement with the Energy Trust of Oregon by October 1, 2005, to reserve funds for the above-market costs of renewable resources that benefit Oregon ratepayers and enable timely completion of resource agreements upon extension of the federal production tax credit.
3. For the next IRP or Action Plan, analyze renewable resources in a manner comparable to other supply-side options, including testing cost and risk metrics for portfolios with amounts higher and lower than current targets, further refine wind's capacity contribution, and consider the effect of fuel type for thermal resource additions on the Company's cost to integrate wind resources.
4. For the next IRP or Action Plan, conduct an economic analysis of achievable Class 1 and Class 2 DSM measures in PacifiCorp's service area over the IRP study period and assess how the Company's base and planned programs compare with the cost-effective amounts determined in the study.
5. For the next IRP or Action Plan, develop supply curves for various types of Class 1 DSM resources, model them as portfolio options that compete with supply-side options, and analyze cost and risk reduction benefits. Evaluate this approach for Class 2 DSM resources and recommend whether this approach is preferable to the current decrement approach.
6. For the next IRP or Action Plan, assume existing interruptible contracts continue unless they are not renegotiable or other resources would provide better value.
7. For the next IRP or Action Plan, determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options.
8. For the next IRP or Action Plan, assess IGCC technology in a location potentially suitable for CO₂ sequestration, including cost, commercialization status, technology risk, and comparative performance under future uncertainties including market prices and CO₂ regulation.
9. For the next IRP or Action Plan, analyze planning margin cost-risk tradeoffs within stochastic modeling of portfolios. If feasible, analyze the cost-risk tradeoff of all portfolios at various planning margins. If not feasible, build all portfolios to a set planning margin, test them stochastically, and adjust top-

performing portfolios to higher and lower planning margins for further stochastic evaluation. Evaluate loss of load probability, expected unserved energy and worst-case unserved energy, as well as Class 3 DSM alternatives for meeting unserved energy. Evaluate alternatives for determining the expected annual peak demand for determining the planning margin — for example, planning to the average of the eight-hour super-peak period.

10. For the next IRP or Action Plan, analyze the costs and risks of portfolios that include various combinations of additional transmission to reach resources that are shorter term or lower cost, along with new generating resources and their associated transmission.
11. For the next IRP or Action Plan, evaluate within portfolio modeling the potential for reducing costs and risks of generation and transmission by including high-efficiency CHP resources and aggregated dispatchable customer standby generation of various sizes within load-growth areas. Evaluate the potential value of CHP resources in deferring a major distribution system investment associated with load growth, assuming physical assurance of load shedding when the generator goes off line, up to the number of hours required to defer the investment.

Jurisdiction

PacifiCorp is a public utility in Oregon, as defined by ORS 757.005, that provides electric service to the public.

On April 20, 1989, pursuant to its authority under ORS 756.515, the Commission issued Order No. 89-507 in Docket UM 180 adopting least-cost planning for all energy utilities in Oregon.

CONCLUSION

PacifiCorp is a public utility subject to the jurisdiction of the Commission.

PacifiCorp's 2004 Integrated Resource Plan, as modified in this order, reasonably adheres to the principles of least-cost planning set forth in Order No. 89-507, and should be acknowledged with the following exception and agreed-upon modifications, and with requirements for the next planning cycle:

Exception:

Action Item 8, Procure a 600 MW high capacity factor resource in or delivered to Utah by the summer of 2011, is not acknowledged, including acquisition of a new coal unit.

Modifications agreed to by PacifiCorp pursuant to Staff recommendations #1, 2, 3, 5, 6, 8 and 10, above, are as follows:

Revised Action Item

1. Use decrement values to assess cost-effective bids in DSM RFP(s). Acquire the base DSM (PacifiCorp and ETO combined) of 250 MWa and 200 MWa or more of additional Class 2 DSM found cost-effective through RFP or in-house programs, up to the levels required to serve load growth, and as approved by each State's Commission. (Action Item 2)

Additional Action Items

2. Execute an agreement with the Energy Trust of Oregon by October 1, 2005, to reserve funds for the above-market costs of renewable resources that benefit Oregon ratepayers and enable timely completion of resource agreements upon extension of the federal production tax credit.
3. For the next IRP or Action Plan, analyze renewable resources in a manner comparable to other supply-side options, including testing cost and risk metrics for portfolios with amounts higher and lower than current targets, further refine wind's capacity contribution, and consider the effect of fuel type for thermal resource additions on the Company's cost to integrate wind resources.
4. For the next IRP or Action Plan, develop supply curves for various types of Class 1 DSM resources, model them as portfolio options that compete with supply-side options, and analyze cost and risk reduction benefits. Evaluate this approach for Class 2 DSM resources and recommend whether this approach is preferable to the current decrement approach.
5. For the next IRP or Action Plan, assume existing interruptible contracts continue unless they are not renegotiable or other resources would provide better value.
6. For the next IRP or Action Plan, assess IGCC technology in a location potentially suitable for CO₂ sequestration, including cost, commercialization status, technology risk, and comparative performance under future uncertainties including market prices and CO₂ regulation.
7. For the next IRP or Action Plan, analyze the costs and risks of portfolios that include various combinations of additional transmission to reach resources that are shorter term or lower cost, along with new generating resources and their associated transmission.

Requirements for the Company's next IRP or Action Plan that the Commission adopts pursuant to Staff recommendations #4, 7, 9 and 11 are as follows:

1. Conduct an economic analysis of achievable Class 1 and Class 2 DSM measures in PacifiCorp's service area over the IRP study period and assess how the Company's base and planned programs compare with the cost-effective amounts determined in the study.
2. Determine the expected load reductions from Class 3 DSM programs such as new interruptible contracts and the Energy Exchange at various prices, and model these programs as portfolio options that compete with supply-side options.
3. Analyze planning margin cost-risk tradeoffs within stochastic modeling of portfolios. If feasible, analyze the cost-risk tradeoff of all portfolios at various planning margins. If not feasible, build all portfolios to a set planning margin, test them stochastically, and adjust top-performing portfolios to higher and lower planning margins for further stochastic evaluation. Evaluate loss of load probability, expected unserved energy and worst-case unserved energy, as well as Class 3 DSM alternatives for meeting unserved energy. Evaluate alternatives for determining the expected annual peak demand for determining the planning margin — for example, planning to the average of the eight-hour super-peak period.
4. Evaluate within portfolio modeling the potential for reducing costs and risks of generation and transmission by including high-efficiency CHP resources and aggregated dispatchable customer standby generation of various sizes within load-growth areas. Evaluate the potential value of CHP resources in deferring a major distribution system investment associated with load growth, assuming physical assurance of load shedding when the generator goes off line, up to the number of hours required to defer the investment.

Effect of the Plan on Future Ratemaking Actions

Order No. 89-507 sets forth the Commission's role in reviewing and acknowledging a utility's least-cost plan as follows:

The establishment of least-cost planning in Oregon is not intended to alter the basic roles of the Commission and the utility in the regulatory process. The Commission does not intend to usurp the role of utility decision-maker. Utility management will retain full responsibility for making decisions and for accepting the consequences of the decisions. Thus, the utilities will retain their autonomy while having the benefit of the information and opinion contributed by the public and the Commission.

Plans submitted by utilities will be reviewed by the Commission for adherence to the principles enunciated in this order and any supplemental orders. If further work on a plan is needed, the Commission will return it to the utility with comments. This process should eventually lead to acknowledgment of the plan.

Acknowledgment of a plan means only that the plan seems reasonable to the Commission at the time the acknowledgment is given. As is noted elsewhere in this order, favorable rate-making treatment is not guaranteed by acknowledgment of a plan. *See* Order No. 89-507 at 6 and 11.

This order does not constitute a determination on the rate-making treatment of any resource acquisitions or other expenditures undertaken pursuant to PacifiCorp's 2004 IRP. As a legal matter, the Commission must reserve judgment on all rate-making issues. Notwithstanding these legal requirements, we consider the least-cost planning process to complement the rate-making process. In rate-making proceedings in which the reasonableness of resource acquisitions is considered, the Commission will give considerable weight to utility actions which are consistent with acknowledged least-cost plans. Utilities will also be expected to explain actions they take which may be inconsistent with Commission-acknowledged plans.

In Order No. 05-021 (UM 1050), the Commission approved an Inter-Jurisdictional Cost Allocation method for PacifiCorp called the Revised Protocol. The Revised Protocol describes how PacifiCorp's costs are assigned or allocated among the six states the Company serves, including such activities as special contracts to retail customers, old and new Qualifying Facilities, Company-owned and contracted hydroelectric resources, and transmission costs. The allocation of a particular expense in whole or in part is not intended to prejudge the prudence of those costs.

With the exception of certain special contracts, DSM program costs are allocated to the state in which the investment is made, and their benefits are reflected in the change in the state's load allocation. The Revised Protocol includes a hydro endowment that benefits primarily Oregon and Washington. Supply-side resources are allocated to all states based on their load allocation. Costs associated with transmission assets and firm wheeling expenses and revenues are allocated among the states in a similar manner to supply-side resources.

ORDER

IT IS ORDERED that the 2004 Integrated Resource Plan filed by PacifiCorp on January 20, 2005, is acknowledged in accordance with the terms of this order and Order No. 89-507.

Made, entered, and effective _____.

Lee Beyer
Chairman

John Savage
Commissioner

Ray Baum
Commissioner

A party may request rehearing or reconsideration of this order pursuant to ORS 756.561. A request for rehearing or reconsideration must be filed with the Commission within 60 days of the date of service of this order. The request must comply with the requirements in OAR 860-014-0095. A copy of any such request must also be served on each party to the proceeding as provided by OAR 860-013-0070(2). A party may appeal this order to a court pursuant to applicable law.