

**CALIFORNIA ENERGY COMMISSION**

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October 29, 2007

Mr. Rick Willis  
Executive Director  
Oregon Public Utility Commission  
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**RE: PacifiCorp's Klamath Hydroelectric Project. Transmittal of Economic and Energy Information from the California Energy Commission to Assist Public Utilities Commissions in Identifying the Least-Cost Project Alternative for Ratepayers**

Dear Mr. Willis:

PacifiCorp is seeking a new license from the Federal Energy Regulatory Commission (FERC) to continue operating its Klamath River Hydroelectric Project, which is located on the Klamath River in Oregon and California. Due to the age of the facilities and its environmental impacts, an extensive array of mitigation measures are likely to be required by FERC and other state and federal environmental agencies in order to bring it into compliance with current environmental laws and regulations. Alternatively, PacifiCorp may choose to remove the project and procure replacement power for its customers.

At the request of the California Department of Fish and Game, the California Water Resources Control Board, and other state and federal agencies, the California Energy Commission (Energy Commission) retained an economic consultant to evaluate the cost and energy issues associated with relicensing or removing the Klamath Hydro Project. The results of this analysis have been sent to FERC, PacifiCorp and the other parties involved with this relicensing proceeding.

PacifiCorp will ultimately request review and approval of costs expended for the Klamath Hydro Project for either the mitigated-relicensing or decommissioning-with replacement-power project option in a series of General Rate Case proceedings. The Energy Commission is providing the results of its energy and economics analyses to the Oregon Public Utility Commission and the other Public Utilities Commissions (PUCs) with jurisdiction over PacifiCorp's service territory to assist in identifying the project option that will provide the optimum benefits to ratepayers at the lowest cost. It is our intention to help inform the record so that appropriate regulatory decisions on cost recovery can be made.

The scientific information provided in the administrative record coupled with the Energy Commission's own energy and economic analyses demonstrate that decommissioning with replacement power is the least-cost and biologically superior project option for PacifiCorp's ratepayers.

### **Background of the Klamath Relicensing Proceeding and Energy Commission Involvement on Energy and Cost Issues**

The Klamath River is one of the largest and most important rivers for salmon in California and Oregon. Historically, it sustained the third largest runs of salmon on the West Coast. The river now provides habitat for several remnant runs of imperiled Chinook salmon, Coho salmon and steelhead trout. A 169 megawatt (MW) hydropower project consisting of four main dams and powerhouses, operated by PacifiCorp, has excluded salmon from over three hundred miles of habitat in the upper Klamath Basin. The hydro project contributes to significant, ongoing impacts to native salmon and trout populations and to water quality. Populations of Klamath Chinook salmon reached such critically low levels in 2006 that the entire Pacific Coast commercial salmon fishing industry in Northern California and Southern Oregon was severely curtailed in order to protect the adult salmon returning to spawn in the Klamath River.

The Klamath Hydroelectric Project, parts of which are almost 90 years old, does not meet current environmental regulatory and legal standards. The current FERC relicensing proceeding will determine if and under what terms a new license should be granted to PacifiCorp to continue operating the Klamath Hydro Project (FERC Project No. 2082) under the Federal Power Act, and in accordance with the Endangered Species Act and Clean Water Act. Substantial facility upgrades and mitigation measures such as fish ladders, water quality control devices, and new limitations on project operations will be required to provide for upstream and downstream salmon migration and to bring the project into conformance with current environmental standards. The Secretary of the Interior and the National Marine Fisheries Service (NMFS) filed mandatory conditions – or mitigation measures – for fish passage and other environmental issues with FERC in March 2006. Federal Power Act Section 18 requires FERC to include the fish passage and related conditions developed by Interior and NMFS. In the summer of 2006, an Administrative Law Judge (ALJ) conducted a hearing on disputed scientific facts in accordance with the new Energy Policy Act procedures. Judge McKenna concluded that the scientific evidence put forth by the agencies to support their recommendations for full volitional fish passage and other mitigation measures is sound. FERC issued its Draft Environmental Impact Statement (DEIS) in September 2006 and the Final Environmental Impact Statement is anticipated late in 2007. The remaining regulatory actions prior to a final license decision by FERC are the FEIS and the Clean Water Act Section 401 Certifications for Oregon and California.

As an alternative to the substantial mitigation measures that will be required as part of a new FERC license, it may be more cost effective to decommission the hydro project, procure electricity from other sources, and restore the river's aquatic habitat. Energy Commission staff, the U.S. Department of Interior's Office of Policy Analysis (Interior) and other state and federal energy and wildlife agencies in Oregon and California collaborated to analyze and compare the net economic costs for the relicensing and decommissioning scenarios. The objective has been to design and conduct a rigorous, objective, and transparent analysis that can be used by government agencies and stakeholders in the FERC Proceeding, settlement negotiations, and regulatory proceedings at the Public Utilities Commissions with jurisdiction over PacifiCorp's service territory.

Dr. Richard McCann of M.Cubed was retained by the Energy Commission to develop the conceptual framework and the Klamath Project Alternatives Analysis Model (KPAAM) used to analyze the costs for the two project scenarios. The U.S. Bureau of Reclamation's (Bureau) Technical Services Center in Denver, Colorado developed the hydrologic model. Cost inputs for the mitigation measures were obtained from filings in the FERC relicensing proceeding from PacifiCorp, and state and federal agencies. Decommissioning cost estimates were developed by the California Coastal Conservancy and their engineering consultant. Replacement power cost estimates were obtained from independent, publicly available sources in the Pacific Northwest and California.

Results are provided in the Energy Commission Consultant Report *Economic Modeling of Relicensing and Decommissioning Options for the Klamath Basin Hydroelectric Project*<sup>1</sup> (*Klamath Consultant Report*). Energy Commission staff and M.Cubed prepared an *Addendum*<sup>2</sup> to the *Klamath Consultant Report* in response to a critique prepared by PacifiCorp and its economic consultant. Results and findings in the *Addendum* supersede those from the initial report and should be considered current. In 2003, Energy Commission staff prepared a *Preliminary Assessment*<sup>3</sup> of the Klamath River Hydro Project. Many findings from the 2003 report are still applicable to analyses of the Klamath Hydro Project.

Each of these reports and the KPAAM2 spreadsheet model are available on our website, <http://www.energy.ca.gov/klamath>, along with other Energy Commission Klamath materials.

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<sup>1</sup> *Economic Modeling of Relicensing and Decommissioning Options for the Klamath Basin Hydroelectric Project*, California Energy Commission Consultant Report, Publication No.700-2006-010, November 2006.

<sup>2</sup> *Addendum A – Response to PacifiCorp's Comments on the Klamath Project Alternatives Analysis Project*, California Energy Commission Consultant Report, Publication No. 700-2007-004-REV1, April 2007.

<sup>3</sup> *Preliminary Assessment of Energy Issues Associated with the Klamath Hydroelectric Project*, California Energy Commission Staff Report No. P700-03-007, Sacramento, California, May 2003.

## **Summary of Methods and Key Findings from the Klamath Consultant Report, Addendum and KPAAM2**

### **1. Klamath Project Energy Summary**

The Klamath Hydroelectric Project currently totals 169 MW nameplate capacity from four main power dams. FERC rates the project's dependable capacity at 42.7 MW. Current average annual generation is estimated to be about 716.8 gigawatt-hours (GWh). At the systems level for PacifiCorp, the Klamath Hydro Project comprises two percent of total capacity, and contributes about one percent to total electricity sales.

Although generally portrayed as a peaking facility, the project operates more as a run-of-river facility due to a number of constraints. In recent filings before the California Public Utilities Commission, PacifiCorp acknowledged that it has little authority or operating discretion to dispatch the Klamath Project to meet electricity demands. The hydro project has no large storage reservoir capacity available for seasonal dispatch, and inflows from the Bureau's irrigation project at Upper Klamath Lake are governed by two recent Biological Opinions issued under the Endangered Species Act to protect threatened salmon and other fish species.

### **2. KPAAM Methods**

KPAAM is a cost-effectiveness evaluation of two future project alternatives; relicensing with mitigation, and decommissioning with 30 years of replacement power. It is not a cost-benefit study, nor does it address the broader range of environmental and social impacts or benefits incurred by either option, such as changes in the fish populations, improvements in water quality, recreational opportunities, or regional economic impacts.

Cost inputs for three categories – mitigation costs, decommissioning costs and replacement power costs – were obtained from publicly available sources and integrated into the spreadsheet model with clearly stated assumptions. Conservative assumptions are used to identify the probable mitigation measures and a 30 percent uncertainty factor is used to account for the broad ranges of complexity and uncertainty in mitigation costs and final regulatory requirements. Standard economic analytic methods are used throughout. Results are appropriately discounted and presented as consistent net present values. The actual spreadsheet model is based on a similar Cost of Generation Model that has been developed by the Energy Commission for use at the CPUC. An associated hydrologic model of Klamath River flows was also developed to model current and future project operations from a variety of possible future constraints. Methods, assumptions and full descriptions of cost inputs are provided in the *Klamath Consultant Report*.

After PacifiCorp provided its critique of KPAAM and the *Klamath Consultant Report* to FERC, Energy Commission staff and M.Cubed revised the model and modified several cost inputs, model formulas and assumptions. The second model run is entitled KPAAM2. Revisions and findings are presented in the *Addendum*.

### **3. KPAAM2 Results**

Results of KPAAM2 are generally consistent with the results of the initial model run, which found that for a broad range of assumptions and replacement power forecasts, it would generally be more cost effective to decommission rather than relicense the Klamath Hydro Project.

- Total net present value (NPV) of the extensive mitigation measures likely to be required to reduce environmental damage from the 169 MW Klamath Hydro Project range from \$223 million to \$415 million, with a midline estimate of \$320 million. The operational mitigation measures would reduce power production by 23 percent to 563 GWh and further constrain peaking dispatch flexibility.
- Total NPV decommissioning and replacement power costs for 30 years would range from \$96 million to \$224 million. Decommissioning costs would range from \$38 million to \$71 million, while 30-year NPV replacement power costs based upon six separate forecasts would range from \$58 million to \$153 million.
- Final results from KPAAM2 show that decommissioning with replacement power is less costly than relicensing with mitigation across a wide range of assumptions and replacement power cost estimates. Economic benefits to PacifiCorp ratepayers from the decommissioning option would range from \$32 million to \$286 million. For the midline case using PacifiCorp's own replacement power forecast, it would be \$114 million less costly to decommission the facilities, restore the fisheries, and procure replacement power for thirty years rather than relicense the Klamath Hydro Project and install the extensive array of mitigation measures likely to be required by FERC and the other environmental regulatory agencies.

### **Energy Commission Staff Perspective on the Klamath Hydro Project**

At this point in the Klamath Relicensing Proceeding, state and federal fisheries, wildlife and water quality agencies have developed an extensive scientific record documenting the environmental damage to regionally significant populations of imperiled salmonids from historic operation of the Klamath Hydro Project. These scientific findings were confirmed by the trial judge in the administrative hearings conducted pursuant to the Energy Policy Act in August 2006. According to the National Marine Fisheries Service (NMFS) in their recommendations to FERC under Section 10(a) of the Federal Power Act, removing the four main hydropower dams is the biologically superior approach to minimizing environmental damage from the Klamath Hydro Project and restoring the fisheries:

“NMFS believes that within this relicensing process the best alternative to contribute to restoration of all fish species of concern in the Klamath watershed is the decommissioning and subsequent removal of the four lower Project dams (Iron Gate, Copco 1 & 2, and J.C. Boyle), combined with improvements in fish passage at Keno Dam. The dam removal alternative is a superior alternative

from a fish passage, water quality, and habitat restoration standpoint. Without man-made barriers to blockade essential fish movements, all fish may move freely and naturally, according to their life history adaptations for fulfilling their biological requirements. This is the basis of our section 10(a) recommendations. Implementing this dam decommissioning and dam removal alternative would go a long way toward resolving decades of degradation where Klamath River salmon stocks are concerned.”

The Energy Commission’s investigations into the energy values associated with the Klamath Project document that this 169 MW hydroelectric facility is a nominal energy resource that contributes a modest one percent to PacifiCorp’s total electricity supply. Project operations and dispatch flexibility are highly constrained by Bureau of Reclamation operations, and would be further constrained by the likely mitigation measures imposed by FERC and other agencies. Our 2003 study showed that loss of the facility’s generation would not significantly affect PacifiCorp’s ability to serve customer load, and that replacement power for the project’s intermittent, non-firm power is available from thermal and renewable resources in the Pacific Northwest.

The Klamath Hydro Project is presently a low-cost energy resource for PacifiCorp’s ratepayers because the legally-required investments in mitigation measures needed to meet modern environmental regulatory standards have not yet been made (KPAAM2 estimates current production costs at \$19 per MWh). PacifiCorp’s ratepayers across six Western states will have to pay either to relicense the project and install substantial mitigation measures, or to decommission the project and procure replacement power elsewhere. Should PacifiCorp prevail in securing a new FERC license that allows for continued operation of the Klamath Hydro Project with the required mitigation, ratepayers will be paying for reduced levels of intermittent power from an old, nominal energy resource at high production costs: KPAAM2 estimates that relicensing with mitigation will increase production costs three-fold to \$60.78 per MWh for the midline case, with a potential range of \$48.12 to \$73.19 per MWh.

Based on this information, we question the wisdom of investing hundreds of millions in ratepayer money to sustain a nominal and environmentally damaging power plant when a lower cost, environmentally superior project alternative is available and feasible.

The opportunity costs for alternative investments of this ratepayer money are significant. For example, for \$320 million a 170 MW wind farm could be constructed that produces intermittent, emissions-free electricity. For \$350 million to \$400 million, developers in California are constructing state-of-the-art 500 MW natural gas-fired combined cycle power plants that meet our state’s stringent air quality standards and produce firm power with some dispatch flexibility. Based on data from the Oregon Energy Trust, which administers Oregon’s energy efficiency programs, investing \$320 million in energy efficiency measures could secure about 2,000 GWh annually in energy savings

(228 average MW) over a 14-year period, nearly three times the Klamath Hydro Project's current annual energy production of 716 GWh.

While some parties to the FERC proceeding have expressed concern about the potential incremental increases in greenhouse gas emissions from thermal replacement power sources, it is important to recognize that 68 percent of PacifiCorp's generation is from coal-fired power plants (6,585 MW) and another four percent from gas-fired facilities. According to the company's Preferred Portfolio in its 2007 Integrated Resource Plan, PacifiCorp proposes to build two new coal facilities and increase ownership in a third by 2015, and construct three new combined cycle gas-fired power plants by 2016 for a total of 2,674 MW in new fossil-fueled capacity. Climate change emissions from these new thermal resources create a far larger carbon footprint than the incremental avoided emissions from the 169 MW Klamath Hydro Project. Moreover, replacement energy from renewables or energy efficiency programs are available in the Pacific Northwest.

In summary, FERC's relicensing proceeding for the Klamath Hydro Project presents a once-in-a-generation opportunity to help restore the historically significant runs of salmon and steelhead to the Klamath River Basin. Low power-high environmental impact power plants like those on the Klamath River require significant and unique energy benefits to justify their continued operations: our analysis reveals no such unique benefits. While the energy benefits from initial construction of the Klamath Hydro Project were apparent early in the 20<sup>th</sup> century, the environmental costs from the project nearly a century later overshadow the remaining nominal energy values. Current energy policies in California and throughout the West are reducing the growth in electricity demand through investments in energy efficiency, and creating fleets of modern, cost-effective renewable and thermal power plants that minimize damage to the environment and maintain electric system reliability. Such policies greatly reduce the need for outmoded, environmentally damaging facilities such as the Klamath Hydro Project.

Based on the scientific, energy and economic evidence provided in this letter, the FERC proceeding administrative record, and in our reports, Energy Commission staff recommends that the Oregon Public Utility Commission authorize cost recovery only for the decommissioning scenario, which is the least-cost, environmentally superior project option for the Klamath Hydro Project.

Mr. Rick Willis  
Oregon Public Utilities Commission  
October 29, 2007  
Page 8

Thank you for the opportunity to share our information and perspective on the Klamath Hydroelectric Project. Please contact Terrence O'Brien, Deputy Director, Energy Facilities Siting Division, at 916-654-3933, or by email at [tobrien@energy.state.ca.us](mailto:tobrien@energy.state.ca.us), if you have any questions or require further information.

Sincerely,



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Mr. Rick Willis  
Oregon Public Utilities Commission  
October 29, 2007  
Page 9

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