



**Federal Energy
Regulatory
Commission**

**Office of
Energy
Projects**

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Draft Environmental Impact Statement

Section 4 – Developmental Analysis



**South Feather Power Project
FERC Project No. 2088-068, California**

**Federal Energy Regulatory Commission
888 First Street N.E.
Washington, DC 20426**

4.0 DEVELOPMENTAL ANALYSIS

In this section, we analyze the South Feather Power Project’s use of the water resources of the Feather River basin to generate power, estimate the economic benefits of the South Feather facilities, and estimate the cost of various environmental measures and the effects of these measures on project operation.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECTS

4.1.1 Economic Assumptions

Under its approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission’s economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

For our economic analysis of the South Feather alternatives, we used the assumptions, values and sources shown in table 4-1.

Table 4-1. Staff assumptions for economic analysis of the South Feather Power Project. (Source: Staff)

Assumption	Value	Source
Base year for costs and benefits	2008	Staff and South Feather
Peak energy value (mills/kWh) ^a	79.72	South Feather 2008
Off-peak energy value (mills/kWh) ^a	54.61	South Feather 2008
Dependable capacity value (\$/kW-yr) ^b	Included in energy value	
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Federal and state tax rate	0%	Staff

Assumption	Value	Source
2006 to 2008 inflation for most final license application costs	5.16%	Staff
Insurance rate	Included in O&M costs	
Discount rate	6.2%	Staff
Interest rate	6.2%	South Feather

^a South Feather in its May 29, 2008, filing estimated the value of peak and off-peak energy using the low and high end-of-week Electricity Price Index for California's North Path 15 as provided by Dow Jones at <http://www.newsdata.com/wps/index.html>. To calculate peak and off-peak energy prices, South Feather averaged the high and low values for peak and off-peak energy for the past year resulting in \$79.72/MWh for peak energy and \$54.61/MWh for off-peak.

^b South Feather did not provide dependable capacity rates or effects of measures on dependable capacity; however, energy values reflect a capacity component since they were developed from market based pricing.

4.1.2 Current Annual Costs and Future Capital Costs under the No-action Alternative

Total annualized costs for the no-action alternative for the South Feather Power Project amounts to \$8,710,800, as table 4-2 shows.

Table 4-2. Summary of current annual costs and future costs under the no-action alternative for the South Feather Power Project. (Source: South Feather, 2007, staff)

Cost	Capital and One-Time Costs	Annual Costs, Including O&M	Total Annualized Costs
Total original net investment ^a	\$20,389,700		\$1,513,100
Future non-license capital costs ^b	\$13,475,200		\$1,000,000
Total relicensing cost ^c	\$6,000,000		\$445,300
Subtotal	\$39,864,900		\$2,958,400

Cost	Capital and One-Time Costs	Annual Costs, Including O&M	Total Annualized Costs
O&M including insurance		\$4,259,100	\$4,259,100
Transmission		\$315,500	\$315,500
Taxes and Fees		\$525,800	\$525,800
Operating reserves		\$631,000	\$631,000
Power Purchase Contract Management		\$21,000	\$21,000
Subtotal annual costs		\$5,752,400	\$5,752,400
Total	\$39,864,900		\$8,710,800

^a Based on South Feathers total investment of \$87,257,979 less \$61,844,549 in depreciation adjusted to the end of 2005 and 2 years additional depreciation at \$2,511,885 per year.

^b South Feather estimates future capital expenses to maintain the Project will equal \$1,000,000 per year. We divided that by the capital recovery factor of 0.07421 to convert to an equivalent 2008 capital cost.

^c Based on estimated relicensing costs projected by South Feather including additional ongoing costs of \$1,000,000 beyond the \$5,000,000 already spent.

4.2 COMPARISON OF ALTERNATIVES

South Feather provided an estimate of average annual output of the project under the no-action alternative (current conditions) of 498,987 MWh, which would provide annual power benefits of \$37,113,800. Subtracting the current costs of \$8,710,800 (see table 4-2) yields an annual net benefit of \$28,403,000. Using the CHEOPS ²⁶operations model, South Feather estimated project generation under South Feather's proposed project, the staff alternative, and the staff alternative with mandatory conditions that is

²⁶Computerized Hydro Electric Operations Planning Software, a proprietary program developed by Devine Tarbell & Associates

summarized in table 4-4.²⁷ These modeling results serve as the basis for our analysis of project economic benefits. The project’s generation output is sold to the Pacific Gas and Electric Company.

Table 4-3 compares the power value, annual costs, and net benefits of the no-action alternative, South Feather’s proposed action, the staff alternative, and the staff alternative with mandatory conditions. In section 5, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the staff alternative, and explain why we conclude the environmental benefits are worth the cost increases and benefit reductions. The decrease in net benefits from \$56.92/MWh under the no action alternative to \$55.26/MWh for the proposed action represents a decrease of 2.9 percent. The decrease in net benefits from \$56.92/MWh under the no-action alternative to \$54.35/MWh for the proposed action with staff-adopted measures represents a decrease of 4.5 percent. The decrease in net benefits from \$56.92/MWh under the no-action alternative to \$53.70/MWh for the staff alternative with mandatory 4 (e) conditions represents a decrease of 5.7 percent.

Table 4-3. Summary of annual net benefits for the no-action, proposed action, staff alternative, and staff alternative with mandatory conditions for the South Feather Power Project. (Source: Staff)

	No Action	South Feather’s Proposed Action	Staff Alternative	Staff Alternative with Mandatory Conditions
Annual power value (\$)	\$37,113,800	\$36,537,100	\$35,565,600	\$35,092,400
Annual power value (\$/MWh)	\$74.38	\$74.52	\$74.59	\$74.54
Annualized cost of plant and current environmental measures (\$)	\$8,710,800	\$8,710,800	\$8,710,800	\$8,710,800

²⁷On May 14, 2008 South Feather filed its alternative 4(e) conditions pursuant to EPAct. This filing contained a CHEOPS-based analysis of the effects on project generation of the instream flow regime contained in the Forest Service’s preliminary 4(e) conditions and the flow regime proposed by South Feather in its alternative 4(e) condition regarding instream flows. These flow regimes correspond to those contained in the staff Alternative with mandatory conditions and the staff alternative, respectively.

	No Action	South Feather's Proposed Action	Staff Alternative	Staff Alternative with Mandatory Conditions
Annualized cost of new environmental measures (including energy losses contained in the power values above) (\$)	\$0.00	\$1,307,900	\$2,490,800	\$3,121,900
Annualized cost of new environmental measures (excluding energy losses contained in the power values above)(\$)	\$0.00	\$731,300	\$942,600	\$1,100,500
Annual cost (\$)	\$8,710,800	\$9,442,100	\$9,653,400	\$9,811,300
Annual cost (\$/MWh)	17.46	19.26	20.24	20.84
Annual net benefit (\$)	\$28,403,000	\$27,095,100	\$25,912,200	\$25,281,100
Annual net benefit (\$/MWh)	56.92	55.26	54.35	53.70

The measures that South Feather proposes, summarized in table 4-5, increase the annualized costs from \$8,710,800 to \$9,442,100 relative to the no-action alternative. South Feather proposes some operational changes which would reduce annual generation by 8,685 MWh to 490,287 MWh, resulting in annual power benefits of \$36,537,200 and an annual net benefit of \$27,095,100. This equals an overall reduction in annual net benefits of \$1,307,900 relative to the no-action alternative.

The measures included in the staff alternative, summarized in table 4-5, would increase annualized costs from \$8,710,800 to \$9,653,400 relative to the no-action alternative. Operational changes would reduce annual generation, which would decrease by 22,139 MWh to 476,833 MWh. The staff alternative would provide annual power benefits of \$35,565,600 and an annual net benefit of \$25,912,200. This

represents an overall reduction in annual net benefits of \$2,490,800 relative to the no-action alternative.

The measures included in the staff alternative with mandatory conditions, summarized in table 4-5, would increase annualized costs from \$8,710,800 to \$9,811,300 relative to the no-action alternative. Operational changes would reduce annual generation, which would decrease by 28,192 MWh to 470,780 MWh. The staff alternative with mandatory conditions would provide annual power benefits of \$35,092,400 and an annual net benefit of \$25,281,100. This represents an overall reduction in annual net benefits of \$3,121,900 relative to the no-action alternative.

4.3 COST OF ENVIRONMENTAL MEASURES

4.3.1 Cost of Environmental Measures for the South Feather Power Project

South Feather provided costs for environmental measures in current dollars. Costs are taken from the final license application filed in 2007, and the South Feather reply comments on comments, recommendations, terms, and conditions (South Feather, 2008). Table 4-4 summarizes the capital and O&M costs by major resource area. Changes in power benefits are addressed in section 4.2.2.

Appendix B includes capital and O&M costs for individual measures proposed by South Feather and in terms, conditions, and recommendations received from agencies and other interested parties.

Table 4-4. Summary of annualized capital and O&M costs for measures included in the proposed action and proposed action with staff modifications for the South Feather Power Project. (Source: Staff)

Resource Area	South Feather's Proposed Action			Staff Alternative			Staff Alternative with Mandatory Conditions		
	Capital Cost	Annualized O&M Cost	Total Annualized Cost	Capital Cost	Annualized O&M Cost	Total Annualized Cost	Capital Cost	Annualized O&M Cost	Total Annualized Cost
Geology and soils	\$0	\$11,000	\$11,000	\$0	\$11,000	\$11,000	\$0	\$11,000	\$11,000
Aquatic resources	\$31,500	\$98,200	\$677,200	\$81,500	\$123,200	\$1,677,400	\$81,500	\$123,200	\$2,150,600
Terrestrial resources	\$42,000	\$91,100	\$94,200	\$77,000	\$170,000	\$175,800	\$77,000	\$327,900	\$333,700
Recreation	\$5,065,000	\$357,800	\$504,100	\$5,065,000	\$392,000	\$538,300	\$5,065,000	\$392,000	\$538,300
Cultural resources	\$0	\$20,300	\$20,300	\$0	\$79,400	\$79,400	\$0	\$79,400	\$79,400
Land use	\$0	\$1,100	\$1,100	\$30,000	\$6,700	\$8,900	\$30,000	\$6,700	\$8,900
Total	\$5,138,500	\$579,500	\$1,307,900	\$5,253,500	\$782,300	\$2,490,800	\$5,253,500	\$940,200	\$3,121,900

4.3.2 Effect of Environmental Measures on Energy Generation

Several measures proposed by South Feather or included in the terms and conditions filed by the agencies and other parties would affect energy generation. For the South Feather Power Project, increased minimum flows proposed for the five river reaches are the only measure that would have a substantive effect on energy generation. Estimates of the effects of measures proposed by South Feather and by other parties were estimated by applying the CHEOPS operations model to optimize and simulate the system by South Feather. Estimates of the power benefits under South Feather's proposed action, the staff alternative (which includes South Feather's alternative 4(e) flows) and in the staff alternative with mandatory conditions (which includes the Forest Service's preliminary 4(e) flows) are shown in table 4-5.

Table 4-5. Summary of the effect of environmental measures on energy for the no-action, proposed action, staff alternative, and staff alternative with mandatory conditions for the South Feather Power Project. (Source: Staff)

Power Benefits Effects	No Action	South Feather's Proposed Action	Staff Alternative	Staff Alternative with Mandatory Conditions
Peak power (MWh)	392,870	388,790	379,361	373,679
Peak power value (\$)	\$31,319,600	\$30,994,300	\$30,242,700	\$29,789,700
Off-peak power (MWh)	106,102	101,497	97,472	97,101
4-9 Off-peak power value (\$)	\$5,794,200	\$5,542,800	\$5,322,900	\$5,302,700
Total power (MWh)	498,972	490,287	476,833	470,780
Power lost relative to no action (MWh)	0	8,685	22,139	28,192
Power value (\$)	\$37,113,800	\$36,537,100	\$35,565,600	\$35,092,400
Reduction in power value relative to no action (\$)	-\$0	\$576,700	\$1,548,200	\$2,021,400

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