

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

In the Matter of the Application of)
HAWAII ELECTRIC LIGHT COMPANY, INC.)
For Approval to Commit Funds in)
Excess of \$2,500,000 (Excluding)
Customer Contributions) for Item)
H0001750, the Puna Turbine Upgrade)
Project.)

DOCKET NO. 2009-0104

DECISION AND ORDER

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PUBLIC UTILITIES
COMMISSION

FILED

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_____)

Docket No. 2009-0104

DECISION AND ORDER

By this Decision and Order, the commission approves HAWAIIAN ELECTRIC LIGHT COMPANY, INC.'s ("HELCO") request to commit approximately \$8,404,000 for Item H0001750, the Puna Turbine Upgrade Project ("Proposed Project"), pursuant to Paragraph 2.3.g.2 of General Order No. 7, Standards for Electric Utility Service in the State of Hawaii ("General Order No. 7").

I.

Background

HELCO, a Hawaii corporation, is a public utility as defined by Hawaii Revised Statutes ("HRS") § 269-1. HELCO was initially organized under the laws of the Republic of Hawaii on or about December 5, 1894. HELCO is engaged in the production, purchase, transmission, distribution, and sale of electricity on the island of Hawaii in the State of Hawaii.

A.

HELCO's Application

By application filed on May 6, 2009,¹ HELCO requested commission approval to commit approximately \$8,404,000 (excluding customer contributions) to replace the Puna Steam Unit's steam turbine rotor.² The Puna Steam Unit is a fossil-fueled generator, which operates as a base-loaded unit on the HELCO system, located at HELCO's Puna Power Station in Keaau, Hawaii.³ According to HELCO, in 2002, the Puna Steam Unit's turbine bearing No. 2 was damaged during a lightning storm. The unit's bearing lubrication system failed and the turbine rotor's journal (shaft) was damaged at the area of bearing support. The unit was repaired by replacing the supporting bearing No. 2 and extensive machining of the shaft (the original diameter was 12.000 inches and the diameter after the machining was 11.649 inches). The unit was put back on-line. However, the turbine manufacturer cautioned HELCO regarding the use of a smaller diameter shaft journal and expressed concern that any further machining would exceed the maximum amount of machining that could be tolerated for the rotor's bearing journal.⁴

¹Application; Verification; Exhibits A - D; and Certificate of Service ("Application").

²HELCO served copies of the Application on the DIVISION OF CONSUMER ADVOCACY, DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS ("Consumer Advocate"), an ex officio party to this proceeding pursuant to HRS § 269-51 and Hawaii Administrative Rules § 6-61-62. No persons moved to intervene or participate without intervention in this proceeding.

³Application, at 3.

⁴Application, at 6.

Project Description

The scope of the Proposed Project includes:

- Restore the No. 2 bearing and journal (shaft) to the original design size by replacement of the rotator⁵ shaft . . . this is the primary objective of the [Proposed] Project.
- Re-design the turbine steam path elements to eliminate the controlled extraction components. The new, simplified design is called "uncontrolled extraction." This would be ancillary to the journal restoration work and would provide a significant efficiency increase for the generating unit, as explained later in this Application.
- Replace the rotating and stationary steam path components (i.e., blades, discs, and diaphragms) to conform to the new uncontrolled extraction design.
- Modify the turbine controls and mechanical components to conform to the new uncontrolled extraction design by eliminating the control valves and electro-hydraulic actuators associated with the extraction system.

Application, at 4.

Other items of work, which are considered operating and maintenance or removal expenses and are not part of the capital cost estimate for the Project, include:

- Cleaning of the turbine casing,
- Inspections of bearings,
- Repairs to the insulation,
- Modifications to the existing auxiliary steam system, and

⁵The rotor replacement is expected to take six weeks of field work. Application, at 10.

- Removal work.

Application, at 5.

On July 5, 2009, HELCO placed an order for a replacement rotor (60 days after the Application's filing). The estimated completion date for the Proposed Project is late 2010 or early 2011.⁶

2.

Project Justification

HELCO represents that its electrical grid consists of a large percentage of fixed (scheduled) dispatch units such as geothermal units, and as-available resources such as wind and hydro units. According to HELCO, the Puna Steam Unit is an integral and critical part of its grid due to the ancillary services it provides (i.e., voltage regulation, frequency regulation, a high inertial capability, and automatic generation control dispatchability).⁷

HELCO contends that its electrical system requires at least two large steam turbines (i.e., Hill 5, Hill 6, or Puna) on line at all times to provide a contingency for the loss of one of the base load steam turbines. In addition, Shipman 3 and Shipman 4 (also steam units) are operated as intermediate units, cycled daily, and provide equivalent ancillary services. According to HELCO, in the event that one of the large steam turbines is out, and another trips or requires unplanned maintenance, either

⁶Application, at 12.

⁷Application, at 5.

Shipman 3 or Shipman 4 is operated as a base load unit to satisfy the contingency requirement and replace the lost ancillary services from the out of service unit.⁸

HELCO's request for approval of the Proposed Project is based in part on the Electric Power Systems, Inc. report dated December 29, 2006 ("EPS report") which examined the impacts to HELCO's system by the addition of the Hawi Renewable Development wind farm and the Tawhiri wind farm. The EPS report concluded, among other things, that "operating the system with less than two large steam turbines on-line places the system at considerable risk of collapse following many contingencies."⁹ The study recommended that HELCO's system not be operated with less than two steam units on-line during any load level.

HELCO also noted that the proposed replacement rotor would eliminate the controlled extraction features of the existing turbine and replace it with the more conventional uncontrolled steam extraction. Since the Puna turbine was built in 1970, improvements have been made in the design of turbine blades and seals and the replacement rotor would restore the efficiency lost by wear and tear and incorporate turbine blade and seal design improvements developed since 1970. HELCO estimates that the plant's net heat rate at 100% generator output will improve from the current rate of approximately 15,200 Btu/kWh to approximately 11,300 Btu/kWh.¹⁰ The Project is

⁸Application, at 6.

⁹Application, at 5-6.

¹⁰Application, at 8.

also intended to improve the thermal efficiency losses of the Puna Steam Unit turbine.¹¹

According to HELCO, the replacement is justified since a repair alternative could increase certain risk factors. HELCO states:

If another machining of the shaft journal were to be required, a detailed engineering review would be necessary to determine the absolute minimum shaft diameter allowable for satisfactory long-term operation of the Puna Steam Unit turbine. Under circumstances that could result in a bearing or lubrication oil failure, there would be no additional margin within the turbine's internal clearances to ensure an interference free incident. Such an incident could result in extensive internal turbine damage, along with the potential for internal generator damage, and a lengthy and costly outage to restore the turbine and generator.

Application, at 8. HELCO asserts that additional damage could warrant a weld repair on the rotor to return the shaft back to original dimensions, which would result in an extended outage of approximately ten weeks.¹²

With regard to the revenue requirement analysis, HELCO states:

[T]he replacement alternative results in a lower revenue requirement, on an annual basis and over [a 35-year study period], compared to the "continue as-is" alternative, mainly as a result of the efficiency gains realized. The anticipated annual fuel savings as a result of the increased operating efficiency . . . results in sufficient savings by 2012 which exceed the estimated capital cost of the replacement alternative. . . .

Another significant benefit of the expected efficiency gains with the rotor replacement is that it has the net effect of lowering HELCO's

¹¹Application, at 7-8.

¹²Application, at 8-10.

avoided cost, thereby lowering the rate of HELCO's energy payments to independent power producers, and thus benefiting the ratepayer[s] through lower overall electricity costs.

HELCO recommends the rotor replacement as a proactive and prudent measure that should be taken to maintain the long-term reliability of the Puna Steam Unit. The [Proposed Project] will also benefit HELCO's customers by improving the efficiency of the unit and reducing fuel consumption. The rotor replacement is the best of the available options, when compared to the "continue as-is" or planned repair alternatives, and is a reasonable course of action.

Application, at 11-12.

HELCO contends that the Proposed Project is consistent with the Hawaii Clean Energy Initiative ("HCEI") as it is a "reasonable and prudent investment in the ongoing maintenance and upgrade of the HELCO generation system." Consistent with the State's movement toward self-sufficiency, the Puna unit may also be converted to operate on biomass.¹³

B.

Consumer Advocate's Statement of Position

On August 7, 2009, the Consumer Advocate filed its Statement of Position¹⁴ indicating that it does not object to approval of the Application. The Consumer Advocate states:

¹³Application, at 14-15.

¹⁴On May 26, 2009, the Consumer Advocate filed a Preliminary Statement of Position stating that it had questions and concerns regarding the application, would issue information requests and participate in this proceeding. See Consumer Advocate's Preliminary Statement of Position, filed on May 26, 2009.

The Consumer Advocate filed its Statement of Position on August 7, 2009 ("Consumer Advocate's Statement of Position").

Given the expected role that the Puna Steam Unit is expected to fulfill as defined by HELCO, it appears that it is necessary to ensure that the Puna Steam Unit remain operational to meet not only existing system demands as a base load unit, but also the system needs in terms of system support. It is also anticipated that the proposed project will decrease the possibility of unexpected break down and to minimize the time that the unit might be out of service.

Consumer Advocate's Statement of Position, at 11. The Consumer Advocate notes that the Proposed Project is reasonable in light of the HCEI as the continued operation of the unit is necessary to maintain system reliability due to the amount of the wind generation on HELCO's system and the possible future conversion of the Puna Steam Unit to utilize a renewable energy resource.¹⁵

The Consumer Advocate, however, expressed concerns as to why HELCO did not propose the replacement soon after the 2002 incident, and why HELCO did not perform the work to correct the design of the extraction process sooner in light of the efficiency losses.¹⁶ The Consumer Advocate states that it will address these issues in HELCO's next rate proceeding "in which the Consumer Advocate will review whether the efficiency improvements to the Puna Steam Unit should have been performed sooner, allowing ratepayers the benefit of lower fuel costs associated with the unit."¹⁷

¹⁵Consumer Advocate's Statement of Position, at 11-12.

¹⁶Consumer Advocate's Statement of Position, at 12.

¹⁷Consumer Advocate's Statement of Position, at 13.

Finally, with regard to the estimated project costs, the Consumer Advocate states that a significant amount of costs, approximately \$6,990,000 or 83%, were associated with outside services and materials based on a vendor quote from ACA Services, Inc. ("ACA"). HELCO had conducted a bid process in which GE and ACA responded. HELCO selected ACA based on delivery schedule, price, efficiency and power output issues. The Consumer Advocate recommends that HELCO file the GE proposal and "reserves its right to address issues, if any, associated with the reasonableness of the instant project's actual project costs in [HELCO's] rate proceeding following the commercial operation of the [Proposed Project]." ¹⁸

II.

Discussion

Paragraph 2.3.g.2 of General Order No. 7 states, in relevant part:

Proposed capital expenditures for any single project related to plant replacement, expansion or modernization, in excess of \$[2.5 million]¹⁹ or 10 percent of the total plant in service, whichever is less, shall be submitted to the Commission for review at least 60 days prior to the commencement of construction or commitment for expenditure, whichever is earlier. If the Commission determines, after hearing on the matter, that any portion of the proposed project provides facilities which are unnecessary or

¹⁸Consumer Advocate's Statement of Position, at 13-14.

¹⁹The commission increased the monetary threshold governing the filing of capital expenditure applications by the HECO Companies, from \$500,000 to \$2.5 million, exclusive of customer contributions. See Decision and Order No. 21002, filed on May 27, 2004, in Docket No. 03-0257.

are unreasonably in excess of probable future requirements for utility purposes; then the utility shall not include such portion of the project in its rate base. If the utility subsequently convinces the Commission that the property in question has become necessary or useful for public utility purposes; it may then be included in the rate base. Failure of the Commission to act upon the matter and render a decision and order within 90 days of filing by the utility shall allow the utility to include the project in its rate base without the determination by the Commission required by this rule²⁰

Upon review, the commission approves the proposed expenditure of funds. The commission finds HELCO's justification for the Proposed Project to be reasonable under the circumstances and agrees that there appears to be a need to replace the rotor at this time. The commission accepts HELCO's representations that: (1) currently, the unit is operating in an impaired state and if damaged further, may potentially be rendered beyond repair; and (2) the HELCO system is in possible jeopardy, should there be any prolonged loss of this unit.

By replacing the rotor, HELCO and its ratepayers will benefit through greater efficiencies, which will reduce the amount of fuel HELCO consumes and reduce HELCO's avoided cost. Reducing HELCO's avoided cost will have the net effect of lowering the rate of HELCO's energy payments to independent power producers, which will benefit HELCO's ratepayers through lower overall electricity costs. Moreover, the duration of time that the unit will be out of service will be shorter compared to

²⁰ HELCO waived the commission's 90-day review period as set forth in Paragraph 2.3.g.2 of General Order No. 7 for an additional 20 days from August 4 to August 24, 2009. See Letter filed on July 27, 2009, from HELCO to the commission.

the repair alternative. Thus, the commission finds that replacement of the rotor is preferable to continuing "as-is" or repairing the rotor.

Based on the foregoing, the commission concludes that HELCO's request to commit approximately \$8,404,000 for the Proposed Project is reasonable and should be approved.

III.

Orders

THE COMMISSION ORDERS:

1. HELCO's request to expend approximately \$8,404,000 for Item H0001750, for the proposed Puna Turbine Upgrade Project, as described in HELCO's Application, is approved; provided that no part of the project may be included in HELCO's rate base unless and until the project is in fact installed, and is used and useful for utility purposes.

2. HELCO shall file a final cost report within sixty days of the project's operation, with an explanation of any deviation of ten percent or more in the project's actual cost from that estimated in the Application. HELCO's failure to submit this report may constitute cause to limit the cost of the project, for ratemaking purposes, to that estimated in the Application.

3. As a condition of approval, HELCO must file the GE proposal within thirty days of this order.

4. HELCO shall conform to the commission's order set forth in paragraphs 2 and 3 above. Failure to adhere to the commission's order may constitute cause for the commission to void this Decision and Order, and may result in further regulatory action as authorized by law.

DONE at Honolulu, Hawaii AUG 24 2009.

PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

By 
Carlito P. Caliboso, Chairman

By 
John E. Cole, Commissioner

By 
Leslie H. Kondo, Commissioner

APPROVED AS TO FORM:


Jodi L.K. Yi
Commission Counsel

2009-0104.laa

CERTIFICATE OF SERVICE

The foregoing order was served on the date of filing by mail, postage prepaid, and properly addressed to the following parties:

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