

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 \$500,000 for )  
Item H0000832, Kailua 19.2 MVAR )  
Capacitor Bank Installation. )  
\_\_\_\_\_)

DOCKET NO. 03-0388

DECISION AND ORDER NO. 21032

Filed June 7, 2004  
At 2:30 o'clock P.M.

Karen Higot.  
Chief Clerk of the Commission

DIV. OF CONSUMER ADVOCACY  
DEPT. OF COMMERCE AND  
CONSUMER AFFAIRS  
STATE OF HAWAII

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DECISION AND ORDER

I.

Background

HAWAII ELECTRIC LIGHT COMPANY, INC. ("HELCO") requests the commission's approval to commit approximately \$840,470 for Item H0000832, the Kailua 19.2 megavars ("MVAR") Capacitor Bank Installation Project ("Project").<sup>1</sup> HELCO makes its request in accordance with Section 2.3.g.2 of General Order No. 7, *Standards for Electric Utility Service in the State of Hawaii*.

HELCO served copies of its application upon the Department of Commerce and Consumer Affairs, Division of Consumer Advocacy ("Consumer Advocate"). On February 13, March 16, and May 3, 2004, HELCO responded to the Consumer Advocate's information requests.

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<sup>1</sup>HELCO's application, filed on November 7, 2003.

The Consumer Advocate does not object to the commission's approval of HELCO's application.<sup>2</sup> The deadline for commission action on HELCO's application is June 7, 2004.<sup>3</sup>

## II.

### Project Overview

The Project involves the installation of 19.2 MVAR of capacitors at the Kailua substation to provide voltage support for the West Hawaii area. The capacitor installation will be automatically controlled and configured as four (4) individual 4.8 MVAR capacitor banks. HELCO explains that: (1) the standard capacitor increment for HELCO's 69 kilovolt ("kV") capacitor bank design is 4.8 MVAR; and (2) capacitor bank additions are usually made in groups of two (2).

HELCO's West Hawaii 69 kV Under-Voltage Evaluation Study, dated May 28, 2003 ("HELCO's Study" or the "Study"), provides the supporting basis for the Project.

## III.

### Planning Criteria and Under-Voltage Conditions

HELCO represents as follows:

1. Under its Planning Criteria, its system must withstand the loss of certain recognized contingencies, such as the loss of a 69 kV transmission line. Following these

<sup>2</sup>Consumer Advocate's position statement, filed on May 4, 2004.

<sup>3</sup>See Stipulated Procedural Order No. 20723, filed on December 19, 2003, at 3; and HELCO's letter, dated May 18, 2004 (proceeding is ready for decision-making).

contingencies, all portions of the 69 kV system must maintain voltage to within +/- ten (10) per cent of nominal (69 kV); no transmission line may exceed its emergency rating. Various 69 kV line contingencies may result in the existing 69 kV system violating the ten (10) per cent under-voltage threshold. HELCO's Study at 5; and HELCO's System Planning Criteria, dated January 23, 1997.

2. HELCO's 69 kV transmission system is at risk for under-voltage conditions. Specifically, "there are 11 different 69 kV line contingencies resulting in 69 kV under-voltage conditions and 15 contingencies resulting in voltages within 1% of the lower 69 kV voltage limit." Under all scenarios, "much of the low-voltage occurs on the west side of the system, generally centering around the Huehue Substation." HELCO's Study at 6.

3. HELCO's system "is at risk for under-voltage conditions whenever system load exceeds about 122 MW. The under-voltage condition steadily worsens as system load increases until about 165 MW, where voltage collapses. As generation is dispatched on the west side of the HELCO system, the severity of this contingency is reduced." Id. at 6.

4. Low voltage conditions usually occur when there is a great distance between the generating source and the load being served, and can occur in situations where the supply for reactive power (measured in vars) is unable to meet the demand. Potential low voltage conditions can be reduced by several methods,

including "installing capacitor banks near the area experiencing the low voltage conditions[.]" HELCO's application at 4 - 5.

5. HELCO's Study concludes:

Various options were considered and evaluated using load flow simulation. Based on cost, operational flexibility, risk issues, and uncertainties regarding the Keahole power plant expansion, it is recommended that 19.2 MVAR of capacitors be installed at the Kailua Substation. The capacitor installation should be automatically controlled and configured as four individual 4.8 MVAR capacitor banks.

HELCO's Study at 2.

6. Reconductoring existing transmission lines and installing new transmission lines were not considered, "given the substantial time required to implement a reconductoring or new line project." Rather, installing the capacitors will: (A) contribute toward relieving some of the low voltage situations; and (B) require substantially less time than reconductoring existing lines. "However, reconductoring is being considered to address potential line overload conditions[.]" HELCO's application at 5.

IV.

Evaluation of Three (3) Options

HELCO evaluated three (3) options using load flow simulations: (1) do nothing; (2) increase generation output at Keahole; or (3) install 69 kV capacitors at its Kailua substation. HELCO's Study at 10. HELCO's Study makes the following pertinent findings and conclusions:

A.

Do Nothing Option

Under the do nothing option, no system improvements will be made. This option requires HELCO's system operator to rapidly identify the under-voltage condition and its cause, assess its severity, and implement corrective measures. Under-voltage conditions are not prevented, and it can take fifteen (15) minutes or longer before corrective actions are implemented, which may be inadequate for preventing catastrophic system failure. "The severity of the potential under-voltage conditions is in violation of HELCO's Planning Criteria, which states that 69 kV voltage must not vary by more than +/- 10% from nominal. As such, this is the least desirable option." HELCO's Study at 10 and 16 - 17.

B.

Increase Generation Output at Keahole Option

"Running additional generation at Keahole once total system load exceeds 122 MW can prevent under-voltage conditions from occurring." The uneconomic dispatch will result in increased generation costs. HELCO's Study at 11 and 13. Under this option, no system improvements will be made. HELCO's application at 7.

"The annual costs associated with increasing generation output at Keahole is estimated to be about \$2.1 million and is offset by about \$1.3 million of system loss savings. The net annual cost to HELCO is expected to be about \$764,000." "If

Keahole CT-4 and CT-5 are installed in 2005, the net annual cost is estimated to be about \$705,000 (2003 dollars)[.]" HELCO's Study at 13 and 16 - 17.

"The additional run time of the Keahole generating units means that more frequent maintenance will be required." The Keahole option "will also severely limit HELCO's operating flexibility since the Keahole diesel generators will be required to run on a daily basis, thus precluding their use as fast start units in response to other system problems." Id. at 16 - 17.

"Although [the Keahole] option eliminates the risk for under-voltage conditions, it is more expensive in terms of cost and loss of operational flexibility." Id. at 16.

C.

Install Capacitors Option

The installation of 19.2 MVAR of 69 kV capacitors is sufficient to prevent under-voltage conditions from occurring in all but three (3) transmission line contingencies. However, if the installation of the capacitors is considered in conjunction with the future planned reconductoring of the Keahole-Keamuku (6800) transmission line, "19.2 MVAR is sufficient to prevent under-voltage conditions, with the exception of the Haina-Waimea (7700) [transmission] line contingency." Furthermore, the installation of 19.2 MVAR of capacitors in combination with "the installation of Keahole CT-4 and CT-5 will eliminate the risk for under-voltage conditions for all line contingencies." Id. at 14 - 18.

The "[o]peration of the capacitor banks could be automatically controlled using zero-crossing switches similar to the existing 69 kV capacitors at the Kahaluu Substation. The zero-crossing switches will help to minimize any voltage transients associated with switching the new banks." Id. at 16 - 17.

The installation of 19.2 MVAR of capacitors will provide "additional operating flexibility, and will help to preserve the fast start capability of the Keahole diesels. The estimated \$840,000 for the installation of capacitors is significantly less than the increasing generation output at Keahole option." The capacitors should be configured as four (4) individual 4.8 MVAR capacitor banks, automatically controlled, with each capacitor utilizing zero-crossing switches.<sup>4</sup> Id. at 17 - 18.

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<sup>4</sup>HELCO states that its "present practice is to install 69 kV capacitors in 4.8 MVAR increments. As such, the proposed installation at the Kailua Substation would require four (4) 4.8 MVAR banks in order to achieve the 19.2 MVAR total." HELCO's Study at 15.

HELCO also examined the feasibility of installing either a Static Var Compensator ("SVC") or Synchronous Static Compensator ("SSC") at the Kailua substation in lieu of capacitors. Both alternative technologies "allow much finer voltage control." However, the estimated costs for the SVC and SSC are approximately \$1.4 million and \$2.6 million, respectively. Id. at 15 - 17.

The Kailua substation is the preferred site for installing the 19.2 MVAR of capacitors.<sup>5</sup> Alternate sites were also considered, but discounted due to the: (1) lack of space; (2) lack of 69 kV circuit breakers; and (3) reduced effectiveness of the capacitor installation. Id. at 13.

"Once the Kailua capacitors are installed, HELCO does not have plans to remove the capacitor banks. [T]he capacitor banks will be available and can be energized automatically or by the HELCO system operator whenever low voltage situations occur." HELCO's response to CA-SIR-3(d).

V.

Keahole Dual-Train Combined Cycle Unit: Overview

HELCO's long-planned dual-train combined cycle ("DTCC") unit includes CT-4, CT-5, two (2) heat recovery steam generators, a steam condensing system, a steam turbine generator, and ancillary equipment ("ST-7"). HELCO, in its present application (Docket No. 03-0388), notes: "[T]he addition of the capacitors at the Kailua Substation should be done in parallel with HELCO's continued efforts to install CT-4 and CT-5." HELCO's application at 10 - 11.

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<sup>5</sup>HELCO explains that load demand is centered in the Keahole area on the west side of the island. Currently, the capacitor banks at the Kahaluu substation are heavily used because it is a source of voltage support nearest to the load center. Installing the Kailua capacitors will place voltage support capacity in a more ideal location, closer to where the support is needed. Once in operation, "the Kailua capacitor banks would most likely become the most heavily used capacitor banks, along with Kahaluu (the next location closest to where the voltage support is needed)." HELCO's responses to CA-IR-2 and CA-IR-3; and HELCO's response to CA-SIR-3(b).

HELCO then explains that its on-going efforts to install ST-7 will include the installation of selective catalytic reduction emission control equipment ("SCR"). To install the SCR, HELCO must: (1) reclassify the Keahole property from conservation to urban; (2) rezone the property for industrial use; (3) amend its current air permit to include SCR; and (4) obtain an extension for the air permit to accommodate the time duration for the land reclassification and rezoning for the ST-7 schedule. HELCO estimates that the land reclassification and rezoning process for ST-7 is anticipated to take several years to complete. Moreover, the possibility exists that "HELCO will need to obtain a new air permit for ST-7 because of the extended period between the installation of CT-4 and CT-5 and the installation of ST-7." Id. at 11; and HELCO's response to CA-IR-4.

HELCO concludes that "if a base-loaded, [DTCC] unit is ultimately installed at Keahole, this [will] eliminate the risk for under-voltage conditions for all line contingencies identified in the study." In the meantime, "HELCO is currently at risk for the occurrence of under-voltage conditions during line contingencies, and installing capacitors is one mitigation measure that can address most of these risks." HELCO's application at 11.

VI.

Keamuku-Keahole 69 kV Transmission Line Reconductoring: Overview

HELCO states that its system is also at risk for transmission line over loads during certain contingencies. Thus: (1) HELCO plans to submit capital expenditure applications "for approval to commit funds for up to three line reconductoring projects to address this situation[;]" and (2) the first project "will involve reconductoring the Keamuku-Keahole (6800) 69 kV line."<sup>6</sup> Id.

HELCO explains:

1. With the installation of 19.2 MVAR of capacitors at the Kailua substation, "there would still be three contingencies that would result in under-voltages." Id. at 11 - 12.

2. "If the installation of capacitors is completed in conjunction with the planned reconductoring of the Keahole-Keamuku (6800) 69 kV line, the 69 kV system will be at risk for under-voltage conditions only for one contingency, the loss of the Haina-Waimea (7700) line." Id. at 12.

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<sup>6</sup>To date, HELCO's "ballpark" estimates for the three (3) line reconductoring projects are: (1) \$2,268,700, Waimea-Ouli (7300) line reconductoring; (2) \$2,527,700, Waimea-Keamuku (7200) line reconductoring; and (3) \$8.8 million, Keamuku-Keahole (6800) line reconductoring. HELCO's response to CA-IR-12(b). The 7300 line reconductoring project is scheduled for 2005, and the 7200 line reconductoring project "will be delayed until the 2005 - 2006 timeframe, after the completion of the 7300 line reconductoring project, as both lines cannot be out of service at the same time." HELCO's response to CA-SIR-5(b). Meanwhile, "[t]he 6800 line reconductoring project is not in the board-approved 2004 - 2008 capital budget" at this time. Id.

3. Thus, "the addition of the capacitors at the Kailua Substation immediately is complementary with HELCO's plans to reconnector the Keahole-Keamuku (6800) 69 kV line in the future." Id.

4. "Reconductoring projects to relieve line overload conditions cannot be mitigated by the installation of the Kailua Capacitor Bank system[.] Capacitor banks are installed as remedial measures for voltage support and do not address the line overload conditions that occur as a result of high current flowing to the load centered in the Keahole area." HELCO's response to CA-IR-12(a).

## VII.

### Integrated Resource Plan

HELCO states that the Project is consistent with its Integrated Resource Plan, 1999 - 2018 ("IRP"), taking into account current circumstances. Specifically:

1. For its IRP, "a high-level transmission study was performed to determine the benefits of adding West Hawaii generation versus East Hawaii generation from a transmission planning point of view." HELCO's application at 13.

2. "The alternative plans examined in the study did not explicitly show the addition of capacitors, as the study focused on transmission line additions and reconductoring projects, and it was assumed for purposes of the study that capacitor additions for voltage support would be the same in all plans. Nonetheless, it was explicitly recognized that there

would be a greater need for capacitor additions without baseloaded generation at Keahole and/or in West Hawaii, as is currently the situation." Id. at 13 - 14.

3. Its IRP also "mentions the potential need for contingency measures, and the potential need for capacitors 'necessary to maintain voltage levels on the system.'" Id. at 14.

4. The Project is also consistent with and should further support IRP objectives, in particular: (A) Objective No. 2, maintaining reliability; and (B) Objective No. 6, supporting the Hawaii Energy objective of achieving dependable statewide energy systems. Id.

5. Its IRP contemplates that "contingency measures will be taken to maintain system reliability when planned supply-side additions are delayed or have to be changed." Given the uncertainty over the timing and approval process governing the installation of CT-4 and CT-5, the installation of the capacitors at the Kailua substation "is particularly important for voltage support pending the addition of CT-4 and CT-5." Id.

6. The capacitor additions will continue to be used and useful after CT-4 and CT-5 are installed or the Keamuku-Keahole (6800) transmission line is reconductored, or both, "because they will resolve the remaining under-voltage line contingencies when generation is economically dispatched." Id.

## VIII.

### Consumer Advocate's Comments

The Consumer Advocate notes that "[w]hile HELCO asserts that its system is currently at risk for severe undervoltage scenarios, the probability that any of these scenarios will occur in the immediate future is unclear."<sup>7</sup>

The Consumer Advocate, in its investigation, examined: (1) whether there is an immediate need to resolve the existing contingencies; (2) assuming a need exists, whether HELCO's alternative is reasonable; (3) the Project's overall impact; and (4) the reasonableness of the Project's costs.

#### A.

##### Immediate Need

It is the Consumer Advocate's understanding that: (1) the Project will be effective in only addressing the under-voltage conditions identified in HELCO's Study; and (2) additional measures are necessary to address the transmission line overload conditions. Based on the Study's data, it does not appear that HELCO faces the possible occurrence of a severe or catastrophic system event.

Thus, while action should be taken at some point to address the possible contingencies noted in the Study, "it is not readily apparent that action needs to be taken at this time given other factors that must also be considered."<sup>8</sup> Rather, HELCO is

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<sup>7</sup>Consumer Advocate's position statement, at 3.

<sup>8</sup>Id. at 6.

presently able to take corrective action, if necessary, using its existing plant.

B.

HELCO's Alternative

The Consumer Advocate reviewed the three (3) options considered by HELCO and makes the following findings:

1.

Do Nothing Option

This scenario represents the *status quo* of uneconomically dispatching existing generation at Keahole to address under-voltage and overload conditions that occur on HELCO's system. For various reasons, the *status quo* will not continue:

a. HELCO's capital budget already includes plans to implement solutions to the existing and potential under-voltage and overload solutions. For example, HELCO is proceeding with the installation of its DTCC unit at Keahole to operate as a base load unit in the near future.

b. HELCO has already initiated plans to reconductor transmission lines in the future.

Accordingly, the Consumer Advocate concludes that the do nothing option "has been rendered moot by HELCO's actions to proceed with alternatives that, if not intended to directly

address the existing situation, will still result in a solution for the identified problems."<sup>9</sup>

2.

Increase Generation Output at Keahole Option

The Consumer Advocate notes that, at the time HELCO was completing its Study, HELCO's ability to proceed with the installation of its Keahole DTCC unit was uncertain (aka the Keahole Project). Now, with HELCO's settlement with certain opponents of the Keahole Project, HELCO is able to proceed.<sup>10</sup>

Since CT-4 and CT-5 are expected to be in commercial operation by the end of 2004, and ST-7 will be installed sometime thereafter, HELCO will eventually have a base load unit in the West side of Hawaii to address the under-voltage conditions identified in its Study. "Thus, the need to evaluate this alternative also appears moot as actions are already being taken to implement this alternative."<sup>11</sup>

3.

Install Capacitors Option

HELCO's Study indicates that the installation of the 19.2 MVAR capacitor bank is sufficient to prevent under-voltage conditions in all but three (3) transmission line contingencies.

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<sup>9</sup>Id. at 8.

<sup>10</sup>See generally Docket No. 7623, HELCO's monthly status reports on the Keahole Project.

<sup>11</sup>Consumer Advocate's position statement, at 10.

In addition: (1) two (2) contingencies will be addressed with the reconductoring of the Keahole-Keamuku (6800) transmission line; and (2) the installation of the 19.2 MVAR capacitor bank in combination with the installation of Keahole CT-4 and CT-5 will address all transmission line contingencies.

The Consumer Advocate notes that the installation of the capacitor bank will not resolve all contingencies, without the implementation of additional measures needed to address all contingencies even if HELCO's application (Docket No. 03-0388) is approved.

C.

Project's Overall Impact

The Consumer Advocate finds that the Project is a short-term, temporary remedial measure to manage certain low voltage situations "that must be remedied by other more permanent measures (e.g., line reconductoring and the installation of the Keahole DTCC unit)."<sup>12</sup> And "while the Consumer Advocate supports having a reasonable level of contingency planning in place, it is unclear whether allowing HELCO to construct CT-4, CT-5 and ST-7, possibly reconductoring various transmission lines, and installing capacitors is reasonable."<sup>13</sup> Thus, "while HELCO has attempted to support the claim that the capacitor banks should be considered used and useful after the installation of the Keahole

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<sup>12</sup>Id. at 12.

<sup>13</sup>Id. at 13.

DTCC unit and the planned line reconductoring is completed, such assertions appear questionable at this time."<sup>14</sup>

Under the Consumer Advocate's interpretation, "[u]ntil the Keahole DTCC unit comes on line, it is HELCO's assertion that it will incur about \$280,300 per year to address the claimed under-voltage problems."<sup>15</sup> HELCO appears to assert that the payback period for the Project may somewhere be between three (3) to four (4) years, suggesting that if the capacitor bank enables HELCO to reduce its fuel costs until the Keahole DTCC unit is available, allowing HELCO to proceed with the Project is reasonable.<sup>16</sup> Despite this conclusion, the Consumer Advocate reiterates its overall concern that the Project is, at best, a temporary or interim solution.

That said, the Consumer Advocate does not object to the Project, "with the understanding that the project should pay for itself within a three to four year period and that the project will serve to mitigate possible voltage collapse scenarios until the Keahole DTCC unit is placed in-service." A remedy to address the possible under-voltage situations, the Consumer Advocate concludes, appears necessary. The Project represents a ready solution to address most of these situations.

At the same time, the Consumer Advocate reserves its right to thoroughly analyze its stated concerns in HELCO's next

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<sup>14</sup>Id.

<sup>15</sup>Id. at 15; see also HELCO's letter, dated May 3, 2004, with attachment.

<sup>16</sup>See id.

IRP docket or rate proceeding to ensure that reliable electric service is not made unnecessarily costly for HELCO's ratepayers.

D.

Project's Costs

The Consumer Advocate states that "there does not appear to be anything to suggest that the costs are unreasonable at this time."<sup>17</sup> Concomitantly, it reserves the right to review the Project's final costs, after the Project is completed and HELCO files its final cost report, or in HELCO's next rate proceeding, if necessary.

IX.

Discussion

HELCO's May 3, 2004 filing, with attachment, represents its latest information and data in support of the Project ("HELCO's Attachment" or "Attachment").<sup>18</sup>

HELCO, using an additional production simulation, compared the incremental cost of committing Keahole generation out of economic commitment *with* the capacitor's costs.<sup>19</sup> HELCO, utilizing certain assumptions, reasons:

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<sup>17</sup>Consumer Advocate's position statement, at 18.

<sup>18</sup>The Consumer Advocate, in its position statement, refers to its meeting with HELCO's representatives held on April 29, 2004. At that meeting, HELCO provided the Consumer Advocate with the information and data set forth in HELCO's May 3<sup>rd</sup> filing, with attachment. See HELCO's letter, dated May 18, 2004. A copy of HELCO's attachment to its May 3, 2004 filing is attached as Attachment 1 to this decision and order.

<sup>19</sup>HELCO's Attachment.

1. If Keahole generation is required to run out of economic commitment for three (3) additional hours per day to address the under-voltage conditions, the incremental annual cost difference is \$280,300. Thus: (A) until the Keahole DTCC unit comes on-line, HELCO will incur about \$280,300 per year to address the under-voltage conditions; and (B) if the Keahole DTCC unit does not come on-line until 2009, i.e., until five (5) years from now, HELCO will incur approximately \$1,210,759 in incremental costs by running the Keahole generation out of economic commitment to address the under-voltage conditions.<sup>20</sup>

2. It is more cost effective to install the capacitors than to operate Keahole generation out of economic commitment to address the under-voltage conditions.<sup>21</sup>

3. The Project enables HELCO to install a remedial measure to mitigate under-voltage conditions without incurring extra fuel and variable operations and maintenance costs for operating Keahole generation out of economic commitment.<sup>22</sup>

The Consumer Advocate, in response, is presently uncertain as to whether a need exists for all three (3) projects *combined*, to wit: (1) the capacitor Project; (2) the Keahole DTCC unit; and (3) the future reconductoring project or projects. It does find that the Project is a temporary or interim solution, and suggests that, in the future, the capacitors may not be used and useful for the provision of electric service. Ultimately,

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<sup>20</sup>Id.

<sup>21</sup>Id.

<sup>22</sup>Id.

the Consumer Advocate, based on HELCO's Attachment, does not object to the Project, "with the understanding that the [P]roject should pay for itself within a three to four year period and that the [P]roject will serve to mitigate possible voltage collapse scenarios until the Keahole DTCC unit is placed in service."<sup>23</sup>

The commission acknowledges: (1) the Consumer Advocate's concerns; and that (2) at best, the Project represents a remedial measure in response to the under-voltage scenarios represented in HELCO's Study.<sup>24</sup> Ultimately, like the Consumer Advocate, the commission is unable to readily test or verify the savings or scenarios claimed by HELCO under its production simulation, i.e., Attachment 1.

HELCO recommends that it proceed with installing the capacitors now, as a mitigation measure to address the risk of under-voltage conditions. HELCO expresses confidence that the capacitor additions will continue to be used and useful after the Keahole DTCC unit is installed or the Keamuku-Keahole (6800) transmission line is reconductored, or both, "because they will resolve the remaining under-voltage line contingencies when generation is economically dispatched."<sup>25</sup>

The commission, after careful review, finds that the Project is a remedial measure that is intended to partially address the under-voltage conditions represented in HELCO's

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<sup>23</sup>Consumer Advocate's position statement, at 17.

<sup>24</sup>The proposed installation of the capacitors is a remedial measure, according to HELCO. See, e.g., HELCO's response to CA-IR-12(a); and HELCO's Attachment.

<sup>25</sup>HELCO's application, at 14.

Study. Under these circumstances, the Project appears reasonable and consistent with the public interest. The commission, thus, will approve the commitment of funds for the Project.

Nonetheless, HELCO is cautioned that the commission shares the Consumer Advocate's concerns. Recognizing, however, that most of these concerns are beyond the intended scope of this proceeding, the commission, like the Consumer Advocate, will closely review these issues in HELCO's IRP, future rate proceedings, and future capital expenditure dockets.

#### X.

#### Orders

##### THE COMMISSION ORDERS:

1. HELCO's request to expend an estimated \$840,470 for the Kailua 19.2 MVAR Capacitor Bank Installation Project 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 public utility purposes.

2. HELCO shall submit a report within sixty (60) days of the Project's commercial operation, with an explanation of any deviation of ten (10) per cent or more in the Project's cost from that estimated in the application. HELCO's failure to submit this report will constitute cause to limit the cost of the Project, for ratemaking purposes, to that estimated in the application.

3. HELCO shall conform to all of the commission's orders set forth above. Failure to adhere to the commission's

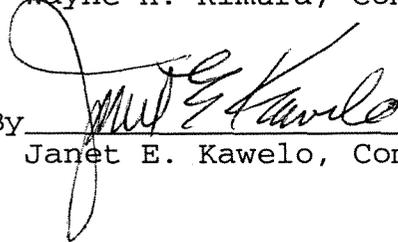
orders shall constitute cause for the commission to void this decision and order, and may result in further regulatory action as authorized by law.

DONE at Honolulu, Hawaii this 7th day of June, 2004.

PUBLIC UTILITIES COMMISSION  
OF THE STATE OF HAWAII

By   
Carlito P. Caliboso, Chairman

By (EXCUSED)  
Wayne H. Kimura, Commissioner

By   
Janet E. Kawelo, Commissioner

APPROVED AS TO FORM:

  
Michael Azama  
Commission Counsel

03-0388.cs

Kailua 19.2 MVAR Capacitor Bank Installation  
Docket No. 03-0388

As explained in the response to CA-SIR-6 (filed March 16, 2004), the Kailua Capacitors project will allow HELCO to install a remedial measure to mitigate low voltage conditions without incurring extra fuel and variable operations and maintenance (O&M) costs for operating the Keahole generation out of economic commitment order. The analysis in Appendix D of the West Hawaii 69 kV Under-Voltage Evaluation Study (filed by letter dated November 10, 2003) estimated the additional costs to operate Keahole CT-4 out of economic commitment order to mitigate the overload situation. Keahole CT-4 (in "Alternate Case 3") is committed out of economic commitment order from 6:00 am to 9:00 pm on a daily basis except during its scheduled overhaul period.

In order to determine the incremental cost to HELCO for operating Keahole CT-4 out of economic commitment order for a longer period (on a daily basis) in order to mitigate low voltage situations, an additional production simulation was completed. The production simulation committed Keahole CT-4 from 5:00 am to 11:00 pm. During this period, HELCO's system load is near or above the 113 MW load level. The fuel and O&M costs from the output of the production simulation for this case, which is identified as "Alternate Case 3a" was compared to the costs from the "Alternate Case 3". A comparison table is shown below.

Table 1. Incremental cost of Committing Keahole Generation out of Economic Commitment Order for Three Additional Hours Per Day

Thermal Generation:	Total Cost (\$)	Total Cost Difference (\$)	Total Cost (\$/MWh)	Total Cost Difference (\$/MWh)
Alternate Case 3	68,495,500		64.23	
Alternate Case 3A	68,775,800	280,300	64.49	0.26

Table 2 uses the incremental cost for committing Keahole generation out of economic commitment order for an additional 3-4 hours per day for the low voltage situation, and calculates the net present value of this annual cost over several time periods, i.e., 3 years, 4 years and 5 years. If HELCO must operate out of economic commitment order for more than three years, it is more cost-effective to install the Kailua Capacitors than to operate out of economic commitment order to address the low voltage situation.

Table 2. Comparison of Kailua Capacitor Costs vs. Committing Keahole Generation Out of Economic Commitment Order.

	Annual Incremental Costs	Years of Operation	Total
Install Kailua Capacitors			\$840,000
Incremental Cost for operating out of economic commitment order	\$280,300	3 <sup>Note 1</sup>	\$780,835 <sup>Note 2</sup>
	\$280,300	4 <sup>Note 1</sup>	\$1,003,966 <sup>Note 2</sup>
	\$280,300	5 <sup>Note 1</sup>	\$1,210,759 <sup>Note 2</sup>

Note 1: Response to CA-IR-4 noted the uncertainty in determining a time frame for installing Keahole ST-7. HELCO's IRP-2 Evaluation Report filed with the Commission in Docket 97-0349 on March 31, 2004 anticipates that ST-7 could be installed in the 2009 time-frame.

The response to CA-SIR-3 explained that the installation of Keahole ST-7 will decrease the frequency of low voltage situations and the Kailua Capacitors may not be as critical once Keahole ST-7 is installed. However, there will always be a need for the capacitors once they are installed, because the capacitors will be utilized for infrequent events that occur on the system that are not normally planned for such as multiple transmission line outages or if the generation at Keahole trips because of system disturbances.

Note 2: Represents the net present value of \$280,300 for different time frames. HELCO's current discount rate = 7.9%, Base year = 2005

General Note: The response to CA-IR-5 explained the possibility of three line reconductoring projects for transmission line overloads (high current flow through a transmission line). The line overloads would occur on the Keahole-Keamuku (6800), Waimea-Keamuku (7200) and Waimea-Ouli (7300) 69 kV transmission lines, and line reconductoring projects are currently being analyzed. The line reconductoring project could mitigate the low voltage conditions, however, the response to CA-IR-5 explained that with all three line reconductoring projects and the addition of a 10.56 MW HRD wind farm operating at full output, the Kailua Capacitors would be required to mitigate low voltage violations.

CERTIFICATE OF SERVICE

I hereby certify that I have this date served a copy of the foregoing Decision and Order No. 21032 upon the following parties, by causing a copy hereof to be mailed, postage prepaid, and properly addressed to each such party.

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DATED: June 7, 2004