

COM-HECO-RIR-1

HECO RT-1, page 10, lines 10-12: The witness states:

...the general trend has been for the CHP equipment vendors and energy service companies to move away from the model of owning equipment at a customer site.

Provide documentation illustrating the general trend cited above.

HECO Response:

Please see the response to HREA-HECO-RT-1-IR-3.

COM-HECO-RIR-2

HECO RT-1, page 11, lines 3-8: The witness states:

This analysis showed a positive net present value benefit for all of the Companies, indicating the CHP Program is expected to be cost-effective from a Utility Cost Test perspective. The Companies' economic analysis methodology, assumptions, and results are explained in detail on pages 51 to 61 of the CHP Program application in Docket No. 03-0366, and were addressed in HECO T-3.

Provide copies of the workpapers for the economic analysis of CHP, in electronic format, in the original software used to prepare the analysis, with all formulae intact, and with all linked spreadsheet files incorporated. This includes all analyses included in Attachments A through H of the CHP application.

HECO Response:

The economic analysis and accompanying workpapers of the Companies' Proposed CHP Program, filed in Docket No. 03-0366, is being revised. See the response to HREA-HECO-RT-1-IR-4. Upon finalization, HECO will provide the revised analysis and workpapers, in electronic format, under separate transmittal. The revised analyses and workpapers contain confidential and proprietary information (e.g., CHP equipment pricing) the public disclosure of which could disadvantage the Companies relative to other providers of CHP systems. The Companies are willing to make such confidential information available to the Commission and the Consumer Advocate pursuant to a protective order; however, the Companies are not willing to provide the information to the other parties/participants even pursuant to a protective order.

COM-HECO-RIR-3

HECO RT-1, page 25, lines 6-13: The witness states:

A Request for Qualifications ("RFQ") was issued to nine manufacturers of CHP equipment on September 10, 2004. The RFQ requested comprehensive information on products, servicing capabilities, project experience, and other criteria. Responses were required to be postmarked by October 1, 2004 and responses were received from seven of the manufacturers. At this time, HECO is reviewing the submittals and is selecting a short list of vendors. These vendors will be reviewed further, and ultimately, several will be selected as pre-qualified vendors.

Provide a list of the vendors to whom the RFQ was sent, and those that submitted responses.

HECO Response:

The CHP equipment RFQ was sent to the following vendors:

1. Coast Intelligen, Inc.
2. Cummins Hawaii, Inc.
3. Fairbanks Morse Engine
4. General Electric
5. Hawthorne Pacific Power Systems
6. Hess Microgen LLC
7. Pacific Detroit Diesel
8. Power Generating Systems, Inc.
9. United Technologies Corporation

Responses were submitted by all with the exception of Power Generating Systems, Inc. and United Technologies Corporation.

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HECO RT-1, page 25, lines 6-13, the same citation as RIR-3 above.

Provide copies of all materials developed by HECO to guide the evaluation and qualification of potential CHP vendors, including rating criteria, financial qualifications, technical qualifications, and other matters that will be considered by the Company. Include any appeal procedures developed for use by vendors that have submitted responses to the RFQ, but may not be selected by HECO as pre-qualified vendors.

HECO Response:

The general content of the requested materials developed by HECO are outlined in the RFQ that was sent to prospective suppliers. A copy of the RFQ is attached.

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RFQ FOR COMBINED HEAT AND POWER VENDORS

REV-00
10-Sept-2004

REQUEST FOR QUALIFICATION
FOR
COMBINED HEAT AND POWER (CHP) SYSTEMS
FOR
EQUIPMENT SUPPLIERS AND EQUIPMENT FABRICATORS
FOR
HAWAIIAN ELECTRIC COMPANY, INC. (HECO),
HAWAII ELECTRIC LIGHT COMPANY, INC. (HELCO), AND
MAUI ELECTRIC COMPANY, LIMITED (MECO)

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1.0 INTRODUCTION

Hawaiian Electric Company, Inc. (HECO), Hawaii Electric Light Company, Inc. (HELCO), and Maui Electric Company, Limited (MECO), hereafter referred to as “Company” or “Companies”, require technical services and equipment from vendors or suppliers, hereafter referred to as “Vendor” or “Vendors”, who can provide Combined Heat And Power (CHP) systems and or equipment.

The Companies intend to provide CHP systems as a means to serve major customers, provide more efficient energy generation and provide additional utility generation capacity. To the extent necessary to complete such projects, the Companies will be responsible for all capital, labor, material, supplies and equipment to implement the CHP projects in accordance with the terms of the standard CHP contract (See Appendix A), which must be duly approved by the Hawaii Public Utilities Commission (PUC). The Companies will purchase CHP systems from qualified Vendors, coordinate their installation with the Vendors and host customers, and shall own and operate the systems. Maintenance will be done by service contract and/or by Company personnel.

2.0 PURPOSE

It is the purpose of this RFQ to pre-qualify Vendors for Company CHP projects. Pre-qualification of Vendors provides the Companies with efficiencies in procurement, and supports standardization, quality control, and cost containment. It is expected that Vendors pre-qualified under this RFQ will sign a Pre-Qualified Vendor Agreement with the Companies. For specific projects, the Companies, in their sole discretion, will either request bid proposals or negotiate directly with Pre-Qualified Vendors for provision of CHP equipment.

CHP systems to be purchased by the Companies will typically have internal combustion engines or combustion turbines, which provide power to a synchronous electrical generator. The waste heat will be utilized to produce chilled water for air conditioning systems via a single or dual effect absorption chiller. Waste heat can also be used to produce domestic hot water or process hot water. Although the Companies recognize that CHP system designs will depend on site-specific factors, CHP systems with units under 500 kW in size are generally expected to be packaged on skids that can be shipped via container to Hawaii within a standard 40 ft shipping container. These packaged systems are expected to be complete and fully functional such that a CHP package could be operated and tested at the vendor’s fabrication facility. Systems with units greater than 500 kW are generally expected to be custom or one-off systems that would typically be assembled, tested and initially operated at the CHP site.

3.0 COMPANY CHP DEVELOPMENT PROCESS

3.1 The Companies will typically develop projects in the following phases: Project Development and Due Diligence, PUC Application, Project Design, Fabrication and Installation, and On-Going System Operation and Monitoring

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- 3.2 Project Development and Due Diligence: The Company will visit the customer's site, collect data, and develop a CHP project concept. CHP Vendor(s) will conduct a general feasibility evaluation and budgetary quote for the Company's CHP concept. The Company will issue a conceptual proposal to the Customer with a description of the CHP system and estimated annual savings. If the Customer agrees with the concept, they will sign a letter of intent with the Company. The Company will issue a Work Authorization to the Vendor for engineering assistance to develop the CHP concept. Work will include review of the CHP concept, checking sizing, developing heat balances and power balances, verifying emissions data, and refining the CHP project pricing. Concurrent with these activities the Company will complete project economic analyses, environmental reviews, preliminary air permitting assessment, site development restrictions, utility grid analysis, noise considerations, community sighting considerations and other activities necessary to complete the Company's Due Diligence. Following successful completion of this phase without discovery of any fatal flaws, the Company will develop and present a proposed Combined Heat and Power Agreement to the Customer for the installation of a CHP system.
- 3.3 PUC Application: The Company must submit all Combined Heat and Power Agreements to the PUC for approval, unless otherwise authorized by the PUC.
- 3.4 Project Design: Concurrent with the PUC Application review period, the Company will authorize the Vendor to complete the final engineering on the CHP system, including component sizing, fabrication drawings, interconnection drawings, scheduling, and final pricing. Based on emission data from the Vendor, the Company will prepare and submit the air permit application. The Company shall complete the on site design and obtain any required building permits.
- 3.5 Fabrication and Installation: Upon receipt of all major discretionary approvals including the PUC Application and air permitting approval, the Company will authorize component procurement, CHP skid fabrication, and shipment. Upon arrival of the CHP equipment at the Customer site, the Vendor shall work on site with other Company sub-contractors to install the CHP system. The Vendor will be responsible for final checkout and start-up of the CHP system. The Company will observe the final acceptance testing conducted by the Vendor and approve the system for commercial use. Criteria for final acceptance testing will be delineated in the Pre-Qualified Vendor Agreement.
- 3.6 On-Going System Operation and Monitoring: The Company shall own the CHP system and assume responsibility for monitoring, operation and maintenance of the CHP after the system is approved for commercial use. A separate maintenance contract for the CHP system with the Vendor may be negotiated, if appropriate.

4. OFFICIAL CONTACT PERSON

The official contact for all communications regarding this RFQ is:

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Mr. Scott Seu
Manager, Energy Projects
Hawaiian Electric Company, Inc.
PO Box 2750
Honolulu, HI 96840-0001

or
Hawaiian Electric Company, Inc.
220 South King Street Suite 1010
Honolulu, HI 96813

Phone 808-543-4805
FAX 808-543-4808
(Telephone and Email communications are considered unofficial unless specified otherwise in the RFQ.)

Questions concerning this RFQ should be directed to the official contact.

5.0 RFQ PROCESS and SIGNIFICANT DATES

- | | | |
|-----|--|--------------------------|
| 5.1 | Issue RFQ: Based on an Industry search of Vendors providing CHP services, the Companies issue RFQ to Vendors | Sept. 10, 2004 |
| 5.2 | Vendor Qualifications Submittal: Vendors Qualification Proposals shall be submitted by this date, as evidenced by postmark. | Oct. 1, 2004 |
| 5.3 | Vendor Short List: The Companies review the Qualification Proposals and develop a short list of Vendors. HECO may conduct telephone interviews with selected Vendors during this timeframe. Vendors will be notified of the time for any telephone interviews. Vendors not selected for the short list will be notified. | Oct. 1 - 15,
2004 |
| 5.4 | Vendor Site Visit: A site visit will be scheduled to the Vendors selected for the short list. The purpose of the visit is to evaluate the Vendors production facilities and inventory levels, answer Vendor's questions, and meet key Vendor employees. Vendors should propose a vendor site, which is representative of where the CHP equipment would be fabricated or assembled. Where possible, site visits to existing installations typical of the Vendor equipment shall be conducted. | Oct 18 – Nov.
5, 2004 |
| 5.5 | Vendor Evaluation: The Company shall evaluate and select Pre-Qualified Vendors. | Nov. 12, 2004 |

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6.0 Qualification Proposal

Qualification Proposals must contain responses to all the following information to be considered responsive.

- 6.1 **Equipment:** Describe the generating equipment sizes, emissions characteristics and certifications (if any), control and monitoring systems including capabilities for centralized control, efficiencies, heat rates, fuel requirements, dual fuel capabilities, operating ranges and the overlap between units for the equipment categories listed. Vendors shall indicate in their response which of the Vendor's equipment can operate on the various fuel types available in Hawaii - diesel, bio-diesel, propane and Synthetic Natural Gas (SNG) - giving specific consideration to the Hawaii fuel specifications provided in Appendix B. Note that the specifications for Hawaii fuels may differ from those in the continental U.S. The vendors are requested to categorize their equipment into the following equipment ranges. Vendors need not supply equipment for each equipment range or fuel type.
- Internal Combustion Engines below 500 kW;
 - Internal Combustion Engines between 500 kW to 2 MW;
 - Internal Combustion Engines between 2 MW to 5MW;
 - Combustion Turbines 1.0 MW to 5.0 MW
- Vendors shall specify the brand and associated general specifications of ancillary equipment typically integrated into their CHP systems. Ancillary equipment shall include, but is not limited to, absorption chillers, heat exchangers, cooling towers, and control systems.
- Vendors shall describe their capabilities in providing packaged skid mounted CHP systems and/or field assembled CHP systems, and indicate the respective size ranges of these systems in kW. Vendors are free to indicate capabilities in providing either category of systems that cross above or below the 500 kW threshold described in Section 2.0, e.g., if a vendor is capable of offering packaged systems for units above 500 kW, or field assembled systems for units below 500 kW, they are free to describe.
- 6.2 **Life Cycle Costing:** Economic evaluation will consider the first cost, fuel efficiency, other operating and maintenance costs, maintenance intervals, expected service life, cost of replacement parts, and other cost related considerations. Submit example 20 year economic life cycle cost models for a typical two-generator configuration rated at 500 kW (2 x 250 kW) and 1000 kW (2 x 500kW) plus or minus 50 kW. Assume values of 10¢ per kwh for electricity, 40¢ per therm for waste heat and \$6.10 per mBtu for fuel. Assume no price escalations. All waste heat shall be assumed to drive a single stage absorption chiller of the Vendors selection.
- 6.3 **Standardization:** Describe aspects of standardization utilized or offered between unit sizes.

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6.4 Operational Flexibility: CHP equipment should be tunable to site specific conditions for automatic operation and have the flexibility for multiple control modes of operation. The control system should be capable of operating at least in the following four control modes:

- Peak Load Following, where the units follow the electric load demand within 5%;
- Normal Baseload, where the units run at a constant electrical load setting 24 hours per day –7 days per week;
- Minimum Load, where the unit load is reduced from the Normal Baseload to a preset Minimum Load setting; and
- Off Mode, when the unit is secured.

Describe the flexibility of the units and the components to match these specific operating modes.

- 6.5 Education and experience of key personnel: Identify key personnel and their roles and responsibilities within the Vendor's organization for project management, cost estimating, engineering design, financing, construction supervision, maintenance, service and training. Attach a brief resume of these key individuals, which describes the qualification and experience of these personnel.
- 6.6 Vendor Experience: Describe experience in successfully completing CHP projects in the following types of facilities and institutions: hotels, schools, military facilities, hospitals or medical facilities, waste and water treatment facilities, office buildings, multi-unit residential buildings, industrial, educational, and recreational facilities. Provide descriptions of actual completed CHP systems, project size, equipment installed, start and end dates, current status, and, where possible, customer contact information. Individuals with specific CHP experience should be identified along with their experience on the CHP projects. Identify any experience in the State of Hawaii; if no such experience, please state.
- 6.7 Sub-Vendor Partner Experience: Describe experience of any sub-Vendors or partners, whom the Vendor utilizes in the completion of CHP projects.
- 6.8 Project Approach: Describe the methodology and project approach used to complete CHP projects.
- 6.9 Hawaii Support: Describe the mechanism to ensure adequate support in Hawaii (Oahu, Maui, and Big Island) to expeditiously execute projects and follow-on maintenance and support. The Vendor shall describe their parts distribution system for Hawaii and how major equipment items can be expedited to each of the Islands for each Company. In addition, provide details about maintenance programs that can be offered, including costs for such in \$/kWh terms.

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- 6.10 Quality Control: Describe the Quality Control Program offered by the Vendor for all phases, such as design, fabrication, installation and operations, any product compliance labels, such as UL or quality control standards such as ISO 9000.
- 6.11 Project Costs: Describe methods used to contain costs and meet budgets.
- 6.12 Guarantee and Warranty: Describe standard guarantee and warranty program and options available for extended warranty.
- 6.13 Availability of Staff and Facilities: Describe the availability of staff and facilities to complete work within required schedules.
- 6.14 Training: Describe ability to provide factory and on-site training for Company design engineers and for Company technicians for equipment maintenance. It is the Companies' intent to utilize a combination of outside contract maintenance services from Vendors, and internal maintenance by Company technicians.
- 6.15 Describe any small and disadvantaged business content.
- 6.16 Describe financial condition and capabilities of the company. Provide supporting materials or documentation.

7.0 EVALUATION OF QUALIFICATION PROPOSALS

- 7.1 Only qualification proposals that are responsive to this RFQ and received within the time constraints will be evaluated for selection.
- 7.2 Complete and responsive qualifications will be evaluated based on the submittal items described in Section 6.0 and the site visit to the short-listed Vendors.

8 SUBMITTING PROPOSALS

- 8.1 Submit Qualification Proposal to the Official Contact Person listed in Section 4.0. Qualification Proposal must be submitted by the date listed in Section 5.0
- 8.2 Facsimile (FAX) proposals or mailgrams are not acceptable.
- 8.3 The Company reserves the right to cancel this Request for Qualifications at anytime.
- 8.4 Telephone Interviews: HECO may conduct telephone interviews with selected Vendors. Vendors will be notified of the time for any telephone interviews.
- 8.5 Number of Qualification Proposal Copies: Three (3) copies of the Qualification Proposal shall be submitted.

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- 8.6 Definition of Terms
- 8.6.1 Amendment: A written document, which may be issued by the Company after issuance of a Request for Qualifications (RFQ), to correct or clarify the RFQ.
- 8.6.2 Calendar Day: Any day including Saturdays, Sundays, and Company recognized legal holidays, beginning at midnight and ending at midnight the following day. If no designation of calendar or working day is made, "day" shall mean calendar day.
- 8.6.3 CHP: Combined heat and power system, typically including a generating unit, absorption chiller, heat exchanger, cooling tower, and associated piping and equipment.
- 8.6.4 Dispute: A claim of the Vendor for the payment of money, adjustment or interpretation of the contract terms, or other relief, arising under or related to the contract.
- 8.6.5 May: Means permissive.
- 8.6.6 Offer: A proposal submitted in response to a Request for Proposal.
- 8.6.7 Proposal: The offer of a Vendor, submitted in the prescribed manner, to perform at the prices quoted for the work required within the time prescribed for performance.
- 8.6.8 Vendor: Any individual, partnership, firm, corporation or joint venture, or other legal entity undertaking the execution of the work under the terms of the contract with the Companies, and acting directly or through his/her, their, or its agents, employees or sub-Vendors.
- 8.6.9 Responsive Vendor: A Vendor who: (1) has adequate financial resources, or the ability to obtain such resources as required for contract performance; (2) is able to comply with a required delivery schedule, taking into consideration all existing business commitments; (3) has a satisfactory record of performance; and (4) has a satisfactory record of integrity, and is otherwise qualified and eligible to receive an award under applicable laws of the State.
- 8.6.10 Shall: Means mandatory.
- 8.6.11 Sub Vendor: An individual, partnership, firm, corporation, joint venture or other legal entity which enters into an agreement with the prime Vendor to perform a portion of the work or supply equipment for the Vendor.
- 8.6.12 State: State of Hawaii.
- 8.6.13 Technical Representative (TR): The person identified and designated by the Contracting Officer to address technical matters regarding the project.

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APPENDIX A

Standard Combined Heat and Power Agreement

Combined Heat and Power Agreement

Section 1. Parties and Effective Date

1.1 Parties to Agreement:

This Combined Heat and Power Agreement (“**Agreement**”) is entered into between (i) _____ (“**Host**”), a _____ corporation doing business in Hawaii, whose principal place of business is _____ and whose mailing address is _____, and (ii) **Hawaiian Electric Company, Inc.**, (“**HECO**”), a Hawaii corporation, whose principal place of business and address is 900 Richards Street, Honolulu, Hawaii 96813 and whose mailing address is P. O. Box 2750, Honolulu, Hawaii 96840-0001. Host and HECO are sometimes referred to hereinafter, respectively, as “**Party**” and, collectively, as the “**Parties**.”

1.2 Regulatory Approval and Effective Date

HECO will file with the State of Hawaii Public Utilities Commission (“**PUC**”) an application requesting approval of this Agreement following execution. This Agreement is contingent upon the issuance of a decision and order by the PUC that (a) approves this Agreement, the electric and thermal energy pricing in Appendices B and C, the monthly facilities fee in Appendix D, and the non-refundable contribution, if any, in Appendix A; (b) is in a final form deemed to be reasonable by HECO, in its sole discretion; (c) approves the fuel supply contract(s) for the fuel to be provided by HECO to operate the CHP Cogeneration System as provided in section 3.5 of this Agreement, unless such contract(s) has previously been approved or has been entered into pursuant to an approved gas utility tariff; (d) allows HECO to include the reasonable costs incurred by HECO pursuant to this Agreement in its revenue requirements for ratemaking purposes and for the purposes of determining the reasonableness of HECO’s rates; and (e) authorizes the full recovery of the CHP Cogeneration System fuel costs, fuel transportation costs (if any) and related taxes through HECO’s Energy Cost Adjustment Clause to the extent such costs are not included in base rates (hereinafter, the “**PUC Approval Order**”). Host understands that the decision and order may not be in a final form deemed to be reasonable to HECO if it (a) contains terms and conditions deemed to be unacceptable to HECO, in its sole discretion, or (b) is not final (or deemed to be final by HECO, in its sole discretion, because HECO is not satisfied that no party to the proceeding in which the decision and order is issued, or other aggrieved person with the right to appeal, intends to seek a change in such decision and order through motion or appeal). This Agreement shall become effective (the “**Effective Date**”) upon receipt by HECO of the PUC Approval Order. Neither party shall have any obligations under this Agreement until the Effective Date.

If HECO has not received the PUC Approval Order within 120 days of the date of the last signature to this Agreement, then either the Host or HECO may terminate this Agreement by providing written notice of such termination delivered to the other prior to the Effective Date. In such event of termination, each Party shall bear its own respective fees, costs and expenses incurred prior to termination, if any, in preparation for performance hereunder, and the Parties shall have no further obligation to each other with respect to this Agreement.

Section 2. Recitals

2.1 Recital 1:

Host is the owner and operator of _____ located at _____ (“**Facility**”). Host desires to purchase from HECO all of its electricity and a portion of its thermal energy in order to provide electrical and thermal service to the Facility, to decrease its energy costs and to improve the reliability of a portion of the Facility.

2.2 Recital 2:

HECO desires to offer its customers Combined Heat and Power (“CHP”) systems to respond to customer demand and to increase customers’ energy alternatives. CHP systems can help reduce a customer’s total energy consumption and costs. Use of distributed generation resources such as CHP should benefit HECO by extending the life of its transmission and distribution systems, as well as by the incremental addition of generating capacity created by CHPs.

2.3 Recital 3:

HECO desires to design, construct, install, own, maintain, and operate a CHP cogeneration system (“System”) at the Facility for the production of electricity and thermal energy.

Section 3. HECO Commitments

3.1 Needs Assessment:

HECO has conducted an analysis of electricity and fuel use at the Facility to determine the amount of electrical and the amount of thermal energy (derived from waste heat generated from the CHP unit(s)) needed by the Facility.

3.2 Permits and Approvals:

From the Effective Date, HECO will exercise due diligence to obtain, at its expense, the building permit and fuel supply for the System, as applicable, and, excluding any approvals or actions that may be required under Hawaii Revised Statutes Chapter 343 (which would be Host’s responsibility if required), all other governmental and nongovernmental agencies’ permits and approvals as are necessary for the installation and operation of the System, and to maintain such approvals throughout the term of this Agreement (“Permits”). If all Permits necessary to install the System are not obtained within one (1) year of the Effective Date of this Agreement, then either Party may terminate this Agreement on written notice to the other Party delivered before such Permits are obtained, and thereafter, the Parties will have no further liability or responsibility to the other.

3.3 Design, Construction and Installation of the System:

HECO will, at its expense, design, construct, install, own, operate and maintain the System at the Facility. A description of the System is attached as Appendix A. HECO and Host have agreed to a preliminary conceptual design of the System. In accordance with the schedule set forth in Schedule 1-A, attached hereto, describing the major project activities and listing significant permit requirements, HECO will provide to Host more detailed System installation plans and specifications. Host and HECO agree to work together to further define the System installation plans and specifications. HECO’s right to install and construct the System and Host’s obligation to purchase and pay for energy from the System are conditioned upon Host’s approval of the final plans and specifications, which approval shall not unreasonably be withheld by Host. HECO will design the System to operate with minimal or no adverse impacts on Host’s and Host’s customers’ or business guests’ use of the Facility.

Host acknowledges that HECO’s obligation to construct and operate the System is subject to certain construction, financial and other assumptions and contingencies noted herein and in Appendix F, attached. If such assumptions are revealed to be inaccurate, regardless of fault by either Party, or such contingencies are not met or satisfied, the Parties agree in good faith to attempt to negotiate amendments or modifications to this Agreement to address the changed circumstances due to the inaccurate assumptions or unsatisfied contingencies. If the Parties cannot mutually agree upon such

amendments or modifications, then either Party may terminate the Agreement upon ten (10) days prior written notice to the other and, absent fraud or other tortious conduct by the non-terminating Party, each Party shall bear its own costs incurred before termination.

To the extent reasonably possible, HECO will perform construction activities to minimize interference with use of the Facility by Host and its customers or business guests. Host acknowledges, however, that construction activities, by their nature, may involve noise and/or dust during Host's regular business hours. HECO will provide and install a sound attenuation cabinet and foundation capable of adequately supporting the operation of the System in accordance with all applicable regulations and codes. Upon completion of construction, and completion of commissioning and break-in periods, HECO will notify Host in writing that commercial operation has commenced ("**Notice of Commercial Operation**"), and that the System has been constructed in accordance with all permits.

If diesel is the chosen fuel for the site, the Host shall allow HECO, a shared-use of its existing fuel tank(s), if any, for the CHP System's fuel storage at no cost to HECO. The Host shall ensure that the fuel tanks meet all regulatory requirements and standards. The Host shall continue to own such existing fuel tanks used by HECO, and HECO will, at its expense, operate and maintain such fuel tanks in accordance with this Agreement. If the Host has no existing fuel tanks or the existing tanks are not acceptable to HECO, HECO will, at its expense, design, construct, install, own, maintain, and operate the fuel tank(s) necessary for the CHP System's fuel storage. The Host shall provide a suitable and adequate site in its premises, acceptable and approved by HECO, for the installation and operation of the HECO's fuel tanks, at no cost to HECO. The Host shall grant HECO a 24-hour access to the site throughout the term of the CHP Agreement.

3.4 Maintenance of the System

HECO will, at its expense, perform all routine and emergency repairs, maintenance, and operation of the System. HECO will provide at its expense, all labor, material, and other supplies necessary to perform such maintenance, repair and operation, including component or System replacement as necessary in HECO's reasonable discretion. In the event of a partial or complete failure of the System, HECO will respond as soon as possible following written or telephone notification from Host, and will effect such repairs as soon as reasonably possible to restore the System to normal operation. HECO shall perform all maintenance activities so as not to unreasonably interfere with use of the Facility by Host and its customers or business guests. HECO shall design the System to insure that, in the event of any System failure, Host's electric system can automatically access power made available from the HECO grid. Host, at its own expense, shall at all times maintain backup heating and cooling sources sufficient to operate the Facility without the System. HECO shall not be responsible or liable for any mold or other biological growth at Host's Facility that either pre-exists installation of the System or that is caused or contributed to by chilled air or water created or supplemented directly or indirectly by use of the System so long as the same is not the result of HECO's negligent acts or omissions in its design, construction, installation, repair, maintenance or operation of the System.

HECO shall comply with all applicable laws with respect to the handling, removal and proper disposal of any hazardous substances, hazardous materials or wastes, as defined by or as may be defined by any applicable federal, state or local law or regulation, including HRS 128D-1 ("**Hazardous Substances**"), brought onto, or released, spilled or disposed of at the Facility or the "Site" by HECO or its contractors and/or subcontractors. HECO shall not be liable or responsible for any Hazardous Substances existing at the Facility or the "Site" prior to HECO's construction, installation and operation of the System at the "Site" ("**pre-existing contamination**").

3.5 Fuel Purchase for System:

HECO will, at its expense, purchase the fuel necessary to operate the CHP System. The Host will normally procure its own fuel supply for its back-up thermal energy system for its cooling and/or heating loads. When using the Host's existing fuel tank(s), HECO will, at its expense, install meters to meter the fuel used by the CHP System as well as the fuel used by the Host for its back-up thermal energy system for its cooling or heating. In such circumstances, the Host shall reimburse HECO for the total actual cost of such fuel provided by HECO, including taxes.

3.6 Billing and Reporting:

HECO will furnish to Host monthly statements showing the amount of electrical and thermal energy produced by the System that is consumed by the Facility and the total charges. HECO will bill Host on a monthly basis.

3.7 Work Performed:

HECO will be solely responsible for maintenance, operation and repair work performed on the System by HECO and HECO's agents, contractors and subcontractors. Except to the extent permitted by HECO in writing, neither Host nor its employees, agents or contractors shall perform any such work on the System. HECO will not be responsible for any loss, damage, cost or expense arising out of or resulting from unauthorized work. HECO warrants that it will own the System free of all mechanics' liens.

3.8 Compliance with Laws

HECO, at all times, shall observe and comply with all applicable laws, regulations, governmental rules, orders and ordinances applicable to the performance of its obligations under this Agreement.

Section 4. Host Commitments

4.1 Accuracy of Information:

HECO has relied and is entitled and will continue to rely on the accuracy of all information provided by Host pertaining to the Facility's physical configuration and operations ("**Host Provided Information**"). If HECO's ability to install, maintain or operate the System as agreed herein and in the final plans and specifications is materially impaired as a result of inaccurate Host Provided Information, regardless of fault on Host's part, then HECO shall be entitled, at its election, to either (1) equitably adjust the thermal energy pricing agreed upon herein to reflect increased maintenance or operation burdens on HECO, (2) equitably adjust schedules and/or other terms of this Agreement affected by the inaccurate Host Provided Information; or (3) terminate the Agreement as provided in section 3.3 above if Host and HECO cannot agree upon such equitable adjustment(s).

4.2 Provision of Site:

A mechanical single line plan for the System based on conceptual design is attached as Appendix A hereto. Host shall provide space acceptable to HECO for installation of the System at the Facility. Such space (the "**Site**") shall be provided at no cost to HECO for the duration of the term of this Agreement and HECO is hereby granted a license for use and access to the Site as contemplated by this Agreement. If the Parties cannot mutually agree upon an acceptable Site for the System or any of its material components within a reasonable time, this Agreement may be terminated by either Party upon written notice to the other, and thereafter, the Parties will have no further liability or responsibility to the other.

Host shall allow HECO the access and use of the facility's water at no charge for cooling tower

water and engine cooling and to a sewer system drain for cooling tower blow-down, if needed.

HECO shall not be obligated to accept any Site containing any Hazardous Substances. HECO shall have the right, but not the obligation, to perform environmental assessments, including surface and subsurface sampling, of the Site.

HECO shall not be liable or responsible for any pre-existing contamination. HECO shall provide written notice to Host immediately upon the discovery of any pre-existing contamination. Except in case of emergency, neither HECO nor its subcontractors will disturb, disrupt, remove, alter, dislodge or otherwise handle any pre-existing contamination at the Site without the prior written consent of Host. HECO may suspend work until Host adequately removes or otherwise addresses the pre-existing contamination to HECO's reasonable satisfaction and in a manner acceptable to all governmental or regulatory agencies with jurisdiction over the matter, including the State of Hawaii Department of Health and the United States Environmental Protection Agency. If HECO incurs additional mobilization or demobilization costs as a result, Host shall pay or reimburse HECO for such costs. If the discovery and presence of pre-existing contamination precludes installation of the System, then either Party may, on written notice to the other, terminate this Agreement. Upon such termination, Host will reimburse HECO for all reasonable costs incurred prior to termination.

HECO shall evaluate the location of the Site for the System with respect to the ability to receive permits under all applicable federal, state and local statutes, ordinances and codes.. HECO shall not be responsible for delays caused by the discovery of archeological or culturally sensitive conditions at the Site.

4.3 Cooperation on Permits and Approvals

Host shall timely cooperate with HECO's efforts to obtain all permits and approvals required under section 3.2 above or elsewhere in this Agreement, and shall cooperate with all reasonable requests by HECO related thereto.

4.4 Facility Ownership:

Host warrants, and shall provide written documentation of the same if requested by HECO, that it has the full authority, including necessary consents, if any, from any mortgagees, lien holders, lessors or lessees, to permit HECO to install and operate the System at the Facility for the term of this Agreement and subject to the terms and conditions of this Agreement.

4.5 Access:

Host will at all times provide safe and reasonable access to the Facility and Site as necessary for HECO to construct, install, operate and maintain the System and its components. Thermal energy and electrical power output will be transmitted from the System, and necessary lines connecting the System with Host's pre-existing conventional electrical and heating/cooling systems will be run in, under, over, across, and through the Facility. Host will compensate HECO for actual costs and expenses incurred (at HECO's then standard rates for HECO's employees or subcontracted maintenance personnel performing work on Systems in the same geographic area) due to any delays or additional work that becomes necessary because of inadequate access to the Facility, Site or work area. HECO shall have the obligation to notify Host if access for such purposes is inadequate. HECO will have the right to suspend work if there is inadequate access until such time as necessary access is provided. In such event, HECO will notify Host of the particular condition or situation affecting access, and when Host corrects the condition or situation, HECO will resume work as soon as practicable. Host will be responsible to HECO for all additional mobilization and demobilization costs associated therewith.

4.6 Maintenance of Facility and Site:

Host will, at its expense, maintain the Facility and Site and pay all utilities, taxes, and bills associated with the Facility and the Site, excluding the System. Host is fully responsible for the upkeep and maintenance of all of Host's equipment that will utilize the System's outputs, such as, but not limited to, hot water, process heat, space heating, and absorption air conditioning. Host will properly maintain in full working order all of Host's equipment that Host may shut down while utilizing the System, including but not limited to back-up generators, independent air conditioning or heating units and hot water heaters. Host shall also provide a data link for transmittal of monitoring data from the System to HECO's dispatch center. Host shall be responsible to take measures, if any are necessary, to control and/or mitigate mold or other biological growth at Host's Facility that pre-exists installation of the System or that may be caused or contributed to by chilled air or water created or supplemented directly or indirectly by use of the System so long as the same is not the direct result of HECO's negligent acts or omissions in its design, construction, maintenance or operation of the System.

In the event of damage to the System that is caused by Host or those for whom Host is legally responsible, Host agrees to pay all repair or replacement costs associated with the damage. HECO will have the right to suspend repair work if continuing with the work might jeopardize the safety of any person or property. In such event, HECO will notify Host of the particular condition or situation affecting safety, and when Host corrects the condition or situation, HECO will resume work as soon as practicable. Host will be responsible to HECO for all additional mobilization and demobilization costs associated therewith.

4.7 Alteration of Facility:

Host will not undertake any alterations or repairs to the Facility that may adversely affect the operation and maintenance of the System (i) without giving at least five (5) working days prior written notice to HECO, setting forth the work to be undertaken (except in the event of emergency repairs, in which event notices may be given by telephone), and (ii) without affording HECO the opportunity to review plans for such work and consult with Host's professionals regarding methods of conducting any such work in a manner likely to reduce or eliminate risks of damage or adverse effect upon the operation of the System. HECO will have no authority to stop any such work or prevent improvements or alterations to the Facility. HECO will be equitably compensated by Host for any costs proximately arising from substantial changes to the Facility, which adversely impact HECO's ability to operate the System as designed and installed, or cause HECO to make modifications to the System (for example, changes in piping or wiring to accommodate a construction change, addition or removal of an engine or piece of equipment resulting from the change in use or amount of use by the Facility). All advice HECO provides concerning the work to be undertaken shall be subject to the separate independent judgment of Host's professionals, and Host will be responsible for all damages to the System resulting from Host's work. HECO will, at its expense, repair any damage to the Facility resulting from the installation and/or operation of the System, but will have no other responsibility for repair of the Facility, except for repairs that are directly attributable to installation or operation of the System.

4.8 Purchase and Sale of Electrical Power Output and Thermal Energy:

Host will purchase from HECO the electrical and thermal energy produced by the System and used by the Facility in accordance with the pricing detailed in Appendix D hereto. In addition to the unit of usage charges, Host shall pay to HECO a fixed monthly facilities fee to cover the cost of the heat recovery equipment not included in HECO's normal electrical rate structure. Usage of electrical and thermal energy will be metered and measured by comparable means applied to commercial suppliers. HECO will pay for all fuel costs used by the System.

4.9 Minimum Energy Take:

Host will accept a minimum amount of available cogeneration thermal output of the System not to fall below the BTUs per month according to Appendix C ("**Minimum Energy Take**"), provided that the System is operable and capable of producing the output necessary to supply the minimum thermal output following the Notice of Commercial Operation date. If Host closes the Facility to customers or business guests or significantly reduces operations to undergo a renovation or similar event ("**Down Period**"), then Host may be excused from payment of the Minimum Energy Take for the Down Period so long as (a) the aggregate duration of Down Periods does not exceed six (6) months during the Initial Term of the Agreement or two (2) weeks during any extension of the Agreement term thereafter; and (b) the then-current term of the Agreement is extended by the number of months (or weeks) in which any portion of the Minimum Energy Take is not paid pursuant to this section. Host may purchase from any other Party or source thermal energy requirements that exceed the maximum output of the System.

4.10 Payment Terms:

Host will pay HECO's bill for electrical, thermal energy, and facility fee consistent with the rules for payment of bills and late payment charges as provided in HECO's Tariff..

4.11: Compliance with Laws

Host, at all times, shall observe and comply with all applicable laws, regulations, governmental rules, orders and ordinances applicable to the performance of its obligations under this Agreement.

Section 5. General Terms

5.1 Ownership of System:

HECO will at all times own the System and all plans and specifications related to it. HECO may file, record and perfect its security and ownership interest in the System. Host shall cooperate with and execute all documents, including a UCC-1 financing statement, necessary for HECO to do so.

5.2 Use of Subcontractors:

HECO will be permitted to use subcontractors to perform its obligations under this Agreement, provided that HECO shall remain obligated to satisfy all of its obligations under this Agreement.

5.3 Term of Agreement:

The Initial Term ("**Initial Term**") of this Agreement will commence on the Effective Date and terminate 20 years after the Notice of Commercial Operation date. After the Initial Term, this Agreement will automatically renew and continue for successive twelve (12) month periods ("**Extended Terms**") unless either Party provides written notice of intent not to renew no later than ninety (90) days prior to the end of the Initial Term or any Extended Term, as the case may be. In the event that delays addressed under Section 4 above are caused by Host during the Initial Term, then HECO may elect to extend the Initial Term by the amount of accumulated time related to the delays.

At the end of the Term of this Agreement, (1) HECO shall retain ownership of the System and shall have the right to use the System for any purpose, including projects unrelated to Host, and (2) HECO shall remove the skid mounted system from the site at its cost, the fuel supplier will remove their tanks at their cost, and Host shall be responsible for the costs to remove the remaining elements of the System from the Facility.

As used in Appendix B to this Agreement, the “**Contract Year**” shall begin on the date of the Notice of Commercial Operation and end twelve (12) months later. A new “Contract Year” shall begin on each anniversary date of the first Notice of Commercial Operation.

5.4 Termination:

A. Host's Rights:

Host may terminate this Agreement upon HECO's material breach hereunder if, after written notice to HECO of the alleged breach and Host's demand to cure such breach, (a) HECO has not, within thirty (30) days of such notice, cured the breach or begun and diligently pursued efforts reasonably calculated to cure the breach in a reasonable time, or (b) HECO has not cured the breach within one-hundred-twenty (120) days of such notice despite its reasonable efforts to do so. Upon such termination, HECO will, at its expense, promptly remove the System, which will be limited to removal of the cogenerator and attached related equipment. The foundation pad and all piping need not be removed, but any piping remaining will be capped. Except as limited in this Agreement, Host may pursue all other legal and equitable remedies available to it arising from such breach.

In addition, after installation of the System, if Host demonstrates to HECO's satisfaction that the total CHP energy costs (electric, thermal and facilities) for any 120 day period exceed the energy costs that Host would incur for the same period for equivalent operations if Host used Host-owned chillers and/or paid for electrical energy directly from the HECO grid pursuant to the applicable HECO (non-CHP schedule) tariff rate, then Host may terminate the Agreement upon thirty (30) days written notice and pay HECO for all recorded project development and construction costs, including AFUDC, HECO has incurred prior to the termination date and all other costs that cannot reasonably be avoided immediately thereafter. Conditioned upon payment of such costs by Host, Host will be offered the opportunity to purchase the System from HECO *as is, where is, without warranty*, at a negotiated price. Alternatively, or if a negotiated price cannot be mutually agreed upon, HECO will, at Host's sole cost, remove the System from the Facility. In such circumstance, HECO may utilize the System or any part of it as it sees fit. If Host purchases and retains the System or any major component of the System, it will enter into an interconnection agreement with HECO if required by HECO's Tariff Rule 14H. In addition, Host shall pay HECO a termination charge equal to the total value of the discount provided through the electricity discount in the CHP tariff for the six (6) months preceding the termination date.

B. HECO's Rights:

HECO may terminate this Agreement upon Host's failure to make payment as provided in Section 4.10 (Payment Terms) of this Agreement after no less than three (3) business days written notice and demand by HECO that such payment be made. Upon such termination, HECO may, at Host's sole cost, remove the System, which will be limited to removal of the cogenerator and attached related equipment. The foundation pad and all piping need not be removed, but any piping remaining will be capped. HECO may also terminate this Agreement upon Host's material breach hereunder if, after written notice to Host of the alleged breach and HECO's demand to cure such breach, (a) Host has not, within thirty (30) days of such notice, cured the breach or begun and diligently pursued efforts reasonably calculated to cure the breach in a reasonable time, or (b) Host has not cured the breach within one-hundred-twenty (120) days of such notice despite its reasonable efforts to do so. Except as limited in this Agreement, HECO may pursue all other legal and equitable remedies available to it arising from such breach. Upon such termination, HECO will, at Host's sole expense, remove the System, which will be limited to removal of the cogenerator and attached related equipment. The foundation pad and all piping need not be removed, but any piping remaining will be capped. In addition, at any time during the term of this Agreement, including prior to construction of the Facility, if HECO determines, in its reasonable discretion, that the economic viability of the project

is materially impaired, HECO may cease operations and terminate this Agreement without cost or liability to HECO other than removal of the System. In such event, if the System has been installed, HECO will offer Host the opportunity to purchase the System, *as is, where is, without warranty*, at a negotiated cost. If Host does not purchase the System, HECO shall be responsible, at its own cost, for removing the System, which will be limited to removal of the cogenerator and attached related equipment. The foundation pad and all piping need not be removed but any piping remaining will be capped.

In any event of material breach by Host, HECO shall be entitled to recover its project development and construction costs, including AFUDC, from Host, and, except as otherwise limited in this Agreement, HECO may pursue all other legal and equitable remedies available to it arising from such breach.

5.5 Indemnification:

HECO shall defend and indemnify Host, its officers, directors, agents and employees against all claims, liabilities, damages, penalties, costs and expenses (including reasonable attorneys' fees) arising from property damage and/or personal injury (including wrongful death) to the extent and only to the extent caused by HECO's (including its employees, agents and contractors) negligent, willful or tortious acts or omissions in performing its obligations under this Agreement.

Host shall defend and indemnify HECO, its officers, directors, agents and employees against all claims, liabilities, damages, penalties, costs and expenses (including reasonable attorneys' fees) arising from property damage and/or personal injury (including wrongful death) to the extent and only to the extent caused by Host's (including its employees, agents and contractors) negligent, willful or tortious acts or omissions in performing its obligations under this Agreement.

The Parties' respective defense and indemnification obligations will survive the expiration or termination of this Agreement for the period set forth in any applicable statute of limitation. Such indemnification will not be limited to the extent of insurance coverage.

5.6 Limitations of Liability:

Except as expressly stated herein, neither Party, nor its employees, agents, contractors, subcontractors or suppliers, shall be liable to the other for any punitive, exemplary, indirect, special, incidental or consequential loss or damages, including but not limited to, lost profit, of any nature whatsoever, arising out of their performance or non-performance hereunder.

Except for defense and indemnification obligations required under Section 5.5 above, HECO's aggregate liability under this Agreement arising out of or in connection with the performance or non-performance of this Agreement or any part thereof shall not exceed one year of estimated annual energy savings from the System.

The limitations in this Section shall survive termination of this Agreement and shall apply whether such claims or liabilities arise or are alleged in contract, tort (including negligence), strict liability or otherwise.

5.7 Assignment:

This Agreement may not be assigned in whole or in part without the written consent of the other Party, which consent may not be unreasonably withheld or delayed, except that Host may assign the Agreement without HECO's consent to any Party acquiring the Facility, provided that such assignment is on notice to HECO, the assignee agrees to be bound hereby and the assignee has a net worth in excess of assignor. Notwithstanding the foregoing, HECO may assign, mortgage, pledge, or otherwise transfer its interests in this Agreement and/or the System to (i) any lender, providing

financing for the System or (ii) an affiliate of HECO as long as such affiliate is comparable in terms of its financial situation and its technical ability to perform the Agreement, in either case without obtaining the consent of Host. Such assignees shall be bound by all of HECO's obligations under the Agreement.

5.8 Governing Law:

This Agreement will be governed, interpreted, and enforced in accordance with the laws of the State of Hawaii, other than the laws thereof that would require reference to the laws of any other jurisdiction.

5.9 No Third Party Beneficiaries:

Host and HECO do not intend to benefit any person or entity not a signatory to this Agreement. No third party beneficiaries are intended or will be created by operation of this Agreement.

5.10 Binding Effect:

This Agreement shall be binding upon and inure to the benefit of the Parties hereto and their respective successors, legal representatives, and permitted assigns.

5.11 Insurance:

5.11.1 Coverage by HECO. During the term of the Agreement, HECO will adequately self-insure through its parent Hawaiian Electric Industries, Inc. or maintain at its sole cost and expense the following insurance coverage:

(a) Commercial General Liability Insurance against claims of third Parties for personal injury and property damage arising from HECO's maintenance of the System, in an amount of not less than Five Million Dollars (\$5,000,000) per occurrence/annual aggregate, and Property Insurance on an all-risk form covering all owned and non-owned assets (including leased, rented or borrowed) HECO may use in the performance of this Agreement, including a waiver of subrogation from the insurer in favor of the Additional Insureds.

(b) Workers' Compensation Insurance to provide statutory workers compensation benefits, as required by the laws of the state of Hawaii and, Employers' Liability Insurance with a limit of not less than One Hundred Thousand Dollars (\$100,000) for each employee; and

(c) Business Automobile Insurance against claims for personal injury and property damage in an amount of not less than One Million Dollars (\$1,000,000) per occurrence.

(d) HECO will provide Host with a certificate containing evidence of such coverage prior to commencing any work hereunder with respect to the applicable System and thereafter will provide Host with appropriate evidence of such coverage upon each anniversary date of the policy.

5.11.2 Coverage by Host. During the term of the Agreement, Host will adequately maintain at its sole cost and expense the following insurance coverage:

(a) Commercial General Liability Insurance against the risks of personal injury and property damage occurring on, in or about the Facility, or arising from operation of the System, in an amount of not less than One Million Dollars (\$1,000,000) per occurrence, Two Million Dollars (\$2,000,000) annual aggregate, and Property Insurance on an all-risk form covering replacement value of the Facility.

(b) Workers' Compensation Insurance to provide statutory workers compensation benefits, as required by the laws of the state of Hawaii and Employers' Liability Insurance with a limit of not less than One Hundred Thousand Dollars (\$100,000) for each employee; and

(c) Business Automobile Insurance against claims for personal injury and property damage in an amount of not less than One Million Dollars (\$1,000,000) per occurrence.

(d) Host will provide HECO with a certificate containing evidence of such coverage prior to HECO commencing any work hereunder with respect to the applicable System and thereafter will provide HECO with appropriate evidence of such coverage upon each anniversary date of the policy.

5.11.3 Insurance Policies. All insurance policies required under this Section 5.11 will be issued by insurers of recognized responsibility. The policy of insurance for Commercial General Liability Insurance will name the other Party as an additional insured and will contain an agreement by the insurer that such policy will not be terminated, canceled or materially reduced in coverage without at least thirty (30) days prior written notice to the additional insured; provided such notice will be ten (10) days in the case of a failure to pay premiums.

5.12 Notices:

Notices will be given by (i) certified mail, return receipt requested, postage paid, or (ii) delivery services such as Federal Express or similar service, or (iii) by facsimile. Notices not given by mail will be effective upon actual receipt by the Party to whom the notice is directed. Notices will be addressed as per Appendix G

5.13 Integration and Modification:

This Agreement shall constitute the entire understanding between the Parties, superseding any and all previous understandings, oral or written, pertaining to the subject matter contained herein. The Parties have entered into this Agreement in reliance upon the representations and mutual undertakings contained herein and not in reliance upon any oral or written representation or information provided to one Party by any representative of the other Party. Neither Party shall claim at any time that it entered into this Agreement in whole or in part based on any representation not stated in this Agreement. This Agreement may be amended or supplemented by and only by written instrument duly executed by each of the Parties.

5.14 PUC Authority:

This Agreement is at all times subject to changes and modifications as the PUC may direct from time to time in the exercise of its jurisdiction. If the PUC orders changes or modifications to this Agreement, then the Agreement shall be amended as ordered, provided that, to the extent possible, the Agreement shall be amended to preserve the economic and operational arrangements between the Parties as set forth in this Agreement. If it is not possible to maintain the economic and operational arrangements, and if the changes or modifications would result in material adverse impacts on the Host's or HECO's rights, obligations or benefits under this Agreement, then the Host or HECO, as the case may be, may terminate this Agreement by providing written notice to the other within thirty (30) days of receiving written notice of the order from HECO. Such termination shall be subject to the same terms and conditions as would arise upon the expiration of the Initial Term or Extended Term(s) of this Agreement under section 5.3.

5.15 Reservation of Rights:

Nothing in this Agreement shall limit HECO's ability to exercise its rights or expand or diminish its

liability with respect to the provision of electrical service pursuant to HECO's Tariff as filed with the PUC or the PUC's Standards for Electric Utility Service in the State of Hawaii, which currently are included in the PUC's General Order Number 7, as either may be amended from time to time.

5.16 Waiver:

The failure of any Party to enforce any provision of this Agreement will not be construed to be a waiver of the provision, or affect the validity of this Agreement or the right of any Party to enforce any provision. The waiver of any breach of this Agreement will not be held to constitute a waiver of any other breach.

5.17 Nondisclosure of Confidential Information:

Customer information provided to HECO relating to Host's non-utility generation alternative and its business operation, and designated in writing by Host as being confidential, shall be treated as confidential. HECO may disclose such information to the PUC and the Consumer Advocate, subject to PUC issuance of a protective order. HECO information provided to Customer related to HECO's CHP design and proposal shall be treated as confidential by Host with the exception that the electric rate discount provided to Host shall not be considered to be confidential.

5.18 Force Majeure:

For purposes of this Agreement, "Force Majeure Event" means any event: (a) that is beyond the reasonable control of the affected Party; and (b) that the affected Party is unable to prevent or provide against by exercising reasonable diligence, including the following events or circumstances, but only to the extent they satisfy the preceding requirements: acts of war, public disorder, insurrection or rebellion; floods, hurricanes, earthquakes, lightning, storms, volcanic eruptions and other natural calamities; explosions or fires; strikes, work stoppages, or labor disputes; embargoes; and sabotage. If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, such Party will promptly notify the other Party in writing, and will keep the other Party informed on a continuing basis of the scope and duration of the Force Majeure Event. The affected Party will specify in reasonable detail the circumstances of the Force Majeure Event, its expected duration, and the steps that the affected Party is taking to mitigate the effects of the event on its performance. The affected Party will be entitled to suspend or modify its performance of obligations under this Agreement, other than the obligation to make payments then due or becoming due under this Agreement, but only to the extent that the effect of the Force Majeure Event cannot be mitigated by the use of reasonable efforts. The affected Party will use reasonable efforts to resume its performance as soon as possible.

5.19 Representations:

HECO and Host each represents and warrants respectively that: (a) It has all necessary right, power and authority to execute, deliver and perform this Agreement; and (b) The execution, delivery and performance of this Agreement by it will not result in a violation of any law or regulation of any governmental authority, or conflict with, or result in a breach of, or cause a default under, any agreement or instrument to which such Party is also a Party or by which it is bound.

5.20 Attorneys' Fees and Costs

The prevailing Party in any action, arbitration or proceeding to enforce the provisions of this Agreement shall be entitled to recover its reasonable attorneys' fees and costs incurred therein.

5.21 Effect of Headings:

The headings or titles of the several sections and exhibits hereof are for convenience of reference and shall not affect the construction or interpretation of any provision of this Agreement.

5.22 Relationship of Parties:

Nothing in this Agreement shall be deemed to constitute any Party hereto as partner, agent or representative of the other Party or to create any fiduciary relationship between the Parties.

5.23 Multiple Counterparts:

This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

5.24 Project-Specific Changes:

Changes to this standard form Agreement, if any, are noted in Appendix E and incorporated herein. In the event of any conflict between the terms of this Agreement and those in Appendix E, the terms in Appendix E shall prevail.

IN WITNESS WHEREOF, the Parties hereto have set their hand the day and year first above written.

Hawaiian Electric Company, Inc.

By: _____
(Signature)

Name: _____
(Print Name)

Title: _____

Date: _____

By: _____
(Signature)

Name: _____
(Print Name)

Title: _____

Date: _____

By: _____
(Signature)

Name: _____
(Print Name)

Title: _____

Date: _____

Appendices:

Appendix A - Description of the CHP System

Schedule 1-A - Permitting and Anticipated Schedule

Appendix B – Electric Energy Discount

Appendix C – Thermal Energy Pricing

Appendix D – Facility Fee Pricing

Appendix E - Clarifications to Standard CHP Agreement

Appendix F - Contingencies

Appendix G – Contact Information

Appendix A

Description of the CHP System

The CHP System designed for _____ was a balance of Facility electrical baseload, chilled water requirements, absorption chiller equipment sizes, and reliability. While the Facility may operate continuously for many weeks the following _____ profile provided the basis for the control system design for the CHP System.

The _____ CHP System consists of the following major components:

- ___ CHP Module: continuous duty, _____-fired ___kW distributed cogeneration reciprocating engine, synchronous generator, heat recovery equipment, integrated protective and interconnecting switchgear, onboard microprocessor control system, synchronizing system, and weatherproof, sound-attenuated cabinet with cabinet mounted mufflers.
- ___ size-ton absorption chiller will be located _____
- ___ size-ton cooling towers will be located _____
- The balance of plant equipment will include a size-ton intercooler chiller, pumps, control valves, fill and expansion tanks, with associated piping and electrical equipment.

If requested by Host and HECO determines that it is feasible and can be provided at a reasonable cost, Host-sited CHP System islanding capability (i.e., the ability to automatically remain in service isolated from the HECO grid) may be provided by HECO as indicated below, provided that compliance with interconnections standards in HECO tariff Rule 14H shall be met and maintained. Standard CHP Systems do not have islanding capability.

- If this box is checked, the CHP System is equipped with islanding capability. Host agrees to make a non-refundable contribution of \$ _____ to cover the incremental cost incurred by HECO to provide the islanding capability, and such non-refundable contribution shall be payable upon CHP System installation and startup.

Work by Others

_____ fuel storage tank(s) to be used for the fuel supply will be installed by _____

The following figure is a one-line diagram of the conceptual design of the System. The ___ size kW cogen units have a thermal output capability of ___ therms/hr at full load. However, the ___ cogen units will be operated at approximately ___ kW each to allow the thermal output to match the size-ton chiller capacity having a thermal requirement of approximately ___ therms/hr.

The Net Capacity of the CHP system generating units is defined as the CHP Module nameplate rating minus the intercooler chiller load.

SCHEDULE 1-A

Appendix B

Electric Energy Pricing

The electric energy supplied by HECO to Host will be billed under the applicable rate schedule (i.e., Schedule J or Schedule PS), and all its provisions shall apply except as modified below:

Electric Energy Rate Discount:

The customer's total monthly bill under the applicable rate schedule shall be reduced by the following rate adjustment applied to the total kWh produced by the CHP System and used by the Host's Facility:

All kWh from CHP System - 1.0 ¢/kWh

HECO shall install a meter on the CHP System to measure the total monthly kWh supplied by the System to which the above energy rate adjustment shall apply.

Electric Energy Rate Discount:

Host will receive an annual cumulative electricity discount credit at a guaranteed minimum level based upon an assumed CHP System annual equivalent availability rate of 85%. The guaranteed minimum discount per Contract Year will be equal to the following:

$$\text{Minimum Discount} = [(A \times 85\% \times D) \times (8760 - B)] \times C$$

Where:

A = the net capacity of the CHP System generating units in KW specified in Appendix A;

B = number of hours during the year in which the customer does not take at least 75% of the available CHP System electric output;

C = the energy rate discount in ¢/kWh noted above;

D = the expected normal loading on the CHP generating units in percent

If the Host's total actual electricity discount for any Contract Year (as shown on HECO's bills to Host) does not equal the Minimum Discount for that Contract Year as calculated above, then Host will be credited with the difference on the billing for the first period in the following year. The Contract Year is defined in section 5.3 of the Agreement.

Appendix C

Thermal Energy Pricing

Thermal Charge – of ____ ¢/therm to be added to customer's monthly bill:

The customer is subject to a minimum monthly thermal energy charge based on the Thermal Energy Minimum Take of _____ therms per month described below.

The Thermal Charge shall be adjusted on June 30 each year based on the percentage change from the previous year's Gross Domestic Product Implicit Price Deflator ("GDPIPD"). The percentage change in GDPIPD will be measured from a base of 110.66 for the year 2002 to the reported value for the year in which the adjustment is made.

If the GDPIPD index is discontinued or revised during the term of this Agreement, then another government index or computation by which it is replaced shall be used in order to obtain substantially the same result as would be obtained if the GDPIPD index has not been discontinued or revised.

Thermal Energy Minimum Take:

The thermal energy monthly minimum take is based on

Appendix D

Facility Fee Pricing

Appendix E

Clarifications to Standard CHP Agreement

Appendix F

Contingencies

This Agreement is predicated upon the assumption that the Host clearly meets all of the criteria established in HECO's CHP Tariff for eligibility. If in the final project implementation, it is discovered that any of those criteria are not met, HECO has the option to either discontinue the project in accordance with the terms of this Agreement or renegotiate the Thermal Rate to reach an equitable going forward rate.

The following assumptions are key elements of the basic elements of the basic pricing for the CHP Systems:

1. The project can be completed using standard components available from qualified vendors – i.e. no “one off” components are required.
2. All components may be skid mounted or located within reasonable proximity in a readily accessible area with no major reconstruction required for access.
3. Construction can be completed utilizing cranes and other equipment available on the island where the system is to be located.
4. Piping and electrical runs to interconnect with existing systems are less than 250 feet in length.
5. Air emissions permits do not require additional emissions controls beyond those currently commercial available from the selected equipment vendor.

If the system does not comply with any of the noted assumptions, the thermal pricing will take such a variance into consideration.

Appendix G

Contact Information for Notices

Host Designated Contact:

HECO Designated Contact:

Mr. Scott Seu (or successor)
Manager, Energy Projects Department
Hawaiian Electric Co.
P.O. Box 2750
Honolulu, HI 96840

Phone: (808) 543-4805

E-mail: scott.seu@heco.com

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APPENDIX B

Hawaii Fuel Specifications

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Diesel Fuel Specification

Chevron Diesel Fuel No. 2 specifications:

Item	Units	Specification Limits	Test Method
Gravity @ 60°F	°API, Specific	30.0 min., .88 min.	D1298 or D4052-86
Viscosity @ 100 DF	SSU	32.3 - 40.0	D445, D2161
BTU content *	MM BTU/BBL	5.84	Calculated or D240
Heat Value, Net	MM BTU/BBL	Report	Calculated or D240
Flash Point, PM	°F	150 min.	D93
Pour Point *	°F	35	D97
Ash	PPM, wt.	100 max.	D482
Cetane Index		40 min.	D4737
Carbon Residue, 10% Residuum	%, wt.	0.35 max.	D524
Sediment & Water	%, vol.	0.05 max.	D1796
Sulfur	%, wt.	0.40 max.	D1552, D2622 or D4294
Distillation			
90% Recovered	°F	540 - 650	D86
Sodium+Potassium	PPM, wt.	0.5 max.	D3605
Sodium+Potassium +Lithium	PPM, wt.	Report	D3605
Vanadium **	PPM, wt.	0.8	D3605
Nitrogen ***	PPM, wt.	120	D4629 or D5762

* Chevron does not provide specifications on these items. Values are typical; they are not guaranteed.

** Typical value is shown, value is not a specification limit.

*** Typical value is shown, value is not a specification limit.

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SNG and Hi-Octane Propane Fuel Specification

Date Components	Typical Analysis					Date Analysis	Jan-2000 SNG	Jan-2000 LPG	Jun-2002 HI Octane	May-2001 LPG Air	May-2001 LPG Air SNG
	Jan-2000 SNG	Jan-2000 LPG	Jun-2002 HI Octane	May-2001 LPG Air	May-2001 LPG Air SNG						
O2 (Oxygen)	-	-	-	8.40	4.12	Molecular Weight [lbs/lbmol]	18.36	43.89	45.12	38.24	28.41
N2 (Nitrogen)	-	-	-	31.60	15.51	Base Compressibility Factor	1.00	0.98	0.98	0.99	1.00
CO (Carbon Monoxide)	0.28	-	-	-	0.16	Liq Specific Wt [lb/gal @60°F]	NA	4.32	4.26	NA	NA
CO2 (Carbon Dioxide)	4.48	-	-	-	2.45	Liq Specific Grav [H2O=1]	NA	0.52	0.51	NA	NA
H2 (Hydrogen)	9.25	-	-	-	4.22	API [(141.5/Sp. Gr.)-131.5]	NA	140.62	144.87	NA	NA
CH4 (Methane)	80.71	-	-	-	41.01	C/H Ratio [lbs(C)/lbs(H)]	3.05	5.19	4.49	8.62	4.06
C2 (Ethane)	0.01	0.20	0.38	0.07	0.04	Gas Specific Gravity [Air=1]	0.64	1.54	1.59	1.33	0.99
=C3 (Propylene)	-	53.76	0.42	31.20	15.29	DOF/lb [Dry@30°HG+4°H2O, 60°F]	20.38	8.39	8.15	9.73	13.13
-C3 (Propane)	0.04	39.82	91.47	22.71	11.19	DOF/gal [Dry@30°HG+4°H2O, 60°F]	NA	36.52	34.89	NA	NA
IC4 (iso-butane)	2.02	0.89	7.41	0.63	1.55	BTU/WCF [Wet @30°HG 60°F]	1,009.47	2,472.66	2,581.19	1,488.71	1,254.39
NC4 (Butane)	2.45	4.98	0.32	5.17	3.91	BTU/DOF [Wet * 1.02765]	1,037.38	2,541.23	2,682.56	1,529.87	1,289.08
IO5 (iso-pentane)	0.63	0.20	-	0.20	0.46	BTU/lb [BTU/DOF * DOF/lb]	21,137.60	21,315.42	21,621.30	14,878.95	16,930.63
NC5 (Pentane)	0.11	0.05	-	0.00	0.06	BTU/Gal [BTU/lb * Liq Sp Wt (lb/gal)]	NA	92,168.30	91,969.09	NA	NA
EC5 (Neo-pentane)	0.02	-	-	0.02	0.02	Air req'd for combustion [mcf/therm]	927.11	906.24	918.97	916.16	921.90
NC6	-	-	-	-	-	Wobbe Index [btu/wal (@30°HG 60°F)]	1,266.95	1,991.27	2,048.97	1,290.85	1,263.97
NC7	-	-	-	-	-	Weaver flame speed [ft=100, c3=16]	12.20	23.04	16.07	22.11	17.02
NC8	-	-	-	-	-	Pseudocritical Temp [°F]	349.22	666.64	670.65	497.67	425.38
NC9	-	-	-	-	-	Pseudocritical Pressure [PSIA]	644.85	640.37	610.20	593.73	624.59
C10	-	-	-	-	-	Vapor Pressure [PSIG @ 100°F]	4,015.05	184.23	165.47	101.93	2,065.48
Total	100.00	100.00	100.00	100.00	100.00	Gross Heating Value [BTU/DOF]	1,025.50	2,509.79	2,619.90	1,510.95	1,273.67
						Net Heating Value	924.90	2,329.17	2,411.19	1,401.89	1,188.20
						Lbs/mcf [Dry @ 30°HG+4°H2O, 60°F]	49.08	119.22	122.68	102.82	76.14
Typical Ranges											
Components	SNG	LPG	HI Octane	LPG Air	LPG Air SNG						
CO (Carbon Monoxide)	0.25-0.4%	#N/A	#N/A								
CO2 (Carbon Dioxide)	3-5%	#N/A	#N/A								
H2 (Hydrogen)	9-10%	#N/A	#N/A								
CH4 (Methane)	79-84%	#N/A	#N/A								
C2 (Ethane)	0-0.01%	0-0.5%	0.25-1.5%								
=C3 (Propylene)	0%	40-70%	5% max.								
-C3 (Propane)	0.03-0.5%	25-60%	90-97%								
IC4 (iso-butane)	1.5-3%	0.5-2%	10% max.								
NC4 (Butane)	1.5-4%	0.5-8%	10% max.								
IC5 (iso-pentane)	0.5-1%	0-1%	0-1%								
NC5 (Pentane)	0.25-0.75%	0-0.5%	0-0.5%								
EC5 (Neo-pentane)	0-0.06%	#N/A	#N/A								
C3+ (Heavier hydrocarbons)	0-0.1%	0-0.5%	0%								

NOTES:

Typical product profile. Variances occur in the make-up of these products:

SNG: Typical profile of SNG manufactured at the SNG Plant.

LPG: Typical profile of commercial propane received from the Chevron refinery.

Hi-Octane Propane: Typical profile of motor propane received from the Tesoro refinery.

LPG Air: Propane & Air that may be fed into the SNG system.

LPG Air SNG: Sample of Propane Air mixed with SNG at a ratio of 51/49 SNG/Propane Air with a specific gravity of .985.

Hi-Octane Propane: IC4 & NC4 10% Max for Bicamas are combined maximum levels.

Typical Ranges are not provided for LPG Air and LPG Air SNG because the blend could range from 100% SNG to 51/49 SNG/Propane Air depending on how the propane air unit is running.

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APPENDIX C

HECO, MECO, HELCO

Terms and Conditions Purchase & Install

[USE FOR HECO ONLY]

TERMS AND CONDITIONS
FOR
HECO PURCHASE ORDER NUMBER _____

I. PREAMBLE

As used herein, PURCHASER shall refer to HAWAIIAN ELECTRIC COMPANY, INC., and SELLER shall refer to the SELLER as indicated in the PURCHASE ORDER referenced above (hereinafter "PURCHASE ORDER") and to which these Terms and Conditions are attached, incorporated or relate.

[USE FOR HELCO ONLY]

TERMS AND CONDITIONS
FOR
HELCO PURCHASE ORDER NUMBER _____

I. PREAMBLE

As used herein, PURCHASER shall refer to HAWAII ELECTRIC LIGHT COMPANY, INC., and SELLER shall refer to the SELLER as indicated in the PURCHASE ORDER referenced above (hereinafter "PURCHASE ORDER") and to which these Terms and Conditions are attached, incorporated or relate.

[USE FOR MECO ONLY]

TERMS AND CONDITIONS
FOR
MECO PURCHASE ORDER NUMBER _____

I. PREAMBLE

As used herein, PURCHASER shall refer to MAUI ELECTRIC COMPANY, LIMITED, and SELLER shall refer to the SELLER as indicated in the PURCHASE ORDER referenced above (hereinafter "PURCHASE ORDER") and to which these Terms and Conditions are attached, incorporated or relate.

II. AGREEMENT

When these Terms and Conditions are attached to and incorporated by reference in the PURCHASE ORDER, and the PURCHASE ORDER is accepted by SELLER, such Terms and Conditions, along with the PURCHASE ORDER and any SPECIFICATIONS referenced therein or herein, shall constitute the terms and conditions of the Agreement between the parties (hereinafter "this Agreement") whereby the SELLER agrees to sell and the PURCHASER agrees to purchase the items of EQUIPMENT and any related services itemized in said PURCHASE ORDER.

III. DEFINITIONS

As used in this Agreement, the following terms shall have definitions as follows:

3.1 ACCEPTANCE CRITERIA: Shall be defined to mean the successful completion of tests and procedures described in the SPECIFICATIONS.

3.2 ACCEPTANCE DATE: Shall be defined to mean the date that EQUIPMENT shall successfully meet the ACCEPTANCE CRITERIA as defined herein.

3.3 CONTRACT PRICE: Shall be defined to mean the price of the EQUIPMENT as shown on the PURCHASE ORDER inclusive of all enforceable amendments thereto.

3.4 DELIVERY DATE: _____.

3.5 DELIVERY DESTINATION: Shall be defined to mean:

Attention: _____

3.6 DEFECTIVE EQUIPMENT REPORT: Shall be defined to mean an instrument that PURCHASER shall tender to SELLER during the WARRANTY PERIOD to confirm notice of defects in the EQUIPMENT.

3.7 EQUIPMENT: Shall be defined to mean the items of equipment, goods or products listed in the PURCHASE ORDER, inclusive of all enforceable amendments thereto.

3.8 EXCLUSIVE AGENT: Director of Purchasing shall act as exclusive agent for PURCHASER, having the authority and responsibility to represent PURCHASER in any and all matters related to the performance of this Agreement.

3.9 FAX: Tele-facsimile.

3.10 SPECIFICATIONS: Shall be defined to mean the document(s) attached to the PURCHASE ORDER and/or incorporated therein, attached hereto, or which otherwise between SELLER and PURCHASER describe the EQUIPMENT, and any technical drawings referred to therein.

3.11 WARRANTY PERIOD: Shall be defined to mean the period which begins on the ACCEPTANCE DATE and ends one (1) year later (excluding any down time caused by breach of the Warranty); provided, however, that any warranty repairs or replacements shall be deemed to renew the WARRANTY PERIOD as to those items so repaired or replaced; provided further, that except for the exclusions and renewal provisions contained herein, the WARRANTY PERIOD shall in no event extend beyond eighteen (18) months from the date the total EQUIPMENT is shipped to PURCHASER.

IV. PURCHASE ORDER

The EQUIPMENT shall be itemized on PURCHASE ORDER. Any preprinted terms and conditions appearing on the PURCHASE ORDER (or any subsequent change orders, amendments thereto or other invoices or orders relating to the EQUIPMENT or PURCHASE ORDER) which are in any way contradictory to or inconsistent with the terms contained herein shall be considered by the parties to be void. From time to time, pursuant to the terms of Article VI herein, PURCHASER may submit its Purchase Change Order to SELLER for its acceptance. Each such Purchase Change Order, upon SELLER's acceptance, shall effectively amend and be made a part of the PURCHASE ORDER and this Agreement.

V. INTENDED USE

It is understood by SELLER that PURCHASER intends to use the EQUIPMENT primarily to _____ in support of PURCHASER's electric power operations in Hawaii.

VI. CHANGES TO PURCHASE ORDER OR SPECIFICATIONS

6.1 Change Requests - If changes to the PURCHASE ORDER or SPECIFICATIONS are proposed by PURCHASER, SELLER will give each such proposal its most serious and prompt attention. SELLER will promptly respond by stating in writing what effect, if any, such changes will have on the CONTRACT PRICE, DELIVERY DATE, and Warranty or Patent Indemnification provisions of this Agreement. In the absence of a written statement from SELLER regarding warranty or patent indemnification provisions of this Agreement, such provisions shall apply without modification should PURCHASER elect to amend the PURCHASE ORDER or SPECIFICATIONS with the change pursuant to Section 6.2 herein.

6.2 Change Orders - If changes in the PURCHASE ORDER or SPECIFICATIONS are elected by PURCHASER to be incorporated into this Agreement, it is understood that any such changes shall be made. Any such changes to the PURCHASE ORDER or SPECIFICATIONS shall be evidenced by a Purchase Change Order. Such Purchase Change Order shall amend the PURCHASE ORDER or SPECIFICATIONS appropriately to incorporate the change and acknowledge the effect, if any, of the change on the CONTRACT PRICE, DELIVERY DATE and Warranty or Patent Indemnification provisions to this Agreement. Such Purchase Change Orders shall be signed by an authorized representative of PURCHASER.

6.3 Technological Developments - SELLER shall promptly advise PURCHASER of all reasonably available technological advances which are known or become known to SELLER over the course of performance of its obligations under this Agreement which may result in the EQUIPMENT having added value (i.e. better performance, design, material, longer useful life, etc.) to PURCHASER. Should PURCHASER elect to incorporate such advances it shall do so pursuant to Section 6.2 herein.

VII. PRICE

The total CONTRACT PRICE of the EQUIPMENT is _____ DOLLARS (\$ _____) F.O.B. the DELIVERY DESTINATION, and is shown in the PURCHASE ORDER, as such may be amended pursuant to Section 6.2.

VIII. PAYMENT TERMS

8.1 Payment Schedule - The CONTRACT PRICE shall be paid according to the following Payment Schedule:

8.2 Thirty (30) Days from Due Date - The payments referenced in Section 8.1 will be made by check within thirty (30) days from the date of PURCHASER's receipt of SELLER's invoice pursuant to Section 8.3; provided, however, that SELLER shall, to PURCHASER's reasonable satisfaction, have completed the payment contingency outlined on the Payment Schedule. In the event of a delay in SELLER's completion of the payment contingency, PURCHASER shall have the right to delay the appropriate payment commensurately.

8.3 Invoicing - SELLER shall post all invoices submitted hereunder to:

[USE FOR HECO ONLY]

Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001
Attention: Accounts Payable
Purchase Order No. _____
Contract No. _____

[USE FOR HELCO ONLY]

Hawaii Electric Light Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001
Attention: Accounts Payable
Purchase Order No. _____
Contract No. _____

[USE FOR MECO ONLY]

Maui Electric Company, Limited
P.O. Box 2750
Honolulu, Hawaii 96840-0001
Attention: Accounts Payable
Purchase Order No. _____
Contract No. _____

Said invoices shall be in duplicate and shall reference the PURCHASE ORDER number and, if applicable, the Contract Number. Should PURCHASER's PURCHASE ORDER contain more than one item, SELLER's invoice will make the proper reference. SELLER

understands that its failure to follow this requirement may result in delayed payments by PURCHASER.

8.4 Payment for EQUIPMENT - Payment for the EQUIPMENT delivered hereunder shall not constitute acceptance thereof. PURCHASER shall have the right to inspect the EQUIPMENT and to reject any and all of the same which are in PURCHASER's judgment defective. EQUIPMENT so rejected or which is supplied in excess of quantities called for herein may be returned to the SELLER at SELLER's risk and expense and, in addition to PURCHASER's other rights, PURCHASER may charge and SELLER shall be liable for all reasonable expenses of unpacking, examining, repacking and reshipment of such EQUIPMENT, or reperformance of the WORK. In the event of defective or damaged EQUIPMENT, PURCHASER reserves the right to require replacement at no extra cost to PURCHASER, as well as payment of damages.

8.5 Setoff - PURCHASER may set off any amount due from SELLER to PURCHASER (for any matter) against any amount payable at any time by PURCHASER in connection with this Agreement.

IX. DELIVERY

9.1 On Time Delivery - SELLER agrees to deliver all EQUIPMENT to PURCHASER's DELIVERY DESTINATION on or before the DELIVERY DATE. The Equipment shall be delivered to PURCHASER F.O.B. _____ (the "F.O.B. POINT").

9.2 Option to Delay Delivery - PURCHASER shall have the right, at no additional charge, to postpone the delivery of the EQUIPMENT (or any component thereof) for a period of [90] days maximum. In the event of such a postponement, PURCHASER shall have the right to commensurately delay its payment(s) due by virtue of the delayed shipment of the EQUIPMENT.

9.3 Failure to Ship or Deliver Equipment. If SELLER, for any reason whatsoever, fails to ship or deliver EQUIPMENT or perform related services within the times specified herein, PURCHASER may at its sole option and notwithstanding any provision herein to the contrary, terminate this Agreement or any part thereof without liability except for EQUIPMENT previously provided and accepted. If at any time, reasonable grounds for insecurity arise regarding the SELLER's performance of this Agreement in accordance with its terms and the PURCHASER notifies the SELLER of its concern, the SELLER must provide adequate assurance of due performance within ten (10) days after receipt of such notice. If adequate assurance is not provided within the prescribed period, PURCHASER may terminate this ORDER or Agreement or any part thereto without liability except for goods or services previously provided and accepted. All rights and remedies recited herein shall be in addition to any rights and remedies provided at law or in equity.

9.4 Choice of Carrier and Routing - SELLER shall consult with PURCHASER as to the choice of a particular carrier and routing for delivery of the EQUIPMENT. If the F.O.B. POINT and PURCHASER's DELIVERY DESTINATION are not the same physical location, SELLER's choice of carrier must be approved by PURCHASER. Such approval shall not be unreasonably withheld.

9.5 Delivery Delays - [1] to [60] Days - If delivery of the EQUIPMENT is delayed from [1] to [60] days beyond the DELIVERY DATE for reasons other than Force Majeure, then SELLER shall pay PURCHASER a Delivery Delay Charge of \$[250] per day for each day that the EQUIPMENT is delayed in its delivery to the DELIVERY DESTINATION beyond the DELIVERY DATE. PURCHASER shall not be entitled to recover any other charges, damages or payments from SELLER for delivery delays of from [1] to [60] days.

9.6 Delivery Delays - Greater than [60] Days - If delivery of the EQUIPMENT is delayed more than [sixty (60)] days beyond the DELIVERY DATE for reasons other than Force Majeure, then such delay shall be considered an irreparable delay and a default of SELLER under this Agreement. In the event of such a delay, PURCHASER shall have the option to terminate this Agreement for cause pursuant to Article XX. Should PURCHASER elect not to terminate this Agreement due to such delay, it shall so notify SELLER in writing, giving the specific time for which it is willing to waive its termination rights for delayed delivery of the EQUIPMENT. In the event of such waiver of termination rights by PURCHASER and subsequent delivery of the EQUIPMENT during the waiver period, SELLER shall pay to PURCHASER a Delivery Delay Charge of \$[250] per day for each day that the EQUIPMENT is delayed in its delivery to the DELIVERY DESTINATION beyond the DELIVERY DATE up to a total of [100]% of the CONTRACT PRICE.

9.7 Delivery Delays Including Force Majeure - If delivery of the EQUIPMENT is delayed more than [180] days beyond the DELIVERY DATE for any reason, including Force Majeure (as described in Section 24.8), then PURCHASER shall have the right to cancel this Agreement without further obligation to SELLER and in such event, SELLER shall return to PURCHASER all monies previously paid to SELLER under this Agreement; provided, however, that if circumstances are such that PURCHASER makes a good faith determination that delivery of the EQUIPMENT is not likely to occur within [180] days of the DELIVERY DATE, then PURCHASER may cancel this Agreement pursuant to this Section 9.6 immediately upon making such good faith determination.

9.8 Notice of Delay - SELLER shall promptly notify PURCHASER in writing of any occurrence that may delay delivery of the EQUIPMENT beyond the DELIVERY DATE and include in such notification SELLER's proposed actions to ensure the DELIVERY DATE is met despite such occurrence.

9.9 Delivery Notice - SELLER shall notify PURCHASER by FAX of an impending shipment hereunder seven (7) calendar days prior to actual shipment whether such shipment is to the DELIVERY DESTINATION or F.O.B. POINT. On the day of actual shipment, SELLER shall confirm shipment by FAX notification which shall include: the carrier's name, the way bill number, number of pieces, weight (by piece and total), and destination.)

9.10 Packing, Etc. - SELLER will pack and ship the EQUIPMENT in a manner consistent with general industry practice for shipping these kinds of goods so as to minimize any deterioration in transit. Should it be necessary to ship the EQUIPMENT in a disassembled state, SELLER shall ship the EQUIPMENT in the largest units possible consistent with expedient transportation of the EQUIPMENT.

9.11 Shipping Documents - Prompt receipt of shipping documents is essential. Transmittal of shipping documents is not to be delayed for preparation of invoices. The following shall be forwarded to _____ as soon as possible after shipment goes forward:

Bill of Lading Original and 2 copies

Packing List 2 copies

To avoid arrival of materials at the DELIVERY DESTINATION prior to notification of shipment and consequent serious inconvenience and extra expense to PURCHASER's field forces, SELLER, or any of SELLER's suppliers making shipment direct, shall transmit on the shipment date, addressed as instructed in this Agreement, by air mail, if necessary:

Packing List 1 copy

Bill of Lading 1 copy

The PURCHASE ORDER Number shall be indicated on all invoices and shipping documents.

Unless otherwise directed by PURCHASER, three copies of all other records, documentation and test data, shall be shipped as a package to the Director of Purchasing as set out in Article XXII. simultaneously with, or prior to, the arrival of the EQUIPMENT.

SELLER shall be responsible for expenses incurred by PURCHASER due to SELLER's failure to comply with the requirements of this Article.

Payment of invoices may be withheld pending receipt of these documents referenced in this Article.

X. TITLE & SECURITY INTEREST

10.1 PURCHASER's Interest - To secure PURCHASER's payments (if any) prior to the shipment of the EQUIPMENT, title to and first security interest in the EQUIPMENT, any work in progress and materials required for the execution of SELLER's obligations hereunder, and any work which SELLER may subcontract in the support of the performance of its obligations hereunder, shall vest in PURCHASER to the extent PURCHASER has made payments hereunder.

10.2 Security Agreement - The parties hereby agree that this Agreement shall constitute the Security Agreement required by the Uniform Commercial Code of the appropriate State. SELLER will execute promptly any financing statement required to perfect and protect the interests of PURCHASER as defined in this Article X.

10.3 Liens & Encumbrances - SELLER shall pay the bills of its suppliers promptly and comply with reasonable requests of PURCHASER for evidence of payment. However, SELLER shall have the right to withhold payment to any of its suppliers who have furnished defective, substandard or incorrect materials or workmanship in which case SELLER shall defend, indemnify and hold harmless PURCHASER against all claims, losses and expenses (including attorneys' fees) resulting from SELLER's election to withhold such payments. SELLER shall not by its actions or inactions permit any attachments to the EQUIPMENT of liens, encumbrances or claims for labor or material and shall defend, protect and hold harmless PURCHASER from all such claims, liens and encumbrances growing out of the design, manufacture, assembly, transit and installation of the EQUIPMENT.

10.4 Filing of Liens. SELLER agrees that it shall not file any liens as a result of producing goods or services hereunder and that it shall not permit or give cause to its subcontractors or other suppliers to file such liens. When requested, SELLER shall provide PURCHASER with lien waivers for itself, its subcontractors and other suppliers in a form satisfactory to PURCHASER, who may withhold any payment(s) otherwise due until it has received reasonable assurances that all of the SELLER's obligations arising from the goods or services have been paid. If a lien is filed, SELLER shall cooperate fully with PURCHASER, at SELLER's expense, to cause the lien to be removed.

XI. EQUIPMENT WARRANTY

11.1 Performance Warranty - SELLER warrants that the EQUIPMENT will perform in accordance with the performance requirements and meet the criteria set forth in the SPECIFICATIONS and will be fit for the use intended by PURCHASER if such use has been communicated to SELLER. SELLER further warrants that if the EQUIPMENT is a fabricated unit, it will function properly for a commercially reasonable length of time for the intended purpose, if no other time is required herein.

11.2 Design, Materials and Workmanship Warranty - SELLER further warrants that the EQUIPMENT will be new and merchantable, of good material and workmanship and first-class quality, fit and sufficient for the purpose intended and free from defects in design, materials and workmanship.

11.3 Survival of Warranties - The warranties set forth in Paragraphs 11.1 and 11.2 above, together with service warranties and guarantees, shall run to PURCHASER, its successors, assigns, and to the users of the EQUIPMENT and shall survive any inspection, delivery, acceptance or payment by PURCHASER for the EQUIPMENT.

11.4 Defect Correction - Parts and Labor - In the event of a breach of either of the warranties in Sections 11.1 or 11.2 during the WARRANTY PERIOD, SELLER shall at its own cost for all parts and labor and without undue delay repair, replace, modify and/or reinstall the EQUIPMENT so as to correct said warranty breach. Shipment of all Warranty repair EQUIPMENT hereunder shall be by the most expeditious means commercially available. SELLER shall make such corrections of defective EQUIPMENT upon written notice thereof anytime such defects appear up to two (2) years from the date of PURCHASER's acceptance of the EQUIPMENT supplied hereunder.

11.5 PURCHASER May Repair - PURCHASER shall have the right but not the obligation, to effect repair of any and all defects, if SELLER shall have previously authorized such action or, in PURCHASER's reasonable commercial judgment SELLER is unable or unwilling to effect the repair. In the event that PURCHASER elects to take this action, it shall be entitled to deduct from any amounts owing to SELLER the direct and incidental costs incurred in remedying the breach of warranty. Should PURCHASER make such deduction of costs, PURCHASER will furnish its bills and other documentation as it may have in its possession on request. PURCHASER's action to effect cure of any warranty breach shall not relieve SELLER of any of its obligations hereunder or under the applicable Uniform Commercial Code except

to the extent that PURCHASER's repair effort shall have directly caused further defects in the EQUIPMENT.

11.6 Notice of Defects - PURCHASER shall give SELLER prompt notice of all defects known to it, either orally to SELLER's on-site representative or telephonically to SELLER's customer service representative. In addition, PURCHASER will tender a DEFECTIVE EQUIPMENT REPORT to SELLER confirming notice of such defects. Upon receipt of such oral or telephonic notice, SELLER shall promptly and without undue delay notify PURCHASER of its intentions and preferences to effect repair of the EQUIPMENT.

11.7 Warranty Limitations - The warranties hereunder shall not apply (1) to normal maintenance services or adjustments; or (2) to any goods which have been repaired or altered, other than as provided above, in any way so as to adversely affect their operation or reliability in SELLER's judgment; or (3) to the effects of ordinary corrosion, erosion, or wear and tear of goods, or failure occurring from operation or condition of service more severe than specified in the Agreement.

THESE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION: IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND INCLUDING ALL REPRESENTATIONS TO THE PURCHASER NOT CONTAINED IN THIS AGREEMENT.

11.8 Performance Bond - A Performance Bond or acceptable Letter of Credit shall be furnished by the SELLER and deposited with PURCHASER, at SELLER's expense, in the amount of ten percent (10%) of the CONTRACT PRICE, guaranteeing to the PURCHASER and SELLER's full compliance with the Warranty and other provisions of this Agreement. Such Bond shall remain in force until the WARRANTY PERIOD has expired. Said Bond is to be submitted [thirty (30)] days after execution of this Agreement.

XII. PATENT WARRANTY

12.1 Patent Infringement Warranty - SELLER warrants that none of the EQUIPMENT, the use thereof or any of the applications, processes or designs employed in the manufacture thereof infringes the valid claims of any letter patent, patent application, copyright, trade secret or any other property right of any third party.

12.2 Patent Infringement Remedies - If in any suit or proceeding, said EQUIPMENT or any part thereof is held to constitute an infringement and the full or partial use of the EQUIPMENT is enjoined, SELLER shall, at no cost to PURCHASER, (i) obtain for PURCHASER a license to use the EQUIPMENT or (ii) modify the EQUIPMENT so as to avoid the infringement without any

degradation in performance. If SELLER cannot obtain such a license, or the EQUIPMENT cannot be so modified, or if as a result of any suit of infringement or alleged infringement, SELLER may elect or be prevented from delivering the EQUIPMENT or any part or component thereof, SELLER shall promptly refund to PURCHASER all money paid by PURCHASER for the EQUIPMENT and pay PURCHASER its actual damages resulting directly therefrom in an amount up to [200]% of the CONTRACT PRICE.

12.3 Indemnity - In the event of a breach or alleged breach of any Warranty in this Article XII, SELLER shall, at its own expense, defend any suit or proceeding brought against PURCHASER and shall fully protect, defend and indemnify PURCHASER against any liability, cost, recovery, or other expense in or resulting from such suit or claim of infringement. PURCHASER shall give prompt notice in writing of any notice or claim of such suit and PURCHASER agrees to cooperate with SELLER to enable it to make such defense.

XIII. RISK OF LOSS

SELLER shall bear risk of loss and damage until the EQUIPMENT shall safely come to rest at the F.O.B. POINT. Thereafter, PURCHASER shall bear risk of loss; provided, however, that SELLER shall bear the risk of loss during any return shipment of EQUIPMENT by PURCHASER to SELLER relating to a warranty breach.

XIV. INSURANCE

14.1 Prior to Delivery - If PURCHASER has made any payments to SELLER towards design, manufacture, or purchase of the Equipment or has a security interest in the Equipment pursuant to Article X hereof, then while SELLER has risk of loss, SELLER agrees, at its own expense, to procure and carry suitable fire, sprinkler leakage and extended coverage insurance on material, work-in-process and any furnished items which comprise or will eventually comprise the EQUIPMENT. The amount to be insured shall be the actual replacement value of said material, work-in-process and furnished items. Such insurance shall provide a loss payable clause in favor of PURCHASER as its interest may appear.

14.2 After Delivery - While PURCHASER has risk of loss, PURCHASER agrees to procure and carry as appropriate, in transit, sprinkler leakage, fire and extended coverage on the EQUIPMENT covering the full insurable value of the EQUIPMENT.

14.3 During Installation - Should the execution of SELLER's obligations hereunder require SELLER's employees or agents to work on PURCHASER's premises, SELLER shall secure, at its own

expense, and prior to such activity: (i) Workers' Compensation insurance with limits required of an employer by law, and Employer's Liability insurance with minimum limits of ONE HUNDRED THOUSAND DOLLARS (\$100,000). In the event that Seller fails to maintain such insurance as required by law, Seller acknowledges and agrees that it will not seek or be entitled to any coverage under Owner's insurance. (ii) Commercial General Liability and Commercial Automobile Liability insurance protecting Contractor and Company against liability from damages because of injuries, including death, suffered by persons other than employees of Contractor and liability from damages to property, arising from and growing out of any operation of the Contractor (including the operation of automobiles, trucks or other vehicles owned or rented) in connection with the performance of this Contract. The Commercial General Liability insurance shall cover Contractual Liability assumed by Contractor under this Contract. Commercial General Liability insurance combined single limit shall not be less than TWO MILLION DOLLARS (\$2,000,000). In the event Owner so specifies, if the Work involves asbestos abatement and/or lead abatement, Contractor shall provide proof of insurance coverage as applicable with a combined single limit of ONE MILLION DOLLARS (\$1,000,000) per occurrence. Commercial Automobile Liability insurance shall have a combined single limit of not less than ONE MILLION DOLLARS (\$1,000,000).

General Liability policies shall name Company as additional insured.

Contractor hereby waives and will cause its insurers to waive all rights of subrogation which Contractor or its insurers may have against Company, Company's agents, or Company's employees.

14.4 Certificates - Failure to maintain in full force and effect the insurance required herein shall constitute a breach of this Contract. Contractor shall provide to Company copies of Certificates of Insurance within ten (10) working days of signing of this Contract, on a form satisfactory to Company, completed by Contractor's insurance carrier or agent, certifying that minimum insurance coverages, as required above, are in effect and will not be canceled or changed until thirty (30) days after written notice is given to Company. (Note: For insurance required in 14.1 and 14.2, certificates are required only on written request by the other party.)

XV. TAXES

SELLER shall assume payment of all duties, tariffs, export fees, excise and other taxes assessed by the Country of Origin and taxes imposed by State or local governments in the Country of Origin (if other than U.S.A.).

PURCHASER shall be responsible to SELLER for any sales tax, use tax or any other federal, state or local tax, measured solely by the CONTRACT PRICE and required to be paid by SELLER by virtue of the sale and delivery of the EQUIPMENT.

XVI. ACCEPTANCE/PERFORMANCE TESTING

16.1 Shop Tests - Prior to shipment SELLER shall conduct shop testing pursuant to standards of the trade and the procedures (if any) outlined in the SPECIFICATIONS. The purpose of these tests shall include, but not be limited to, performance evaluation to identify any mechanical interferences between machine members, improper adjustments made during assembly, and generally to determine that the EQUIPMENT is in good working order. PURCHASER shall have the option to observe said preshipment testing. It is understood that all defects in materials and workmanship identified as a result of said testing will be corrected by SELLER prior to shipment of the EQUIPMENT unless specifically directed by PURCHASER to the contrary. Upon completion of all shop tests, SELLER shall submit to PURCHASER a statement certifying that the EQUIPMENT has passed all required shop tests. SELLER shall promptly provide to PURCHASER all factory or shop test data or reports.

16.2 Failure to Inspect and Accept or Reject. Failure to inspect and accept or reject EQUIPMENT shall not relieve the SELLER from responsibility for compliance with order requirements nor impose liability on PURCHASER.

16.3 Acceptance Test - Upon completion of installation and adjustment of the EQUIPMENT as required, PURCHASER shall promptly commence the acceptance testing procedure designated in the SPECIFICATIONS, if any. If no such acceptance testing procedure is provided for, acceptance shall be deemed to have occurred when the ACCEPTANCE CRITERIA is otherwise met.

16.4 Certification of Acceptance - On the ACCEPTANCE DATE, PURCHASER shall certify to SELLER, in writing upon request, of its acceptance of the EQUIPMENT, provided that the EQUIPMENT shall have demonstrated (during the acceptance procedure) its performance to be in accordance with the SPECIFICATIONS. The acceptance of the EQUIPMENT shall in no way release SELLER of any of its obligations hereunder (warranty or otherwise).

16.5 Provisional Acceptance - In the event that the acceptance procedure identifies areas of performance non-conformance which in PURCHASER's sole commercial judgment do not materially impair PURCHASER's use of the EQUIPMENT in the short term, PURCHASER shall have the option to certify its provisional acceptance of the EQUIPMENT. In this case, PURCHASER shall itemize those areas in which the EQUIPMENT has failed to perform acceptably. SELLER shall acknowledge said list and inform PURCHASER, in writing, as to when the non-conformance shall be corrected. SELLER agrees that time is of the essence with regard to such modifications. PURCHASER shall have the right to withhold payment of any funds normally due by virtue of acceptance. The amount of the payment withheld shall be determined by PURCHASER and shall be reasonably commensurate with the reduced value of the EQUIPMENT. Upon completion of the modifications by SELLER, it shall notify PURCHASER of same and the acceptance procedures shall be rerun in their entirety should PURCHASER elect to do so. Should SELLER fail to meet the corrective modification completion date, PURCHASER may, at its option, revoke its provisional acceptance and use any of its remedies as may be provided herein or by the appropriate Uniform Commercial Code.

XVII. SPARE PARTS

If the EQUIPMENT is designed to utilize spare parts, sixty (60) days prior to initial shipment, SELLER shall supply PURCHASER with a recommended Spare Parts List with related data and literature for the EQUIPMENT. SELLER agrees for a period of five (5) years to sell to PURCHASER at prevailing delivery and payment terms, all necessary spare parts required for maintenance of the EQUIPMENT. Spare parts will be at catalog prices. Further, SELLER agrees within the limits of productions capability, to provide emergency spare parts within a twenty-four (24) hour period after receipt of the emergency order. Should SELLER no longer support this EQUIPMENT beyond five (5) years, SELLER agrees to supply PURCHASER or some other manufacturer with all manufacturing drawings so that PURCHASER can maintain the EQUIPMENT.

XVIII. COMPLIANCE WITH LAWS

18.1 The parties agree that they will perform their respective obligations hereunder in accordance with all applicable federal, state and local laws, rules and regulations now and hereafter in effect. If any term or provision of this Agreement shall be found to be illegal or unenforceable then, notwithstanding, this Agreement shall remain in full force and effect and such term or provision shall be deemed stricken.

18.2 Equal Employment Opportunity - (Applicable to all agreements of \$10,000 or more. 41 CFR 60-1.4 and 41 CFR 60-741.5.) SELLER is aware of and is fully informed of its responsibilities under Executive Order 11246 (reference to which include amendments and orders superseding in whole or in part) and shall be bound by and agrees to the provisions as contained in Section 202 of said Executive Order and the Equal Opportunity Clause as set forth in 41 CFR 60-1.4 and 41 CFR 60-741.5(a), which clauses are hereby incorporated by reference.

18.3 Employment of Disabled Veterans and Veterans of the Vietnam Era - (Applicable to all agreements of \$10,000 or more. 41 CFR 60-250.4 and 41 CFR 60-741.5.) SELLER agrees that it is and will remain in compliance with the rules and regulations promulgated under The Vietnam Era Veterans Readjustment Assistance Act of 1974, The Affirmative Action Clause set forth in 41 CFR 60-250.4, the Rehabilitation Act of 1973 and the Equal Opportunity Clause set forth in 41 CFR 60-741.5 which clauses are incorporated by reference herein.

XIX. CANCELLATION AT PURCHASER'S CONVENIENCE

Without limiting any rights or remedies which PURCHASER may have in the event of any default or failure of performance by SELLER, PURCHASER shall have the right, upon ten (10) days prior written notice to SELLER, to cancel this Agreement at any time and without cause prior to complete delivery. Such cancellation shall be without any obligation or liability to SELLER other than payment to SELLER of (1) any and all costs actually incurred by SELLER in performance of this Agreement prior to notice of cancellation hereunder plus (2) a profit factor equal to [5]% of such costs actually incurred by SELLER less (3) the salvage value of any materials acquired prior to cancellation. Any progress payments of the CONTRACT PRICE shall be credited against the amount owed hereunder and in the event the payments exceed such amount owed, the excess shall be returned to PURCHASER.

XX. TERMINATION FOR CAUSE

If SELLER shall fail to comply with the SPECIFICATIONS or drawings referenced therein in any material respect, or if it shall fail substantially to comply with any other provision of this Agreement, then PURCHASER may, without prejudice to any other right or remedy and upon giving ten (10) days prior written notice, terminate this Agreement in whole or in part and/or reject all or part of the EQUIPMENT herein whether or not the manufacture thereof has been completed or such has been received at the DELIVERY DESTINATION. Upon notice of termination by PURCHASER, SELLER shall promptly return all monies previously paid to SELLER by PURCHASER for the EQUIPMENT (if any) and shall pay PURCHASER direct damages equal to: i) all costs incurred by PURCHASER in preparation for the EQUIPMENT including but not limited to engineering, systems programming, site preparation, cost of supplies and facilities excepting only such costs which can be applied to EQUIPMENT obtained from any other supplier and, ii) the difference in price between the EQUIPMENT to be delivered hereunder and the equivalent substitute equipment.

XXI. BANKRUPTCY

If PURCHASER has made any payments to SELLER towards design, manufacture or purchase of the Equipment or has a security interest in the Equipment pursuant to Article X hereof, then if SELLER shall be adjudicated bankrupt, or if it should make a general assignment for the benefit of creditors, or if a receiver shall be appointed due to its insolvency, PURCHASER may without prejudice to any other right or remedy terminate this Agreement and at its option may take possession of the EQUIPMENT and finish the manufacture by whatever method PURCHASER may deem expedient. At PURCHASER's request, SELLER will fix appropriate notices or labels on the EQUIPMENT being manufactured under this Agreement to indicate ownership of PURCHASER. To the extent reasonably possible, materials and work in process pertaining to the EQUIPMENT shall be stored separately from other stock and marked conspicuously with labels indicating ownership by PURCHASER.

XXII. NOTICES

All notices hereunder must be in writing. These notices shall be deemed duly given upon delivery if delivered by hand (against receipt) or three (3) days after posting, if sent registered mail, return receipt requested to:

In the case of notices given by PURCHASER to SELLER:

In case of notices given by SELLER to PURCHASER:

[USE FOR HECO ONLY]

Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001
Attention: Director of Purchasing

[USE FOR HELCO ONLY]

Hawaii Electric Light Company, Inc.
P. O. Box 1027
Hilo, Hawaii 96721-1027
Attention: Director of Purchasing

[USE FOR MECO ONLY]

Maui Electric Company, Limited
P. O. Box 398
Kahului, Hawaii 96733-6898
Attention: Director of Purchasing

With copy to:

Or to whomever else the parties may designate by notice pursuant to this Article XXII.

Non-Legal notices hereunder may be sent by FAX or Telex to the following numbers:

	<u>PURCHASER:</u>	<u>SELLER:</u>
FAX	- (808) _____	
Confirmation	- (808) _____	

XXIII. INDEMNIFICATION

SELLER shall indemnify, defend, and hold harmless PURCHASER, its directors, officers, employees and agents from and against all liabilities, damages, losses, penalties, claims, demands, suits, costs, expenses (including but not limited to reasonable attorneys' fees and costs), based upon or arising out of damage to property, injuries to persons (including death) or other acts caused or contributed to by a defect in the EQUIPMENT or by SELLER or anyone acting under its direction or control or in its behalf in the course of its performance under this Agreement; provided, however, that such aforesaid indemnity and hold harmless obligation shall not be applicable to the extent that such liability is based upon the sole negligence, gross negligence or willful misconduct of PURCHASER, its directors, officers, employees or agents.

XXIV. GENERAL TERMS

24.1 Promotion Limitation - SELLER agrees that it will not use PURCHASER's name whether by including reference to PURCHASER in any list of customers advertising that its services or products are used by PURCHASER or otherwise, without written authorization by PURCHASER's authorized representative.

24.2 Survival Beyond Completion - The terms, provisions, representations and warranties contained in this Agreement shall survive the delivery of the EQUIPMENT and the payment of the CONTRACT PRICE.

24.3 Amendments - No amendment to this Agreement shall be effective unless it is in writing and signed by duly authorized representatives of both parties.

24.4 Complete Agreement - This Agreement (including all referenced Attachments) represents the entire Agreement between the parties with respect to the purchase and sale of the EQUIPMENT. All prior agreements, representations, statements, negotiations and undertakings whether oral or written are superseded hereby. In the event there is a conflict between the provisions of these Terms and Conditions, the Purchase Order or any attachment to either document, these Terms and Conditions shall have precedence.

24.5 Effect of Waiver - No term or provision hereof shall be deemed waived and no breach excused, unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to, or waiver of, a breach by the other, whether express or implied, shall not constitute a consent to, waiver of, or excuse of any other different or subsequent breach. PURCHASER's failure to insist on

performance of any term or condition or to exercise any right or privilege, shall not waive any such term, condition, right or privilege.

24.6 Authority - Each party represents that it has full power and authority to enter into and perform this Agreement, and the person signing this Agreement on behalf of each has been properly authorized and empowered to enter into this Agreement, understands it, and agrees to be bound by it.

24.7 Applicable Law/Forum - This Agreement is made under and shall be governed by and construed in accordance with the laws of the State of Hawaii. Each party agrees and consents that any dispute arising out of this Master Agreement, however defined, shall be brought in the State of Hawaii in a court of competent jurisdiction, provided, however, that Company, at its option, may elect to submit any such dispute to binding arbitration pursuant to the arbitration rules of the American Arbitration Association then in effect.

24.8 Force Majeure - Neither party shall be liable for a delay in the performance of its obligations and responsibilities under this Agreement due to causes beyond its control, such as, but not limited to, war, terrorist acts, strikes or lockouts, embargo, national emergency, insurrection or riot, acts of the public enemy, fire, flood, or other natural disaster, provided that said party has taken reasonable measures to notify the other in writing of the delay. Failure of subcontractors and inability to obtain materials shall not be considered as a Force Majeure delay. Non-performance by one party hereunder due to Force Majeure shall excuse performance by the other party until such time as the party relying on Force Majeure is again meeting its obligations under this Agreement.

24.9 Assignment - SELLER shall not assign this Agreement or its obligations hereunder to any third party without prior written consent from PURCHASER. PURCHASER shall not assign this Agreement or its obligations hereunder to any third party except its First Mortgage Bond Trustee and its subsidiaries without prior written consent from SELLER. Neither consent will be unreasonably withheld.

24.10 Regulatory Approval - This Agreement is subject to any and all required regulatory conditions and approvals, including those of the Public Utilities Commission.

24.11 Ownership of Materials. Except as otherwise provided, any and all drawings, specifications, technical information and business information of any type whatsoever, whether or not characterized as secret or confidential obtained under this Agreement or related to the Work, whether received or disclosed

by written or oral communication or otherwise, including all documents, materials and information prepared or developed by SELLER in the performance of this Agreement (except as provided below), are PURCHASER's exclusive property and shall be deemed PURCHASER's confidential information and SELLER shall receive and maintain the same in the strictest confidence. SELLER shall not use such materials or information for any purpose other than for purposes of quotation or performance under this Agreement, and shall not otherwise disclose such materials or information to others except with the PURCHASER's consent given in writing. SELLER shall return all copies of all materials relating to the Work to PURCHASER upon completion of the Work.

24.12 Term of Confidentiality. This requirement under Section XXIV shall remain in effect for as long as such material, information or Discoveries have not become generally known in the industry without the PURCHASER's fault or negligence. This requirement shall survive the expiration or termination of any other agreement between the PURCHASER and the SELLER whether now or hereafter executed.

24.13 Disputes, Controversies or Claims. SELLER agrees that PURCHASER shall have the sole and exclusive right to decide whether disputes, controversies, or claims arising out of or relating to this Agreement shall be settled in accordance with the rules of the American Arbitration Association or through litigation in a court of competent jurisdiction. Should PURCHASER agree to arbitrate the claim or controversy, the award may be entered in any court having jurisdiction thereof or in the forum of PURCHASER's choosing. Pending any decision, appeal or judgment in such proceedings or settlement of any dispute arising under this Agreement, SELLER shall proceed diligently with the performance of this Agreement in accordance with PURCHASER's decision.

Any claim against PURCHASER by SELLER must be commenced within one (1) year after the cause of action or claim accrues. All rights of SELLER to commence any court action or proceedings with respect to this Agreement shall expire and terminate one (1) year after the cause of action accrues.

24.14 Attorneys' Fees and Costs - If SELLER's actions arising out of or relating to this Agreement cause PURCHASER to retain counsel to assist it in resolving the matter in dispute or if PURCHASER is forced to pursue legal action against SELLER to enforce the terms and conditions of this Agreement, then PURCHASER shall be entitled to its attorneys fees and costs incurred therein.

24.15 Survival of Indemnity Obligations - All indemnity obligations under this Agreement shall survive termination of this Agreement.

XXV. COUNTERPARTS CLAUSE

The parties agree that this Agreement may be executed in counterparts, each of which shall be deemed an original, and all of which shall together constitute one and the same instrument binding all parties notwithstanding that all of the parties are not signatories to the same counterparts. For all purposes, duplicate unexecuted and unacknowledged pages of the counterparts may be discarded and the remaining pages assembled as one document.

IN WITNESS WHEREOF, SELLER and PURCHASER by their respective duly authorized representatives hereby accept and agree to be bound by these Terms and Conditions and the PURCHASE ORDER and SPECIFICATIONS to which they relate.

[USE FOR HECO ONLY]

HAWAIIAN ELECTRIC COMPANY, INC.
("PURCHASER")

By _____
Its

By _____
Its

[USE FOR HELCO ONLY]

HAWAII ELECTRIC LIGHT COMPANY, INC.
("PURCHASER")

By _____
Its

By _____
Its

[USE FOR MECO ONLY]

MAUI ELECTRIC COMPANY, LIMITED
("PURCHASER")

By _____
Its

By _____
Its

("SELLER")

By _____
(print name: _____)
Its

By _____
(print name: _____)
Its

COM-HECO-RIR-5

HECO RT-1, page 40, , lines 5-14: The witness states:

The first CHP agreement was executed on September 8, 2004 between HECO and Pacific Allied Products, a major plastics and Styrofoam manufacturer located in Campbell Industrial Park. The contract is for HECO to install, own, operate, and maintain a CHP system on the Pacific Allied site consisting of two 250 kW diesel generators and a 100 ton absorption chiller.

The other CHP agreement was executed October 6, 2004, between HELCO and the owners of the Sheraton Keauhou Resort, a newly renovated hotel in Keauhou on the Big Island. The contract is for HELCO to install, own, operate, and maintain a CHP system on the hotel site consisting of two 370 kW diesel generators and a 95 ton absorption chiller.

Provide workpapers showing the estimated acquisition cost, maintenance cost, fuel cost, system efficiency, system reliability, and other economic elements of the CHP systems proposed for Pacific Allied Products and the Sheraton Keauhou.

HECO Response:

The Companies object to the production of the requested customer-specific and project cost information on the grounds that 1) such information is confidential and proprietary (i.e., the public disclosure of the thermal charge and detailed project cost information could disadvantage the Companies relative to competitors on future CHP project proposals, (2) customer-specific information is confidential and has been protected from disclosure by the Commission in other proceedings, and (3) the disclosure of such customer-specific information has not been consented to by the customers. The Companies are willing to make the customer-specific and project cost information available to the Commission and the Consumer Advocate pursuant to a protective order.

COM-HECO-RIR-6

HECO RT-1, page 50, lines 7-8: The witness states:

The equity of levying differential charges based on a customer's vintage must also be taken into consideration.

What is the basis for the Company's conclusion that new customers with expanding service requirements would be treated differently from existing customers with expanding service requirements under the County of Maui proposal? Provide citations to the testimony where the type of vintaging alleged is proposed.

HECO Response:

See COM T-2, page 33, lines 8-9, COM T-2, page 56, lines 10-13, and COM T-2, page 57, lines 1-5.

COM-HECO-RIR-7

HECO RT-1, page 52, lines 13-14: The witness states:

Doesn't the addition of substantial new generation tend to put upward pressure on rates?

Provide any analysis done by or for the Company showing the effect of the new generating facilities on MECO rates, as identified on Page 16 of Exhibit H to the CHP docket.

HECO Response:

MECO's IRP-2 Report, Section 8.4.3, Rate Impact Analysis, and Appendix N, provided detailed comparisons of the rate impacts between MECO's IRP-2 finalist resource plans. This IRP-2 analysis, however, was done prior to the development of MECO's CHP Program and therefore did not include the CHP systems included in the CHP Program economic analysis, Exhibit H, Docket No. 03-0366. MECO's IRP-3 cycle is currently underway, and a Rate Impact Analysis, including MECO's CHP Program, will be conducted and included in the IRP-3 report scheduled to be filed in October 2006.

COM-HECO-RIR-8

HECO RT-1, page 54, lines 12-14: The witness states:

However, existing customers, most of whom did not make large renovations, accounted for nearly half of the load growth on the island of Maui in 2003.

Provide the workpapers associated with the statement that existing customers are causing nearly half of the increased load on Maui. Segregate this load increase into newly constructed facilities, construction additions at existing facilities, modifications requiring electrical service changes at existing facilities, and load growth among existing customers not requiring electrical permits of any kind.

HECO Response:

Pursuant to Prehearing Order No. 20922 issued April 23, 2004, a party shall not be required to make computations, compute ratios, reclassify, trend, calculate, or otherwise rework data contained in its files or records. MECO's customer information system identifies new services by the date that service was first established at a location. MECO does not segregate and classify the information into the categories requested.

The statement above is based on sources of load growth in 2003. The components of load growth in 2003 are:

- New services established in 2003
- Carryover from new services established in 2002
- Growth from services established prior to 2002 (i.e. existing customers)

The workpaper attached as page 2 of this response shows that load growth from existing customers was equal to 44% of the total load growth in 2003.

Maui Electric Company, Ltd., Maui Division
Load Growth Components in 2003**Maui Accounts in 2002**

Commercial	kWH
new in 2002	3,683,248
pre-2002	713,384,972
Total Comm	717,068,220

Residential	kWH
new in 2002	2,202,090
pre-2002	376,387,032
Total Res	378,589,122

2002 Total	kWH
new in 2002	5,885,338
pre-2002	1,089,772,004
Total	1,095,657,342

Maui Accounts in 2003

Commercial	kWH
new in 2002	11,991,376
new in 2003	7,457,457
pre-2002	720,505,588
Total Comm	739,954,421

Residential	kWH
new in 2002	7,720,029
new in 2003	2,621,664
pre-2002	388,147,127
Total Res	398,488,820

2003 Total	kWH
new in 2002	19,711,405
new in 2003	10,079,121
pre-2002	1,108,652,715
Total 2003	1,138,443,241

2002 Total	kWH
new in 2002	5,885,338
new in 2003	
pre-2002	1,089,772,004
Total 2002	1,095,657,342

Sources of Incr 2002 to 2003

new in 2002	13,826,067
new in 2003	10,079,121
pre-2002	18,880,711
Total	42,785,899

Percent

new in 2002	32.3%
new in 2003	23.6%
pre-2002	44.1%
	100.0%

COM-HECO-RIR-9

HECO RT-1, page 54, lines 16-18: The witness states:

New customers are only responsible for slightly more than half of the load increase, but would pay the entire marginal cost of new facilities under the COM's proposal.

Does the Company understand that the proposal of the County would require new customers and expanding service to existing customers to pay only for the pro-rata share of new facilities that their demand requires to the extent it is not already recovered in rates, not for the entire cost of new capacity nor for the entire capacity of new generating facilities beyond that needed to serve their growing needs?

HECO Response:

The Company's rebuttal testimony responds to the COM proposal on impact fee as stated in COM-T-2, page 17, lines 14-21; pages 56-57; and pages 60-67.

COM-HECO-RIR-10

HECO RT-1, page 56, lines 18-19: The witness states:

The justification for the Lanai discount was fully documented in Docket No. 03-0261.

Provide a calculation of the “full-cost” of service for Castle & Cooke based on the last cost of service study prepared on the Lanai system, compared with the revenue being received under the current contract. Include all workpapers, including electronic copies of the spreadsheets with all formulae intact.

HECO Response:

In accordance with Prehearing Order No. 20922 issued April 23, 2004, a party shall not be required to make computations, compute ratio, reclassify, trend, calculate or otherwise rework data contained in its files or records. The Company has not prepared such calculation.

COM-HECO-RIR-11

HECO RT-3, page 2, line 14: The witness states:

Demand for electricity on Oahu (as well as on Maui and Hawaii) continues to increase...These events clearly illustrate HECO's increasing need for additional capacity.

Provide the actual output of each generating plant owned by or contracted to HECO on October 12 and 13, 2004 at the time of the system peak for each day. Indicate the rate "firm" capacity of each generating unit. If any resources listed as "firm" in HECO's capacity planning were not available, indicate the reason. If any resources treated as "as-available" were providing power, provide the hourly generation for those resources for the entire 48 hour period of October 12 and 13.

HECO Response:

The tables on pages 2 and 3 of this response provide the hourly unit loadings (in gross MWs) for the days October 12 and October 13, 2004. On these dates, the following generating units were unavailable:

<u>Unit</u>	<u>Reason for unavailability</u>
Waiau 3	Generator electric problem (unavailable from 2103 hours 10/12/04 to 1204 hours 10/13/04)
Waiau 8	Scheduled maintenance
Waiau 9	Turbine problem
Kalaeloa	Superheater tube leak on CT-2 (unavailable from 2103 hours 10/12/04 to 1705 hours 10/13/04)
H-POWER	Scheduled maintenance to boiler #2

-hourly Unit Loadings (Gross MWs) for October 12, 2004

	Honolulu		Waiau				Kalaheba				Kalaheba				AES		HFLOWER		Tesoro		
	8	9	3	4	5	6	7	8	9	10	1	2	3	4	5	6	Firm	Firm	Firm	Firm	
Capacity	56.3	57.0	49.0	49.0	57.0	58.0	92.0	92.0	52.0	50.0	92.0	90.0	92.0	93.0	142.0	142.0	180.0	180.0	180.0	46.0	
Gross	52.3	51.4	46.2	46.2	54.6	55.6	88.1	88.1	51.9	49.9	88.2	86.3	88.2	89.2	134.7	133.9	180.0	180.0	180.0	46.0	
Net																					
Firm/As-avail	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	As-avail
1:00	0	0	0	0	0	0	26	0	0	0	47.8	50.7	63.4	67.6	90.8	60.4	180.7	180.7	180.7	20.3	0.3
2:00	0	0	0	0	0	0	26.8	0	0	0	30.1	41.1	57.9	50.7	90.8	60.6	180.3	180.3	180.3	20.3	0.3
3:00	0	0	0	0	0	0	26.8	0	0	0	36.3	39.9	51.6	45.4	90.7	60.5	179.6	179.6	179.6	21.0	0.7
4:00	0	0	0	0	0	0	27	0	0	0	35.3	38.2	52.7	47.6	91.6	61.5	180.3	180.3	180.3	20.1	0.6
5:00	0	0	0	0	0	0	10.1	0	0	0	39.4	46.7	60.5	62.1	91.3	61.0	180.5	180.5	180.5	20.9	0.5
6:00	0	0	0	14.9	0	0	26.5	0	0	0	58.3	57.3	65.9	71.9	91.3	87.7	196.2	196.2	196.2	20.3	0.7
7:00	0	25.7	0	24.5	9.2	26.8	62.4	0	0	0	75.2	66.2	70.8	75.6	92.8	98.3	195.7	195.7	195.7	20.6	1.1
8:00	0	25.4	0	24.7	25.6	32.2	78.3	0	0	0	83.4	79.3	77.6	86.7	91.7	96.8	196.6	196.6	196.6	18.8	0.6
9:00	19.3	26.7	11.4	25.1	25.3	38.8	85.1	0	0	0	88.8	75.8	77.5	87.0	110.3	117.8	196.2	196.2	196.2	20.0	0.8
10:00	25.6	25.9	29.7	24.7	25.5	29.6	79.1	0	3	14.9	83.1	81.2	77.3	86.8	115.3	124.8	196.2	196.2	196.2	18.4	0.6
11:00	25.7	26.3	42.4	25.2	25.6	29.6	70.4	0	0	14.4	83.0	74.4	77.3	86.5	131.7	138.4	197.0	197.0	197.0	17.3	1.3
12:00	25.8	26.1	42.7	24.6	25.7	32.5	79.1	0	0	15.6	82.7	80.6	77.3	86.6	134.5	137.7	195.9	195.9	195.9	19.5	0.6
13:00	25.9	25.0	43	24.7	34.0	35.5	80.7	0	0	15	83.1	81.4	77.3	87.1	133.4	136.0	195.0	195.0	195.0	10.0	0.3
14:00	25.9	25.9	43.1	24.9	34.7	32.4	84.1	0	0	14.9	83.1	79.7	77.2	86.1	133.5	137.4	195.1	195.1	195.1	20.7	0.8
15:00	31.3	31.1	43.7	25	34.8	31.7	70	0	0	18.5	83.0	77.5	77.3	87.0	140.0	136.9	196.0	196.0	196.0	19.1	0.7
16:00	38.3	34.4	43.4	27.3	35.8	46.2	36.8	0	0	20.8	83.4	82.1	76.1	85.0	133.3	137.1	195.9	195.9	195.9	19.7	0.8
17:00	30.4	31.6	43.1	25	35.6	38.8	52	0	0	19.7	83.5	72.1	75.9	85.4	133.4	137.0	196.5	196.5	196.5	19.0	0.6
18:00	26.3	26	43.4	25.4	25.9	32.3	78.3	0	0	15	82.8	79.6	76.0	87.7	134.0	137.8	195.1	195.1	195.1	18.8	1.1
19:00	26.9	34.1	43.3	24.8	41.9	46.6	82.6	0	0	25.2	84.2	82.8	75.9	87.0	132.7	137.2	195.6	195.6	195.6	21.1	0.3
20:00	26.6	26.5	43.6	24.5	25.1	32.6	78.9	0	0	15.2	83.6	80.6	76.1	86.2	133.9	137.9	195.8	195.8	195.8	20.0	0.6
21:00	26.8	27.4	33.7	24.9	25.5	37.7	85.1	0	0	15	83.4	82.1	75.9	86.8	134.6	138.6	115.5	115.5	115.5	18.1	1
22:00	26.3	26.4	33.6	11.3	23.7	27.4	65.7	0	0	0	78.9	83.4	72.9	83.4	133.8	137.6	94.1	94.1	94.1	18.7	0.4
23:00	0	25.9	0	0	25.4	24.4	54.7	0	0	0	61.9	58.0	68.0	72.2	133.4	137.0	94.8	94.8	94.8	20.8	0.5
24:00	0	0	0	0	25	0	48.8	0	0	0	53.6	55.2	66.1	66.9	132.9	101.0	95.2	95.2	95.2	19.1	0.3
At Oct 12 Peak	35.5	33.5	43.4	31.8	39.3	44.6	82.1	0	0	25	84.1	83.1	76	85.5	132.5	136.6	195.8	195.8	195.8	18.4	0.3

Scheduled Maintenance
Forced Outage

Hourly Unit Loadings (Gross MWs) for October 13, 2004

Capacity Gross Net Firm-as-avail	Honolulu		Waiau				E		Kahe		6		Kalaheba	AES	HPOWER	Tesoro			
	8	9	3	4	5	6	7	8	9	10	1	2	3	4	5	6	Firm	As-avail	
1:00	56.3	57.0	49.0	49.0	57.0	58.0	92.0	92.0	50.0	92.0	54.4	65.3	93.0	142.0	142.0	142.0	180.0	46.0	0
2:00	52.3	54.4	46.2	46.2	54.6	55.6	88.1	88.1	49.9	88.2	51.0	51.8	89.2	134.7	133.9	133.9	180.0	46.0	0
3:00	0	0	0	0	24.8	0	33.7	0	0	0	51.0	54.4	92.0	93.0	93.0	94.8	180.3	21.1	0
4:00	0	0	0	0	24.3	0	34.9	0	0	0	51.8	53.8	89.2	89.2	89.2	95.7	180.5	20.3	0
5:00	0	0	0	0	24.3	0	34.6	0	0	0	37.3	46.1	89.2	89.2	89.2	95.2	180.4	20.8	0
6:00	0	0	0	0	24.4	5.5	36.2	0	0	0	38.7	46.2	89.2	89.2	89.2	95.0	180.0	20.3	0
7:00	0	0	0	24.3	24.8	25.5	35.8	0	0	0	50.7	52.7	89.2	89.2	89.2	95.1	180.2	21.2	0
8:00	20.3	25.6	0	25	25.8	27.7	65.8	0	0	0	80.7	70.5	84.4	84.4	84.4	95.0	179.6	19.3	1.3
9:00	32.8	32.7	0	25.6	26	31.2	75.9	0	0	0	83.2	77.3	87.2	87.2	87.2	96.4	179.9	19.9	1.2
10:00	48.4	39.5	0	26.3	34.3	52.9	82.9	0	0	15.2	84.8	82.7	77.3	87.7	110.8	136.7	180.1	18.8	1.5
11:00	50.3	50.3	0	37.1	37	54.8	52	0	0	15	84.8	82.4	77.3	88.0	119.7	136.0	180.1	19.5	1.1
12:00	53.9	51.8	0	42.1	41.7	51.5	40.5	0	0	15.5	84.6	82.6	77.3	89.5	139.5	141.0	180.2	20.0	0.6
13:00	42.4	42.4	20.2	20.5	25.6	52.1	60.3	0	0	34.8	84.7	83.9	77.2	86.2	140.2	140.6	179.9	19.1	0.8
14:00	5.6	32.1	42	24.8	39.8	45.4	73.5	0	0	20	84.6	83.6	77.2	86.2	140.2	140.6	179.9	19.0	0.5
15:00	44.7	40.7	40.4	25.4	39.5	51.1	77.7	0	0	15.3	84.6	83.8	77.2	87.3	140.0	140.5	180.3	18.5	0.8
16:00	48.2	40.5	41.5	33.3	39.7	53.4	52.9	0	0	15.7	84.5	83.6	76.9	87.0	139.9	140.0	180.6	20.3	0.6
17:00	31.7	45.8	41.1	40.1	39.8	48.9	34.3	0	0	16	84.6	83.7	76.1	86.5	139.4	140.4	180.6	19.8	1.1
18:00	25.3	26.1	36.9	24.6	25.7	25.6	79.7	0	0	25.2	84.5	83.4	76.0	87.4	138.2	138.3	179.9	19.7	0.9
19:00	26	27.8	32.6	26.8	25.6	38.8	79	0	0	16.2	83.6	82.1	76.1	81.8	137.8	139.2	180.3	21.6	1.3
20:00	26	25.7	32.4	24.5	24.9	28	57.2	0	0	15.3	74.5	67.4	76.0	81.8	137.1	138.4	180.3	21.6	1.3
21:00	26	25.6	0	24.5	25.3	26.4	36.7	0	0	16.2	83.6	82.1	74.9	85.0	135.9	137.7	180.1	21.5	0.6
22:00	26.2	0	0	0	25.7	25.0	39.4	0	0	0	76.8	69.3	75.0	85.0	136.8	138.3	179.8	22.8	0.7
23:00	0	0	0	0	25.5	0	28	0	0	0	58.7	59.5	70.2	80.6	135.5	132.8	180.0	22.2	1.3
24:00	0	0	0	0	25.5	0	21.8	0	0	0	55.3	57.2	66.3	70.7	132.8	100.3	180.0	22.1	0.8
At Oct 13 Peak	26	28	33.1	26.8	25.6	38.8	79.2	0	0	15.9	83.4	82	76.1	86.3	137.3	138.8	179.8	21.9	0.8

Scheduled Maintenance, - 23 MW

Forced Outage, - 90 MW

Forced Outage

Scheduled Maintenance

Forced Outage

COM-HECO-RIR-12

HECO RT-3, page 9, line 13, the witness states, “(y)es, a survey of customers was conducted.” Provide a copy of the survey to parties in this proceeding that were not parties to the cited proceeding.

HECO Response:

A copy of the Commercial and Industrial Stand-By Generation and Interruptible Load, A Site Survey of Large Customers, dated July 8, 2003, that was filed as Exhibit D in HECO’s Commercial and Industrial Direct Load Control Program application, Docket No. 03-0415, is attached.

**COMMERCIAL AND INDUSTRIAL
STAND-BY GENERATION AND
INTERRUPTIBLE LOAD**

A Site Survey of Large Customers

Prepared by:

Market Research and Evaluation Division
Energy Services Department
Hawaiian Electric Company, Inc.

July 8, 2003

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EXECUTIVE SUMMARY

The purpose of this study was to research the markets for two proposed load management measures on O'ahu, Stand-By Generation and Interruptible Loads. The Stand-By Generation measure would utilize customer-owned stand-by generators to provide system support during periods of high demand. The Interruptible Load measure would utilize customer-owned interruptible load to provide system support during periods of high demand. This study sought to determine the *technical potential* (i.e., the kW available from a physically-possible perspective) for the Stand-By Generation measure and the corresponding technical potential for the Interruptible Load measure. In addition, some initial attempts were made to assess qualitatively the *market potentials* (i.e., the kW available from a customer-choice perspective) for the two measures. An on-site survey of 104 large customers *excluding government accounts* was conducted during April 1-11, 2002. A separate survey of government customers was conducted during April 2-19, 2002.

The combined results of the two surveys indicate that an estimated 114.5 MW of stand-by generator capacity are available as potential resources to HECO. The largest potential stand-by generator contributors would be Office Buildings (28.6 MW), Military Facilities (19.7 MW), Hotels (14.7 MW) and Other Commercial Accounts (14.5 MW). Of the 114.5 MW, about 40-50% would be available during the priority peak hours of 5 PM to 9 PM, and about 60-70% would be available during the daytime peak hours of 11 AM to 2 PM.

Table 1: Technical Potential – Stand-By Generation

Building Type	Data Sources	Estimated Population	Estimated MW	% of Total
Office	20	109	28.6	25.0%
Military	8	8	19.7	17.3%
Hotel	22	60	14.7	12.8%
Other Commercial	¹	223	14.5	12.6%
Housing	23	99	9.7	8.4%
Health	11	26	8.8	7.7%
State/Local Gov	15	15	7.2	6.3%
Manufacturing	7	27	4.7	4.1%
Retail Non-Food	21	64	3.9	3.5%
Federal	5	5	2.7	2.3%
Total	132	636	114.5	100.0%

For facility managers, the level of the incentive is the key to participation in the stand-by generator program. An incentive of \$50 per kW would offer large customers about \$19,000 per year on average to switch some load to stand-by generation. At that level, 31% of the facility managers were interested in participating. Among those who were not interested at \$50 per kW, raising the incentive to \$75 per kW would offer them about \$24,000 per year on average for participating. At that level, 26% of the remaining 69% of facility managers were interested in participating, bringing the total potential participation rate at \$75 per kW to 57%.

¹ The estimate for "Other Commercial" accounts is based on information from the 104 facilities surveyed in the Office, Hotel, Housing, Health, Manufacturing and Retail Non-Food sectors. To avoid counting them twice in the total, these 104 are not listed as data sources for "Other Commercial." They include agricultural and other pumping, air transportation facility, amusement, cold storage, communications, education, food processing, grocery, restaurant, services and wholesale non-governmental accounts.

Exhibit D
Page 6 of 31

Noise, odor and the length of time HECO would want the generators to run are important considerations. About 25% of the facility managers felt that noise and odor would be significant disadvantages to participating in a stand-by generation program. For about half of the facility managers, legal liability, the critical nature of their loads, the amount of notice, duration, frequency and time of day that HECO would request them to switch to stand-by generation, the level of incentive, and the penalty for failure to start stand-by generation were important considerations for participation in either program. Most participants would want at least one hour's notice to switch to stand-by generators. The reliability of the generators was the only other potential disadvantage cited by more than 10% of the facility managers.

The results of the surveys indicate that an estimated 53.7 MW of interruptible load are available on O'ahu. Given one hour's notice, facility managers could make available about 31 MW; given four hours' notice, about 45 MW would be available.

Although no specific incentive levels were mentioned in discussions with the facility managers, they indicated that the level of the incentive is the key to participation. The amount of advance notice, the frequency and the duration of the interruption are also important considerations.

Anecdotal evidence suggests that while government facilities, especially military facilities, tend to have significant numbers of stand-by generators, they also tend to have less leeway to interrupt load than commercial and industrial facilities.

Table 2: Technical Potential – Interruptible Load

Building Type	Data Sources	Estimated Population	Estimated MW	% of Total
Other Commercial	- ²	223	13.9	25.9%
Manufacturing	7	27	10.7	19.9%
Office	20	109	6.6	12.2%
State/Local Gov	15	15	5.4	10.0%
Retail Non-Food	21	64	4.9	9.2%
Hotel	22	60	4.6	8.7%
Housing	23	99	4.5	8.3%
Federal	5	5	1.9	3.6%
Health	11	26	1.2	2.2%
Military	8	8	0.0	0.0%
Total	132	636	53.7	100.0%

² The estimate for "Other Commercial" is based on information from 103 facilities surveyed in the Office, Hotel, Housing, Health, Manufacturing and Retail Non-Food sectors. A military hotel was excluded because of its unique situation. See also the footnote to Table 1.

BACKGROUND AND OBJECTIVES

This study was designed to obtain estimates of the availability of stand-by generators and interruptible load from HECO's large commercial and industrial customers. In addition, an attempt was made to obtain similar estimates for County, State, and Federal (including military) government customers.

The specific aims of the study were:

- To estimate the total amount of stand-by generation available on the HECO system;
- To estimate the total amount of interruptible load available on the HECO system;
- To investigate the relative attractiveness of the stand-by generator program at two levels of incentive: \$50 per kW, and \$75 per kW; and,
- To determine barriers to participation.

Many of HECO's customers install stand-by generators as a precaution against interruptions in service or to reduce their peak demand and therefore their capacity payment. Organized and utilized collectively, these stand-by generators can provide cost-effective system-level relief at times of high demand or system distress.

Customer facilities span a wide range of business types, operating hours, and activities. This diversity allows HECO to look at the possibilities of interrupting service to lower priority loads at times of high demand or system distress.

By offering a suitable incentive, HECO's program seeks to utilize these stand-by generators and interruptible loads as a utility resource program that can be treated as a resource on par with a central power plant. This program would establish formal contracts with participating commercial customers to reduce their loads when called upon by the System Operations Department.

To assess the technical potential for these measures, HECO commissioned ASW Engineering to assist with the development of a survey and to field that survey.

NARRATIVE OF FINDINGS

This section summarizes the analysis of the technical potential and barriers to adoption for stand-by generation and interruptible rates. Part A describes the Stand-By Generator portion of the survey and related findings. Part B describes the Interruptible Load component of the survey and related findings.

PART A: STAND-BY GENERATION

I. TECHNICAL POTENTIAL

Based on both the site surveys of health facilities, hotels, housing, manufacturers, office buildings and retail stores, and the information from specific governmental accounts on O'ahu, it is estimated that there are 114.5 megawatts (MW) of load that could be transferred to stand-by generation.

Table 3: Estimate of Available Generator Capacity

	Avg. kW	Data Sources	Est. Pop.	Est. MW
Office Buildings	263	20	109	28.6
Military	2,467	8	8	19.7
Hotels	238	22	60	14.7
Other Commercial	65	- ³	223	14.5
Housing	94	23	99	9.7
Health Facilities	334	11	26	8.8
State/Local Gov	478	15	15	7.2
Manufacturing	174	7	27	4.7
Retail - Non-Food	58	21	64	3.9
Federal	535	5	5	2.7
Total		132	636	114.5

The largest potential market is among office buildings, followed by military bases and hotels. Those three sectors contain about 63 MW of load connected to stand-by generation.

³ The estimate for "Other Commercial" accounts is based on information from the 104 facilities surveyed in the Office, Hotel, Housing, Health, Manufacturing, and Retail Non-Food sectors. To avoid counting them twice in the total, the 104 facilities are not listed as data sources for "Other Commercial". The "Other Commercial" category includes agricultural and other pumping, air transportation facility, amusement, cold storage, communications, education, food processing, grocery, restaurant, services, and wholesale non-governmental accounts. See the Appendix for more information on how the estimate for this segment was developed.

Facilities managers were asked how much of their loads they could transfer to stand-by generation during the hours of HECO's evening peaks, 5 PM to 9 PM, and during the hours of HECO's daytime peaks, 11 AM to 2 PM.

Table 4: Stand-By Generation Availability by Time of Day

Group	Pop. N	<u>Least MW Could Reduce</u>		<u>Most MW Could Reduce</u>	
		5 PM - 9 PM	11 AM - 2 PM	5 PM - 9 PM	11 AM - 2 PM
Health Facilities	26	1.3	1.1	1.4	1.2
Hotels	60	10.7	11.9	10.9	12.0
Housing	99	3.1	10.0	3.8	10.6
Manufacturing	27	4.5	5.4	4.5	5.4
Office Buildings	109	18.7	23.0	19.4	24.7
Retail - Non-Food	64	0.4	0.9	1.0	1.5
Other Commercial	223	7.7	10.1	8.2	10.7
Federal	5	0.3	0.3	0.3	0.3
State/Local Gov	15	1.1	0.0	0.5	0.0
Military	8	0.4	0.3	10.2	10.2
TOTAL	636	48.2	63.0	60.2	76.6
Percent of Available MW (114.5)		42%	55%	53%	67%

Notes: The availability by time of day for "Other Commercial" accounts was estimated from the average availabilities, in percent, from the site surveys. See the Appendix for additional information on how these values were developed. For "State/Local Gov" the most load that could be switched to stand-by generation from 5pm to 9pm (0.5 MW) is smaller than the least that could be switched (1.1 MW) because two facility managers were not able to estimate the most load.

Purely from an operational standpoint, about 42% of the loads connected to stand-by generation – about 48 MW – would be available during the evening peak hours. During the daytime peak hours, availability would increase to about 55% – about 63 MW.

II. INCENTIVES AND BARRIERS TO PARTICIPATION

To obtain a preliminary assessment of the amount of load connected to stand-by generation that could actually be contracted for, facilities managers with one or more generators were asked how interested they were in shifting load to stand-by generation in return for \$50 per kW per year. They responded using a five-point scale anchored at “Not at all interested” (1) and “Very interested” (5).

If a facility manager was neutral or not interested (3 or lower on the scale) in participating at \$50 per kW per year, he or she was asked his or her interest at \$75 per kW per year. To help the facility manager assess interest, the survey interviewer calculated the approximate incentive for participation, given the site’s available load.

Table 5: Interest in Participating in Stand-By Generation Program, by Incentive

Group	n	At \$50/kW/Year		At \$75/kW/Year*		Total
		Percent Interested	Average Incentive	Additional Pct. Interested	Average Incentive	Percent Interested
Health Facilities	12	17%	\$ 21,900	42%	\$ 22,500	59%
Hotels	21	24%	\$ 23,200	19%	\$ 27,200	43%
Housing	19	26%	\$ 10,900	32%	\$ 16,900	58%
Manufacturing	4	50%	\$ 34,500	0%	na	50%
Office Buildings	14	50%	\$ 25,100	29%	\$ 42,800	79%
Retail - Non-Food	11	36%	\$ 11,500	18%	\$ 13,500	54%
Average		31%	\$ 19,300	26%	\$ 23,700	57%

* Asked only if not interested at \$50 per kW per year.

At \$50 per kW per year, almost a third (31%) of the facility managers who responded were interested. Facility managers for Manufacturing (50%) and Office

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Buildings (50%) were the most interested at \$50 per kW per year. Facility managers for Health Facilities (17%) were least interested at \$50 per kW per year.

When the rate per kW was increased to \$75, the average incentive rose from about \$19,000 to about \$24,000. At \$75 per kW another one fourth (26%) of the facility managers were interested, so the total potential participation rate at \$75 per kW is about 57%. Facility managers for Office Buildings (79%) were the most interested at \$75 per kW per year; facility managers for Hotels (43%) were the least interested.

Disadvantages of Stand-by Generation

The facility managers were asked to rate the significance of nine features of stand-by generation. The scale ranged from “not at all a problem” (1) to a “very significant problem” (5). Noise and odor were the primary problems (Table 6, below).

Table 6: Disadvantages of Stand-By Generation

	Very Significant		Not at All			Average Score
	5	4	3	2	1	
Noise	16.7%	9.0%	14.1%	9.0%	51.3%	2.3
Odor	11.4%	11.4%	10.1%	17.7%	49.4%	2.2
Reliability	3.8%	12.8%	5.1%	21.8%	56.4%	1.9
Maintenance	1.3%	3.9%	19.5%	18.2%	57.1%	1.8
Space requirements	5.1%	2.6%	6.4%	15.4%	70.5%	1.6
Cost of running	0.0%	2.6%	10.4%	29.9%	57.1%	1.6
Testing	0.0%	5.2%	9.1%	23.4%	62.3%	1.6
Providing fuel	1.3%	1.3%	10.3%	20.5%	66.7%	1.5
Health permits	2.7%	0.0%	4.1%	12.2%	81.1%	1.3

Salient Elements in Deciding to Participate

The facility managers were also asked to rate the importance of nine elements salient to a decision to participate in a stand-by generation program. The scale ranged from “Not at all” important (1) to “Extremely” important (5).

The most important elements in the decision to participate in a stand-by generation program were the amount of advance notice (average score 4.2) and the level of the incentive (4.1). The least important was not wanting to be involved with HECO (1.9). The other six elements were of roughly equal importance (Table 7, below).

Table 7: Decision Elements for Participating in a Stand-By Generator Program

	Extremely Important		Not at All Important			Average Score
	5	4	3	2	1	
Advance notice	44.4%	38.9%	9.7%	4.2%	2.8%	4.2
Level of the incentive	53.3%	26.7%	6.7%	6.7%	6.7%	4.1
Length of HECO's requests	29.3%	42.7%	12.0%	9.3%	6.7%	3.8
Critical nature of loads	34.7%	25.3%	18.7%	12.0%	9.3%	3.6
Frequency of HECO's requests	25.0%	30.3%	25.0%	13.2%	6.6%	3.5
Time of day of request	26.7%	28.0%	20.0%	18.7%	6.7%	3.5
Liability or legal Issues	34.2%	17.1%	26.3%	9.2%	13.2%	3.5
Penalty for failure to start	19.2%	31.5%	26.0%	8.2%	15.1%	3.3
Not wanting utility involved	1.3%	9.2%	19.7%	19.7%	50.0%	1.9

Notice to Activate Stand-By Generation

Were they to participate in a stand-by generation program, the majority (72%) of facility managers would want one or more hours advance notice to activate their generation (Table 8, below). Less than a third of facility managers would require only one hour or less advance notice.

Table 8: Minimum Acceptable Advance Notice to Activate Generator

	n	< 30 min	30-60 min	1-2 hrs	2 hrs +	NA/NR
Health Facilities	11	0.0%	18.2%	45.5%	36.4%	0
Hotels	21	0.0%	23.8%	33.3%	42.9%	1
Housing	16	6.3%	25.0%	37.5%	31.3%	7
Manufacturing	3	0.0%	33.3%	0.0%	66.7%	4
Office Buildings	14	7.1%	14.3%	35.7%	42.9%	6
Retail - Non-Food	11	0.0%	45.5%	27.3%	27.3%	10
Total	76	2.6%	25.0%	34.2%	38.2%	28

NA/NR = Not Asked/No Response

Maximum Hours of Participation

Were they to participate, half of the facility managers would not want to run their generators much more than 80 hours a year. The exceptions were hotel facility managers, who would be willing to run about three times as long (236 hours), and housing building managers, who would be willing to run for about half again as long (116 hours).

Table 9: Maximum Hours per Year Willing to Run Stand-By Generation

	n	Average Hours/Year	NA/NR
Health Facilities	4	83	7
Hotels	9	236	13
Housing	9	116	14
Manufacturing	1	80	6
Office Buildings	9	86	11
Retail - Non-Food	4	87	17
Total	36		68

NA/NR = Not Asked/No Response

III. SUMMARY FOR STAND-BY GENERATION

Around 114 MW of load is connected to stand-by generation. Of that amount, about 40-50% would be available during the priority peak hours of 5 PM to 9 PM, and about 60-70% would be available during the daytime peak hours of 11 AM to 2 PM.

For facility managers, the amount of advance notice and the level of the incentive are key to participation. Most of the managers would want advance notice of an hour or more to switch to stand-by generation.

An incentive of \$50 per kW would offer large customers about \$19,000 per year to switch some load to stand-by generation. At that level, 34% of the facility managers were interested in participating.

Among those who were not interested at \$50 per kW, raising the incentive to \$75 per kW would offer them about \$24,000 per year for participating. At that level, 47% of the remaining 66% of facility managers were interested in participating, bringing the total interest in participating at \$75 per kW to 65%.

Noise, odor and the length of time HECO would want the generators to run are important considerations. About 25% of the facility managers felt that noise and odor would be significant disadvantages to participating in a stand-by generation program. The reliability of the generators was the only other potential disadvantage cited by more than 10% of the facility managers.

For about half of the facility managers, legal liability, the critical nature of their loads, the amount of notice, duration, frequency and time of day that HECO would request them to switch to stand-by generation, the level of incentive, and the penalty for failure to start stand-by generation were important considerations for participation in the program.

PART B: INTERRUPTIBLE LOADS

IV. TECHNICAL POTENTIAL

Based on the site surveys of health facilities, hotels, housing, manufacturers, office buildings and retail stores, and on the information from specific governmental accounts, it is estimated that about 8% of large customers' loads are interruptible, totaling 53.7 megawatts (MW).

Table 10: Estimate of Available Interruptible Load

	% Of Cust. Load	Data Sources	Est. Population	Est. MW
Other Commercial	12.7%	— ⁴	223	13.9
Manufacturing	19.0%	7	27	10.7
Office Buildings	8.4%	20	109	6.6
State/Local Gov	11.1%	15	15	5.4
Retail - Non-Food	12.0%	21	64	4.9
Hotels	7.4%	22	60	4.6
Housing	9.4%	23	99	4.5
Federal	27.9%	5	5	1.9
Health Facilities	4.6%	11	26	1.2
Military	0.0%	8	8	0.0
Total	8.4%	132	636	53.7

⁴ The estimate of available interruptible load for "Other Commercial" accounts was based on the results from the 103 sampled sites. See the Appendix for more information on how this estimate was developed.

V. INCENTIVES AND BARRIERS TO PARTICIPATION

Salient Elements in Deciding to Participate

The facility managers were asked to rate the importance of nine elements salient to a decision to participate in an interruptible program. The scale ranged from “Not at all” important (1) to “Extremely” important (5).

Table 11: Decision Elements for Participating in an Interruptible Load Program

	Extremely Important		Not at All Important			Average Score
	5	4	3	2	1	
Level of the incentive	58.1%	27.4%	12.9%	1.6%	0.0%	4.4
Length of HECO's requests	32.8%	37.7%	24.6%	3.3%	1.6%	4.0
Advance notice	38.7%	27.4%	21.0%	11.3%	1.6%	3.9
Time of day of request	25.8%	40.3%	25.8%	4.8%	3.2%	3.8
Frequency of HECO's requests	17.7%	33.9%	38.7%	8.1%	1.6%	3.6
Critical nature of loads	17.7%	24.2%	41.9%	6.5%	9.7%	3.3
Liability or legal issues	32.8%	14.8%	18.0%	23.0%	11.5%	3.3
Penalty for failure to start	16.4%	31.1%	23.0%	8.2%	21.3%	3.1
Not wanting utility involved	0.0%	8.2%	14.8%	13.1%	63.9%	1.7

As is the case with stand-by generation, the most important issue is the level of the financial incentive. The duration, amount of advance notification and the time of day are also quite important to two-thirds of the facility managers.

Extent of Willingness to Interrupt Loads

Were they to participate, about half of the facility managers would not want to interrupt their loads for more than two hours in any one day. The exceptions were

manufacturing facility, retail managers and housing building managers, most of whom would be willing to interrupt for at least two hours in a given day.

Table 12: Maximum Hours per Day Willing to Operate Below a Pre-Set Load

	n	None	<2 Hours	2-4 hrs	4-6 hrs	6+ hrs	NA/NR
Health Facilities	10	20.0%	40.0%	40.0%	0.0%	0.0%	1
Hotels	19	26.3%	36.8%	10.5%	15.8%	10.5%	3
Housing	18	11.1%	33.3%	38.9%	11.1%	5.6%	5
Manufacturing	4	25.0%	0.0%	25.0%	25.0%	25.0%	3
Office Buildings	12	41.7%	8.3%	33.3%	16.7%	0.0%	8
Retail - Non-Food	14	7.1%	35.7%	57.1%	0.0%	0.0%	7
Average		20.8%	29.9%	33.8%	10.4%	5.2%	

NA/NR = Not Asked / No Response

On average, if they participate, facility managers would not want to interrupt their loads for more than three days in a row. And most would not want to interrupt their operations for more than about 36 days in a year, or about three times a month. An exception was facility managers at retail stores. They indicated a potential willingness to interrupt operations for about three and a half days in a row and for a total of about 80 days in a year, or 6 to 7 times a month.

Over half the interruptible load would be available with just one hour's notice, and over three-quarters would be available with four hours' notice. Hotels and condominiums (housing) would require the most advance notification. Table 13 (next page) shows that health facilities have the lowest percentage reduction available with one hour's notification.

Table 14: Maximum Days and Responsiveness For An Interruptible Load Program

	n	Average Maximum Days In a Row	Average Maximum Days In a Year	Percent of Maximum Reduction by Amount of Notification			NA/NR
				1 Hour	4 Hours	24 Hours	
Health Facilities	8	2.9	37.6	42.5%	95.0%	95.0%	3
Hotels	14	2.3	33.6	58.9%	70.3%	89.6%	8
Housing	15	2.5	27.7	52.0%	73.3%	80.2%	8
Manufacturing	2	2.7	36.7	78.3%	100.0%	100.0%	5
Office Buildings	6	2.9	49.7	70.0%	100.0%	100.0%	14
Retail - Non-Food	14	3.4	79.7	63.6%	96.4%	100.0%	7
Average		2.8	45.3	57.8%	84.6%	91.8%	

NA/NR = Not Asked / No Response

VI. SUMMARY FOR INTERRUPTIBLE LOADS

About 54 MW of load is potentially interruptible. Of that amount, about 31 MW would be available with one hour's notice; about 45 MW would be available with four hours' notice.

For facility managers, the level of the incentive is key to acceptance of the interruptible load program. However, no specific incentive levels were tested in the survey. The amount of advance notice, the frequency and the duration of the interruption are also important considerations. Legal liability, the critical nature of their loads, the amount of notice, duration, frequency and time of day that HECO would request them to switch to stand-by generation, the level of incentive, and the penalty for failure to start stand-by generation were important considerations for participation in the program for about half of the facility managers.

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APPENDIX

RESEARCH METHODOLOGY

Sample Design

Large Customers. Construction of the sample frame of large commercial customers started with the 828 HECO accounts with a maximum demand over 200 kW during any month in calendar 2001 which were still active in March 2002. Sixty accounts were deleted from the frame because technical audits had been previously conducted at their sites.

Because only about 100 sites could be visited, the sample was drawn using simple random sampling from among the accounts in the six business groups that contained the largest total demand (not including Government accounts):

Table A-1: Population Characteristics

Business Group	Customers	Total kW	kW Share	Sample n
Health Facilities	26	26,139	8.4%	11
Hotels	60	62,778	20.1%	22
Housing	99	47,509	15.2%	23
Manufacturing	27	56,131	18.0%	7
Office Buildings	109	78,213	25.1%	20
Retail - Non-Food	64	40,986	13.2%	21
Total	385	311,756	100.0%	104

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The sample was allocated according to the business groups' share of the total kW for the six groups. Due to the short time available for scheduling site visits, however, the final sample allocation did not reflect each group's share of kW.

Government Sector. HECO account managers responsible for federal, military and state/local government accounts identified the accounts used to estimate potentially available kW at government sites. Because of their thorough knowledge of their large government accounts, the list of accounts provided by the managers' constituted a current census of potential participating sites.

Data Collection

Large Customers. The primary purpose of the survey was to assess the potential for stand-by and interruptible rate programs at Hawaiian Electric Company. Secondary purposes included obtaining customer input on the design of the programs, and initiating a dialogue with large customers. To accomplish this, and to understand better the potential for stand-by and interruptible rates, 104 customers with demand exceeding 200 kW were surveyed on-site.

The sample of customers selected to participate in this survey was designed to be statistically representative of HECO's large customers. Potential participants were identified from lists of customers in six primary business groups: Retail Non-Food, Office Buildings, Manufacturing, Housing, Hotels, and Hospitals. The six groups surveyed account for 384 large customers, and represent about 60% of HECO's total of 635 large customers.

A local firm, Ward Research, was contracted to recruit customers to participate in the on-site survey. Preliminary telephone calls were made to identify or confirm a

contact person. All potential respondents were mailed an introductory letter on HECO stationery informing them of the research study and inviting their participation. Telephone recruiting began a few days later.

On-site interviews with facility managers were conducted between April 1, 2002 and April 11, 2002. Senior staff from ASW Engineering Management Consultants, of Tustin, California, conducted the interviews.

Government Accounts. In addition to the large customer on-site surveys, exploratory interviews were conducted by three HECO account managers for Military and Government accounts, beginning April 1, 2002 and ending April 25, 2002. The account managers' knowledge of these accounts was used in determining potential interruptible loads for these customer groups.

Stand-By Generation Assessment

Technically Available Stand-by Generation. For the six primary business groups surveyed, the estimates of the technical potential for stand-by load were based on the load currently connected to stand-by generators, as estimated by the facility managers. If a facility manager was not sure of the amount of connected load and therefore gave the interviewer a range of loads, the low end of the range was used in the estimate. Of the 104 sites surveyed, 78 had stand-by generation.⁵ Facility managers were able to provide estimates of their total load that was connected to a stand-by generator at 69 of these sites.

⁵ One site provided data on a generator scheduled for installation in 2004; another provided data on a generator not connected to loads on HECO's grid; a third provided data on a generator dedicated to fire support.

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The 78 sites include 122 generators, with a total capacity of 35,554 kW. Of these 122 generators, 25 (20%) are under 100kW, 34 (28%) are between 100 and 200 kW, 47 (39%) are between 200 and 500 kW, and 16 (13%) are over 500 kW. There is no correlation, however, between the capacity of a generator and the percentage of its capacity actually connected to load.

Large Customers. The estimate of the total load that could be potentially served by stand-by generation for each sampled business group was based on the average of the load connected to a stand-by generator reported by each customers in the sample.

The estimate of the total potentially available stand-by load among the 223 customers in the "other commercial" group (the non-governmental business groups that were not sampled) was estimated using a regression analysis on 96 sampled sites that provided information on stand-by generation load. The estimated regression model had the following functional form:

$$\text{StandbyGen kW} = 0.00036 * \text{Average Monthly kWh Consumption}$$

The parameter value of 0.00036 was estimated using the ordinary least squares method. The average monthly consumption of each facility was used in the model rather than the average maximum monthly demand because it had a higher correlation with the amount of load connected to stand-by generation.

The average monthly electricity consumption for the 223 other commercial customers was 180,622 kWh. Multiplying the average monthly kWh by the parameter of 0.00036 results in an estimated average standby generation amount of 65 kW per facility. The total amount of standby generation in these 223 facilities is estimated to be 14.5 MW.

Government Accounts. The estimate of the total potentially available stand-by load at 28 federal, state and local governmental facilities was based on the load currently connected to stand-by generators, as provided to HECO's account managers by their government contacts.

Table A-2 shows the estimated load that can be served by stand-by generation for each business group.

Table A-2: Estimates of Stand-By Generation Loads

Business Group	Sample Average	Total	Estimated Pop. Total
	kW (A)	Customers (B)	kW (A×B)
Office Buildings	262.7	109	28,637
Military*	2,466.9	8	19,735
Hotels	245.0	60	14,699
Other Commercial*	65.0	223	14,500
Housing	97.5	99	9,648
Health Facilities	339.1	26	8,815
State/Local Gov*	478.4	15	7,176
Manufacturing	174.3	27	4,705
Retail - Non-Food	61.6	64	3,945
Federal*	535.2	5	2,676
Total Large Customers and Government	180.1	636	114,537

* Not sampled; see text.

Accuracy of the Estimate of Technically Available Stand-by Generation.

The estimate of the technically available stand-by generation is 114.5 MW. To calculate the standard error of this estimate, the standard deviations of the estimates from the samples of each segment were combined according to equation 5.6 in William Cochran's *Sampling Techniques 3rd Edition* (New York, John Wiley & Sons, 1977, page 92). The standard error for the total amount of stand-by generation was estimated to be 11.3 MW.

A 95% confidence level for the lower limit of technically available stand-by generation is the sample estimate of 114.5 MW minus 1.694 standard errors, or 95.3 MW.

Stand-By Generation Availability by Time of Day. The estimate of the load reduction from stand-by generation by time of day for each sampled business group was based on the average values shown in Table A-3. Each sampled site was surveyed on the amount of load that could be replaced by stand-by generation at two time periods. The customer was asked to provide both a low and high estimate by time period.

The last column in Table A-3 shows the average amount of total load that is connected to stand-by generation for each group. The percentage values in Table A-4 equals the ratio of the average available load by time period divided by the average load connected to stand-by generation.

For the "Other" commercial accounts, the amount of stand-by generation available by time of day was based on the average stand by generation availability values for all 104 sampled sites. The bottom row of values in both Tables A-3 and A-4 were used to derive the availability estimates for the "Other" commercial group.

The population estimates of stand-by generation availability by time of day provided in Table 4 were derived by multiplying the total standby load shown in Table A-2 by the corresponding percentage values shown in Table A-4.

Table A-3: Average Stand-By Generation Load Availability by Time of Day

Business Group	n	Least MW Reduced		Most MW Reduced		Stand-by Load
		5 PM - 9 PM	11 AM - 2 PM	5 PM - 9 PM	11 AM - 2 PM	
Health Facilities	11	51	44	55	46	339
Hotels	22	181	202	185	204	245
Housing	23	31	101	38	107	97
Manufacturing	7	168	200	168	200	174
Office Buildings	20	172	211	178	227	263
Retail - Non-Food	21	7	14	16	23	62
All Sampled Sites	104	96	127	102	134	184

Table A-4: Percent of Total Stand-By Generation Load Availability by Time of Day

Business Group	Least MW Reduced		Most MW Reduced	
	5 PM - 9 PM	11 AM - 2 PM	5 PM - 9 PM	11 AM - 2 PM
Health Facilities	15%	13%	16%	14%
Hotels	74%	82%	76%	83%
Housing	32%	104%	39%	110%
Manufacturing	96%	115%	96%	115%
Office Buildings	65%	80%	68%	86%
Retail - Non-Food	11%	23%	25%	38%
All Sampled Sites	52%	69%	56%	73%

Average Incentives for Participation. The average incentive amounts for participating in a stand-by generation program contained in Table 5 were based on the estimates of the connected loads provided by the facility managers, multiplied by the incentive levels (\$50/kW/year and \$75/kW/year). The ASW surveyors calculated this amount during the interview. If an incentive level was missing from a completed survey form, an incentive level was not imputed to the respondent.

Interruptible Load Assessment

Technically Available Interruptible Load. For the six primary business groups that were surveyed, the estimates of the technical potential for interruptible loads were based on the loads which the facility managers believed they could curtail without adversely affecting operations. The average percent interruptible load for each of the six sampled business groups were calculated as the weighted average of the percent load reduction provided by the facility manager with their average monthly maximum demand being used as the weight.

The weighted average of the percent interruptible load for the seven surveyed manufacturing accounts was found to be about 36%. However, the two largest manufacturing accounts were not surveyed. These two large accounts consume 27 MW of the total 56 MW for the manufacturing group. It was reported by the account representative for these two large customers that these two accounts would not be able to interrupt any of their load. Thus the 36% interruptible load value obtained from the survey was only applied to the remaining manufacturing load of 29 MW resulting in the nearly 10.5 MW of interruptible load for this business group.

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For the federal, state and local governmental facilities, the amount of interruptible load was provided to HECO's account managers by their government contacts.

Table A-5: Derivation of the Estimate of Interruptible Loads

Business Group	Sample Percent of	Total kW in the	Estimated Pop.
	Total kW (A)	Population (B)	Total kW (A×B)
Other Commercial*	12.7%	109,492	13,890
Manufacturing	19.0%	56,131	10,656
Office Buildings	8.4%	78,213	6,562
State/Local Gov*	11.1%	48,325	5,385
Retail - Non-Food	12.0%	40,986	4,933
Hotels	7.4%	62,778	4,647
Housing	9.4%	47,509	4,462
Federal*	27.9%	6,918	1,930
Health Facilities	4.6%	26,139	1,202
Military*	0.0%	162,884	0
Total Large Customers and Government	8.4%	639,375	53,667

* Not sampled; see text.

The percentage of load that is interruptible is somewhat correlated with both demand and energy use. The sampled customers had higher-than-average demand and energy use (which is why they were chosen for surveying) than 223 large customers who were not sampled. Therefore, to estimate the available interruptible load among the 223 other non-governmental large customers in business groups that were not sampled, a regression analysis was performed where the percentage of interruptible load is modeled

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as a function of the maximum monthly kW and the average monthly kWh using the sampled customers. The estimated regression model is shown below:

$$\begin{aligned} \% \text{ Interruptible Load} &= 0.0799 \\ &+ 0.1696 * \text{Average Monthly Maximum MW demand} \\ &- 0.0003252 * \text{Average Monthly MWH consumption} \end{aligned}$$

The above equation suggests that the percentage of load that is interruptible tends to be higher for sites with higher maximum demand and tends to be lower as the load factor for the site increases. This appears to make sense, since customers with high load factors might tend to have fewer discretionary loads that can be interrupted.

The above equation was solved for 222 of the 223 other commercial accounts. For the largest account, the percent interruptible load was set to zero based on information from the account representative. For each site, the calculated percent interruptible load was multiplied by the average monthly maximum demand to determine the amount of load that could be interrupted by site. Summing up the estimated interruptible load across the 223 sites derived the total interruptible load for the other commercial business group.

Accuracy of the Estimate of Technically Available Interruptible Load. The estimate of total interruptible load was 53.7 MW. To calculate the standard error of the estimate of interruptible load, the standard deviations of the estimates for each segment were combined according to the formula used for the analysis of stand-by generation cited above, and a one-tailed confidence level was used to estimate the lower limit of interruptible load. The estimate of the standard error was 11.8 MW. A 95% confidence interval for the lower limit of interruptible load is the sample estimate of 53.7 MW minus 1.683 standard errors, or 33.8 MW.

COM-HECO-RIR-13

HECO RT-5, page 10, lines 8-13: The witness states:

The rates, terms, and conditions of HELCO's standby service rate rider (Rider A) that was approved by the Commission in Docket No. 99-0207, was based on a stipulated agreement between the CA and HELCO. The stipulated standby rate level includes a portion of the generation (20%) and transmission costs (52%), and all of the distribution demand costs (100%) allocated to HELCO's Schedules J and P customers.

Provide the original workpapers used to develop the figures of 20%, 52%, and 100% for the standby rate recovery of generation, transmission, and distribution costs in sufficient detail that this can be applied to the most recent unit costs for the MECO system developed by the Company.

HECO Response:

Please see HECO response to HREA-HECO-RT-5-IR-3.

COM-HECO-RIR-14

HECO RT-5, page 10, lines 8-13, the same citation as RIR-13 above.

Provide the most recent unit costs for generation capacity, transmission capacity, and distribution capacity for the MECO system to the extent not provided in response to previous COM information requests.

HECO Response:

Please see HECO response to COM-HECO-DT-IR-33 and COM-HECO-SIR-3.

COM-HECO-RIR-15

HECO RT-5, page 11, lines 9-12: The witness states:

The COM's proposed standby rate design with usage-based recovery of the fixed costs (e.g., recovering fixed costs on the basis of kWh usage) would likely result in under recovery of the utility's fixed costs and result in an increase in rates to other ratepayers.

Provide any analysis prepared by or for the Company of the effect of having 50 - 100 CHP customers on the system, each paying a standby rate of the form on the HELCO system, compared with each paying a standby rate of the form proposed by the County of Maui in its rebuttal testimony relative to the fixed costs of capacity required to serve standby loads.

HECO Response:

Such an analysis has not been prepared by or for HECO.

COM-HECO-RIR-16

HECO RT-5, page 12, lines 10-13: The witness states:

The Companies may propose rates specific to DG customers, such as standby service rates, in its next general rate case following the Commission's issuance of its decision and order in this instant docket, in order to reflect and/or incorporate the Commission's findings in the design of such rates.

Provide copies of all utility standby rates that the witness has received or reviewed in the past four years.

HECO Response:

The list of utility standby rates that the witness has reviewed is provided below. The tariff sheets are voluminous. Please contact Dan Brown at HECO's Regulatory Affairs at 543-4795 to arrange for inspection.

1. Cambridge Electric Light Company – Rate SB-1 – Standby Service
2. San Diego Gas & Electric Company – Schedule S – Standby Service
3. San Diego Gas & Electric Company – Schedule S-I – Standby Service-Interruptible
4. Southern California Edison – Schedule S – Standby
5. Pacific Gas and Electric Company – Schedule S – Standby Service
6. Pacific Power – Schedule 218 – Back-up, Maintenance, and Supplementary Service
7. Pacific Power & Light Company – Schedule 33 (Washington) – Partial Requirements Service less than 1000 kW
8. Pacific Power & Light Company – Schedule 47T (Washington) – Partial Requirements Service – Metered Time-of-Use, 1000 kW and Over
9. Pacific Power & Light Company - Schedule 36 (Oregon) – Partial requirements Service Less Than 1000 kW

10. Niagara Mohawk – SC-7 – Sale of Supplemental, Backup, and Maintenance Service to Customers with On-Site Generation Facilities
11. Western Massachusetts Electric – Schedule PR – Standby and Supplemental Power Service For Partial Requirements and General Service Customers
12. Utah Power – Schedule No. 31 – Back-Up, Maintenance, and Supplemental Power
13. Pacific Power & Light Company, Portland, Oregon – Schedule No. AT-47 – Large General Service Partial Requirements Service – Metered Time-of-Use, 500 kW and Over
14. Monongahela Power Company, Allegheny Power – Schedule AGS – Alternative Generation Schedule
15. The Potomac Edison Company, Allegheny Power – Schedule AGS – Alternative Generation Schedule
16. Pacific Power Schedule 33 (Wyoming Western Service territory) – Schedule 33 – Partial Requirements Service

COM-HECO-RIR-17

HECO RT-5, page 12, lines 10-13, the same citation as RIR-16 above.

Provide any analysis prepared by or for the Company of the appropriate level of standby capacity that would be required for each of the three utilities if the number of CHP systems identified on pages 2, 4, and 6 of Exhibit A to the CHP application were installed.

HECO Response:

Such analysis has not been prepared by or for HECO.

COM-HECO-RIR-18

HECO RT-5, page 13, beginning at line 1, the witness states that, “inverted rates for the residential class is irrelevant.”

Provide any studies of the applicability or impact of inverted residential rates prepared by or for the Company since 1996.

HECO Response:

Such studies have not been prepared by or for HECO. The referenced HECO testimony states that “The COM’s proposal on inverted rates for residential class is irrelevant to this proceeding...” and provided four reasons why it should be rejected by the Commission.

COM-HECO-RIR-19

HECO RT-5, page 13, lines 4-6: The witness states:

The residential customers are generally not the potential users of distributed generation.

Provide any documents or information which supports the witness's statement that residential customers are generally not the potential users of distributed generation.

HECO Response:

The residential customers are generally not the potential users of distributed generation as defined in this docket. The general size of the distributed generation units under contemplation in this docket precludes the residential customers served under Schedule R. See item 1.A.1 of HECO-R-600 and CA-RT-100.

COM-HECO-RIR-20

HECO RT-5, page 15, lines 18-20: The witness states:

The Companies' load management riders, as well as the stand-alone Schedule U, provide alternative time-of-use pricing incentives for customers to shift their load away from the system priority peak hours.

Provide a list of all customers served on time-of-use rates by MECO. For each customer, provide the energy usage by time period.

HECO Response:

The energy usage of the customers served under MECO's Rider T is attached. The identities of the customers are not provided in order to not disclose such customer-specific information.

Maui Electric Company, Ltd.
Summary of Rider T Customer kWh
2004 Year-to-Date

Month	<u>Customer 1</u>		<u>Customer 2</u>		<u>Customer 3</u>		<u>Customer 4</u>		<u>Customer 5</u>	
	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak
	0700- 2100 HRS	2100-0700 HRS	0700- 2100 HRS	2100- 0700 HRS						
Jan-04	1,300	2,000	800	700	9,400	12,200	1,700	1,200	4,600	3,200
Feb-04	8,900	9,700	4,600	5,200	10,700	17,100	5,500	1,800	12,000	11,400
Mar-04	1,900	7,100	1,100	4,300	9,100	13,500	6,700	2,100	8,400	8,000
Apr-04	5,200	14,200	3,100	7,900	12,800	21,900	7,800	2,800	11,800	11,200
May-04	5,200	15,100	2,400	9,000	13,600	24,000	8,500	6,800	11,000	14,200
Jun-04	8,800	19,400	2,800	10,700	19,800	36,200	4,500	6,300	11,800	16,600
Jul-04	5,000	17,500	1,300	9,500	22,300	36,500	7,000	4,400	13,400	15,200
Aug-04	13,700	21,900	4,300	10,000	16,800	33,200	8,700	3,500	12,600	14,200
Sep-04	13,800	22,000	5,400	9,300	19,700	35,500	6,700	2,400	8,800	11,800
Oct-04	10,700	18,600	3,100	9,100	15,200	30,100	3,200	2,500	8,000	11,000
Nov-04										
Dec-04										
Total	74,500	147,500	28,900	75,700	149,400	260,200	60,300	33,800	102,400	116,800

Source: MECO Customer Service Department.

Maui Electric Company, Ltd.
Summary of Rider T Customer kWh
2004 Year-to-Date

Month	<u>Customer 6</u>		<u>Customer 7</u>		<u>Customer 8</u>		<u>Customer 9</u>		<u>Customer 10</u>	
	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak						
	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	2100- 0700 HRS						
Jan-04	4,650	4,050	4,000	3,000	300	12,000	3,800	5,400	2,720	4,800
Feb-04	8,250	9,600	5,800	6,300	0	43,200	6,000	10,800	3,600	5,040
Mar-04	6,600	8,400	4,200	5,300	300	32,400	5,400	7,600	3,200	5,600
Apr-04	8,700	10,500	5,800	5,700	0	14,700	2,600	5,800	1,360	2,160
May-04	13,650	19,950	6,700	7,700	300	29,100	4,800	7,400	3,120	6,160
Jun-04	19,200	29,400	9,700	11,400	0	61,500	8,400	11,400	6,400	7,040
Jul-04	18,900	30,300	9,000	10,100	300	78,300	9,000	16,600	9,200	9,680
Aug-04	20,100	28,350	8,700	9,100	0	72,600	7,800	15,600	5,520	9,840
Sep-04	16,200	26,400	7,600	8,200	300	96,300	10,200	20,000	4,560	8,800
Oct-04	15,150	25,650	6,800	7,400	0	84,600	8,200	18,000	6,080	10,160
Nov-04					300	64,200	6,400	14,400	6,240	7,440
Dec-04										
Total	131,400	192,600	68,300	74,200	1,800	588,900	72,600	133,000	52,000	76,720

Source: MECO Customer Service Department.

Maui Electric Company, Ltd.
Summary of Rider T Customer kWh
2004 Year-to-Date

Month	Customer 11		Customer 12		Customer 13		Customer 14		Customer 15	
	kWh On	kWh Off								
	Peak	Peak								
	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	0700- 2100 HRS						
Jan-04	1,800	1,000	8,800	14,200	23,100	22,800	4,600	23,600		
Feb-04	200	400	9,000	13,200	22,500	22,200	8,200	15,800		
Mar-04	1,800	1,000	9,200	14,600	23,100	21,900	5,600	21,400	12,000	144,000
Apr-04	200	200	8,200	8,400	21,600	21,900	6,800	21,200	6,000	132,000
May-04	1,000	400	12,200	18,000	24,600	24,300	12,200	39,200	6,000	120,000
Jun-04	800	400	11,800	18,800	22,500	22,500	19,600	46,400	0	120,000
Jul-04	3,800	2,000	16,400	26,000	24,000	22,500	22,600	53,200	6,000	114,000
Aug-04	5,400	3,800	17,600	29,200	25,800	23,700	19,400	52,600	6,000	36,000
Sep-04	5,600	3,200	15,400	26,800	30,600	24,300	23,400	54,400	6,000	0
Oct-04	6,200	4,400	15,200	29,000	29,400	28,200	20,400	47,200	6,000	6,000
Nov-04	3,800	2,600	13,400	19,400	33,000	31,500	18,000	35,000	600	2,400
Dec-04										
Total	30,600	19,400	137,200	217,600	280,200	265,800	160,800	410,000	48,600	674,400

Source: MECO Customer Service Department.

Maui Electric Company, Ltd.
Summary of Rider T Customer kWh
2004 Year-to-Date

Month	Customer 16		Customer 17		Customer 18		Customer 19		Customer 20	
	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak
	0700-2100 HRS	2100-0700 HRS	0700-2100 HRS	2100-0700 HRS	0700-2100 HRS	2100-0700 HRS	0700-2100 HRS	2100-0700 HRS	0700-2100 HRS	2100-0700 HRS
Jan-04	2,240	3,360	1,300	2,900	5,280	5,920				
Feb-04	3,920	7,280	1,300	5,700	8,800	13,440				
Mar-04	1,440	6,320	2,600	4,300	7,520	10,080				
Apr-04	4,720	10,400	1,100	5,400	9,280	13,120				
May-04	1,440	11,760	2,400	7,400	10,240	21,440				
Jun-04	2,160	14,960	2,900	10,500	11,360	27,840	5,506	3,855	8,440	7,840
Jul-04	2,960	14,240	2,900	10,300	10,720	25,920	5,357	3,826	1,560	840
Aug-04	2,480	13,680	2,000	10,000	11,680	24,320	5,058	3,449	2,360	1,680
Sep-04	2,400	10,960	1,200	7,700	29,760	26,880	5,537	3,923	4,640	7,320
Oct-04	1,600	8,960	1,000	6,700	9,120	16,960	3,766	2,726	4,040	6,240
Nov-04										
Dec-04										
Total	25,360	101,920	18,700	70,900	113,760	185,920	25,224	17,779	21,040	23,920

Source: MECO Customer Service Department.

Maui Electric Company, Ltd.
Summary of Rider T Customer kWh
2004 Year-to-Date

Month	<u>Customer 21</u>		<u>Customer 22</u>		<u>Customer 23</u>		<u>Customer 24</u>		<u>Customer 25</u>	
	kWh On	kWh Off								
	Peak	Peak								
	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	0700- 2100 HRS	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	2100- 0700 HRS
Jan-04							750	7,800		
Feb-04							450	6,150		
Mar-04							600	9,000		
Apr-04							450	10,200	14,734	11,665
May-04							0	10,500	14,580	10,231
Jun-04	9,942	7,034	10,893	7,669	6,601	4,723	150	6,300	19,288	13,617
Jul-04	10,193	7,296	8,992	6,422	5,692	4,024	150	9,300	20,957	14,908
Aug-04	8,945	6,200	8,240	5,906	5,266	3,651	150	5,400	20,114	14,204
Sep-04	8,071	5,600	6,410	4,414	4,337	3,048	150	7,800	19,063	14,675
Oct-04	4,736	3,482	4,953	3,693	4,939	3,652	150	6,450	15,235	11,905
Nov-04										
Dec-04										
Total	41,887	29,612	39,488	28,104	26,835	19,098	3,000	78,900	123,971	91,205

Source: MECO Customer Service Department.

Maui Electric Company, Ltd.
Summary of Rider T Customer kWh
2004 Year-to-Date

Month	Customer 26		Customer 27		Customer 28		Customer 29		Customer 30	
	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak
	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	2100-0700 HRS	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	2100-0700 HRS
Jan-04			7,240	9,360	104,400	123,600	16,640	19,840	8,400	15,180
Feb-04			7,640	9,640	103,200	134,400	15,010	21,600	7,320	13,020
Mar-04			7,040	9,320	91,200	105,600	15,840	26,080	8,280	18,060
Apr-04	10,095	8,269	5,880	9,360	94,800	124,800	18,400	22,880	6,900	13,560
May-04	10,256	7,424	6,040	8,840	91,200	133,200	15,520	25,280	6,060	15,000
Jun-04	11,229	8,067	6,160	8,920	104,400	164,400	14,190	25,970	5,880	18,300
Jul-04	15,183	10,654	6,280	9,160	94,800	154,800	12,320	32,960	6,720	21,960
Aug-04	15,157	10,868	5,920	8,960	105,600	178,800	10,560	32,480	6,300	21,000
Sep-04	11,165	8,442	6,360	9,360	93,600	157,200	12,160	39,040	7,080	23,280
Oct-04	8,360	6,210	5,920	8,400	92,400	151,200	11,360	34,080	6,840	21,240
Nov-04							13,280	33,760	7,860	20,400
Dec-04										
Total	81,445	59,934	64,480	91,320	975,600	1,428,000	155,280	313,970	77,640	201,000

Source: MECO Customer Service Department.

Maui Electric Company, Ltd.
Summary of Rider T Customer kWh
2004 Year-to-Date

Month	<u>Customer 31</u>		<u>Customer 32</u>		<u>Customer 33</u>		<u>Customer 34</u>		<u>Customer 35</u>	
	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak	kWh On Peak	kWh Off Peak
	0700- 2100 HRS	2100- 0700 HRS	0700-2100 HRS	2100-0700 HRS	0700-2100 HRS	2100-0700 HRS	0700- 2100 HRS	2100- 0700 HRS	0700- 2100 HRS	2100-0700 HRS
Jan-04	150	38,550	223,200	148,800	250,200	169,200	762	9,943	4,500	3,000
Feb-04	8,850	37,350	220,800	151,200	248,400	172,800	665	10,466	4,500	3,000
Mar-04	9,600	32,850	223,200	156,000	210,600	144,000	627	9,587	18,500	13,500
Apr-04	9,450	39,750	232,800	160,800	237,600	162,000	707	11,368	0	0
May-04	9,450	44,400	213,600	151,200	241,200	169,200	835	9,658	1,000	1,000
Jun-04	10,500	50,550	244,800	165,600	246,600	172,800	975	12,855	1,500	1,000
Jul-04	9,900	49,800	237,600	165,600	248,400	169,200	1,053	12,195	1,500	1,000
Aug-04	9,750	53,100	228,000	158,400	261,000	181,800	5,290	7,606	2,000	1,500
Sep-04	10,500	52,950	252,000	177,600	244,800	169,200	8,801	5,521	15,000	10,500
Oct-04	9,150	43,500	218,400	158,400	232,200	162,000	5,900	4,792	19,000	14,500
Nov-04										
Dec-04										
Total	87,300	442,800	2,294,400	1,593,600	2,421,000	1,672,200	25,615	93,991	67,500	49,000

Source: MECO Customer Service Department.

COM-HECO-RIR-21

HECO RT-5, page 15, lines 18-20, the same citation as RIR-20 above:

Provide the Company's estimated usage by time period for all Schedule P customers on Maui as a group, and separated by those subject to time-of-use rates and those not subject to time of use rates.

HECO Response:

The requested information is not available. The results of the 1995 MECO Class Load Study filed in MECO's 1997 test-year rate case, Docket No. 96-0040, may be used by the COM to determine the requested information. (MECO transmittal letter dated October 7, 1996, Docket No. 96-0040.)

COM-HECO-RIR-22

HECO RT-5A, page 1, lines 12-14: The witness states:

Over the last fifteen years, I have provided written and oral testimony for federal and state regulatory agencies on topics such as unbundled rate design and electric industry restructuring.

Provide copies of all testimony submitted by Mr. Gegax to any regulatory commission on the subject of standby rates since 1990. If more than three such submissions have occurred, provide the three most extensive testimonies.

HECO Response:

Dr. Gegax has not submitted testimony to any regulatory commission on the subject of standby rates.

COM-HECO-RIR-23

HECO RT-5A, page 3, lines 10-14: The witness states:

3. their insistence on time-of-use rates complemented by significant metering investments...

For each MECO Schedule P customer, provide the make and model of meter(s) currently installed, and the modifications or replacement cost associated with converting the metering to TOU-capable metering.

HECO Response:

Maui Division's Schedule P customers totaling only 116 customers, have GE 3-Phase meters (Model ES5, EV3, EV4, EV5) that are TOU-capable but would require re-programming to provide the readings for the specified time-of-use rating periods. However, the same TOU-capable metering is not currently installed for the 1,249 Schedule J customers. The Schedule J customers would also be impacted by the COM's proposal to convert to what appears to be mandatory time-of-use rates for Schedules J and P as stated in COM T-2, pages 86-87. MECO does not have information on the modifications or replacement costs associated with converting to TOU-capable metering for each of the Schedule J customers.

COM-HECO-RIR-24

HECO RT-5A, page 10, line 25: The witness states:

Standby service itself is a type of “insurance”...

The term “insurance” is used to describe standby service. Does the witness agree that the cost of “insurance” typically is a small fraction of the cost of the product that the customer would receive in the event that an “insurance claim” is necessary, such as an automobile insurance or home fire insurance premium relative to the cost of the potential loss being insured?

HECO Response:

While I am not an expert on automobile insurance or home fire insurance, common sense suggests that if the premiums are less than the cost of the insurance claims, then the insurance company is not charging enough to cover its costs. Since a generator is expected to be shut down several times over the life of the generator, the probability that the capacity necessary to provision standby service is 100%. If the probability was 100% that an insured car or home would be destroyed during the life of that asset, then the insurance premiums would be sufficient to cover those full costs.

COM-HECO-RIR-25

HECO RT-5A, page 12, line 19:

The witness uses the term “cost-causation principles” in describing the development of standby rates.

Please provide a reference to one of the principle texts of utility ratemaking, such as Principles of Public Utility Rates (Bonbright, 1961), Public Utility Economics, (Garfield and Lovejoy 1964), or The Regulation of Public Utilities (Phillips, 1984) that supports your definition of “cost causation” to imply recovery of fixed costs in fixed charges in the context of setting standby rates.

HECO Response:

To Dr. Gegax’s knowledge, none of the referenced textbooks specifically address standby rates.

COM-HECO-RIR-26

HECO RT-5A, page 14, lines 18-19: The witness states:

This reservation amount should be equal to the DG rated capacity – 300 kW in Figure 1.

Is it the witness' position that the utility must maintain one unit of reserve or standby capacity for each unit of distributed generation connected to the system? For example, if all of the 55 potential CHP systems identified by HECO on Page 2 of Exhibit A to the CHP application were constructed, totaling some 23 megawatts of CHP capacity, what level of standby capacity would the utility be required to own and maintain over and above the level required for requirements customers in order to provide standby service?

HECO Response:

As I state in my rebuttal testimony, the full reservation amount is applied to the full cost of transmission and distribution. This is not true for generation capacity where only a portion of the generation costs is applied to the reservation amount. This portion is to reflect the DG customer's investment in generation capacity and its fair share of the costs associated with reserve generation capacity which, in turn, is a cost allocation issue. Absent a detailed analysis of the utility's costs, I cannot tell you exactly what that portion would be.

COM-HECO-RIR-27

HECO RT-5A, page 14, Figure 1:

Referring to Figure 1, does the witness agree that during the periods when the example customer does not use standby service, that this standby capacity is available to serve needs of other standby and/or requirements customers. How does the witness propose that the cost of this capacity that is required to serve multiple customers be allocated between the potential users of the capacity?

HECO Response:

No. The costs related to transmission, distribution, and ancillary services generation capacity should be fully allocated to all customers including standby customers.

COM-HECO-RIR-28

HECO RT-5A, page 14, lines 20-23: The witness states:

...the standby charge itself is lower than the demand charge applied to the portion of the load that is being normally satisfied by utility generation (200 kW in Figure 1) because standby charges include only a portion of the generation capacity.

Please reconcile this with the statement beginning on page 13, line 26: “Therefore, the appropriate design of rates for a DG customer based on cost-causation principles would include a demand charge large enough to recover the full cost associated with the capacity necessary to meet the customer’s full demand at any time.”

HECO Response:

The “full cost associated with the capacity necessary to meet the customer’s full demand at any time” that is included in the standby charge includes only a portion of the generation capacity costs – that is associated with reserve generation as well as other ancillary services. During times when the DG facility is unavailable, the DG customer is also required to pay the full cost attributable to the energy actually being produced by the backup generation .

COM-HECO-RIR-29

HECO RT-5A, pages 13-14, lines 26-3: The witness states:

Therefore, the appropriate design of rates for a DG customer based on cost-causation principles would include a demand charge large enough to recover the full cost associated with the capacity necessary to meet the customer's full demand at any time.

Explain how this is consistent with Ms. Seese's testimony that the HELCO standby rate was designed to recovery 20% of generation fixed costs.

HECO Response:

See HECO response to COM-HECO-RIR-28.

COM-HECO-RIR-30

HECO RT-5A, page 14, lines 24-26: The witness states, 'the standby charge applied to the 300 kW amount is lower than the demand charge in the customer's normal tariff.'
How does the witness reach that conclusion, and what methodology does the witness propose for setting the standby demand rate at a level lower than the normal tariff?

HECO Response:

See HECO response to COM-HECO-RIR-28.