HECO T-6
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TESTIMONY OF
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HAWAIIAN ELECTRIC COMPANY, INC.

Subject: Distributed Generation Resources

INTRODUCTION

Q. Please state your name and business address.

A. My name is Scott W. H. Seu. My business address is P.O. Box 2750, Honolulu, Hawaii 96840.

Q. What is your present position with Hawaiian Electric Company ("HECO")?

A. I am the Manager of HECO's Energy Projects Department. My educational background and experience are given in HECO-600.

Q. What is the scope of your testimony?

A. I will provide testimony on HECO's current efforts to develop or evaluate distributed generation ("DG") resources on Oahu, including combined heat and power ("CHP") systems. I will focus on HECO's expectations for adding DG capacity in the 2006-2010 timeframe.

DISTRIBUTED GENERATION OVERVIEW

Q. What is distributed generation ("DG")?

A. DG, as described by the Commission in Order No. 20582 of Docket No. 03-0371, involves the use of small-scale electric generating technologies installed at, or in close proximity to, the end-user's location.

Q. Is there a specific size limit to DG?

A. There is no defined or discreet limit, but generally "small-scale" should be construed relative to the utility's system loads and to the loads of large customers. For example, a 20 MW generating unit might be considered DG for a large customer on Oahu, but on Maui this amount of generation would be akin to a central station power plant unit. Generally, DG does not include facilities that are designed to provide significant export power to the electric grid at the

transmission level, as opposed to being sized to meet individual customer loads or feed a distribution circuit.

Q. What DG technologies are there?

A. DG technologies that are fossil-fuel based include internal combustion engines, combustion turbines, microturbines, and fuel cells, although some classify fuel cells as renewable given the potential for them to run on hydrogen generated from renewable resources. DG technologies that are renewable include wind turbines and photovoltaics.

Q. Which of these DG technologies are most commonly used?

A. Currently, internal combustion engines are the most commonly used type of DG technology, primarily because of the maturity of the technology, their availability in a wide range of sizes from under 10 kW to over 10 MW, and their relatively low cost. Combustion turbines are commercially available, typically above 1 MW in size, and are used in larger DG applications. Microturbines and fuel cells are still in the formative stages of the product development cycle and their use is very limited.

Q. What about the renewable technologies, wind turbines and photovoltaics?

A. Both technologies are commercially available and in use. However, they are not as common in small-scale DG applications as internal combustion engines, either because of practical siting challenges for wind turbines, or relatively high costs of photovoltaics.

HECO'S DG ACTIVITIES

Q. What DG is HECO currently developing or evaluating?

A. HECO is developing or evaluating the following DG resources on Oahu:

1) HECO-sited peaking DG,
2) utility peaking DG on customer sites,
3) customer-owned standby DG, dispatchable by the utility for peaking purposes,
4) customer-sited combined heat and power ("CHP") systems, and
5) HECO-sited photovoltaic ("PV") systems, consistent with HECO's integrated resource plan.

HECO-Sited Peaking DG

Q. Please describe HECO's company-sited peaking DG efforts.

A. The objective of this effort is to install dispatchable, firm generating capacity for peaking purposes as quickly as possible to mitigate the reserve capacity shortfalls on HECO's system. Small scale DG located at HECO-owned sites other than power plants are the most feasible way to accomplish this objective. Such installations, if appropriately sited and limited in size and operation to reduce potential environmental impacts, can be permitted and installed more quickly compared to central station generating units. More specifically, by limiting the size of DG installations to 5 MW or less, an environmental assessment or environmental impact statement is not required. Additionally, by accepting annual fuel use limitations (which limit annual operating hours of the DG units), the DG units can be air permitted as non-covered sources.

Q. With these limitations in size and operating use, are these peaking DG installations intended to be used for long term peaking capacity?

A. No. The purpose of these peaking DG units is to mitigate the reserve capacity shortfall until other permanent generating capacity can be added.

Q. Has HECO implemented any such peaking DG?

A. Yes. Given the expected reserve capacity shortfalls over the next several years, in 2005 HECO installed three leased 1.64 MW diesel generating units each at three HECO sites, for a total of nine DG units and 14.76 MW. The first three units were placed in service at Ewa Nui Substation in October 2005, the second three units at Iwilei Tank Farm in November 2005, and the last three units at Helemano Substation in December 2005.

Q. Is HECO pursuing the installation of additional HECO-sited peaking DG in 2006?

A. Yes. We have already selected two HECO sites and are working to identify a third site for installation of a total of nine more 1.64 MW diesel generating units by the end of 2006.

Q. Please describe these 2006 efforts in greater detail.

A. We have selected HECO's CEIP Substation and HECO's Kalaeloa Poleyard as desired DG sites, based on available space, zoning, and ability to interconnect to HECO's distribution system. We are also evaluating a number of other HECO sites for our third site, including two sites that were developed as candidate sites for the 2005 DG installations. Those sites, Uwapo Substation and Hoaeae Substation, were discussed in HECO RT-7, Docket No. 04-0113, particularly the fact that we have already made progress in obtaining various permits.

Q. Has any work been done in addition to site selection?

A. Yes. In February 2006, we issued an RFP to DG equipment vendors to obtain bids for lease or purchase of the DG units and we received bids in March 2006. Also, we are working with a consultant to perform a detailed system impact study of DG at the candidate sites.

Q. Given these efforts, what are your expectations for HECO-sited peaking DG capacity by the end of 2006?

A. Assuming we are successful in implementing the DG described above at three more HECO sites this year, we would have a total of eighteen DG units deployed at six HECO sites, providing a total of 29.5 MW of peaking capacity.

Q. What about HECO-sited peaking DG in 2007 and beyond?

A. We are finding, via our evaluation to select a third DG site for 2006, that it is becoming more challenging to identify feasible HECO sites for placement of DG, considering space, zoning, and the need for additional infrastructure. It is likely that after the 2006 DG projects, there will not be any more HECO sites that can accommodate three DG units, and so further HECO-sited DG projects would provide smaller amounts of capacity, and not be as cost-effective as the 2005-2006 installations. It may still be possible to install on the order of 3 to 6 MW of additional HECO-sited DG in 2007 and beyond, but such installations would need to be compared from a planning and cost perspective against other options to bring dispatchable DG onto HECO's system, such as customer-sited DG.

Utility Peaking DG on Customer Sites

Q. What is being considered as "utility peaking DG on customer sites", and why is HECO evaluating this option?

A. We are evaluating the installation of HECO-owned peaking DG units on customer-owned sites because, eventually, all feasible utility-owned sites will be used and there will likely be a continued need for additional peaking capacity.

Q. What specific efforts are underway?

A. HECO has been in discussions with the Department of Defense ("DOD") about possible installation of HECO-owned DG at Oahu military bases to serve HECO system capacity needs.[1] We have been looking for further opportunities to install

[1] In reviewing DG opportunities at DOD sites, HECO is also assessing the ability to provide ancillary reliability or energy cost savings benefits to the DOD. Such benefits may be necessary to justify, from the DOD's perspective, the provision of sites to HECO.

5 MW increments of DG on a temporary basis, similar to the efforts described above at HECO-owned locations.

Q. What sites were considered?

A. We focused on all of the large DOD installations on Oahu: Pearl Harbor Naval Station, Hickam Air Force Base, Schofield Barracks, and Marine Corps Base Hawaii. DOD staff also provided input on a few additional sites such as Fort Shafter and Wheeler Army Airfield. Within each of these bases, we focused on existing substations or industrial areas that would be conducive to installing DG in a cost-effective manner, without impacting DOD operations.

Q. What opportunities were identified?

A. On a preliminary basis, there appear to be only one or two sites that might be feasible, meaning we may be able to install 5 to 10 MW of DG. This might be surprising to some, considering the large amount of real estate controlled by DOD. However, much of that land is restricted for DOD operations. In addition, DOD industrial or substation sites are hemmed in by neighboring facilities, and vacant areas would generally require expensive "green field" development due to the lack of existing infrastructure.

Q. Does HECO intend to pursue installation of the 5 to 10 MW of temporary DG at the DOD sites, and when would the DG be expected to come on line?

A. We do intend to pursue this DG for development in the 2007 - 2008 timeframe. The exact timing of the installations would depend on the length of time necessary to work with the DOD to secure, permit, and develop the sites.

Q. What about installing larger increments of generation greater than 5 MW?

A. We have also been in discussion with the DOD about the possibility of installing a larger peaking facility at a DOD site. We intend to conduct a feasibility study

with the Navy this year to further investigate how large of a facility could be developed, at what expense, and in what timeframe. HECO would then need to consider how this potential supply side resource fits in with HECO's system generation plans.

Q. Could such a larger facility be developed before 2009 to help with HECO's reserve capacity situation?

A. No. We are assuming that such generation would be more permanent in nature and trigger more extensive contracting, permitting, and regulatory review requirements at both the state and federal levels. These requirements include negotiation of an agreement between HECO and the DOD, a federal environmental impact statement, PUC approval, and covered source air permitting. With regard to covered source air permitting, our intent is to consider what combination of emission controls and operating hour restrictions would be necessary to avoid triggering federal Prevention of Significant Deterioration ("PSD") review, since if PSD air permitting is triggered, development of a larger DG plant would take just as long as a central station generating facility. Although the intent would be to size and design the facility to not trigger the same amount of approvals as a central station power plant, nonetheless, I do not foresee us being able to develop such a facility until late 2010 at the earliest.

Customer-Owned Standby DG

Q. Please explain HECO's efforts to evaluate customer-owned standby DG.

A. HECO is examining the feasibility of dispatchable standby generation ("DSG") similar to that established by tariff at Portland General Electric Company ("PGE"). In the PGE DSG program, the utility does not own the emergency generator, but is allowed to dispatch customer-owned standby generators for

limited peaking duty up to 400 hours per year, in exchange for certain technical and economic provisions.

Q. What provisions are provided to the DSG customer by PGE?

A. PGE provides funding to the customer to support the purchase and installation of paralleling switchgear, remote communications and monitoring equipment, protective relays, and other equipment required to enable PGE to dispatch and operate the customer's standby generator in parallel to the utility grid. PGE provides the fuel for the generator, pays for maintenance, and supports the customer in obtaining permits.

Q. Can you summarize the potential benefits of a DSG program to the DSG customer and the utility?

A. The potential benefits of a PGE-type dispatchable standby generation arrangement to a customer include (1) reduced or avoided capital, operations, and maintenance costs, (2) improved generating unit reliability due to regular startups and testing under load, and (3) utility consulting and collaboration. The potential benefits to the utility of such an arrangement are the provision of very cost-effective utility system reserve capacity, albeit for a limited number of hours per year, and the ability to support the operation of a critical customer.

Q. What specific actions are being taken to evaluate DSG?

A. In December 2005, we signed a letter agreement with the State Department of Transportation Airports Division ("DOT Airports") to conduct a feasibility evaluation of DSG at the Honolulu Airport. We will be working with DOT Airports through this summer to evaluate the feasibility and identify the potential benefits and costs of such an arrangement to both DOT Airports and HECO. This arrangement would be compared to the DOT Airports' alternative options of

either pursuing standby generation without any HECO involvement, or installing and operating standby generation under HECO's Commercial Industrial Direct Load Control ("CIDLC") program.

Q. What amount of dispatchable capacity is being considered at the Honolulu Airport, and if developed, when would the capacity be available to HECO?

A. The exact amount of DSG that could be developed at the Honolulu Airport is not known at this time, but we are targeting approximately 8 MW based on the amount of critical loads at the facility. Similar to the PGE DSG installations, we anticipate this DSG capacity would be a limited duty peaking resource available for several hundred hours per year, as the DSG units would be non-covered source air permitted with annual fuel use restrictions. If DSG is shown to be feasible and is successfully developed, I expect the capacity could become available to HECO in the 2008 timeframe.

Q. Are there other DSG opportunities in addition to the Honolulu Airport, and if so, how much capacity might be expected and in what timeframe?

A. Based on the PGE experience, DSG opportunities will arise when a large customer makes a decision to install new standby generation and the customer's facility can physically and technically accommodate the additional equipment required for permitting and remote dispatch. Although we are aware of a few such customers on Oahu, at this time I do not have an estimate of DSG potential since we are focused first on proving the concept of DSG with the Honolulu Airport evaluation and have not done any market analysis. Our plan is to take an incremental approach evaluating the Airport project and perhaps one or two more potential DSG customers, but we are not making any assumptions about implementing a DSG program. It may be helpful to know that PGE, which has a

larger system than HECO serving approximately 4,000 MW of peak load, has contracted approximately 30 MW of DSG over the last five years, available for utility dispatch up to 400 hours per year. We would be hard-pressed to duplicate that level of DSG here on Oahu given the smaller size of our system.

Q. Are there other models for dispatchable standby generation besides the PGE program?

A. Yes. Carolina Power & Light Company, doing business as Progress Energy Carolinas, Inc., offers a Premier Power Service Rider to its customers. Under the Premier Power Service Rider PPS-7A, Progress Energy supplies utility-owned and operated power generators to customers supplying capacity from 50 kW to 8 MW per site. Although the primary focus is to provide electricity to the customer's site in the event normal service is interrupted, the utility in its Premier Power Service Rider also reserves the right to dispatch the generation "to achieve system benefits, provided such dispatch does not interfere with or reduce the effectiveness of the generation to provide an alternate supply of electricity in the event normal electric supply is interrupted to the Customer." Detroit Edison offers a similar standby generation service to its customers. The main difference in this model is that the standby generating unit is provided and owned by the utility, and the customer is charged a monthly fee.

Other utilities have also developed various standby generation services: (1) Duke Power requested and received approval in 2001 from the N.C. Utilities Commission of an experimental service schedule called "On-Site Generation Service", (2) Florida Power Corporation requested and received approval in 2001 from the Florida P.S.C. for an Experimental "Premier Power Service Rider", and (3) Madison Gas and Electric Company, in 1999, implemented a "Backup

Generation Service Rider", but suspended participation by new customers in 2001.

Q. Will HECO consider these other DSG models?

A. We may, however, at this time our focus is on the PGE model due to its extremely attractive cost-effectiveness and provision of mutual benefits to both the utility and the DSG customer.

Combined Heat and Power

Q. What are HECO's expectations with regard to CHP development on Oahu over the next four years?

A. We are forecasting up to 7 MW of new CHP being developed on Oahu in the 2006-2010 timeframe.

Q. How does this compare to prior CHP forecasts?

A. It is significantly lower than prior CHP forecasts. As shown on page 6 of HECO's March 6, 2006 Adequacy of Supply Letter, we had previously been forecasting up to 24 MW of CHP for this same timeframe.

Q. Why is the CHP forecast so much lower?

A. There are two primary reasons for the lower CHP forecast. First, over the last couple of years, it has become clearer that CHP development in Hawaii, particularly on Oahu, has been negatively affected by macro-scale economics. Specifically, the economic viability of CHP is highly sensitive to CHP fuel costs and grid electricity prices. The energy efficiency benefits of a CHP system may not translate to overall cost savings for a customer if the cost of CHP fuel – diesel, synthetic natural gas, or propane – is significantly higher than the cost of fuel used to generate grid electricity – low sulfur fuel oil in HECO's case.

The second reason is that HECO's ability to do CHP projects as a regulated utility may be restricted as a result of Decision and Order No. 22248

("D&O 22248") and Order No. 22375, in Docket No. 03-0371, the DG investigative docket. Although D&O 22248, as clarified by Order No. 22375, sets forth circumstances allowing regulated utility development of CHP systems, as a practical matter, the conditions make it substantially more difficult for utilities to provide CHP systems on a programmatic basis, rather than on a project-by project basis.

Q. Does HECO anticipate being able to dispatch the 7 MW of CHP that is forecasted?

A. It is possible that some of the 7 MW of CHP might be utility-owned and, therefore, dispatchable to some extent by the utility depending on factors such as the load shape of the thermal load at the customer's site, and how the CHP is sized relative to the thermal load.

Q. What about utility dispatch of customer or third party-owned CHP?

A. That is unlikely. This is not a realistic expectation or requirement for CHP systems owned by customers or third-parties. A third-party CHP system would be operated to maximize benefits to the customer and the CHP system owner. The utility-owned CHP system would be operated and maintained to balance the customer benefits with the overall utility operation. For example, a utility-owned CHP unit would offer the advantage of "real-time dispatchability".

Utility dispatch of customer-owned standby generation may be more realistic, but requires detailed technical and permitting evaluations, and installation of additional equipment. As discussed above, HECO is examining such an option.

Photovoltaic Systems

Q. What is HECO doing with regard to PV DG?

A. We have performed preliminary engineering for development of approximately 300 kW of PV at HECO's Ward Avenue complex, consistent with our IRP-3 preferred plan. We are currently determining our options with regard to financing the PV systems.

Q. When would this PV be installed?

A. The Ward Avenue PV would be installed sometime in 2007, subject to acquisition of required permits and regulatory approvals.

Q. Why is PV relevant to HECO's system capacity situation, given that it supplies energy on an intermittent basis?

A. PV systems do not meet firm capacity needs, but they do provide value to the utility in terms of producing energy and meeting renewable portfolio standards requirements.

Q. Does HECO anticipate growth in the number of PV systems to be installed on Oahu over the next several years?

A. Yes. Recent developments at the federal level may contribute to increased installations of PV systems by HECO's customers. The federal government recently increased the tax credit incentives for PV systems. Beginning January 1, 2006, the federal tax credit for commercial PV systems increased from 10% to 30% with no cap and there is a new 30% credit up to $2,000 for residential PV systems. The federal and state tax credits end December 31, 2007 and the fate of the tax credits after expiration is uncertain at this time. While State tax credits for PV systems so far remain unchanged, the changes in federal incentives may stimulate market response to PV systems. HECO anticipates that some customers may install PV systems during the forecast period, however, the amount and timing of such installations is indeterminate.

Q. Would HECO develop PV systems at customer sites?

A. Initial development and ownership of PV systems is generally not cost-effective for the electric utility, since regulated electric utilities are not eligible for federal renewable energy investment tax credits. As a result, the utility is evaluating how it might support the installation of PV systems at customer sites in partnership with third party PV developers. The economic viability of this model appears to be better on the neighbor islands compared to Oahu.

SUMMARY

Q. Please summarize HECO's expectations for DG development over the 2006-2010 timeframe.

A. With regard to DG projects whose firm capacities can be estimated, we anticipate adding approximately 15 MW more of HECO-sited temporary DG in 2006, and perhaps 3 to 6 MW more in 2007-2008 after which we will have exhausted HECO sites. There are opportunities to install 5 to 10 MW of similar temporary DG at Oahu military bases, also in the 2007-2008 timeframe. We are in the midst of evaluating the feasibility of an 8 MW DSG project at the Honolulu Airport, which, if successful, could be on line by early 2008. Finally, up to 7 MW of CHP is forecasted in the 2006-2010 period, however some of this CHP will be owned by non-utility entities and will not be dispatchable by HECO.

Q. What about the other DG efforts described in your testimony?

A. Our efforts to evaluate larger DG at DOD sites are still in the initial stages. Due to the expected requirements for permitting, contracting, and regulatory approvals, no additional capacity would be expected from these efforts before 2010. As for additional capacity from DSG, there are some additional opportunities which

HECO may pursue in parallel to its Honolulu Airport evaluation, however, it is not expected that such projects will add more than a few more megawatts of dispatchable DG. Finally, although we are pursuing development of PV at HECO's Ward Avenue complex and are considering how we might support customer-sited PV systems, such installations will not contribute firm capacity.

Q. What would be your sum total of expected dispatchable DG in the 2006-2010 period?

A. Based on the activities and opportunities above, I estimate installation of a total 30 to 45 MW of limited-duty dispatchable DG in the 2006-2010 timeframe.

Q. What is your understanding of how this amount of DG capacity might resolve HECO's need for system capacity?

A. To my understanding, this amount of DG will be helpful, but will not resolve, HECO's need for additional capacity. This is discussed by Mr. Sakuda in HECO T-2.

Q. Does this conclude your testimony?

A. Yes, it does.