Honolulu Seawater Air Conditioning' LLC's (HSWAC) Recommendations Regarding DSM Program Objectives/Optimization

HECO's Proposed DSM Expenditure Cap

Honolulu Seawater Air Conditioning, LLC (HSWAC) fully supports the existing DSM Program Objectives, but is strongly opposed to, and cannot support, HECO's proposed arbitrary DSM expenditure cap for the following reasons:

1. According to HECO "[t]he purpose of the proposed cap is to recognize that ratepayers are essentially paying for these DSM programs" and "… there is also an immediate impact on customers' electricity bill including an increase in bills for those customers not participating in the DSM programs) in the near term." While there may be an immediate impact (i.e., increase) in customers' bills in the near term, if these customers take advantage of savings provided by various DSM measures, their bills should decrease in the long term and the cumulative benefits will be much greater than any near term costs.[1]

2. Those who elect not to take advantage of these programs will see slightly larger near-term bills because of the relatively small DSM charge, but their bills will increase to a much greater extent due to rising oil prices and HECO's current proposed and anticipated future rate increases.

3. HECO, in its IRP process, should endeavor to provide a portfolio of opportunities, and any necessary incentives, for customers to reduce their bills through DSM measures. However, the total amount provided should not be limited by the failure of a few customers to take advantage of these measures. This is simply not an adequate justification for an arbitrary cap.

4. For those customers that are unable to afford the generally higher initial capital cost of DSM measures, it would be more prudent to for HECO or the third party administrator to develop additional innovative financing programs to enable low

[1] HECO has been very actively promoting the installation of compact fluorescent lights (CFL) as an effective energy and cost saving DSM measure. The average HECO residential customer uses about 8,000 kWh/yr at an average cost of $0.20/kWh, for an annual cost of $1,600. A DSM charge of 2.5% on this amount (without any revenue adjustments) is only $40/yr. A CFL saves about 75% of the electricity used in an incandescent bulb with the same light output. Assuming: (1) a 25-W CFL replaces a 100-W incandescent; (2) electricity savings are 75%; (3) the lights are used for 4 hr/day, and (4) residential electricity costs $0.20/kWh, then annual cost savings are $21.90/100-W CFL. Thus, the average residential customer can more than offset their DSM charge by replacing only two 100-W bulbs. Replacing only four bulbs would allow for a 5% DSM charge without any increase in residential customer bills. HECO could provide these CFLs for free, to low-income customers, as part of their DSM program without substantially increasing overall program costs. More recently, the Pay-As-You-Save (PAYS) program has been proposed to allow low-income customers to obtain a solar water heating system with no increase, and in many cases a decrease, in their monthly bills.

income customers to take advantage of these DSM measures. For those who don't want to make use of DSM measures, any higher bills they experience are an unavoidable consequence of a personal choice.

5. HECO has proposed an annual DSM expenditure cap of 2.5% of the base revenue. HECO claims that "this level of expenditure is consistent with the levels of expenditures by the utilities on the mainland …" While, as HECO claims, the proposed cap may be at the higher end of the expenditure range for selected utilities (i.e., 0.5% to 3.4%), this does not mean that 2.5% is an adequate amount to achieve necessary Energy Efficiency goals, especially when you consider HECO's current over-dependence on expensive, imported, fossil fuels which generate greenhouse gas emissions and other pollutants and HECO's current (and projected) reserve capacity shortfalls.

6. HECO provides no estimate of a dollar amount at the 2.5% level (for the years 2010 to 2028) so it is difficult to determine how much they are talking about and whether this amount will be sufficient to achieve appropriate Energy Efficiency goals[2]. Furthermore, HECO has not yet established these Energy Efficiency goals. Without an adequate knowledge of the magnitude of the required Energy Efficiency goals, and the cost to achieve them, it would not be prudent to establish an arbitrary DSM expenditure cap at this time.

7. HECO has repeatedly asked the Commission for flexibility in the execution of its DSM programs, the ability to shift funds from one program to another, and for additional funds for particular programs. An arbitrary DSM expenditure cap would reduce this flexibility, not only for HECO, but also for the third party administrator[3] that will take over these programs beginning January 1, 2009.[4]

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[2] "In addition to DSM objectives, Energy Efficiency goals must also be established to measure performance." [page 14]; "…in addition to any quantitative or qualitative DSM objectives, Energy Efficiency goals will be established and used to measure actual demand and energy savings." [page 15]; and "After consideration of all of the foregoing, the commission determines that it is necessary to immediately establish Energy Efficiency goals in this docket, and that the goals may be revised in the IRP process. This will allow Energy Efficiency goals to be set immediately (except for KIUC and TGC, as discussed below), and allow for a comprehensive review in subsequent IRP processes." [pages 17 – 18] Decision and Order No. 23258 ("D&O 23258"), February 13, 2007.

[3] "In the commission's view, the Non-Utility Market Structure for administering Energy Efficiency programs is the most appropriate for the HECO Companies. First, the Non-Utility Market Structure will remove the perceived inherent conflict between a utility's desire to generate revenues and income, and Energy Efficiency measures that serve to decrease sales and defer the need for additional plant investment ... Second, the commission expects that DSM program administration by a new entity will facilitate the introduction of innovative Energy Efficiency programs to the State, resulting in greater customer choice, increased participation levels, and higher overall energy savings. In particular, the Non-Utility Market Structure is expected to result in improved penetration in hard-to-reach and under-served segments. Third, the Non-Utility Market Structure is expected to improve the cost-effectiveness of administering DSM programs ..." [D&O 23258 - pages 35 – 36]. "… all DSM programs, including those designed for the commercial and industrial sector, will be administered by the non-utility third-party." [D&O 23258 - page 39]

[4] "[O]n February 13,2007, the Commission filed Decision and Order No. 23258 in Docket No. 05-0069 stating that by January 2009, all of the HECO Companies' Energy Efficiency DSM programs, with the

8. Placing an arbitrary expenditure cap on DSM expenditure could mean that certain very useful DSM technologies (e.g., solar water heating [SWH] or seawater air conditioning [SWAC]) may not be able to receive the rebate to which they are entitled. In the case of SWH, a higher rebate level and the existence of both State and federal tax credits has stimulated sales. If these sales exceed HECO's expectations, and an arbitrary DSM expenditure cap is in effect, there may not be sufficient monies available for all qualified customers.

9. SWAC systems are very large and provide proportionally large benefits to HECO's utility system, to Oahu, and to the State. Several SWAC systems have been proposed for Oahu and one is currently being developed for Downtown Honolulu. Each of these systems has a nominal design capacity of 25,000 tons. At a minimum, 18,000 to 20,000 tons of connected capacity are required at startup[5], with maximum capacity being reached 6 to 18 months after startup.[6] HECO has estimated that the rebate for SWAC would be in the range of $150 to $230 per ton.[7] (Based on its own calculations, HSWAC maintains that it will, and should, be higher than this.) Even using HECO's low estimate, this means that HECO would have to provide a total rebate of $2.70 to $5.75 million for a typical SWAC system in a given year. HSWAC is justifiably concerned that an arbitrary DSM expenditure cap may not allow this required[8] rebate to be provided.

For all of the above reasons, HECO's proposed arbitrary DSM expenditure cap should be rejected.

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exception of the Company's Load Management programs, shall transition to the Non-Utility Market Structure. As a result, HECO's IRP-3 assumptions beyond the five-year action plan may be characterized as "questionable" as there is no assurance that under the Non-Utility Market Structure the same programs will continue at the level proposed in IRP-3." [ORDER NO. – 23328 / DOCKET NO. 2007-0084 / Regarding Integrated Resource Planning ("ON 23328), March 29, 2007, page 4 of Exhibit 1]

[5] This represents the breakeven capacity needed for system financing and is a function of a particular system.

[6] Additional capacity can be quickly brought on line and it is anticipated that once construction has begun on the SWAC system, commitments for the remaining 5,000 to 7,000 tons of capacity will be filled very soon after startup.

[7] "HECO states that the appropriate rebate levels that SWAC should be eligible for are $0.05 per kWh and $125 per kW offered under the CICR Program. Under these rebate levels, HECO states that preliminary analysis indicates that the rebate through the CICR Program would be between approximately $150 per ton and $230 per ton." [D&O 23258 - pages 132 and 133]

[8] According to the Commission "HREA's SWAC Proposal, considered under HECO's CICR Program, shall [underlining added for emphasis] have rebate levels consistent with the rebate levels for other customized Energy Efficiency measures in the CICR Program." [page 147]

DSM Program Objectives/Optimization

HECO has summarized their DSM program objectives as follows: (1) energy savings; (2) peak demand reductions (including overall demand reduction, targeted peak reduction, targeted geographical load reduction, and load shifting); (3) customer equity (providing all classes of customers the opportunity to participate in the programs); (4) cost effectiveness (recognizing that this objective may sometimes be at odds with customer equity); and (5) market transformation.

They have asked Advisory Group members to assist them in "balanc[ing] the DSM objectives to determine an optimum DSM portfolio."

In order to do this, it is necessary to not only consider DSM objectives, but the overall objectives of the Integrated Resources Program (IRP) process. DSM is only one part of the IRP process.

IRP-3, and the objectives stated therein, should serve as the baseline for IRP-4 development.[9]

Integrated Resources Planning

Goals of IRP

The primary goals of Integrated Resources Planning (IRP), as defined by the IRP Framework and State of Hawaii-Public Utilities Commission, are:[10]

- "… the identification of the resources or the mix of resources for meeting near- and long-term consumer energy needs in an efficient and reliable manner at the lowest reasonable cost."
- "… giv[ing] consideration to the plans' impacts upon the utility's customers, the environment, culture, community lifestyles, the state economy, and society."

[9] "Pursuant to Section III.B.2 of the Commission's IRP Framework, revised on May 22, 1992, HECO is to conduct its next major review of the IRP plan set for in IRP-3 and establish a new 20-year time horizon for the period 2009 through 2028 as IRP-4." [ON 23328, footnote 6, page 4 of Stipulation]; "… HECO, the Consumer Advocate, and LOL agree that the integrated resource planning process is continuous and that given the above, it would be more appropriate for HECO to begin a new IRP cycle in which forecasts and planning assumptions can be updated and developments since the October 28,2005 filing of HECO's IRP-3 Plan can be appropriately considered …" [ON 23328, footnote 6, page 4 of Stipulation]; and "Approximately 15 months prior to the proposed June 2008 filing date of the Company's IRP-4 Plan (i.e., March of 2007), HECO will conduct Advisory Group meeting(s) to discuss the development of the Company's IRP-4 Plan, including modifications, if any that may be required to the IRP-3 Plan based on the Commission's findings in Docket Nos. 03-0371, 03-0372, 05-0069, 05-0145 and 05-0146. In such meetings, HECO will commit to improving the manner in which the Company implements the IRP planning process as set forth in the IRP Framework." [ON 23328, footnote 6, page 5 and 6 of Stipulation] - HECO's INTEGRATED RESOURCE PLAN: 2006 – 2025 ("IRP-3"), Docket No. 03-253, October 28, 2005, Hawaiian Electric Company, Inc.

[10] IRP-3, pages 1-22 and 4-1

IRP Objectives

A number of objectives were also identified for the IRP process:[11]

- Protect the environment;
- Economical electricity;
- Power quality and reliability;
- Energy security and sustainable future;
- Minimize potential negative societal and cultural impacts;
- Increase plan flexibility; and
- Utility financial integrity and competitiveness.

Criteria for Judging HECO's IRP Plans

HECO's Preferred IRP Plan should be judged on how well it meets IRP goals and objectives. And, the DSM portion of the IRP Plan should be judged on how well meeting these DSM objectives contributes towards meeting overall IRP objectives.

One Possible Approach to DSM Program Optimization

One possible approach to DSM Program Optimization is to prepare a matrix of IRP and DSM objectives similar to that on the next page:

Each of the DSM objectives would be analyzed to see how it impacts, and helps to meet, IRP objectives. A similar approach should be taken for the Supply Side.

Ideally, the IRP objectives would be prioritized and/or assigned a weighting. Then DSM (and Supply Side) programs would be evaluated to determine how well they meet these objectives, while still fulfilling DSM and Supply Side objectives.

A brief discussion of each of the objectives follows the table. The analysis is not all-inclusive and is used to demonstrate a possible approach to this problem. The results shown in the table are HSWAC's preliminary assessment of an optimum approach to DSM program development.

[11] IRP-3, page 1-5

Objective	Energy Savings	Peak Demand Reductions	Customer Equity	Cost Effectiveness	Market Transformation
Protect the Environment	+	o	o	o	+
Economical Electricity	+	+	o	+	o
Power Quality and Reliability	+	+	o	o	+
Energy Security and Sustainable Future	+	o	o	-	+
Minimize Potential Negative Societal and Cultural Impacts	+	o	+	o	o
Increase Plan Flexibility	o	+	-	+	+
Utility Financial Integrity and Competitiveness	o	o	+	+	+

Key: + = positive impact o = little or no impact - = negative impact

IRP Objective 1 – Protect the Environment

DSM Objective 1 - Energy Savings

- HECO relies on fossil fuels for more than 90% of its energy needs for electricity production.
- Fossil fuel combustion produces greenhouse gases (GHG) and a wide variety of other air and water pollutants.
- GHG reductions have become much more important since the last IRP process with the passage of HB 226[12] during the 2007 legislative session and the recognition of the importance of this issue by parties to this IRP docket.[13]
- DSM measures that provide for energy savings would therefore reduce emissions and the adverse impacts on the environment.
- Thus, energy savings (reduced use of fossil fuel) is very important for protecting the environment.
- Therefore, energy savings through DSM should receive a high points total or rating.

DSM Objective 2 – Peak Demand Reductions

- Demand reductions can be achieved through load shifting, energy efficiency, energy storage, and demand control.

[12] Act 235 – H.B. 226, S.D. 2, H.D. 2, C.D. 1 – RELATING TO GREENHOUSE GAS EMISSIONS, http://www.capitol.hawaii.gov/sessioncurrent/bills/HB226_cd1_.htm, Establishes as state policy statewide greenhouse gas emissions limits at or below the statewide greenhouse gas emissions levels in 1990 to be achieved by January 1, 2020. Establishes greenhouse gas emissions reduction task force to prepare a work plan and regulatory scheme to achieve the statewide greenhouse gas emissions limits.

[13] "HECO, the Consumer Advocate, and LOL agree that the issue of Climate Change requires attention throughout the IRP-4 process. In order to facilitate this, HECO will conduct (as part of its IRP-4 process) a technical session with a panel discussion on climate change and global warming, and will perform a scenario analysis (or analyses) to analyze potential future requirements or utility costs arising out of measures that may be adopted to address climate changes/global warming. The intent of the panel discussion is for HECO and the Advisory Group members to get a better understanding of the issues relating to global warming and how it should be considered in the IRP process. The Advisory Group members will have the opportunity to provide experts for this panel discussion and will be allowed to participate in a question and answer forum. HECO will include a copy of this panel presentation and discussions with its IRP-4 Plan filing, so that the information will become part of the record in the IRP-4 Docket opened by the Commission. (In order to include a copy of the panel discussion with the IRP-4 Plan filing, a transcript of this panel discussion will be prepared.) The Advisory Group also will have the opportunity to provide input to HECO regarding the climate changes/global warming alternative scenario analysis (or analyses), and any climate change/global warming alternative resource plan considered in the IRP-4 process." [ON 23328, page 13 - 14 of Stipulation]

- Load shifting (e.g., by getting customers to shift energy use from on-peak to off-peak) will reduce demand, but may not have any significant impact on energy use, and therefore may not provide any environmental benefits.

- Energy efficiency can reduce peak demand and energy use. The demand reduction has no impact on the environment, while the reduced energy use will.

- Energy storage (e.g., ice storage for air conditioning) shifts the load for air conditioning from the daytime peak to off-peak night use. Unfortunately, such systems may actually be less efficient than conventional air conditioning systems, are significantly less efficient than SWAC systems, and may actually use more energy. As a consequence, energy storage systems may have a more negative impact on the environment.

- Demand control (e.g., radio control of water heaters during peak use periods) may reduce peak demand, but provides little or no energy savings (aside from the use of a better insulated and more energy efficient water heater). Thus, demand control does little or nothing to protect the environment.

DSM Objective 3 – Customer Equity

- On the one hand, because the residential sector may be harder to reach with DSM measures, there may be a need to provide larger DSM incentives to obtain DSM program objectives for this customer class. However, compact fluorescents and solar water heating are two DSM measures that can have a significant impact and are heavily promoted by the utility.

- On the other hand, commercial electricity use is much greater than residential electricity use, and the DSM options are greater and the ability to reach customers in this class is easier.

- Thus, as long as a maximum effort is made to achieve Energy Efficiency goals for both customer classes, customer equity will have little or no impact on protecting the environment.

DSM Objective 4 – Cost Effectiveness

- The impact of the “cost effectiveness” of a DSM measure, or portfolio of DSM measures, depends on how cost effectiveness is measured.

- Presumably, all DSM measures that pass the MAP analysis are “cost effective.”

- Unfortunately, the economic analysis used in the MAP analysis only looks at the simple payback of a differential capital cost through energy savings and does not consider the value of other benefits provided (e.g., reduction of potable water use

and sewage generation by SWAC systems through elimination of cooling towers; GHG emissions reduction; etc.)

- DSM measures should be evaluated on their net energy and GHG emissions benefits and this value should be used to help determine cost effectiveness (i.e., how much does it cost to save a unit of fossil fuel energy or GHG emissions).

DSM Objective 5 – Market Transformation

- The only way that market transformation can affect the environment is if there are market barriers that need to be overcome in order for promising DSM technologies to gain a foothold in the market.

- For example, SWAC district cooling is a relatively unfamiliar technology to Hawaii customers. SWAC system reduce energy sue by more than 75% and eliminate the need for cooling towers. District energy systems have been successfully deployed for more than 100 years, ocean pipes have been used for similar periods, and all the other required components are available off the shelf. The only difference between conventional district cooling systems and a SWAC district cooling system is the source of the cooling – electric chillers vs. infinitely renewable, cold deep seawater.

- By not providing sufficient DSM incentives to overcome market barrier and transform the market, the utility risks the possibility that SWAC systems may not be developed here. This would create a lost opportunity for demand reductions and energy savings that are equal to all of HECO's other DSM programs.

A similar approach has been taken for each of the other IRP and DSM objectives with the results entered in the table.

Conclusions

- Based on the tabulated assessment of how well various DSM objectives help to meet IRP objectives, the importance of DSM objectives was ranked as follows:

    - Energy Savings (8 points)[14]
    - Market Transformation (5 points)
    - Peak Demand Reduction (3 points)
    - Cost Effectiveness (3 points)
    - Customer Equity (1 point)

- Energy Savings appears to be most important towards meeting IRP objectives for a variety of reasons.

[14] Large + = 2 points; Small + = 1 point; o = 0 points; Small - = -1 points; Large - = -2 points

- DSM Objective 1 – Energy Savings (#1)

    - Reduced fossil fuel energy use will greatly help to protect the environment.
    - Energy (electricity) savings have the potential to significantly reduce customer bills (even if electricity rates rise).
    - Energy savings may also lead to demand reduction and reduce the impact on T&D (including power quality problems associated with variations in voltage). System reliability will increase due to decreased demand, particularly at peak.
    - Energy savings through greater energy efficiency and electricity substitution by renewables (e.g., solar water heating and SWAC) will reduce the need for imported fossil fuels, increase energy security, and help to make Hawaii more sustainable.
    - Societal and cultural impacts will be reduced through stabilization and reduction in electricity costs and through a reduction in the adverse impacts of fossil fuel power plants that are generally sited in lower-income areas.
    - Little or no impact on increasing plan flexibility.
    - Energy savings will have little or no impact on utility financial integrity and competitiveness. Load growth will stabilize, or continue to grow at a slower rate. Rates may have to increase slightly to cover utility sunk costs. Utility will still have to provide most electricity needs.

- DSM Objective 5 – Market Transformation (#2)

    - Market transformation which allows the DSM program to take advantage of promising technologies (e.g., SWAC) can greatly contribute to energy savings, and thus help to protect the environment.
    - Market transformation should have little, or no, affect on economical electricity if available program finds are appropriately distributed to those technologies that provide the most benefits for the buck. On the other hand, inequitable/non-cost-effective distribution of these funds could have negative impacts on the cost of electricity.
    - Again, market transformation which allows the DSM program to take advantage of promising technologies (e.g., SWAC) can greatly contribute to demand reduction which will reduce the impact on T&D (including power quality problems associated with variations in voltage). System reliability will increase due to decreased demand, particularly at peak.
    - Energy security will increase due to a reduced dependence on imported fossil fuels. Renewable energy based technologies, such as SWAC and solar water heating, will help to create a more sustainable future.
    - Market transformation may have little or no impact on minimizing potential societal and cultural impacts.
    - Market transformation allows the DSM program to take advantage of promising technologies, which increases the portfolio of available options and increases plan flexibility.
    - Again, by creating a large portfolio of DSM options, the utility's reserve capacity shortfall will decrease, as a result their bond rating might rise, and

customers who take advantage of DSM options may not find it necessary to produce their own electricity and go off-grid.

- DSM Objective 2 – Peak Demand Reductions (#3)

  - Peak demand reductions will do little or nothing to help protect the environment.
  - The reduced need for new power plants will help to reduce the cost of electricity.
  - Power quality and reliability will improve if the utility system is not stressed due to excessive demand on the T&D system and a severe reserve capacity shortfall (both of which will be mitigated by peak demand reductions).
  - Peak demand reductions, alone, will have little or no impact on energy security and sustainable future.
  - Peak demand reductions will do little or nothing to minimize potential negative societal and cultural impacts (unless the avoided peaking power plants were to be sited in lower-income areas).
  - Peak demand reductions can help to increase plan flexibility if there is a recognition and consideration of the fact that the utility needs to address both daytime and nighttime peaks.
  - Peak demand reductions will have little or no impact on utility financial integrity and competitiveness. Load growth will stabilize, or continue to grow at a slower rate. Rates may have to increase slightly to cover utility sunk costs. Some additional capacity may still be required, but the utility's bond rating may improve if they are able to significantly reduce their reserve capacity shortfall through aggressive DSM program implementation (and renewable energy development).

- DSM Objective 4 – Cost Effectiveness (#4)

  - Presumably, all of the DSM measures selected through the MAP analysis are "cost effective" on the basis of simple payback of incremental capital cost through energy savings. This type of cost effectiveness does not necessarily correlate with protection of the environment. For example, demand control strategies may be very cost effective, but not save energy. Other DSM measures may provide significant in addition to energy savings (e.g., potable water savings, sewage reduction, reduced use of toxic chemicals with SWAC) that are not included in HECO's determination of cost effectiveness.
  - Aggressive implementation of a wide variety of DSM measures has the potential to significantly reduce energy use and associated negative externalities. If we consider the beneficial impacts of this on customer bills, rather than on utility rates, this can greatly help to reduce electricity costs to the average customer.
  - The cost effectiveness of DSM measures will have little or direct no impact on power quality and reliability.

- If externality benefits provided by certain DSM measures are not included in the cost-effectiveness analysis (i.e., quantitatively through monetization, rather than just qualitatively), some promising DSM measures may be missed and others may not receive the priority they deserve. This objective was assigned a negative value because of this.
- Cost effectiveness will have little, or no, impact on minimizing potential negative societal and cultural impacts.
- By appropriately including externalities values in the cost effectiveness equation, the portfolio of DSM measures will increase and those measures that provide the greatest benefits will receive the highest priority.
- Again, by creating a large portfolio of DSM options, the utility's reserve capacity shortfall will decrease, as a result their bond rating might rise, and customers who take advantage of DSM options may not find it necessary to produce their own electricity and go off-grid.

- DSM Objective 3 – Customer Equity (#5)

  - Customer equity should have little, or no, impact on protecting the environment, economical electricity, power quality and reliability, or energy security and sustainable future.
  - By focusing more of DSM program funds on the residential sector (especially low income assistance), these customers will be better able to take advantage of DSM opportunities, and the utility may be able to minimize potential negative societal and cultural impacts.
  - In trying to achieve customer equity, the utility may forego opportunities in one customer class that could significantly increase the cumulative impact of the entire DSM program.
  - By trying to achieve customer equity, the utility may be able to retain a greater proportion of customers from both classes who otherwise might go off grid (particularly if they felt that they were unfairly subsidizing the other customer class).

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