STRATEGIES TO FACILITATE THE DEVELOPMENT AND USE OF RENEWABLE ENERGY RESOURCES IN THE STATE OF HAWAII

A Report to the Legislature
Pursuant to S.C.R. 40, S.D. 1, 1994

Public Utilities Commission
State of Hawaii
February 1996

Table of Contents

Exhibits

Exhibit A - S.C.R. 40, S.D. 1, 1994

Exhibit B - Commission Order No. 13441

Exhibit C - Commission Order No. 13849

FOREWORD

The following report presents the findings of an informational proceeding conducted by the Public Utilities Commission pursuant to Senate Concurrent Resolution No. 40, Senate Draft 1, 1994 (S.C.R. No. 40). The resolution requested a study of renewable energy resource utilization in the State of Hawaii and resulted in the opening of Docket No. 94-0226.

We wish to acknowledge the research assistance of the U.S. Department of Energy, especially Blair Swezey of the National Renewable Energy Laboratory, and the parties in Docket No. 94-0226, whose collaborative efforts produced this report.

We also acknowledge the cooperation and support extended to the parties in the docket by Jane Aus Yamashiro, who facilitated the collaborative process, and the following participants in our workshops on renewable energy resource issues:

- James Birk of the Electric Power Research Institute
- Cheryl Harrington, Ed Holt, David Moskowitz, and Carl Weinberg, of The Regulatory Assistance Project
- Alan Hoffman of the U.S. Department of Energy
- Eric Miller of Kenetech Windpower
- Ed Smeloff of the Sacramento Municipal Utilities District

Yukio Naito
Chairman
Public Utilities Commission

EXECUTIVE SUMMARY

Senate Concurrent Resolution No. 40, S.D.1 (S.C.R. No. 40), adopted by the 1994 Legislature, requested the Public Utilities Commission (Commission) to initiate an informational docket to facilitate the development and use of renewable resources in the State of Hawaii. In response to S.C.R. No. 40, the Commission, by Order No. 13441, filed on August 11, 1994, opened Docket No. 94-0226. The objectives of this informational docket were to:

- Study the policies, statutes, and programs of other jurisdictions, as well as the strategies employed by these jurisdictions to implement the deployment of renewable energy resources;
- Examine policies presently employed by the State of Hawaii with respect to facilitating the utilization of renewable energy resources;
- Identify barriers to the development of renewables in Hawaii; and
- Formulate strategies to remove the barriers and implement the use and development of renewables in Hawaii.

Twenty-one parties representing state and county agencies, regulated providers of electric power and energy services, authorized non-utility generators operating in Hawaii, vendor/developers, and business and community interest groups were parties in the docket. The parties included the counties of Hawaii, Kauai, and Maui; the Department of Business, Economic Development and Tourism (DBEDT); the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs; Hawaiian Electric Company, Inc.; Hawaii Electric Light Company, Inc.; Maui Electric Company, Limited; Kauai Electric Division of Citizens Utilities Company; Hawaiian Commercial and Sugar Company; Inter-Island Solar Supply; Kahua Ranch, Ltd.; Makani Uwila Power Corporation; John Crouch, dba Energy Resource Systems; the Pacific International Center for High Technology Research; RLA Consulting Inc.; the Honorable Senator Matt Matsunaga; TRM/Wind Energy International, Inc.; Waimana Enterprises, Inc.; Zond Pacific, Inc.; and David Rezachek.

Docket activities commenced with a series of workshops conducted by the Commission. The workshops featured presentations by local and mainland experts on renewable energy. The parties subsequently participated in an intensive collaborative process to attempt to build consensus in identifying barriers to the successful deployment of renewable energy resources in Hawaii and developing strategies to overcome those barriers.

This report consists of two parts. The first part consists of a study conducted by the Analytic Studies Division of the National Renewable Energy Laboratory (NREL), entitled Renewable Energy Policy Options for the State of Hawaii. The NREL study reviews and evaluates the policies employed by other states to encourage the development of renewables development, and identifies potential policy options appropriate for Hawaii. The second part consists of the

Collaborative Document, which summarizes the parties' collaborative efforts to identify barriers and formulate strategies for the use of renewables in Hawaii.[1]

The NREL Report: Renewable Energy Policy Options for the State of Hawaii

NREL cites the following factors as primary impediments to the successful deployment of renewable energy resources in Hawaii:

- Renewable energy systems are capital intensive and accordingly, require a large initial capital investment.
- Electric utilities fail to incorporate the benefits of renewables, e.g., environmental advantages and economic and security benefits of nonreliance on imported fuels, in their market decisions.
- Market power is concentrated in the hands of the electric utility companies, thus, impeding alternative types of investments, including investments in renewables.

In its review of state policies to encourage renewable energy deployment, NREL identifies three major policy vehicles which are commonly used by other states and which have been employed by the State of Hawaii:

- *Financial incentives for developers*, such as tax credits, tax exemptions, or direct loans and grants, which lower the high initial cost of renewable energy systems.
- *Power purchase contract rules* which assist non-utility developers in securing contracts for the sale of power to a utility by guiding contract negotiations and the determination of "avoided cost" payments.
- *Integrated resource planning (IRP)* which requires utilities to consider renewables among the range of generation alternatives when developing their least-cost plans. In Hawaii, as well as some other jurisdictions, utilities are required to consider environmental, fuel diversity, and economic development issues when selecting resources for its integrated resource plan.

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[1]To avoid a duplication of effort, docket issues regarding the assessment of Hawaii's renewable resources were deferred to DBEDT. In an October 1995 report, entitled *Hawaii Energy Strategy Report*, DBEDT's Hawaii Energy Strategy program (HES) assesses wind, solar, biomass, hydroelectric, ocean thermal energy conversion, geothermal, and wave energy resources, and identifies areas with high resource development potential. In conjunction with this report, DBEDT developed an analytic resource supply curve computer model which permits ongoing feasibility assessments of available renewable resources and sets forth a plan for integrating renewable energy into Hawaii's energy supply mix.

The NREL study identifies the following as basic strategies which have been implemented or considered by other states to further the deployment of renewable energy resources:

Net energy metering (or billing), a customer incentive where utilities pay small-scale renewable generators the retail rate for the net difference between the amount of energy used from the utility and the amount supplied to the utility grid.

Set-asides, where the utilities administratively or legislatively require the utilities to reserve a block of new generation for renewable resources.

Renewable-specific legislation, which establishes renewables as a preferred generation choice.

Direct access, which opens the electric utility system and grid to renewable energy suppliers for the sale of renewable-generated power to willing consumers.

Green pricing, which gives customers the opportunity to support the implementation of renewables by paying a premium to cover the utility's incremental cost of acquiring renewables.

Risk allocation, through methods such as the elimination of fuel adjustment clauses, to shift some of the risk of fuel price volatility from the ratepayers to the utility's shareholders.

Targeted financial incentives and disincentives for the utility, which reward a utility for prudent investments in renewables and penalize a utility for not investing in renewables. This can be accomplished through the imposition of tax levies and exemptions, increases or decreases in the utility's rate of return, and performance-based ratemaking in which renewable deployment is one criterion for determining utility earnings.

System benefits charges, which impose standard customer fees to fund public renewables programs that may not be feasible for the utility in a more competitive environment.

Green requests for proposals, which consist of utility competitive bidding solicitations for new generation resources limited to renewables.

Renewables portfolio standards, which impose minimum renewable energy requirements on every electricity supplier.

To promote the development of renewables in the State of Hawaii, NREL suggests the following strategies:

- A clear pronouncement by the State that renewable energy development remains an important objective, and the establishment of a concrete goal for renewable development and supporting policies.

- Establishment by the State of an official preference that all new generating capacity employ renewable energy resources unless it is demonstrated, on a case-by-case basis, that the employment of renewables is not in the public interest.

- Development of financial incentives to utilities, renewable energy providers, and customers that could be funded from general revenues or by a "systems benefit charge" assessed on all electricity customers.

- Establishment of a portfolio standard to create a market for the development of renewables by imposing a minimum renewable energy requirement for the State's electricity mix.

- Development by the utilities of a competitive green power product that allows customers to exercise voluntarily a preference for electricity from renewable energy sources.

- Authorization for alternative renewable energy providers to supply renewable energy service options directly to a utility's wholesale and retail customers.

- Establishment of a net energy metering policy that allows customers to offset high retail rates with small-scale renewable electric systems.

The Collaborative Document[2]

The Collaborative Document identifies the following as real and perceived barriers to the increased development of renewable resources in Hawaii:

- Insufficient avoided cost prices for developer financing;

- Limitations on the amount of renewable energy that can be accommodated by the electric utilities;

- A complex and lengthy permitting process and limited availability of sites;

- A form of price offered to renewable developers that does not facilitate financing;

- The lack of new renewables in current 20-year integrated resource plans;

- Unduly protracted purchase power agreement negotiations;

[2]The Collaborative Document is not a consensus document and does not represent unanimous agreement by all parties.

- The lack of renewable-specific wheeling mechanisms and opportunities for consumer access to renewable power;

- The potential negative environmental and societal impacts of renewable resources;

- The development status of certain renewable and storage technologies that may not be sufficiently mature to be economically viable; and

- Fragmented and overlapping efforts by the State in renewable energy research, development, demonstration, and commercialization.

The Collaborative Document recommends that the following key strategies be considered by the Legislature, the Commission, DBEDT, the counties, and renewable energy developers to facilitate the successful development of renewable energy resources in Hawaii:

Legislative strategies

- Maintain existing tax credits for the purchase and installation of solar and wind energy devices, heat pumps, and ice systems (Hawaii Revised Statutes (HRS) § 235-12).

- Authorize special purpose revenue bond financing for renewable energy projects.

- Facilitate and expedite permit processing by providing training opportunities for permitting agency staff and providing funds to implement the Consolidated Application Permitting Process and the Permit Process Facilitation Act of 1985 which would streamline state and intergovernmental permit processes.

- Establish set-asides, procurement targets, or quotas to mandate the purchase of specific amounts of renewable energy within set timeframes.

- Mandate that preferential treatment be given to renewables in integrated resource plans.

Commission strategies

- Minimize the NIMBY (not-in-my-backyard) syndrome by providing public education on conservation and the benefits of renewable energy.

- Provide financial assistance to IRP participants to facilitate their continued input into the IRP process.

- Establish renewable set-asides in integrated resource plans.

- Consider utility/shareholder incentives, such as the recovery of utility costs for renewable energy demonstration projects or joint ventures through utility rates.

- Permit customer incentives, such as net billing payment rates for small renewable energy systems.

- Facilitate the calculation of avoided costs by requiring capacity and energy value payments to as-available energy producers, requiring an externalities adder for renewables above avoided costs, and utilizing a standard offer contract and a standardized method of calculating avoided costs.

- Implement and enforce statutes and regulations that expedite power purchase contract negotiations by:

    - Initiating rulemaking procedures to allow qualifying facilities to petition the Commission for a hearing when negotiations are at an impasse;

    - Utilizing the services of a hearings officer or arbitrator for Hawaii Administrative Rules chapter 6-74-15(c) hearings;

    - Implementing HRS § 269-16.2 by requiring Commission approval of rules, guidelines, and standards that interpret federal and state laws governing non-utility generators; and

    - Streamlining the regulatory approval process for renewable power purchase agreements.

- Consider the use of competitive options by:

    - Eliminating energy cost adjustment clauses that pass oil price variability risks to a utility's ratepayers;

    - Implementing a competitive bidding process for the acquisition of new resources; and

    - Permitting renewable energy suppliers to sell their power directly to retail consumers.

Utility strategies

- Increase the accommodation of renewable energy power by the electric utilities by implementing demand-side management measures and conducting a study on the use of energy storage systems.

- Analyze the potential of niche applications for renewables resources, such as HELCO's photovoltaic applications program.

- Consider the provision of incentives to utility shareholders for investing in renewable energy facilities and renewables research, development, and demonstration (RD&D) projects.

- Utilize reasonably demonstrated avoided capacity costs for as-available resources in power purchase negotiations and in IRP benefit and price valuations.

- Facilitate developer financing of independent power purchase projects by:

  - Utilizing front-loaded and standard contracts, and contract terms that establish predictable payment streams and recognize the demonstrated life of an asset;

  - Continuing the application of minimum purchase rates for as-available renewable resources;

  - Applying an externalities adder to avoided energy costs; and

  - Promptly reviewing power purchase contract proposals and specifying what the problem areas of a proposal are to the qualifying facility making the proposal within 75 days.

- Amend procedures to ensure the early involvement of public and public advocates in the energy planning process.

- Participate in resource assessment on a cost-sharing basis with the State.

- Assume a greater role in resource assessment, and improve utility system operation and resource planning methodologies and models by:

  - Utilizing modeling conventions and generation capacity expansion criteria that consider the merits of as-available generation resources for system reliability;

  - Reanalyzing the amounts of intermittent renewable energy resource power that the utility's system can absorb to favor the deployment of renewables;

  - Improving methodologies that valuate the merits of renewables and proceed with the quantification of externalities through the IRP process; and

  - Employing cost-effective methods to minimize the negative impacts of potential renewable resource projects, such as making design and site changes.

- Consider a net energy billing program.

- Implement a green pricing tariff to assist the utility in acquiring new renewable resources and implementing renewable energy RD&D projects.

DBEDT strategies

- Monitor and support legislation to maintain existing renewable energy tax credits.

- Obtain clarification on the application of existing state tax credits to large renewable energy facilities.

- Study the feasibility of implementing developer, utility, and customer incentives to facilitate the deployment of renewables by:

  - Establishing a work group to examine the efficacy of new state incentives;

  - Developing strategies to reallocate the risk of oil price vulnerability away from the ratepayers; and

  - Considering a production incentive for renewable energy developers that is funded by a ratepayer surcharge.

- Have DBEDT's energy resources coordinator take the lead in coordinating state energy research, development, and demonstration activities.

- Convene a workshop of pertinent state agencies to streamline renewable energy development efforts and resolve conflicting agency objectives.

- Conduct an organizational analysis of research and development organizations and develop a restructuring plan for renewables.

- Lead efforts to streamline the permitting process required for renewable resource projects by:

  - Seeking amendment of HRS § 201-64, the Permit Process Facilitation Act of 1985, to make discretionary provisions of the law mandatory; and

  - Encouraging the permitting agencies to establish special rules for small scale projects and to weigh in the net benefits of renewable projects in permitting decisions.

- Move forward with energy planning activities by:

  - Modifying DBEDT's existing computer model to enable analyzation of the combined effects of a variety of distributed renewable energy projects in a given service territory;

- Funding the publication of additional copies of the final report of DBEDT's Renewable Energy Resource Assessment and Development Program to enable distribution of the report to the utilities, and local and out-of-state renewable energy developers; and

- Engaging in research to improve renewable energy system performance by actively monitoring and participating in renewable resource development and demonstration projects applicable to Hawaii.

County strategies

- Establish renewable energy subzones, i.e., areas compatible with renewable energy resource availability, zoning, and long-range county plans.

Renewable energy developer strategies

- Use tax credits and special revenue bond financing for renewable projects.

- Educate the public on the environmental and social impacts of renewable energy projects and encourage public input for project developer and government use.

- Conduct IRP supply-side studies.

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National Renewable Energy Laboratory

1617 Cole Boulevard
Golden, Colorado 80401-3393
(303) 275-3000

NREL

JAN 25 4 20 PM '96

January 24, 1996

Chairman Yukio Naito
Hawaii Public Utilities Commission
465 South King Street
Honolulu, HI 96813

Dear Chairman Naito,

Enclosed is the final report on state-level renewable energy policy options that I have prepared for the Hawaii Public Utilities Commission pursuant to our arrangement with the U.S. Department of Energy. This final report incorporates comments and suggestions received from several of your staff.

Again, I appreciate and have enjoyed the opportunity to work with the Commission and to assist you in assembling this information. If I can be of any further assistance to the Commission in these matters, please do not hesitate to contact me.

Sincerely,

Blair G. Swezey
Principal Policy Advisor

cc: Joseph Galdo, DOE
Allan Hoffman, DOE
Val Jensen, DOE

Renewable Energy Policy Options for the State of Hawaii

A Report to the Hawaii Public Utilities Commission

Blair G. Swezey

January 1996

National Renewable Energy Laboratory
1617 Cole Boulevard
Golden, Colorado 80401-3393
A national laboratory of the U.S. Department of Energy
Managed by Midwest Research Institute
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Preface

The National Renewable Energy Laboratory (NREL) is a national laboratory operated for the U.S. Department of Energy (DOE). NREL is a national resource committed to leadership, excellence, and innovation in renewable energy and related technologies.

This report is a result of a collaborative effort between DOE and the Hawaii Public Utilities Commission (PUC) to provide a systematic examination of state regulatory policies and procedures that facilitate the development and use of renewable resources. The information is being provided to assist the PUC in responding to a legislative request to conduct a study of strategies to facilitate the utilization of renewables in Hawaii.

One intended result of federal investments in renewable energy research and development (R&D) programs is the adoption and use of renewable energy technologies in the energy marketplace. Insights into the nature of energy markets can help to assure that the technologies being developed are compatible with these markets.

NREL's Analytic Studies Division (ASD) supports the long-range planning of the overall federal renewable energy R&D program, both at NREL and DOE, by conducting analyses on aspects of energy market competition that are relevant to the present and future deployment of renewable energy technologies. The ASD reports on these efforts to DOE and NREL managers, as well as external utility sector stakeholders, to enhance their awareness of competitive and institutional factors that may impact on the successful deployment of renewable energy technologies in the marketplace.

This work was sponsored by the Office of Utility Technologies in DOE's Office of Energy Efficiency and Renewable Energy.

About the Author

Blair G. Swezey is a principal policy advisor in NREL's ASD in Golden, Colorado. At NREL, Mr. Swezey evaluates the implications of current and prospective national, regional, and state policies for renewable energy deployment in the electric utility sector and is the program leader for NREL's Utility Analysis activities. Previously, he managed NREL's integrated resource planning activities. He has completed several studies on renewable energy economics and policies, and has prepared and presented testimony in several state utility regulatory proceedings. He is also editor of the *State Renewable Energy News*, a newsletter on state and utility renewable energy activities prepared for the Subcommittee on Renewable Energy of the National Association of Regulatory Utility Commissioners (NARUC).

Before joining NREL in 1987, Mr. Swezey spent more than eight years on the executive staff of the Electric Power Research Institute (EPRI) in Palo Alto, California.

Mr. Swezey holds a B.S. degree in Political Economy of Natural Resources from the University of California at Berkeley and completed graduate studies in Economics at San Jose State University.

NOTICE

Introduction

On April 15, 1994, the Senate Committee on Science, Technology and Economic Development of the Hawaii State Legislature passed a resolution requesting that the Public Utilities Commission (PUC) conduct a study on facilitating the use of renewable energy resources. Specifically, the legislature urged the PUC "to conduct a systematic examination of other states' policies and procedures which facilitate the development and use of renewable resources. The final report to the Legislature must contain a summary of the policies examined, identification of elements applicable to Hawaii, and recommendations for implementation of such elements."[1]

In response to the Senate Resolution, the PUC instituted a proceeding on renewable energy resources to "identify the policies, programs, procedures, and incentives necessary for the successful deployment of renewable technologies, such as wind power, biomass, solar, hydro and geothermal in Hawaii."[2]

The Senate Committee report accompanying the Resolution notes that "the State has the willingness and the resources to become energy self-sufficient through the use of renewable sources of energy" but that "Hawaii has not adopted regulatory policies to facilitate and encourage the development of these resources." This report examines the current status of renewable energy development in Hawaii and the United States, including the market and policy environment within which this development has taken place. However, it also recognizes that the electric utility industry is entering a period of fundamental change, toward greater competition, one in which the appropriateness of past policies that were promulgated in a regulated utility environment are being increasingly questioned. Prospective policies to encourage renewable energy development must be viewed within this context of changing market structure and opportunity.

Values Associated with Renewable Resources

Renewable energy represents a number of energy sources based on natural forces that are both replenishable on a cyclic basis and sustainable over the long term. These sources generally include the energy contained in the hydrologic cycle (hydropower), the heat of the earth (geothermal), wind and solar processes, and a number of energy sources based on plant or waste matter (wood and agricultural materials, municipal solid waste, and landfill methane).

The most important motivation for greater use of renewable energy sources in Hawaii lies in their economic and environmental benefits. Because renewable energy is derived primarily from natural and continuously replenishable sources, greater use of renewable energy sources contributes to a cleaner and more sustainable energy system. For example, greater reliance on

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[1]Senate Committee on Science, Technology and Economic Development, Seventeenth State Legislature, "Senate Resolution Requesting a Study on the Facilitation of Renewable Energy Resources Utilization," Standing Committee Report No. 3068, April 15, 1994.

[2]Hawaii Public Utilities Commission, Order, Instituting a Proceeding on Renewable Energy Resources, Including the Development and Use of Renewable Energy Resources in the State of Hawaii, Docket No. 94-0226, Order No. 13441, August 10, 1994.

wind energy, and other nonfuel-using renewables, avoids airborne emissions associated with fossil fuel combustion alternatives.

Development of the state's indigenous renewable energy sources can displace imported fuels, thereby reducing the outflow of the state income required to pay for these fuels. Renewables development can also provide localized benefits in terms of job creation.

Greater use of renewables has additional benefits. First, renewable resources are abundant in Hawaii and thus can help lessen the risk of fossil fuel supply disruptions and price fluctuations. Second, renewable energy sources are diverse. There are many different types of renewables that can be used, which reduces the risk of overreliance on any one energy source. Finally, some renewables-based technologies, such as wind and solar, can be deployed in modular fashion with short lead times, which decreases the risk in both the timing and the magnitude of generation investments.[3]

Renewable Energy Use and Policy in Hawaii

Because of its natural endowment, as well as its heavy dependence on imported oil, the State of Hawaii has longstanding policies of encouraging and promoting renewable energy development. As early as 1974, the State Legislature created a position of Energy Resources Coordinator (ERC) for the state, whose responsibility it is "to coordinate the efforts [and] . . . to formulate plans for the development and use of alternative energy sources. . . . so that there will be a maximum conservation and utilization of energy resources in the State." The state has also established more concrete energy policy goals of increased energy self sufficiency (in which the ratio of indigenous to imported energy is increased) and greater energy security, through increased diversity of Hawaii's energy sources, while at the same time recognizing the need for energy systems that are dependable, efficient, and economical.[4]

The State's Department of Business, Economic Development, and Tourism (DBEDT) leads efforts to reduce the high dependence on imported fossil fuels, with the DBEDT Director designated as the State ERC. Among the duties of the ERC is to formulate plans and objectives, and conduct programs for renewable energy development, and to recommend appropriate actions to the governor and the legislature. The ERC seeks to encourage renewable energy research and development, demonstration, and deployment and has done this through the establishment and promotion of a variety of renewables-oriented programs.[5]

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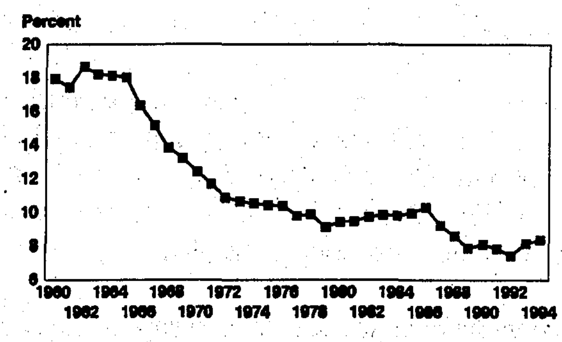
[3]The New England Electric System (NEES) has adopted an "option theory" approach to the incorporation of uncertainty in making long-term resource decisions. Shorter lead time investments offer the utility flexibility in being able to delay a resource decision and obtain better information on future market conditions. See the Company's *NEESPLAN 4: Creating Options for More Competitive and More Sustainable Electric Service*, November 1993.

[4]"Renewable Energy and State Policy," Presentation by Rick Egged, Interim Director and Energy Resources Coordinator, State of Hawaii Department of Business, Economic Development, and Tourism, to the Hawaii Public Utilities Commission Renewable Energy Workshop, January 26, 1995.

[5]Ibid. Also, see Department of Business, Economic Development and Tourism, *State Energy Resources Coordinator's Annual Report — 1994* for a description of DBEDT energy programs.

Despite the efforts of DBEDT and the ERC, historical data on renewable energy use in Hawaii indicate that the policy goal of increasing the share of renewable energy production and use is not being met. In fact, renewable energy use in Hawaii, as a percentage of total state energy use, has been on the decline (Figure 1). This trend obviously holds implications for whether the stated energy policy goal of increased use of indigenous renewable energy resources can be realized without further state action or encouragement.

Figure 1 - Renewables Percentage Contribution to Hawaii State Energy Mix



In Hawaii, transportation accounts for more than half (55%) of total primary energy use, while the electricity sector accounts for just less than 30% (Figure 2). Ideally, the development and utilization of renewable energy sources should be pursued in all energy-consuming sectors of the economy. However, the electricity sector, specifically, offers many different avenues for employing renewables today, while the near-term opportunities to tap renewables for transportation uses are more limited. Because of its flexibility as an energy form, electricity represents a very attractive carrier for conversion of renewable resources to useful energy. In fact, about 60% of all renewable energy use in the United States is in the form of electricity, compared to about 36% of all primary energy sources combined.

Currently, renewable energy resources account for 11% of Hawaii's electricity generating capacity (Figure 3). Excluding hydro, the renewables share is 10%, which is substantially greater than the comparable U.S. nonhydro renewables share of 2%. Nevertheless, the share of renewable electricity generation in Hawaii has been falling because of the downsizing of the Hawaiian sugar industry, which has resulted in the closing or fossil fuel conversion of several sugar mill generating facilities.

Figure 2 - Sector Mix of Energy Use in Hawaii (Excludes Most Renewables)

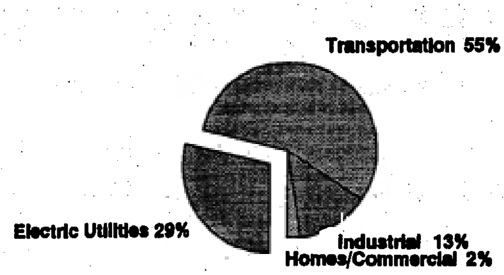
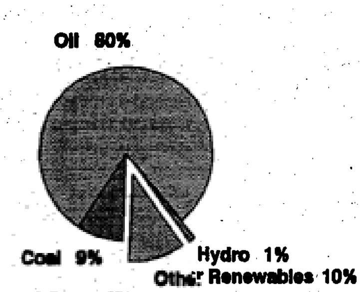


Figure 3 - Fuel Shares of Hawaii Electricity Generating Capacity - 1993



Renewable Energy Resources and Technologies

Different types of technologies are employed to convert renewable energy sources into useful energy forms. These energy forms include heat (thermal energy), liquid and gaseous fuels, and electricity. Renewable energy technologies (RETs) use various types of devices and equipment to collect and convert renewable energies. Because renewable energy sources tend to be more diffuse in nature than fossil fuels, a greater percentage of the cost of tapping these sources is incurred up front in the capital requirements for collection and conversion equipment. This is often referred to as the "front-loaded" cost of renewables development.

One important aspect of renewable electric systems is that they represent a spectrum of scale sizes from bulk power generation to smaller, distributed applications. For example, biomass power and geothermal generation systems are typically of the same size as small fossil power plants, i.e., 20 megawatts (MW) to 50 MW in size, while solar technologies, such as photovoltaics and solar water heating, can be sized to serve individual households.

Renewable energy sources also supply energy in different ways. Again, some renewable energy systems can mimic fossil generators in their degree of dispatchability (i.e., the ability to supply power on demand) while others, particularly those based on wind and solar energy, provide energy and power only when the resources are available. However, the existing utility system, as well as storage, can often be used to "firm up" the power from these intermittent renewable energy sources.

Much experience has been gained during the last 15 years with the commercial operation of renewable energy technologies; a total of more than 15,000 MW of nonhydro renewable energy capacity has been developed and successfully integrated into utility systems across the United States (Table 1). About 80% of this capacity has been developed by nonutility entities, primarily due to policies and incentives that have promoted nonutility development. As a result of this market stimulus, the costs of many renewables are now comparable to those of constructing new power plants using traditional utility fossil fuel energy sources. The results of several recent utility competitive bidding solicitations on the Mainland show that many different types of renewables projects have been offered in a price range of 4.5¢ per kilowatt-hour (kWh) to 6.0¢/kWh.[6] In June 1995, Northern States Power in Minnesota announced a winning levelized bid price of 3.0¢/kWh for development

Table 1 - U.S. Non-Hydro Renewable Electric Capacity and Generation - 1993

Energy Source	Capacity (MW)	Generation (Bil kWh)
Wood/Wood Waste	6,267	32.2
Agricultural Waste	648	3.3
Municipal Solid Waste	2,237	13.4
Landfill Gas	461	2.6
Utility Biomass	464	2.0
Wind	1,992	3.0
Solar	389	0.9
Geothermal	1,068	9.2
Utility Geothermal	1,739	7.6
Total Renewables	15,265	74.2

[6]These include bidding solicitations conducted by New England Power Company, Portland General Electric, and the three major California investor-owned utilities.

of a 100-MW wind project.[7] For comparison, weighted utility avoided energy cost rates (exclusive of capacity savings) across the Islands range from 3.2¢/kWh to 8.7¢/kWh.[8]

Hawaii is blessed with significant quantities of renewable energy resources of all types that can potentially be developed for commercial uses. DBEDT has documented this potential in many studies. For example, a DBEDT-sponsored report notes that "for most renewable energy technologies, a sufficient resource exists on each island to warrant consideration of an energy project." The report goes on to identify projects that "represent realistic opportunities for developing renewable energy in the State... (and that) would result in renewable energy making a significant contribution to Hawaii's energy mix."[9] Among the renewable resources examined were wind, solar, biomass, hydro, and wave and ocean thermal.

At the same time, the characteristics of the state's renewables resources and utility grids present special challenges for the integration of some renewable energy systems. The island utility systems are relatively small and are not interconnected. Also, the most attractive renewable resources for development may not be located in close proximity to the primary utility loads. These specific circumstances mean that large-scale renewable energy systems, typical of many bulk power applications on the Mainland, may not be as appropriate for the Islands.

The lack of grid interconnections means that Hawaii's utilities cannot take advantage of the operational diversity available to many contiguous utility systems on the Mainland, which allows these utilities to coordinate operations and achieve greater efficiencies in cost structure and in maintaining system reliability. Therefore, isolated utilities often plan for a greater level of system redundancy to achieve conventional levels of utility system reliability. On the other hand, the special nature of the Hawaii utility grids, where redundancy and high transmission and distribution costs result in comparatively high retail electricity rates, provides enhanced market opportunities for smaller scale, distributed renewable energy systems.

Finally, the availability of land for large renewable energy developments may be at a premium. Land is relatively expensive in Hawaii and may not be zoned for energy development. The time and cost of obtaining appropriate land use permits may be development impediments.[10]

The state of Hawaii already has important commercial experience with the development of its indigenous renewable energy supplies. DBEDT reports a total of 302 MW of installed generating

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[7]McGraw Hill, *Independent Power Markets Quarterly*, Third Quarter 1995, p. 60.

[8]*Stipulation to Resolve Proceeding*, Before the Public Utilities Commission of the State of Hawaii, Instituting a Proceeding to Investigate the Proxy Method and the Proxy Method Formula Used to Calculate Avoided Energy Costs and Schedule Q Rates of the Electric Utilities in the State of Hawaii, Docket No. 7310, March 4, 1994.

[9]R. Lynette & Associates, Inc., "Renewable Energy Resource Assessment Plan," Draft, August 27, 1993.

[10]R. Lynette & Associates, Inc., *Experiences with Commercial Wind Energy Development in Hawaii*, Electric Power Research Institute, EPRI TR-102169, April 1993.

capacity from renewable energy sources,[11] which provided 10.3% of Hawaii's electricity in 1993.[12] In addition, the solar energy industry estimates that the state's stock of solar water heating systems displaces an additional 60 MW, or about 2%, of generating capacity.[13] Below, the different types of renewable energy resources and technologies and the status of their development in Hawaii are briefly described.

Hydropower

Until the 1980s, very little renewable energy had been developed for power generation in the United States, except for hydropower. Hydropower represents a proven resource and technology that at one time supplied more than one-third of total U.S. power needs. However, with the growth of fossil fuel and nuclear generation, the hydropower share has declined to about 13% today. Also, the growth of hydropower has slowed as many of the largest and best sites have been developed. However, significant development potential remains for smaller development using "run-of-the-river" technology, which relies on natural water flow and avoids the need for large impoundment dams.

Several small hydroelectric generating plants operate on Hawaii, Kauai, and Maui, totaling 28.5 MW of capacity. The largest of these projects (12 MW) entered commercial operation in 1993 near Hilo on the island of Hawaii and provides about 6% of the island's total electricity needs. The power output is sold to HELCO. Hydropower has proven to be a stable, although relatively small, power source for Hawaii. Further development potential is limited by the lack of suitable river sites that remain to be exploited.[14]

Biomass

Use of biomass resources has been primarily associated with waste disposal, where the "fuel" is a by-product requiring disposal. This occurs in forest-related and agricultural operations, as well as in urban settings with municipal waste and landfill gas. Many businesses and municipalities have developed small generation systems that use these waste resources. Because these waste resources may become more scarce with greater use, industry researchers are investigating the farming of short-rotation woody crops as a way to significantly expand the future supply of biomass resources.

Biomass provides the largest fraction of the state's electricity contribution from renewable energy sources (Figure 4). The primary biomass energy source used on the Islands is bagasse waste from sugarcane production. The bagasse is fired in conventional steam boilers to cogenerate

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[11] "Status of Renewable Energy in Hawaii & the State's Promising Resources," Presentation by Maurice Kaya, Energy Program Administrator, State of Hawaii Department of Business, Economic Development, and Tourism, to the Hawaii Public Utilities Commission Renewable Energy Workshop for Docket 94-0226, January 26, 1995.

[12] DBEDT, *Annual Report — 1994*, *Supra* Note 5.

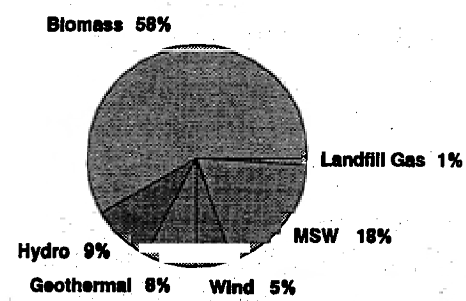
[13] Based on 60,000 solar water heaters installed, each displacing 1 kW of generation capacity.

[14] Rick Egged Presentation, *Supra* Note 4.

steam and electricity that is used directly in sugar mill operations; excess electricity generated is sold to the utilities.

The downsizing of the Hawaiian sugar industry means that less sugarcane is being grown and processed and, as a consequence, less bagasse is available as an energy feedstock. During 1994, two sugar mills ceased operations on the island of Hawaii, and a third closed on Oahu during 1995. As a result, less electricity will be generated using bagasse, and in fact, one facility has already been converted to operate on coal.

Figure 4 - Mix of Renewable Electric Capacity in Hawaii



Given the sugar industry downsizing and the potential for future declines in bagasse feedstocks, DBEDT has been investigating the potential to grow other crops as dedicated energy feedstocks. In addition, DBEDT has joined forces with the U.S. Department of Energy (DOE) to demonstrate the technical feasibility of producing a fuel gas from sugarcane bagasse. Biogasification, used in conjunction with a combined-cycle generating system, has the potential to double the efficiency of electricity production from bagasse.[15]

The contribution from municipal solid waste (MSW) combustion comes from a single plant on Oahu that began commercial operation in 1990. The project, serving the City and County of Honolulu, processes raw garbage to produce a "refuse-derived fuel." This fuel is then burned to generate as much as 60 MW of power, which is sold under contract to HECO. Outside of Honolulu, however, very little additional potential exists for MSW-based electricity generation. Finally, a small, 3-MW landfill gas project has been in operation since 1989 on Oahu. This technology may also be considered for other Honolulu landfills.[16]

Geothermal

Geothermal energy, thermal energy that exists beneath the Earth's surface, can be exploited for power generation or for direct thermal use. Conventionally accessed resources consist of either dry steam or hot water that is piped to the surface and run through power turbines, either directly or after the heat is transferred to a second working fluid.

Hawaii's existing generation contribution from geothermal energy consists of a 25-MW non-utility-owned project in the Puna District on the Big Island. The Puna project came on-line in 1993 following several years of government and utility-sponsored testing of the local geothermal resource. Although the operation of this project has been a technical success, the project has

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[15]DBEDT, *Annual Report — 1994, Supra* Note 5.

[16]Hawaiian Electric Company, *Electricity from Alternate Energy: A Progress Report from Hawaiian Electric Company*, March 1991.

encountered opposition from local residents on the basis of cultural and religious beliefs.

Current state policy supports the development of geothermal energy as a potential resource exclusively for the Island of Hawaii. Assessments indicate that the Puna geothermal resource is highly productive and capable of supporting the generation of additional power for the island.[17]

Wind

Wind turbines capture the wind's energy with rotating blades and convert this energy to electricity through a generator system. The turbines are mounted on towers to maximize the wind energy capture because the wind is generally faster and less turbulent farther from the ground. Although wind turbines can be operated in stand-alone systems, there are economic and operating advantages to siting wind turbines in large arrays or wind farms. Important progress has been made in the development of wind energy technology, with each successive generation of turbines realizing dramatic improvements in cost and performance.

Because of the strong and consistent trade winds, wind energy development has been pursued in Hawaii for almost twenty years, but with mixed success. During those years, HECO, either directly or through its HERS subsidiary, has been involved in several wind turbine demonstration projects. These turbines were generally first-of-a-kind technologies built by companies without a commercial track record in the wind industry. HERS also acquired a commercial wind farm that was developed between 1983 and 1985 using early generation, small-scale turbine technology. A study performed for the Electric Power Research Institute (EPRI) characterizes this early development as plagued by "poor turbine siting, overly optimistic energy projections, revenue shortfalls, and inappropriate station design," all factors that can be improved on.[18]

Today's wind industry has evolved through successive technology iterations such that mainland utility interest in wind generation has expanded enormously. Today, more than 15 utilities are actively pursuing or participating in wind energy development utilizing the latest technologies, which have availabilities of greater than 95% and much improved operational characteristics.[19]

Nevertheless, wind energy development offers an operational and integration challenge to Hawaii's utility systems. The wind plants already in place today on the Big Island can contribute from 9% to 23% of total demand, depending on the time of day. The HELCO system is characterized by long highly loaded and exposed transmission lines, lack of control over the operation of some large independent power generation, limited spinning and operating reserve capability, and no automatic generation control. However, another EPRI study found that even greater amounts of wind energy use could be accommodated by using advanced variable-speed

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[17]DBEDT, *Annual Report — 1994*, *Supra* Note 5.

[18]R. Lynette & Associates, *Supra* Note 10.

[19]S. Williams and B. Bateman, *Power Plays: Profiles of America's Independent Renewable Electricity Developers*, 1995 Edition, Investor Responsibility Research Center, Washington, D.C., June 1995.

wind turbine technology, which offers an improved electrical interface, and/or by making various operational improvements in the utility system.[20]

Wind energy systems are currently eligible for a 20% state income tax credit and a 1.5¢/kWh federal production tax credit. The continued availability of these credits is important to the economic viability of new wind energy development in the state.

Solar

Solar technologies for utility system application fall into several categories: direct thermal applications, thermal electric conversion, and direct electric conversion using photovoltaic (PV) devices.

Direct Thermal Applications

Solar thermal systems collect the thermal energy in solar radiation for direct use in low- to high-temperature thermal applications. Low-temperature applications include residential and commercial solar water and space heating; high-temperature applications include industrial process heat. The simplest (and most widespread) of the solar thermal technologies provides energy for domestic water heating. These systems typically circulate water through rooftop, flat-plate collectors and store the hot water in conventional household water tanks until needed. There are an estimated 1 million solar hot water systems in use nationwide, both in residential and commercial applications. Solar heating systems can also be used for commercial applications, as evidenced by a solar condominium project in Honolulu that provides for nearly 70% of the high-rise building's hot water needs.[21]

The Hawaii Solar Energy Association (HSEA) estimates that there are 60,000 solar water heating systems installed in the state, which provide 90% of the hot water requirements for an average of 3.9 people per system.[22] Hawaii offers an attractive venue for the use of solar water heating technology because of the state's abundant solar resource, a relatively constant year-round water heating load that leads to a high solar energy contribution, and the high percentage of electric water heating use that can be displaced.

There is a positive correlation between the level of state solar income tax credits and the level of solar water heating system installations in Hawaii. Tax credits help offset the impact of the front-loaded capital commitment of a solar system investment. Since the tax credit was raised to 35% in 1989, solar system installations have increased to more than 1000 annually from a level of about 400 systems under the former 15% tax credit. HSEA also estimates that 520 to

[20] Electrotek Concepts, Inc., *Small System Performance Under High Wind Plant Penetration*, Electric Power Research Institute, EPRI TR-102784, August 1993.

[21] Solar Energy Industries Association, *Catalog of Successfully Operating Solar Process Heat Systems*, Washington, D.C.

[22] Data from the Hawaii Solar Energy Association.

640 jobs are associated with Hawaii's solar water heating industry.

HECO has proposed to offer customer incentives for solar water heating "retrofits" as a component of its Residential Efficient Water Heating (REWH) Program. The solar system incentive will be offered in conjunction with the state tax credit. HECO estimates that its program would result in the installation of more than 16,000 solar water heating systems over a 5-year period. However, HECO cautions that "if the state abandons the tax credit program, the (utility) may need to revise the program and reevaluate the cost-effectiveness of the affected measures."[23]

Solar Thermal Electric Conversion

Solar thermal electric systems use concentrating mirrors to produce higher temperatures that can be used with conventional power generation steam cycles. Three technologies have been pursued: the parabolic trough, the parabolic dish, and the central receiver, with these technologies being distinguished primarily by their different collection and conversion devices. Only the parabolic trough system has seen commercial application, with the other two technologies still undergoing research, development, and demonstration (RD&D).

To date, there has been little development activity with solar thermal electric technology in Hawaii, and none is currently being pursued or contemplated.

Photovoltaics

Photovoltaics represent possibly the most modular and flexible renewable energy technology. PV systems employ a solid-state device, or solar cell, to convert sunlight directly into electricity. PV systems operate unattended, with no fuel or cooling requirements, and no operating emissions or noise. However, because much of the current PV cell technology uses crystalline semiconductor materials (similar to integrated circuit chips), production costs have been high compared to those of conventional generation sources. Industry and researchers continue to search for and experiment with lower cost materials.

Even with higher costs, however, PV systems can offer unique advantages because they can be strategically located to maximize savings to the utility system. For example, several utilities have been investigating the distributed use of PV to relieve system stresses in heavily loaded distribution areas. Also, utilities are using PV to serve remote loads and displace costly dedicated distribution lines. Perhaps the ultimate distributed PV application is in rooftop systems, which locates generation with loads without environmental impacts such as fuel combustion emissions. Some utilities are currently investigating rooftop systems, and several states have adopted net energy metering policies that encourage homeowner investment in these systems.

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[23]Hawaiian Electric Company, Inc., Application and Certificate of Service, Filing for Approval of a Residential Efficient Water Heating Program, Recovery of Program Costs and Lost Revenues, and Consideration for Shareholder Incentives, Before the Public Utilities Commission of the State of Hawaii, Docket No. 94-0206, July 20, 1994.

Hawaii has been active on several fronts in photovoltaics. MECO has been a participant in the federally-funded Photovoltaics for Utility-Scale Applications (PVUSA) program to demonstrate utility-scale PV applications and has installed, with DBEDT support, a 20-kilowatt (kW) unit on Maui. HECO is a member of the Utility PhotoVoltaics Group (UPVG) and is investigating the use of PV in remote applications.[24] DBEDT is also supporting PV development through its participation in the PV for Utilities (PV4U) program, which is a national collaborative to catalyze the efforts of key utility sector players to stimulate greater near-term use of PV in the utility market for both grid-connected and stand-alone systems.[25]

Ocean Thermal Energy Conversion

Ocean thermal energy conversion (OTEC) systems exploit the temperature differential between sun-warmed surface ocean waters and deep, colder waters. This differential, which can be as great as 36 to 38 degrees Fahrenheit, is employed in a vaporization cycle to drive a turbine generator. The requirement to maximize the thermal gradient limits the application of OTEC systems to more tropical environs. Research into OTEC development reached a peak in the late 1970s but has waned since.

The feasibility of the OTEC concept was first demonstrated in Hawaii in the late 1970s. An experimental open-cycle OTEC facility, with a 210-kW (gross) capacity, has been operational in Kona since December 1992 to examine the feasibility of larger commercial-scale applications of the technology.[26]

The Influence of Federal Energy Policies

Federal energy policy plays an important role in providing a framework for energy policy formation at the state level. Several federal actions during the last 20 years have provided an impetus for renewable energy development in the states. More recently, federal energy policies have focused on greater reliance on market forces to guide energy decisions.

The Public Utility Regulatory Policies Act

The Public Utility Regulatory Policies Act (PURPA) was passed by the U.S. Congress in 1978 as one of five laws to help reduce the nation's dependence on imported oil. PURPA expressly encouraged the use of renewable and waste energy resources in electricity production to conserve oil and natural gas. PURPA removed several market and institutional barriers to the development of these resources, which became known under the statute as "qualifying facilities" ("QFs"). First, electric utilities were required to interconnect with and provide nondiscriminatory backup power to QFs. Second, utilities were required to purchase power from these developers at the utility's "avoided cost," or the cost that the utility would have incurred by generating or otherwise

[24]Rebuttal Testimony of Arthur Seki, Hawaiian Electric Company, Inc., in Docket No. 7259 (HELCO RT-4), 1994.

[25]DBEDT, *Annual Report — 1994, Supra* Note 5.

[26]Ibid.

supplying the power itself. And finally, PURPA exempted QFs from federal and state utility regulatory requirements. More than one-third of the capacity developed under PURPA has been renewables based, with the remainder coming from fossil-fuel-based cogenerators.

The implementation of PURPA brought about an important change in the electricity industry by opening the electricity generation market to a class of alternative, nonutility generators (NUGs). Before PURPA, NUGs had no market outlet for their generation, unless the local utility voluntarily accepted it. PURPA created a market focused on smaller, more efficient generation technologies (e.g., renewables and cogeneration-based plants), which had the effect of lowering the capital threshold for entering the power generation business. As the independent power industry has matured, NUGs now compete head-to-head with utilities in the development of larger, utility-scale plants.

The implementation of PURPA has not been without controversy. Utilities have long argued that PURPA required them to contract for power they did not need. More important has been disagreement over the determination of a utility's avoided cost. In PURPA, avoided cost was defined as "the incremental costs to an electric utility of electric energy or capacity or both which, but for the purchase from the qualifying utility or qualifying facilities, such utility would generate itself or purchase from another source." The regulations established by the Federal Energy Regulatory Commission (FERC) to implement PURPA did not specify a particular methodology for the determination of avoided cost, instead leaving it to the states to establish that the cost developed was "just and reasonable." In practice, there are a variety of alternative methods for determining avoided cost.[27] More recently, in states where competitive bidding or other competitive capacity procurement methods have been adopted, the administrative determination of avoided costs has become largely unnecessary. This is because the bidding process, by inviting participation from all prospective generators, reveals a market-based avoided cost.[28]

The efficacy of many avoided cost contracts signed in the early days of PURPA implementation are now being questioned by utilities. In some ways, PURPA has become a victim of its own success. Many of the early contracts contain high avoided cost payments that were based on projections of rising energy prices and high utility construction costs. With the competition wrought by PURPA having actually lowered the costs of new generation, as well as prices from existing generation, many of these contracts appear to be uncompetitive in today's electricity market.

Section 210(h) of PURPA allows utilities or QFs to petition FERC to review a state or utility's application of PURPA. Several utilities have contested the legality of state statutes or policies that require them to purchase power from QFs at rates above avoided cost. Connecticut Light and Power (CL&P) challenged a state law that required the utility to purchase power from

[27]See S. Ferrey, *Law of Independent Power*, Volume 1, Chapter 7: Avoided Cost, Clark Boardman Callaghan, New York, NY, Release #6, September 1995.

[28]In reality, the bidding selection process is more complicated than this, because there are important nonprice factors that are also considered in project evaluation.

municipal waste generators at the municipal's retail rate. The FERC ruled that the state statute violated PURPA by mandating avoided costs that exceeded the utility's incremental cost of either generating the power itself or purchasing power on the market.[29]

Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E) challenged the legality of a statewide bidding process in California that was restricted to qualifying facilities under PURPA. FERC ruled that the bidding process violated PURPA because a state must consider all potential supply sources in setting avoided cost.[30] However, FERC did not rule on whether the prices realized from the auction were actually above avoided cost.

FERC has been very careful to point out the narrow focus of these rulings; they relate only to the use of PURPA to promote particular energy sources. Indeed, in the SCE/SDG&E Order, FERC writes that "we acknowledge California's ability under its authorities over the electric utilities subject to its jurisdiction to favor particular generation technologies over others. We respect the fact that resource planning and resource decisions are the prerogative of state commissions. However, the State cannot pursue its policy choices in this regard under the guise of implementing the requirements of PURPA and our regulations."

And in his concurrence to the SCE/SDG&E Order, FERC Commissioner Massey noted that "our order in no way affects the authority of states to adopt and implement power supply policies outside of PURPA. Our order today construes only the requirements of PURPA, and does not (indeed, could not) purport to limit the authority of states beyond the context of PURPA. Our order says only that states cannot act under PURPA to require utilities to pay more than their avoided costs."

In its order on requests for reconsideration of its SCE/SDG&E decision,[31] FERC noted several ways in which states can act to encourage renewables development outside of PURPA. Although not intending to be definitive, FERC writes that

> as a general matter, states have broad powers under state law to direct the planning and resource decisions of utilities under their jurisdiction. States may, for example, order utilities to build renewable generators themselves, or deny certification of other types of facilities if state law permits. They also, assuming state law permits, may order utilities to purchase renewable generation.
>
> States also may seek to encourage renewable or other types of resources through their tax structure, or by giving direct subsidies. Use of the tax structure may allow states to affect the price of renewables or other alternatives. By imposing a tax on fossil generators or by giving a tax

[29]Federal Energy Regulatory Commission, *Order Granting Petition for Declaratory Order* (Connecticut Light and Power Company), Docket No. EL93-55-000, January 11, 1995.

[30]Federal Energy Regulatory Commission, *Order on Petitions for Enforcement Action Pursuant to Section 210(h) of PURPA* (Southern California Edison Company/San Diego Gas & Electric Company), Docket Nos. EL95-16-000 and EL95-19-000, February 22, 1995.

[31]Federal Energy Regulatory Commission, Order on Requests for Reconsideration (Southern California Edison Company/San Diego Gas & Electric Company), Docket Nos. EL95-16-001 and EL95-19-001, June 2, 1995.

incentive to alternative generation, states may allow the alternative generation to be more competitive in a cost comparison with fossil-fueled generation.

A state may, through state action, influence what costs are incurred by the utility. Thus, accounting for environmental costs may be part of a state's approach to encouraging renewable generation. For example, a state may impose a tax or other charge on all generation produced by a particular fuel, and thus increase the costs which would be incurred by utilities in building and operating plants that use that fuel. Conversely, a state may also subsidize certain types of generation, for instance wind, or other renewables, through, e.g., tax credits.

The increased competition initiated with PURPA and the resulting market-induced lowering of generation costs brought into question the efficacy of the traditional monopoly organization of the electric utility industry. If greater competition in power supply led to lower generation costs, could further economies be gained by opening other segments of the power industry to competition?

The Energy Policy Act of 1992

For decades, electric utility companies have held exclusive territorial franchises to supply electricity. The granting of these franchises was premised on the fundamental belief that electricity generation and delivery is a natural monopoly, that is, there are a number of inherent characteristics of the electricity business that make it unamenable to competition. Some of the more traditional characteristics include the scale economies of operating a single transmission and distribution grid and the large capital requirements to gain entry into the business. Electricity is also considered to be a societal necessity and as such is "affected with the public interest." Regulation serves to protect consumers from exploitation by the exercise of the utility's monopoly power. In return for the granting of exclusive service franchises, utilities are assured recovery of prudently incurred costs and are allowed the opportunity to earn a "fair" rate of return on investment.[32]

Recent changes in the electricity market have brought into question the efficacy of this historical regulatory compact. The economies of scale inherent in the construction of electric generation plant were exhausted by the end of the 1960s.[33] The implementation of PURPA during the 1980s underscored this phenomenon by promoting the development of smaller scale, more efficient generators with lower costs than the large, capital intensive utility generators. As a result, significant regional electricity cost differentials have developed, exerting pressure on utilities to lower their rates.

The U.S. Congress further reinforced the trend toward greater competition in the electricity sector with the passage of The Energy Policy Act (EPAct) of 1992. Even with the greater number of power generators that had developed since PURPA, the lack of guaranteed market access

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[32] J. Bonbright, A. Danielsen, D. Kamerschen, *Principles of Public Utility Rates*, Second Edition, Public Utilities Reports, Inc., Arlington, VA, 1988.

[33] R. Hirsh, *Technology and Transformation in the American Electric Utility Industry*, Cambridge University Press, New York, 1989.

remained a barrier to greater competition in wholesale generation markets.[34] With EPAct, Congress amended the Federal Power Act to allow any wholesale generator to petition the FERC for a transmission order, subject to certain conditions.

The FERC has established an aggressive timetable for meeting the EPAct requirements and addressing related issues. In a Notice of Proposed Rulemaking issued in March 1995, FERC proposes several rules to address transmission issues and guide the development of a more openly competitive utility industry. First, utility transmission grids will be opened, and utilities will be required to offer service to wholesale suppliers that is "comparable" to the level of service that it provides to itself and existing contractual partners. Second, utilities would be required to "functionally unbundle" their systems by separating the generation business from the transmission and distribution business. Finally, provisions would be made for existing utilities to recover their "stranded costs," or the costs previously incurred to service customers that may decide to contract for power with a new supplier.

Clearly, the implementation of EPAct will impose a new set of rules on the operation of the electric utility industry. It should result in a more dynamic market for electricity in which buyers and sellers alike will be free to negotiate their own power deals. At the same time, however, these developments bring into question the entire system of utility regulation that has been premised on the protection of the public interest in a monopoly-controlled market.

Tax and Financial Incentives

Since 1978, the U.S. Congress has employed a number of tax and financial incentives to help stimulate the commercialization of renewable energy technologies. Much of the renewables development through 1986 took advantage of these incentives to offset higher front-end costs and to compensate for the additional risk inherent in deploying new technologies in the commercial marketplace. Since 1986, federal financial incentives have been more sporadically available. With passage of the EPAct, Congress established (or continued) several incentives. It (1) permanently extended the 10% business investment tax credit for solar and geothermal projects, excluding public utility property, (2) created a production tax credit of 1.5¢/kWh for wind energy and "closed-loop" biomass systems, with public utility property eligible, and (3) authorized the creation of a 1.5¢/kWh production payment for solar, wind, biomass (excluding waste-to-energy), and geothermal (excluding dry steam) generation by publicly owned utilities and rural electric cooperatives.

State Policies in Support of Renewables Development

Against the backdrop of federal energy laws, incentives, and policies, the actions that states have taken in guiding electricity resource planning and procurement have been key to the success of renewables in the marketplace. In Hawaii, the influence of federal energy policies is apparent in the makeup of the state's energy program, which encompasses energy planning and policy, alternate energy development, and energy conservation. In addition, the PUC has established rules and other procedures relating to utility acquisition of renewable resources, which are

[34]Neither PURPA nor EPAct authorizes nonutility entities to make electricity sales directly to consumers.

modeled after the federal PURPA standards.

Many other states have recognized that the development of renewable energy resources offers benefits in terms of fuel diversity, environmental protection, and economic development, and that these factors should be considered in resource decisions in addition to comparative cost determinations. As a result, these states have adopted various policies to encourage renewable energy deployment. The different types of policies are described below.

Power Purchase Contracts

Much of the nonhydro renewables development of the 1980s occurred as a direct result of state policies to implement PURPA and provide power purchase contracts to nonutility project developers. Some states legislated their own versions of PURPA and actively promoted the development of the nonutility industry. States, including Hawaii, also adopted regulations that set forth procedures for the determination of avoided cost and for contracting with QF developers under PURPA. More than anything else, the ability of nonutility developers to secure long-term power purchase contracts from utilities, often in the form of standard offer contracts, has been the key factor in driving renewable energy development in these states.[35]

Net Energy Metering

Net energy metering (or billing) is a policy under which smaller electricity generators pay a single rate for the net difference between the amount of energy that they use from the utility and the amount that they supply to the grid. The small generator, who is also a utility customer, is reimbursed for the electricity supplied to the utility at the utility's (and customer's) retail rate instead of at the traditional avoided cost (or wholesale) rate. This policy is also known as reverse metering because the customer's electric meter (assuming a single meter) essentially runs in reverse when power is supplied to the utility.

Similar to investments in demand-side management (DSM), net energy metering provides an important incentive to small-scale renewable generators by allowing these generators to displace power normally provided by the utility company at the prevailing retail rate, rather than the traditional utility avoided cost rate, which tends to be much lower. Clearly, the higher the rate being avoided by the customer, the more attractive the renewable investment will be.

Electric utility companies argue that net energy metering results in lost revenues and a ratepayer subsidy because the utility must still maintain the facilities and infrastructure to service the small generator's load when its power demand exceeds it power output. Although this may be true, the utility will realize system benefits from the more distributed location of the small generator, particularly during peak periods. And in California, an analysis found that the metering, interconnection, and administrative cost savings from using a single meter under net energy metering, rather than the traditional dual metering approach, exceed the potential lost revenues

[35] J. Hamrin and N. Rader, ***Investing in the Future: A Regulator's Guide to Renewable Energy***, **National Association of Regulatory Utility Commissioners, Washington, D.C., February 1993.**

to the utility.[36]

According to the American Wind Energy Association, net energy metering policies for small renewable generators have been implemented in 10 states.[37] In August 1995, California became the latest state to enact a net energy metering law. The California law applies specifically to solar electric generating facilities of 10 kW or less. In other states, various types of renewable facilities may qualify for net energy metering, up to 100 kW.

Financial Incentives

Financial incentives, such as tax credits, tax exemptions, and direct loans and grants, have been used by states to stimulate and encourage the development of renewables. For example, during the 1980s, California provided state income tax credits, as well as property tax exemptions, for solar energy development to match the credits offered by the federal government. More recent examples include Iowa, which offers various tax exemptions for landfill gas and wind energy systems; Minnesota, which provides loans and financial incentives to family farms and cooperatives for wind energy resource development; and Virginia, which offers an incentive grant for the development of PV manufacturing facilities within the state.

Very few states have adopted direct incentives to reward utilities for investment in or to purchase power from renewable-energy-based generation sources. Most recently, the Wisconsin Public Service Commission (PSC) established an incentive program "to reward utility use of renewable resources for generating electricity." An incentive of 0.75¢/kWh will be paid for qualifying wind and solar-based generation and an incentive of 0.25¢/kWh will be paid to all other qualifying renewables-based generation (biomass; co-fired, refuse-derived fuel; tire-derived fuel; and hydro). The incentive, which is collected through rates, is available for 20 years for both utility-owned and utility-purchased generation from new projects that are placed in operation or receive construction authority by the end of 1998.

Integrated Resource Planning

Integrated resource planning (IRP) developed as a more comprehensive process for comparing resource alternatives and addressing uncertainty in electricity planning. IRP addresses both the direct costs of power generation that have driven traditional resource decisions and indirect costs and benefits, such as relative environmental impacts. The existence of an IRP process provides a broader framework for the consideration of renewables in resource planning and procurement. Through 1994, 38 states had formal IRP-related processes in place, and 19 states (including 16 of the former) had adopted some type of IRP legislation.[38] Hawaii adopted an IRP "Framework" in May 1992.

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[36]California Solar Energy Industries Association, "SB 656 Net Metering Impacts on Pacific Gas & Electric Company," undated.

[37]*Wind Energy in the U.S.: A State-by-State Survey*, 1995.

[38]Edison Electric Institute, *Integrated Resource Planning in the States: 1994 Source Book*, Washington, D.C., 1994.

In Title I, Section 111 of the EPAct, the U.S. Congress formally endorses IRP as a mechanism that utilities should use for selecting future resources. IRP is defined as "a planning and selection process for new energy resources that evaluates the full range of alternatives, including new generating capacity, power purchases, energy conservation and efficiency, cogeneration and district heating and cooling applications, and *renewable energy resources*, in order to provide adequate and reliable service to its customers at the lowest system cost"[39] (emphasis added). "The process shall take into account necessary features for system operation, such as diversity, reliability, dispatchability, and other factors of risk. . . and shall treat demand and supply resources on a consistent and integrated basis." However, EPAct does not require states to formally adopt IRP.

Presumably, if an IRP process can adequately consider these and other important elements, it should properly capture the many positive attributes of renewables. However, state and utility IRPs differ markedly in their consideration of resource attributes. There are also differences in the degree to which the resulting plans are binding on a utility's resource acquisition process. Because IRP processes may not adequately consider the different resource attributes, some states have implemented additional policies to encourage greater attention to renewables.

Environmental Externalities

The valuation of energy market externalities, including environmental impacts, and the inclusion of such costs in resource acquisition decisions and electricity pricing can enhance the economic competitiveness of "cleaner" renewable energy projects when compared to those based on traditional fossil fuel resources. Mostly through the IRP process, states have begun to examine the externalities related to energy resource options and choices. By 1994, 29 states and the District of Columbia required electric utilities to consider externalities in their resource planning processes.[40] The Hawaii IRP Framework requires utilities to consider the environmental impacts of different resource options. Although HECO has established an advisory group on externalities, no significant results have yet emerged.

Of particular importance in externalities valuations is the treatment of carbon dioxide (CO_2) emissions. A comparison of state-adopted CO_2 emissions values shows that these values can differ quite markedly, from $1 to $23 per ton emitted.[41] As a result, CO_2 values can represent

[39]"The term 'system cost' means all direct and quantifiable net costs for an energy resource over its available life, including the cost of production, distribution, transportation, utilization, waste management, and environmental compliance."

[40]J. Fang and P. Galen, *Issues and Methods in Incorporating Environmental Externalities into the Integrated Resource Planning Process*, National Renewable Energy Laboratory, NREL/TP-461-6684, November 1994.

[41]B. Biewald and S. Bernow, "Climate Change and the U.S. Electric Sector," *Proceedings of the Fourth National Conference on Integrated Resource Planning*, National Association of Regulatory Utility Commissioners, 1992.

up to one-half of the externalities penalty ascribed to a new coal plant.[42] Because most renewables are emissions free, explicit accounting for CO_2 emissions could provide a substantial boost to renewables development.

However, to date, externalities rulemakings have not had much impact on renewable resource selection. In New York, for example, the consideration of environmental attributes in competitive solicitations for new capacity has had the general effect of favoring the selection of natural gas-based projects over coal-fired projects. Similar results have been experienced in Massachusetts.

Economic Development

Very few states have attempted to consider in-state economic development in resource planning decisions. Because the relative contribution of different types of projects to economic development is difficult to quantify, the criteria for consideration have been very general.

The Hawaii IRP Framework requires utilities to consider the impacts of different resource options on the state's economy. Also, DBEDT has developed a state energy system modeling capability and conducted comprehensive energy resource assessments that can be used to perform analyses of the economic impact of energy policy decisions. Initial assessments of alternate energy development scenarios indicate small but positive gains for the state in jobs and personal income.[43]

Studies have been performed in other states that attempt to measure the localized or state economic benefits of renewables development. A study conducted for Maine found that the encouragement of renewables-based cogeneration and small power facilities in the state has produced direct economic benefits of $120 million to $220 million, before consideration of environmental benefits.[44] And the Wisconsin Department of Administration calculated that more aggressive renewable energy development in the state could "generate about three times more jobs, earnings and output (sales) in Wisconsin than the same level of imported fossil fuel use and investment."[45]

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[42]Each $1 per ton value for carbon emissions roughly converts to a mill per kWh externalities penalty for a new coal plant. Thus, the higher value of $23 per ton translates into an externalities penalty of 2.3¢/kWh. For a comparison of total externalities values for coal and natural gas plants, see S. Wiel, "The New Environmental Accounting: A Status Report," *The Electricity Journal*, November 1991.

[43]State Department of Business, Economic Development, and Tourism, *Hawaii Energy Strategy Report*, October 1995.

[44]Economic Research Associates, et al., *Energy Choices Revisited: An Examination of the Costs and Benefits of Maine's Energy Policy*, Mainewatch Institute, February 1994.

[45]Wisconsin Department of Administration, Division of Energy and Intergovernmental Relations, Wisconsin Energy Bureau, *The Economic Impacts of Renewable Energy Use in Wisconsin*, April 1994.

Fuel Diversity

Generally, a broad mix of fuel and resource types provides diversity in utility power supply and reduces the risks associated with overreliance on any one particular fuel type. These risks may come in the form of fuel price escalation, fuel supply interruptions, or regulatory changes. Some states, including Hawaii, have attempted to explicitly account for the value of fuel diversity in resource planning considerations, however methodologies for accomplishing this are not well developed. For example, in New York, fuel diversity is considered important but it has been noted that "there are no standard criteria to determine when a system is sufficiently fuel diverse, nor is there a standard measure or definition of what fuel diversity means."[46] And the California PUC has also determined that protecting against "the financial risks of relying too much on a given fuel" is important but has yet to devise a diversity methodology.[47] Instead, the PUC established a renewables set-aside as an interim measure.

Set-Asides

Renewable energy set-asides offer an alternative means to assure some contribution from renewable energy sources. In such a program, a block of capacity is established for which only renewables are eligible to compete. This approach assures the recognition of renewables-specific resource and project attributes and also maintains the competitive benefits of traditional bidding schemes. A precedent for set-asides has been established by utilities that have held separate supply-side and demand-side auctions because of the difficulty of comparing these two types of resources in a competitive framework. Renewables-only solicitations also offer utilities unfamiliar with renewables a vehicle through which to evaluate renewable energy potentials and economics within its operating region.

Renewable energy set-aside programs have been established in California, Colorado, Iowa, and New York. In California, the renewables bidding solicitation under the state's set-aside was nullified by the 1995 FERC ruling.[48] Colorado and Iowa have established renewables set-asides

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[46]New York State Energy Office, Department of Public Service, Department of Environmental Conservation, *Draft New York State Energy Plan: 1991 Biennial Update,* Volume III, Issue Reports, Staff Report, Issue 6H: Fuel Diversity, July 1991.

[47]See California Public Utilities Commission, *Order Instituting Investigation on the Commission's own motion to implement the Biennial Resource Plan Update following the California Energy Commission's Seventh Electricity Report,* "Phase 1B Opinion: Changes to Final Standard Offer 4 for Use in Conjunction with the 1990 Electricity Report," Decision 91-06-022, June 5, 1991; and "Interim Opinion, Resource Plan Phase: Bidding for New Generation Resources," Decision 92-04-045, April 22, 1992.

[48]Despite the FERC ruling, the California PUC has expressed its expectation that the state's utilities adhere to the spirit of the renewables set-aside "to achieve the resource procurement statutory mandates, including mandates for diversity provided by renewable resources." California Public Utilities Commission, "Assigned Commissioners Ruling Regarding June 21, 1995 Public Discussion Endorsing Settlement," Dockets I.89-07-004 and I.90-09-050, July 5, 1995.

equivalent to 2% of new utility load growth and capacity, respectively.[49] And under a settlement agreement in New York, the state's utilities agreed to pursue development of between 303 MW and 387 MW of renewable energy-based projects, both utility and nonutility-owned. The settlement followed the establishment of a 300-MW renewable energy development goal in the 1992 state energy plan.[50]

Renewables-Specific Legislation

Finally, state policies and legislation that explicitly call for special consideration of renewables may provide a vehicle to accelerate renewables development. Many states with longstanding policies encouraging the development of renewables have achieved remarkable success in acquiring and integrating renewables into the state energy resource mix. California, for example, leads the nation in the amount of installed generating capacity from nonhydro renewables, having seven times more capacity than any other state.[51] Other states with established renewable energy policies, such as Maine and Vermont, have also realized significant renewables development.

Recent renewables policy statements and actions include:

<u>Colorado</u> — A 1994 state law "adds encouragement of renewable energy development to the factors to be considered by the (PUC) in setting and reviewing rates and policies of regulated utilities."

<u>Minnesota</u> — A 1993 state law establishes a state preference for renewable energy generation as a utility's first choice of power supply. The law states that "the commission shall not approve a new or refurbished nonrenewable energy facility in an integrated resource plan or a certificate of need. . . nor allow rate recovery (for such facility). . . unless the utility has demonstrated that a renewable energy facility is not in the public interest."

<u>Nebraska</u> — In 1995, the State Legislature passed a bill establishing renewables as preferred energy sources. The law states "that it is in the public interest to encourage energy efficiency and the use of indigenous energy sources" and allows utilities to give priority to energy efficiency and renewable resources in least-cost planning, to the extent practicable.

<u>New York</u> — The 1992 State Energy Plan recommended a market test/demonstration program

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[49] Elements of the Iowa set-aside have been challenged before FERC on avoided cost grounds. See Midwest Power Systems, Inc., Petition for Declaratory Order, In the Matter of the Sale of Electricity to Midwest Power Systems Inc. Pursuant to the State of Iowa Alternate Energy Producer Statute, May 31, 1995.

[50] New York Public Service Commission, *Case 92-E-0954: Proceeding on Motion of the Commission to Examine the Plans for Implementation of Renewable Resources as Part of Meeting Future Electricity Needs in New York State*, Settlement Agreement, October 12, 1993.

[51] N. Rader, *The Power of the States: A Fifty-State Survey of Renewable Energy*, Public Citizen, Washington, D.C., June 1990.

to procure 300 MW of a diverse range of renewable resources. As a result, the PSC initiated proceedings through which agreement was reached among all parties to acquire as much as 387 MW of new renewables.

Oregon — In 1994, the PUC established an overall policy goal that "utilities should conduct renewable resource assessment and confirmation activities in order to be prepared to evaluate and acquire cost-effective renewable resources to meet future (no later than the year 2000) resource needs." The PUC also adopted a staff recommendation that the commission "allow cost recovery of renewable resource costs which exceed the utility's avoided cost" when, for example, "the value of gaining experience with renewables or diversifying its resource mix justifies the additional cost." As a result, utilities in the state are actively exploring renewables development. One utility, Portland General Electric, has held a competitive solicitation for renewables projects through a green request for proposals or "green RFP."

Wisconsin — In 1994, the State Legislature established a goal "that, to the extent it is cost-effective and technically feasible, all new installed capacity for electric generation be based on renewable energy resources."

Renewable Energy Policy Options in a More Competitive Electricity Market

Past state policies to promote renewables have been crafted in a regulated electricity market regime. Where regulation continues to play a prominent role, these types of policies will still be important. However, as the electricity industry transitions to a more competition-oriented system, policy makers should look to develop policies that take greater advantage of market mechanisms. These policies should be directed toward both producers and customers alike. Some potential policies are discussed below.

Direct Access

One of the basic tenets of a competitive market is that there are many producers and consumers such that no one entity can control prices or access to the market. Producers must be able to reach consumers, and consumers must be able to access producers. However, in the traditional electric utility system, franchised utilities control access to the system at both the wholesale and the retail levels. Providing for direct access would empower renewables producers (or their intermediaries) to market green services directly to consumers and allow consumers to exercise a preference for green power by making purchases from renewables producers. This more competitive market construct would also help assure that the cost of green power is minimized. Primarily in an attempt to lower electricity costs, a number of municipalities on the Mainland are shopping for alternative power supplies in the wholesale market. However, some of these cities are also exploring power deliveries from renewable power suppliers as a component of their purchases.

Green Pricing

A large segment of the American public has consistently supported greater development of renewable energy sources, and utility surveys are also uncovering customer preferences for renewables.[52] As a result, a number of utilities are investigating the implementation of a "green pricing" service.

Green pricing offers an intermediate step to the direct access model by providing customers access to renewable energy through an optional green service or tariff to be offered by the utility. A price premium is charged to cover the incremental cost to the utility of acquiring renewable resources specifically for these customers.

The green pricing concept is generally considered to be most attractive for residential customers. However, utilities might also offer a green electricity product to its larger customers, such as municipalities or industrial and commercial customers, at a blended rate that would include a renewables component.[53]

Elements of the green pricing concept are based on the notion that new technologies are often purchased by "early adopters." Also, many consumers are willing to pay more for certain products which, all other things equal, are less detrimental to the environment. Proponents of green pricing argue that even if only a small percentage of customers was to "sign up" for the service, this could have an important "market pull" impact on the development of renewables. And many utilities favor the approach as a way of acquiring renewables for certain customers without impacting rates for its other, nonparticipating customers.

Critics of green pricing programs object to singling out a subset of utility ratepayers to fund a public good (i.e., the provision of a cleaner environment through the development of renewable energy sources) through voluntary contributions rather than public policy measures. Calculation of the price premium may be contentious because of disputes over avoided costs. Also, no alternative (competitive) green service may exist with which to benchmark the costs of the utility's program.

During 1995, at least three states formally approved the concept of utility green pricing programs: The Michigan PSC has approved a special green service for Detroit Edison customers for a planned 28.4 kW PV demonstration facility; the Nevada legislature has given the Nevada Power Company explicit statutory authority to provide a voluntary green service to its customers; and the New York PUC approved a proposal by Niagara Mohawk to develop a voluntary green pricing program, allowing customers to pay an extra $6.00 per month for electricity from renewables.

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[52]See, for example, B. Farhar, *Trends in Public Perceptions and Preferences on Energy and Environmental Policy*, National Renewable Energy Laboratory, NREL/TP-461-4857, February 1993, and D. Moskovitz, "'Green Pricing': Customer Choice Moves Beyond IRP," *The Electricity Journal*, October 1993.

[53]For example, Portland General Electric is packaging power from two planned wind projects for sale to wholesale customers. See *State Renewable Energy News*, Fall 1995, available from the National Renewable Energy Laboratory.

Risk Allocation

In a regulated utility system, utility shareholders and ratepayers share in the risks of most utility investments because utility investments are incurred for the purposes of providing necessary services to consumers and the public at large. As long as these costs are prudently incurred, utilities can expect full cost recovery as well as a reasonable return on the investment.

Controversy may develop when actual costs exceed planned costs. Examples may include cost overruns on a new power plant or the costs of retroactively imposed environmental compliance measures. In Hawaii, the heavy reliance on oil-fired generation makes the electricity system particularly vulnerable to shifts in the price of oil, the impacts of which are generally collected through a fuel cost adjustment clause (FAC).

Because of the assurance of cost recovery, the existence of an FAC provides little incentive for a utility to avoid the risks associated with reliance on any particular fuel. In Hawaii, this works against renewables, because although renewables may provide some value in diversifying the fuel mix, these values are not recognized in the marketplace.

A competitive market can introduce a more proper allocation of the risks of fuel and technology choices. All other things equal, a supplier would bear the economic and financial risks of a sudden increase in the cost of fuels or of retroactive environmental compliance measures, just like a renewable energy developer selling to a utility bears the risk of resource quality or equipment performance. Utilities in several states already operate today without FACs.[54]

HECO argues that elimination of the fuel adjustment clause would simply raise rates to customers because the utility would bear the full cost implications of these risks. The company argues that "it makes sense for the customer to bear the risk of fuel price variability rather than to pay a higher price for electricity in order to eliminate the risk."[55] But this is the crux of the matter, that internalization of these risks necessarily increases the price of electricity from more risky sources. In a competitive market, customers would have the choice of paying a higher fixed rate for renewables as a source of insurance from these risks, just as homebuyers can choose a fixed rate mortgage as insurance against interest rate fluctuations.

Targeted Financial Incentives and Disincentives

State governments can exercise significant influence over energy markets through tax and other fiscal policies, such as tax levys and exemptions, tax credits, depreciation schedules, loan guarantees, and other financial devices. The use of these devices can help mitigate the higher

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[54]States that currently have no automatic fuel clause for major electric utilities include Arizona, Kansas, Missouri, Montana, Oregon, Texas, Vermont, and Wisconsin. See R. Morgan, "Time to Face FACs: How Fuel Clauses Undermine Energy Efficiency," *The Electricity Journal,* October 1993.

[55]HECO, "Barriers and Strategies," Working Draft 5/30/95, prepared as input to the Hawaii renewable energy docket working group.

front-end investment requirements for renewables. Important examples in Hawaii are the state income tax credits for solar and wind energy systems.

In addition, state utility regulators authorize the rate of return for jurisdictional utilities. Thus, PUCs can reward utilities by increasing the rate of return or penalize them by decreasing the rate of return. This device could be used as an incentive for utilities to make prudent investments in renewables. Looking forward to a more competitive electricity market structure, some regulators are investigating the use of performance-based ratemaking (PBR) for utilities.[56] Under a PBR-type mechanism, renewables deployment progress could be one utility performance factor by which earnings would be determined.

System Benefits Charges

Many states are considering establishing a "universal wires charge" that would collect a standard fee from all electricity customers to fund programs that may no longer be feasible for the utility to provide in a more competitive electricity market. The institution of a wires charge arises most often in discussions of a utility's "stranded costs" for which a "competition transition fee" would be collected from ratepayers to recover uneconomic costs that might result from exposing the utility company to greater competition.[57] In a restructured utility system, it is generally anticipated that the charges would be collected at the distribution level.

The wires charge concept is also relevant as a "system benefits charge" for the provision of public programs, such as energy conservation, renewables and low-income assistance, that have previously been supported in utility rates. In Arizona, a customer surcharge has been adopted to fund a utility's Energy Efficiency and Solar Energy Fund. In addition to recovery of demand-side management expenses, the surcharge covers all capitalized and expensed program costs associated with the development and implementation of renewable energy projects.[58]

Green RFPs

Green RFPs refer to competitive bidding solicitations for new generation resources that are limited to renewable resources. Rather than negotiate separately with any one developer, an open and competitive solicitation encourages developers to offer their lowest cost resources in competition with each other. A cap can also be placed on the price that the utility is willing to pay for these resources. Green RFPs conducted by mainland utilities indicate that a number of different renewable energy resource options are available that can provide clean and cost competitive power for ratepayers over the long term.

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[56] L. Hill, *A Primer on Incentive Regulation for Electric Utilities*, Oak Ridge National Laboratory, ORNL/CON-422, October 1995.

[57] These stranded costs relate to those utilities with high embedded costs, some portion of which may not be recoverable from customers in a more competitive market in which electricity prices may fall.

[58] Arizona Corporation Commission, Decision No. 58644, In the Matter of the Commission's Examination of the Rates and Charges of Arizona Public Service Company, Docket No. U-1345-94-120, June 1, 1994.

Portfolio Standard

A renewables portfolio standard would impose a minimum renewable energy requirement for the state's electricity mix. Every entity participating as an electricity supplier would be required to provide and maintain a certain percentage of its supply from renewable energy sources. However, the renewables obligation would be tradeable so that all electricity suppliers need not become renewables providers. For example, electricity suppliers could contract with dedicated renewables developers to meet their renewables obligation. Such a trading scheme would enhance the value of renewable energy resources in the state and at the same time use market forces to minimize the costs of developing and maintaining the portfolio. The trading element of the portfolio standard is patterned after the sulfur dioxide (SO_2) trading program contained in the Clean Air Act Amendments of 1990. The establishment of a renewables portfolio standard has been proposed as an element of the California PUC's recent electric industry restructuring decision.[59] A renewables portfolio standard could also be employed more broadly to include all sources of energy used in the state, including transportation.

Summary and Recommendations

The State of Hawaii has an abundance of indigenous renewable energy resources, the development of which can lessen the risks and financial burdens associated with the importation of fossil fuels. Renewable energy development can also provide the state with greater diversity and environmental sustainability of its electricity supply. Renewable energy technologies have developed to the point that they are either today already cost competitive on a life-cycle basis in many applications or are approaching cost parity with traditional electricity sources.

Important progress has been made in the development of renewable energy resources in Hawaii. However, despite these advances, the share of renewable energy use has been declining because of the sugar industry downturn. Greater use of renewable energy in Hawaii's electricity sector is currently impeded by the following:

- Renewable energy systems tend to be capital intensive and thus require a greater initial outlay of capital investment.

- Many of the values that renewables possess, such as environmental benefits and the economic and security benefits of displacing imported fuels, are not directly captured in electricity market decisions.

- Electric utilities are today the sole providers of electricity on the Islands. If the utilities do not actively pursue or participate in the development or acquisition of renewables, the development of these resources is significantly impeded. Furthermore, the state's consumers, who may prefer greater development of renewable resources, can only exercise this preference through the services that the utility provides, short of making their own system investments.

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[59]California Public Utilities Commission, Order Instituting Rulemaking on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation, Decision 95-12-063 (December 20, 1995) as modified by D.96-01-009 (January 10, 1996).

Several strategies could be pursued to promote greater renewables development. These strategies, which are not mutually exclusive, fall into two general categories: (1) providing greater incentives for utilities and other power supply entities to develop or pursue renewables (or disincentives for not doing so), and (2) providing alternative avenues for electricity consumers to access renewables if utility service offerings are not responsive to their preferences or to the achievement of state policy goals. Associated policy actions might include:

<u>A Tangible State Renewables Goal</u> — First and foremost, the state needs to make a clear pronouncement that renewable energy development remains an important objective of state energy policy. The state might consider the establishment of a concrete goal for renewable energy development and the development of policies to support the realization of this goal.

<u>Renewables Preference</u> — The state could also establish an official preference (similar to that adopted in Minnesota) that all new generating capacity should use renewable energy resources unless it can be demonstrated, on a case-by-case basis, that this would not be in the public interest. Any such analysis should include explicit consideration of fuel supply and price risks, as well as environmental and economic development impacts.

<u>Targeted Financial Incentives</u> — The state might provide incentives to help move Hawaii's energy industries toward greater renewables development. The state currently offers income tax credits for the installation of solar and wind systems to help defray the higher front-end costs of these systems, and these credits should be maintained. Incentives could also be provided to utilities as a reward for prudent renewables programs or and investments. These incentives could be funded either out of general revenues or by a "systems benefit charge" for renewables development that all electricity customers would be required to pay; the systems benefit charge could be used to establish a "State Renewables Development Fund."

<u>Portfolio Standard</u> — The establishment of a portfolio standard would promote development of the most cost-effective renewables by creating a market specifically for renewable energy development and allowing utilities and other electricity suppliers to trade renewable energy allowances. The portfolio standard could also be extended to other energy-consuming sectors.

One of the more important obstacles to greater renewables development in the electricity sector is that market power is concentrated in the hands of the state's electric utility companies. Although there is ample historical and economic rationale for today's regulated monopoly utility system, this market concentration serves to impede alternative types of investments, such as renewables, unless the utilities are willing participants. Outside of making changes to the utility incentive structure, the response to which cannot be known in advance, several types of reforms could be initiated that focus on promoting greater competition through providing for greater customer access to renewables.

<u>Green Power Marketing</u> — At the very least, the state's utilities should develop a "green power" product that would allow the utilities' customers to voluntarily exercise a preference for electricity from renewable energy sources. However, assurances should be provided that the renewable energy service to be offered is a competitive product, perhaps by holding a "green RFP" for the new projects to be developed or allowing third party entities to develop and offer

similar products and services.

Direct Customer Access — Alternatively, third party entities might be allowed to provide renewable energy service options directly to a utility's wholesale and retail customers. The terms of this access must be fair so as not to discriminate against or unduly impact the cost of the renewables-based power.

Net Energy Metering — Because of the large spread between utility wholesale electricity prices and retail rates in Hawaii, there is a considerable potential for small-scale, distributed renewable electric systems, such as photovoltaics, to make market inroads on the customer side of the meter. A net energy metering policy, which would allow customers to offset their high retail rates and which many other states have already implemented, should be considered.

Recommendations for Particular Renewable Energy Resources

Biomass — Bagasse has provided the bulk of the state's contribution from biomass resources. However, with the sugar industry on the decline, alternative biomass resources and conversion technologies must continue to be explored and pursued, including the exploitation of the state's waste resources.

In addition, the short availability of the federal production tax incentive for generation facilities using "closed-loop" biomass resources provides a near-term incentive to accelerate the investigation of these resources.

Geothermal — Geothermal resource development has just recently started contributing to the state's electricity mix. The state should seek avenues for expanding the use of the geothermal resource where appropriate. A 5-MW expansion of the existing Puna project is currently being negotiated.

Wind — Hawaii has attractive wind resources, but past commercial development experience has been disappointing. The state should explore mechanisms for encouraging the deployment of improved wind turbine technology. Similar to "closed-loop" biomass, the short availability of the federal production tax incentive for new wind energy generation provides a near-term incentive to move ahead with actual projects.

Solar — The enhancement of the state income tax credit has revived the solar water heating industry in Hawaii. In addition, HECO has proposed a customer-oriented solar water heating program that, in conjunction with the tax credits, will help ensure that this momentum is sustained. These types of programs should be continued and encouraged.

Perhaps the most promising long term application for solar electricity in Hawaii is the use of photovoltaics. Although PV-based electricity continues to be more expensive than bulk power generation, the economics become more favorable the farther into the distribution system PV systems are considered. Given the relatively high retail rates in Hawaii, the potential for customer-oriented PV systems deserves near-term attention. The state should explore options for encouraging these applications.

Ocean Thermal Energy Conversion — OTEC systems offer a longer term potential for clean electricity from an indigenous, renewable energy resource. Efforts should continue in the research and development of this technology.

COLLABORATIVE DOCUMENT

Docket No. 94-0226

Renewable Energy Resource Investigation

November 3, 1995

RENEWABLE ENERGY RESOURCE INVESTIGATION
DOCKET NO. 94-0226

Summary of Contents

Appendices:

RENEWABLE ENERGY RESOURCE INVESTIGATION
DOCKET NO. 94-0226

Table of Contents

Appendices:

DOCKET NO. 94-0226

RENEWABLE ENERGY RESOURCE INVESTIGATION

EXECUTIVE SUMMARY

On August 11, 1994, The Public Utilities Commission of the State of Hawaii (Commission) instituted an investigation to identify the policies, programs, procedures, and incentives needed for the successful implementation of renewable resource technologies in the State of Hawaii. The Commission named and admitted sixteen parties to the investigation docket. After meeting with the parties and conducting a series of workshops and discussion sessions, the Commission tasked the parties to engage in a consensus building process. The parties were asked to identify the barriers to renewable resource development in Hawaii and formulate specific strategies to remove these barriers.

In its Order No. 13849, filed April 10, 1995, the Commission stated that

> "[t]he expected outcome of the consensus building process is a collaborative document which will outline the following:
>
> (1) All barriers, real or perceived, that impede the utilization of renewable energy resources in Hawaii;
> (2) Actual strategies to remove the barriers identified and deploy the utilization of renewable energy resources;
> (3) A list delineating strategies upon which the parties agree and disagree, and where agreement could not be reached, the reasons for disagreement and the extent to which compromise or alternative strategies were sought; and
> (4) Strategies that require further examination."

The <u>Collaborative Document</u> is the result of the consensus building process (collaborative) identified by the Commission. Included in this document is an outline and discussion of the real and perceived barriers and associated strategies identified by the participants in the collaborative. The identified barriers have been organized into related groups and the strategies addressing each barrier are identified.

Several strategies require further examination prior to implementation. For these strategies, studies, work groups or other preliminary activities are identified as vehicles to implement the strategies.

The <u>Collaborative Document</u> is not a consensus document and does not represent unanimous agreement by all parties. There is not agreement by all parties whether some of the barriers are real or are only perceived barriers. The degree of agreement regarding each barrier is identified in the discussion of each barrier. There is also no agreement regarding many of the strategies that are identified. In several places in the <u>Collaborative Document</u> the positions of each of the parties regarding each identified strategy are identified.

For each identified barrier and strategy where there is not agreement by the parties, a discussion is provided that briefly characterizes the positions of the proponents and opponents. The parties clarify their individual positions in the Statement of the Parties included at the end of the <u>Collaborative Document</u>.

The parties met in a series of facilitated meetings in order to reach agreement on the barriers and strategies. The parties attempted to reach compromise and identify alternative strategies. In addition to the facilitated meetings, all parties drafted several rounds of proposed text and comments regarding the proposed text. For each round of text and comments, copies were distributed by all parties, to all parties, for review.

A smaller group of individual participants was deputized by the collaborative to serve as a working group to consolidate the text into a uniform and coherent document. The working group produced a draft document that was circulated to all parties. Comments from the parties were then incorporated into a final draft which was reviewed and adopted by the collaborative group at the last facilitated meeting.

A matrix identifying each barrier, strategy and the positions of the parties is provided as a part of this Executive Summary. Each party was given the opportunity to state its agreement, disagreement or statement of no position regarding each strategy. The positions of the parties on the strategies take into account the discussion of the strategy in the <u>Collaborative Document</u>, as well as the title of the strategies reflected in the matrix. The positions of individual parties, including conditions they may have placed on their positions, are identified in more detail in the Statement of the Parties included at the end of the <u>Collaborative Document</u>.

Please note that a statement of "no position" for a strategy in the matrix does not necessarily mean that a party does not have a position regarding the strategy. For example, a statement of no position in the matrix may mean that a party may agree with only part of the wording of the strategy, that a position is only possible on a case by case basis, or that there is not sufficient information to take a definitive position at this time. Parties that are so inclined may elaborate on a "no position" vote in their position statements. Please refer to the discussion of the strategy in the text and each party's statement of position in the Statements of the Parties.

The parties participating in the Renewable Energy Resource Investigation, Docket No. 94-0226 are:

Division of Consumer Advocacy
County of Hawaii
County of Kauai
County of Maui
Department of Business, Economic Development & Tourism
Energy Resource Systems
Hawaii Electric Light Company, Inc.
Hawaii State Senate Committee on Science,
  Technology and Economic Development
Hawaiian Commercial & Sugar Company
Hawaiian Electric Company, Inc.
Inter Island Solar Supply
Kahua Ranch, Ltd.
Kauai Electric Division of Citizens Utilities Company
Makani Uwila Power Corp.
Maui Electric Company, Limited
Pacific International Center for High Technology Research
Puna Geothermal Venture
RLA Consulting
David A. Rezacheck, Private Citizen
TRM/Wind Energy International, Inc.
Waimana Enterprises, Inc.
Zond Pacific, Inc.

PARTIES: HECO,MECO,HELCO, KE-KAUAI ELEC.; CA-CONSUMER ADVOCATE; D-DBEDT; H- HAWAII COUNTY; M-MAUI COUNTY; KI-KAUAI COUNTY; P-PICHTR; W-WAIMANA; N-NEW WORLD; I-INTERISLAND SOLAR; KRL-KAHUA RANCH; ERS-ENERGY RESOURCES; R-DAVID REZACHEK;Z-ZOND

PUC DOCKET 94-0226 --SUMMARY MATRIX OF THE COLLABORATIVE REPORT OF THE PARTIES

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
	1. current avoided cost offered to renewable developers may be insufficient				1-2				
1.a	uncertainty regarding the applicability and availability of state income tax credits to re projects				1.a-1				
		1.a.1	seek clarification from dept. of taxation regarding applicability of existing credits to large re facilities	letter request	1.a-2	dbedt	heco, ke,d,ki,m,h,n,r,z		p,w,krl,i,ca,ers
		1.a.2	support and maintain existing re tax credits to the extent appropriate	monitor legislature	1.a-3	legislature	heco,ke,d,r,p,ki,m,h,w, n,krl,i,ers,z		ca
		1.a.3	examine efficacy of additional state incentives to encourage re	working group	1.a-4	dbedt, developers, utilities	heco, ke,d,r,p,ki, m, h,n,krl,i,ers,z		w,ca
1.b	cost effectiveness of re resources				1.b-1				
		1.b.1	pursue the deployment of renewables that appear to be cost effective and monitor others	purchase power negotiations	1.b-1	utilities, developers, puc	heco,ke,d,p,ki,m,h,w,n, krl,i,ers,r,z		ca
		1.b.2	improve cost effectiveness of renewables through rd&d	see barrier grouping 9	1.b-2	see barrier grouping 9	heco,ke,d,ki,m,h,n,r,z		p,i,krl,w,ers,ca
		1.b.3	increase/refocus govt. tax incentives	see 1.a-3	1.b-2	dbedt led	heco,ke,d,n,r,z		p,krl,w,i,m,h, ers,ki,ca
		1.b.4	provide govt. support in addition to govt. tax incentives	see 1.c-3	1.b-3	utilities, dbedt	heco,ke,d,n,z		p,krl,w,i,m,k,h,ca, ki,ers
		1.b.5	green pricing	see 1.e-2	1.b-3	utilities, puc, advisory group	heco,ke,d,r,p,ki,m,h,n, krl,i,ca,ers,z	w	
		1.b.6	energy wheeling for counties	puc proceeding	1.b-4	puc,utilities,ca, counties	d,p,i,w,krl,h,ki,r,m,ers,z	heco, ke	ca
		1.b.7	net billing payment rates for small re systems	puc rule-making	1.b-5	puc	p,krl,i,ers,m,r,h,ki,d,z	heco, ke	ca
1.c	unresolved avoided cost issues				1.c-1				
		1.c.1	reduce uncertainty regarding avoided costs	puc resolve pending dockets	1.c-2	puc	heco,ke,d,p,ki,m,h,w,n, krl,i,ers,r,z,ca		
		1.c.2	reasonably demonstrated avoided capacity costs for as available renewables	irp process, purchase power contract negotiations	1.c-3	puc, utilities, developers	heco,ke,d,p,ki,m,h,w,n, krl,ers,ca,i,z		
		1.c.3	perform an analysis of the combined effects of distributed re projects in a given service territory	computer model	1.c-4	utilities, dbedt	z,heco,ke,d,ki,m,h,n, ca,r		w,p,i,krl,ers
1.d	current fuel adjustment clause passes on risk of oil price variability to consumers				1.d-1				
		1.d.1	puc eliminate ecac on a forward going basis	puc rulemaking	1.d-2	puc	d,p,krl,i,z	heco, ke,ki, m,n,ca	h,w,ers,r

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	barrier		strategy	vehicle	page	agency	agree	disagree	no position
		1.d.2	conduct analysis on a system to "flatten" risk of oil price variability	workgroup	1.d-3	dbedt	ke,d,r,z	heco, ca	n,ki,m,h,w,p,i, krl,ers
1.e	evaluation and consideration of beneficial impacts of renewable energy use				1.e-1				
		1.e.1	require utilities to pay an externalities adder above avoided cost	externalities adder	1.e-3	puc	d,p,w,n,krl,i,ers,z	heco, ke,h	ki,m,r,ca
		1.e.2	green pricing	green pricing utility tariff	1.e-4	utilities, puc, advisory group	heco, ke, d,r,p,ki,m,h,n,krl,i,z,ca	w	
		1.e.3	consider a production incentive for re developers funded by utility surcharge	analysis of potential costs of such a fund	1.e-7	dbedt, utilities, developers, puc	d,n,i,p,krl,ers,r,z	heco, ke	w,ki,m,h,ca
1.f	inability of utility system operation models and economic models to accurately and adequately model and evaluate re systems				1.f-1				
		1.f.1	puc resolve docket 7310	puc docket 7310	1.f-3	puc	heco,ke,d,p,ki,m,h,w,n, krl,i,r,ca,ers,z		
		1.f.2	consider modeling conventions and generation expansion criteria that are sensitive to the contribution of as-available generation	generation capacity criteria, irp process, ppa contract negotiations	1.f-4	utilities, puc, developers, ca, dbedt, pichtr, nrel, epri	heco,d,p,ki,m,h,n,i,ke, ers,w,ca,r,krl,z		
	2. apparent limitations on the amount of re power that can be accommodated by the electric utilities				2-2				
2.a	minimum load conditions leading to curtailment				2.a-1				
		2.a.1	dsm programs that shift load off-peak	utility irp process, dsm program design	2.a-3	utilities	heco,ke,d,ki,m,h,n,i,ca, ers,r,z		p,w,krl
		2.a.2	study and possible implementation of energy storage systems	utility irp process	2.a-4	utilities	heco,d,ki,m,h,n,r, ca,w,z		p,i,krl,ers,ke
2.b	intermittency of some re resources				2.b-1				
		2.b.1	reanalyze amounts of intermittent re power that utilities can absorb	report on limitations on penetration of intermittent power	2.b-1	utilities, developers	heco,ke,d,ki,m,h,n,r, ca,z		p,w,i,krl,ers
		2.b.2	study and consider implementation of energy storage systems	utility irp process and action plans	2.b-2	utilities, dbedt, developers	heco,d,ki,m,h,n,z,r,ca		p,w,i,krl,ers,ke
2.c	need to integrate technology with the grid				2.c-1				

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
		2.c.1	reanalyze the amount of re intermittent power that can be absorbed	see 2.b.1	2.c-1	utilities, developers	heco,ke,d,ki,m,h,n,r, ca,z		p,w,i,krl,ers
		2.c.2	analyze potential for niche applications for renewable resources	helco pv program	2.c-2	helco	heco,ke,d,ki,m,h,n,r, ca,z		p,w,i,krl,ers
		2.c.3	study and implement energy storage systems	see 2.b.2	2.c-2	utilities, dbedt, developers	heco,d,ki,m,h,n,r, ca,z		p,w,i,krl,ke,ers
	3. complex and lengthy permitting process; and limited land availability				3-1				
3.a	complex and lengthy permitting process				3.a-1				
		3.a.1	amend hrs 201, part IV, the permit facilitation act of 1985	legislative amendment	3.a-3	legislature, dbedt	d,r,p,n,krl,i,ers,z		heco,w,ke,ki,h,m, ca
		3.a.2	fund consolidated application permitting process and permit facilitation acts	administrative budget request	3.a-4	legislature, administration	heco,ke,d,r,n,z		p,w,i,krl,ers,m,h, ki,ca
		3.a.3	create a hawaii energy commission	legislation	3.a-6	legislature	r,n,i,z	heco,d, ki,m,h,	ke,p,w,krl,ers,ca
		3.a.4	consider reducing the number of agencies with permitting authority over re projects	dbedt working group	3.a-9	dbedt, utilities, developers, counties, legislature	heco,ke,d,r,n,z		p,krl,i,w,ki,m,h,ca, ers
		3.a.5	provide additional resources for permitting agencies	administration budget request and appropriations from legislature	3.a-10	administration legislature	heco,ke,r,n,z	ki,m,h	d,p,i,krl,w,ers,ca
		3.a.6	establish re subzones and enterprise zones	dbedt led working group	3.a-11	dbedt, utilities, developers, counties	heco,d,r,n,z	ki,m,h	p,i,krl,w,ers,ke,ca
		3.a.7	special rules for permitting small projects	dbedt led working group	3.a-13	dbedt, osp, utilities, developers, permitting agencies, legislature	heco,d,r,ki,m,h,n,z	ke	w,p,i,krl,ers,ca
3.b	limited availability of land								
		3.b.1	establish re subzones and enterprise zones	dbedt led working group	3.b-1	dbedt, utilities, developers, counties	heco,d,r,n,z	ki,m,h	p,i,krl,w,ers,ke,ca
		3.b.2	develop a re bidding process for access to state lands	working group	3.b-2	dlnr, dbedt, utilities, developers, government agencies	d,r,ki,m,h,n,z		heco,ke,w,p,i,krl, ers,ca

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
3.c.	developers may not be granted access to public lands or renewable energy resources				3.c-1				
		3.c.1	develop a re bidding process for access to state lands	working group	3.c-2	dlnr, dbedt, utilities, developers, government agencies	d,r,ki,m,h,n		heco,ke,w,p,i,krl, ers,ca
		3.c.2	enact legislation to ensure solar access for project term	study by hsea	3.c-4	legislature, counties, hsea	d,r,n,i		w,m,ki,h,p,krl,ers, ca,ke,heco
3.d.	nimby syndrome for siting re projects				3.d-1				
		3.d.1	involve public and public advocates early in the energy planning process	irp advisory groups	3.d-1	utilities, puc, ca, dbedt, dlnr	ke,d,r,ki,m,h,n,z		p,i,krl,w,heco,ers, ca
		3.d.2	educate the public about the net benefits of re projects and conservation	re public information media	3.d-3	puc, dbedt, ca, utilities, developers	heco,ke,d,r,ki,m,h,n,z		p,i,krl,w,ers,ca
		3.d.3	location of projects with significant potential impacts as remotely as possible	dbedt led working group	3.d-4	osp, dbedt, dlnr, utilities, developers, permitting agencies, counties, legislature	heco,ke,d,r,ki,m,h,n,z		p,i,krl,w,n,ca
		3.d.4	financial assistance to participants in advisory groups	advisory group meetings during non-business hours	3.d-5	puc, ca, utilities, legislature	ki,m,h,p,krl,i,ers,r,z	heco,ke	d,w,n,ca
3.e	potential negative environmental and social impacts of re development projects				*3.e-1				
		3.e.1	public education programs	convene public discussion workshops	*3.e-1	developers, utilities, government agencies	d,ki,m,h,n,r,ke,z		p,i,krl,w,heco,ers, ca
	4. form of price offered to renewable developers may not facilitate financing				4-2				
4.a	tying the value of, and payments for, re generated electricity directly to the price of oil.				4.a-1				
		4.a.1	continuing/modifying min. rates for as available re resources	ppa negotiations	4.a-3	puc, utilities, developers	heco,ke,d,r,ki,m,h,n,z	w	p,i,krl,ers,ca

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
		4.a.2	fixed or more predictable payment streams	ppa negotiations	4.a-5	puc, utilities, developers	d,r,p,i,krl,w,n,ers,z	heco,ke	ki,m,h,ca
		4.a.3	apply adders to filed avoided energy costs	see appendix x	4.a-6	see appendix B	d,p,w,krl,i,r,ers,z	heco,ke	ki,m,h,n,ca
4.b	high initial cost of re projects				4.b-1				
		4.b.1	use of tax credits that reduce initial costs of re projects	legislation	4.b-2	legislature, developers	heco,ke,d,p,ki,h,krl,i,n, r,ers,z		m,w,ca
		4.b.2	use of special purpose revenue bonds that reduce financing costs	legislation	4.b-3	legislature, developers	heco,ke,d,p,krl,i,ki,m,h, n,r,ers,z		w,ca
		4.b.3	consider front end loaded prices if adequate security is available	ppa negotiations	4.b-4	puc, utilities, developers	heco,ke,d,p,krl,i,ki,m,h, n,r,ers,z		w,ca
		4.b.4	consider the demonstrable life of the underlying asset of the re project in determining ppa term	ppa negotiations	4.b-6	puc, utilities, developers	heco,p,krl,i,ke,d,w,n,r, ers,z		m,h,ki,ca
	5. new renewables are not included in utility resource plans.				5-2				
5.a	long term reliability of the renewable energy technology				5.a-1				
		5.a.1	monitor ongoing re developments	monitor ongoing re demonstration projects	5.a-1	utilities, developer, government agencies	heco,ke,d,r,ki,m,h,n, ca,z		p,i,krl,ers,w
		5.a.2	actively participate in re demonstration projects applicable to hawaii	utilities to use portion of rd&d funds	5.a-3	utilities, puc, developers, government, third party investors	heco,ke,d,r,ki,m,h,n, ca,z		p,i,krl,ers,w
5.b	lack of incentives to utility to purchase re				5.b-1				
		5.b.1	develop standard offer contract for re sales to utilities	puc docket to consider standard offer contract	5.b-2	puc	ke,d,r,p,ki,m,h,w,n,krl,i, ers,z	heco	ca
		5.b.2	require payment of capacity and energy values to re producers	see 1.c.2	5.b-4	puc, utilities, developers	d,r,p,ki,m,h,w,n,krl,i, ers,ke,z	heco	ca
5.c	lack of incentives to utilities sufficient to overcome the risk of producing re				5.c-1				
		5.c.1	consider incentives to utility shareholders for investing in rd&d projects	heco to work with ca and others to develop a proposal	5.c-2	utilities,ca	d,r,ki,m,h,n,z	w	heco,p,i,krl,ke,ca, ers
		5.c.2	consider utility investment in joint ventures for renewable projects	puc and ca to provide guidance	5.c-3	puc, ca	heco,ke,d,r,p,ki,m,h,w, n,krl,i,ers,z		ca

- 8 -

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
5.d	lack of equal transmission access to independent power producers and wholesale and retail wheeling			see barrier grouping 7	5.d-1	see barrier grouping 7			
5.e	inadequate evaluation and treatment of re and ipps in irp process				5.e-1				
		5.e.1	consider quotas, set-asides, or targets	legislation, puc rule, irp process	5.e-2	legislature, puc	d,p,ki,n,krl,i,ers,r,ca,z	heco,ke	m,w,h
		5.e.2	consider preferential consideration of renewables in irp process	legislation, puc rule, irp process	5.e-3	puc, legislature	d,r,p,ki,n,krl,i,ers,z	heco,ke	h,w,m,ca
		5.e.3	consider competitive bidding	puc docket	5.e-4	puc	d,p,ki,m,h,n,krl,i,ers,r, ca	heco,ke,z	w
		5.e.4	consider retail wheeling	see barrier grouping 7	5.e-5	see barrier grouping 7	d,w,p,i,krl,n,ki,h,m,r,z, ers	heco,ke	ca
5.f	evaluation and consideration of beneficial impacts of re use relative to conventional fossil fuels				5.f-1				
		5.f.1.	improve methodologies to value benefits of renewables	irp process	5.f-3	utilities, puc, irp advisory groups	ke,d,p,ki,m,h,w,n,krl,i, heco,r,ers,ca,z		
		5.f.2	proceed with quantification of externalities	heco utilities action plan	5.f-4	heco utilities, externalities advisory group, puc	heco,ke,d,ki,m,h,w,ca, z,r		p,n,krl,i,ers
		5.f.3	establish green rfps	green rfp	5.f-5	puc	d,r,p,ki,n,krl,i,ers,z	heco,ke	h,w,m,ca
		5.f.4	establish renewable set asides	establishment of set asides for renewables in irp	5.f-6	puc	d,r,p,ki,n,krl,i,ers,z	heco, ke	w,m,ca,h
		5.f.5	consideration of competitive bidding	puc generic docket on competition in electric industry	5.f-7	puc	d,p,ki,m,h,n,krl,i,ers,r, ca	heco,ke,z	w
5.g	lack of adequate, high quality, renewable resource data				5.g-1				
		5.g.1	consider funding additional copies of dbedt renewable energy resource assessment report	budget	5.g-2	dbedt	heco,ke,d,r,ki,m,h,n,z		p,w,krl,i,ers,ca
		5.g.2	utilities and developers assume greater monetary role in resource assessment	increased private sector funding	5.g-3	dbedt, developers, utilities	d,r,ki,m,h,n,z		heco,ke,w,p,krl,i, w,ers,ca
	6. lengthy ppa negotiations				6-1				
6.a	lack of incentives to utilities to purchase re			see barrier 5.b	6.a-1	see barrier 5.b			

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
6.b	implementation of existing statutes and regulations				6.b-1				
		6.b.1	puc to implement provisions of scr 2(1994)	puc rulemaking	6.b-3	puc	d,r,w,n	heco,ke	ki,m,h,ca,p,i,krl, ers
		6.b.2	puc to enforce current rule (6-74-15c)	puc action enforcing existing rules	6.b-4	puc	d,r,p,w,n,krl,i,ers	heco,ke	ki,m,h,ca
		6.b.3	puc implement requirements of act 176 (1994)	puc enforcement of existing law	6.b-5	puc	d,r,w,n	heco,ke	ki,m,h,ca,p,i,krl, ers
6.c	protracted time to negotiate with re developers				6.c-1				
		6.c.1	initiate rulemaking proceedings to adopt rules to enforce mandates	puc rulemaking	6.c-1	puc	r,p,w,n,krl,i,ers,z	heco,ke	ki,m,h,d,ca
		6.c.2	streamline regulatory approval process for re ppas	puc rulemaking	6.c-2	puc	r,p,w,n,krl,i,ers,z	heco	ki,m,h,d,ca,ke
		6.c.3	enforce current rules regarding negotiations between utilities and qfs	puc enforcement of existing rules	6.c-3	puc	d,r,p,h,w,n,krl,i,ers,z	heco,ke	ki,m,ca
		6.c.4	initiate rulemaking pursuant to scr no. 2	puc rulemaking	6.c-3	puc	d,r,p,w,n,krl,i,ers,z	heco,ke	ki,d,h,ca,m
		6.c.5	utilize services of a hearing officer	employment of hearing officer	6.c-4	puc	d,r,p,m,w,n,krl,i,ers,z	heco,ke	h,ki,m,ca
		6.c.6	implement requirements of act 176	puc enforcement of existing law	6.c-5	puc	d,r,p,w,n,krl,i,ers,z	heco,ke	ki,m,h,ca
		6.c.7	rulemaking to require a d&o within 60 days of complaint filed	puc rulemaking or legislation	6.c-5	puc, legislature	r,p,w,n,krl,i,ers,z	heco,ke	ki,d,h,ca,m
		6.c.8	expedite contracting process	utilities enacting the strategy	6.c-6	utilities	d,r,p,ki,m,h,w,n,krl,i, ers,z	heco,ke	ca
		6.c.9	standard offer contracts for re sales to utilities	puc rulemaking	6.c-7	puc	ke,d,r,p,ki,m,h,w,n,krl,i, ers	heco,z	ca
		6.c.10	reduce uncertainty regarding determination of avoided costs	see strategy 1.c.1	6.c-7	puc	heco,ke,d,p,ki,m,h,w,n, krl,i,ers,r,ca		
	7. electric utility regulatory structure								
7.a	absence of re specific retail wheeling mechanisms or opportunities				7.a-1				
		7.a.1	include in the framing of the electric utilities competition docket specific issues relating to providing renewable access	puc electric utilities competition docket	7.a-2	puc	d,p,w,n,krl,i,h,m,ki,ers, r,z		heco,ke,ca
		7.a.2	allow re nugs to transmit and distribute re to customers willing to pay	puc docket or rulemaking	7.a-3	puc	d,r,p,w,n,krl,i,z,ers	heco,ke	ca,m,ki,h

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
		7.a.3	permit county governments to engage in re retail wheeling	see strategy 1.b.6	7.a-4	puc, utilities, ca counties	d,p,ki,m,h,w,n,krl,i,ers, r,z	heco,ke	ca
	8. environmental and social impacts				8-2				
8.a	potential negative social and environmental impacts				8.a-1				
		8.a.1	negative impacts should be taken into consideration in siting	siting, permitting, irp process	8.a-2	utilities, developers, puc, permitting agencies	heco,ke,d,ki,m,h,n,ca, r,z		p,krl,i,w,ers
		8.a.2	mitigate negative impacts	project design, permitting, irp process	8.a-3	utilities, developers, puc, permitting agencies	heco,ke,d,ki,m,h,n,z,r, ca		p,krl,i,w,ers
		8.a.3	avoided impacts of re projects should be considered	permitting, irp process	8.a-4	puc, permitting agencies	d,ki,m,h,n,ca,r,z		heco, ke,p,krl,i,w,ers
	9. status of development of certain renewable and storage technologies				9-2				
9.a	limited federal and state funds for re demonstration projects				9.a-1				
		9.a.1	conduct pilot rd&d projects by utilities	heco to use portion of rd&d funds to develop and implement pilot demonstration projects	9.a-2	utilities	heco,ke,d,ki,m,h,n,r, ca,z		p,i,krl,w,ers
		9.a.2	consider safe harbors for demonstration projects	safe harbor cost recovery guidance	9.a-3	puc guidance	d,p,ki,m,h,n,krl,i,ers,z,r		heco,ke,w,ca
		9.a.3	implement a green pricing pilot fund for re rd&d projects	see strategy 1.b.5 and 1.e.2	9.a-5	utilities, puc, advisory group	ke,d,r,p,ki,m,h,n,krl,i, heco,ers,z,ca	w	
9.b	long term reliability of technology				9.b-1				
		9.b.1	monitor ongoing re demonstration projects	monitor ongoing re demonstration projects	9.b-3	utilities, dbedt, pichtr	heco,ke,d,ki,m,h,n,z,r, ca		p,krl,i,w,ers
		9.b.2	actively participate in re demonstration projects	re pilot rd&d demonstration projects	9.b-4	utilities	heco,ke,d,ki,m,h,n,r, ca,z		p,krl,i,w,ers
9.c.	technical maturity of re resource				9.c-1				

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
		9.c.1	monitor and/or conduct re demonstration projects	see strategy 9.b.1,2	9.c-5	utilities, dbedt, pichtr	heco,ke,d,r,ki,m,h,n, ca,z		p,krl,i,w,ers
		9.c.2	conduct irp supply-side studies	conduct irp supply-side studies	9.c-5	utilities, developers, dbedt	heco,ke,d,r,ki,m,h,n, ca,z		p,krl,i,w,ers
		9.c.3	conduct pilot rd&d projects by utilities		9.c-7	utilities	heco,ke,d,r,ki,m,h,n, ca,z		p,krl,i,w,ers
		9.c.4	consider safe harbors for re demonstration projects	see 9.a.2	9.c.7	puc guidance	d,r,p,krl,ki,m,h,n,i,ers,z		ke,heco,w,ca
		9.c.5	implement a green pricing pilot fund for re rd&d projects	see 9.a.3	9.c-7	utilities, puc, advisory group	heco,ke,d,r,p,ki,m,h,n, krl,i,ca,ers,z	w	
	10. segmented governmental commitment to re				10-2				
10.a	conflicting objectives of, and lack of coordinating between various government agencies and departments regarding formulation and implementation of energy policy				10.a-1				
		10.a.1	director of dbedt should assert his role as energy resources coordinator	dbedt action	10.a-2	dbedt	d,r,ki,m,h,n,z		ke,heco,p,i,krl,w, ers,ca
		10.a.2	convene workshop of affected agencies to resolve conflicts, streamline etc.	workshop	10.a-3	dbedt, osp	d,ki,m,h,n,z,r		ke,heco,p,i,krl,w, ers,ca
		10.a.3	administration or legislature should establish clearly stated re and diversification goals	legislation	10.a-4	legislature, administration	d,r,ki,m,h,n,z	heco	ke,p,i,krl,w,ers,ca
		10.a.4	set-asides or procurement targets for re	legislation, executive order	10.a-5	legislature, administration	d,r,p,ki,krl,i,ers,z	heco,ke	m,w,h,ca
10.b	fragmentation of state efforts and overlap of various organizations with respect to re				10.b-1				
		10.b.1	energy resources coordinator take the lead in coordinating state efforts	organizational analysis of state funded re rd&d organizations	10.b-2	dbedt with approval of governor and legislature	d,ki,m,h,n,z		heco,ke,p,krl,i,w, ers,r,ca
		10.b.2	analysis of restructuring of involved agencies	organizational analysis of state funded re rd&d organizations	10.b-2	dbedt with approval of governor and legislature	d,ki,m,n,z		heco,ke,p,krl,i,h, w,ca,ers,r

	barrier		strategy	vehicle	page	agency	agree	disagree	no position
		10.b.3	utilities, developers and state should jointly support research	cost-shared research	10.b-2	dbedt, developers, utilities, pichtr, uh, nelha, federal agencies	heco,ke,d,ki,m,h,z,r		p,krl,i,w,n,ca,ers

PARTIES:

CA-CONSUMER ADVOCATE
D-DBEDT
ERS-ENERGY RESOURCES
H-HAWAII COUNTY
HECO-HECO, MECO, HELCO
I-INTERISLAND SOLAR
KI-KAUAI COUNTY
KRL-KAHUA RANCH
M-MAUI COUNTY
P-PICHTR
R-DAVID REZACHEK
W-WAIMANA
Z-ZOND

OTHER ENTITIES:

DLNR-DEPARTMENT OF LAND AND NATURAL RESOURCES
EPRI-ELECTRIC POWER RESEARCH INSTITUTE
HSEA-HAWAII SOLAR ENERGY ASSOCIATION
NELHA-NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY
NREL-NATIONAL RENEWABLE ENERGY LABORATORY
OSP-OFFICE OF STATE PLANNING
OTEC-OCEAN THERMAL ENERGY CONVERSION PROJECT

Barrier Grouping 1

Current avoided cost price offered to renewable developer/producers may be insufficient

RENEWABLES DOCKET NO. 94-0226 COLLABORATIVE.

IDENTIFIED BARRIERS AND STRATEGIES

Barrier Grouping 1 **Current avoided cost price offered to renewable developer/producers may be insufficient.**

INTRODUCTION:

Most of the facilities used to generate and distribute electrical energy are owned by electrical utilities. However, some generation facilities, including most of Hawaii's renewable resources, are owned by non-utility, independent power producers. Federal law and state administrative rules establish mandatory guidelines regarding the prices that must by paid by utilities to independent power producers for power generated by renewable energy resources. In general, the price paid to a non-utility renewable energy producer is determined by the "avoided cost" of the power that otherwise would have to be generated by the utility.

The potential barriers listed in this section relate to the cost of developing the resource, and the price paid for power produced by the resource. A renewable resource will normally be developed only if the expected cost of producing power from the resource is less than the expected price for the power. The strategies addressed in this section include those that reduce the costs of renewable energy resources and those that would increase the price paid by utilities for power from renewables.

Barrier 1.a Uncertainties regarding the applicability and availability of state income tax credits to renewable energy projects.

DEFINITION:

While the current law offers significant benefits to solar, wind, and ice storage developers through December 31, 1998, the Administration's attempt during the 1995 Legislature to repeal all state income tax credits creates some uncertainty. While these credits were not repealed, the possibility that they could again come under scrutiny remains. However, once a credit is earned, it is unlikely that it would be lost retroactively. However, even the discussion or proposal to eliminate tax credits or delay their implementation can potentially adversely affect plans for financing and developing renewable energy projects. Stability is required.

The uncertainty regarding applicability of Energy Conservation Income Tax Credits is primarily with respect to large-scale solar systems.

DISCUSSION:

Current State Law regarding energy tax credits is included in Act 319, which amended Section 235-12, HRS, in 1990, providing for individual or corporate income tax credits for solar or wind energy devices, heat pumps, or ice storage systems. Solar includes both solar water heating systems and photovoltaic systems. All of these systems can be effective demand-side management measures. The provisions are for systems installed and placed in service after December 31, 1989, but before January 1, 1999. The credits are as follows:

Renewable Energy System	State Income Tax Credit
Solar (Single Family Home)	35% or $1,750, whichever is less
Solar (Multi-Unit Primarily Residential Dwelling)	35% or $350 per unit if system provides not less than 80% of daily annual hot water needs of all building occupants
Solar (Hotels, Commercial, and Industrial Facilities)	35% of actual cost of system
Wind	20% of actual cost of system
Ice Storage	50% of actual cost of system

All tax credits apply only to the actual cost of the solar, wind, heat pump, or ice storage system, including accessories and installation. The tax credit shall be claimed against net income tax liability for the year in which the energy system was purchased and placed in use in Hawaii. Tax credits that exceed the taxpayers income tax liability may be used as a credit against the taxpayer's income tax liability in subsequent years until exhausted. The credits are not refundable.

The uncertainty regarding Energy Conservation Income Tax Credits is primarily with respect to large-scale solar systems. HRS §235-12 (b) (4) Energy Conservation; income tax credit, as it is currently written, appears to provide a thirty-five per cent income tax credit to solar systems for existing hotel, commercial, and industrial facilities, regardless of system size.

A solar energy system is defined in §235-12 (e) as "any new identifiable facility, equipment, apparatus, of the like that converts solar insolation ... to useful thermal or electrical energy for heating, cooling, or reducing the use of other types of energy dependent upon fossil fuel for their generation."

STRATEGIES:

Strategy 1.a.1 Seek clarification from Department of Taxation (DoTax) regarding applicability of existing tax credits to large RE facilities.

DISCUSSION:

If uncertainties have been identified, then a request should be made to the State Department of Taxation to clarify the applicability and availability of state income tax credits to large-scale renewable energy projects.

VEHICLE: Draft letter requesting DoTax clarification.

AGENCY: DBEDT

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, r, z

OPPONENTS:

NO POSITION: p, w, krl, i, ca, ers

Strategy 1.a.2 Support and maintain existing RE tax credits to the extent appropriate.

DISCUSSION:

Stability of incentive is required for developers' financial planning.

The State of Hawaii currently offers income tax credits to developers of wind and solar energy projects under HRS §235-12 (b) (4) Energy Conservation; income tax credit. A thirty-five percent income tax credit is provided for solar energy systems, and a twenty per cent income tax credit is provided for wind energy systems. These income tax credits are effective for solar and wind energy systems placed in service after December 31, 1989, but before January 1, 1999.

The State administration made an attempt to eliminate energy conservation income tax credits during the 1995 legislative session. Proponents of the tax credits maintain that they not only conform to State Policy but have a net economic benefit in terms of (1) reduced oil imports and energy consumption, and (2) the maintenance of local industry. The attempt to eliminate tax credits was unsuccessful. However, the governor has stated that these tax credits will be subject to further review and possible elimination during the 1996 legislative session. Thus, solar and wind energy developers cannot absolutely rely on these tax credits being in effect for any development projects in the near future.

VEHICLE: Monitor and support appropriate legislation.

AGENCY: DBEDT and DoTax with supporting analysis/testimony from Counties, Utilities, Consumer Advocate, and RE developers.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, p, ki, m, h, w, n, krl, i, ers, z

OPPONENTS:

NO POSITION: ca

Strategy 1.a.3 Examine the efficacy of additional State incentives to encourage RE.

a. Seek Legislation for performance-based or production tax credits, similar to Federal production credits for RE (1.5¢/kWh).

DISCUSSION:

Some renewable energy projects may earn little or no income, making a direct payment production incentive more effective than a tax credit incentive in encouraging renewable energy development.

b. Broaden law to offer tax credits for all renewable energy technologies; e.g., energy-dedicated biomass crops.

c. Extend the duration of existing tax credit programs for ten years or increase period to 15 years.

d. Eliminate the minimum hot water production percentage requirements for solar and heat pump water heating systems for multi-unit residential buildings and make the percentage and limits of the tax credits equivalent to those provided for single family residences.

e. Establish RE Enterprise Zones in conjunction with renewable resource subzones. Where RE Enterprise Zones are established provide tax incentives to RE facility developers, irrespective of facility ownership.

VEHICLE: Establish working group to examine the efficacy of additional State incentives to promote renewable energy resources.

AGENCY: DBEDT, Developers, Utilities, General Public

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, p, ki, m, h, n, krl, i, ers, z

OPPONENTS:

NO POSITION: w, ca

Barrier 1.b Cost effectiveness of RE resources.

DEFINITION:

Certain renewable resources (and certain potential renewable projects) are not or do not appear to be "cost-effective" (from a "utility cost" perspective) at this time.

DISCUSSION:

A resource is cost-effective, in this context, if the expected life-cycle costs of developing, owning and operating a generating facility that uses the resource are less than the expected life-cycle revenues for power generated by the facility (from the perspective of the developer of the resource). In general, the "market" (i.e., developers of renewable resources) will determine whether the expected cost of implementing a particular renewable resource is less than the expected price.

There is consensus that this is a barrier to the deployment of facilities utilizing such resources. There is no consensus as to which renewable resources are cost-effective at this time.

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 1.b.1 Pursue the deployment of renewables that appear to be currently cost-effective, and monitor the progress of renewables that show promise of becoming cost-effective in the future.

VEHICLE: Power purchase negotiations.

AGENCIES: Utilities, RE developers, PUC.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, m, h, w, n, krl, i, ers, r, z

OPPONENTS:

NO POSITION: ca

Strategy 1.b.2 Improve the cost-effectiveness of renewable resources through RD&D.

DISCUSSION:

Research, development and demonstration ("RD&D") strategies are discussed under barrier grouping 9.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, r, z

OPPONENTS:

NO POSITION: p, i, krl, w, ers, ca

Strategy 1.b.3 Increase/refocus the government tax incentives currently available.

DISCUSSION:

State tax incentive strategies are discussed under barrier 1.a.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, n, r, z

OPPONENTS:

NO POSITION: p, krl, w, i, m, h, ers, ki, ca

Strategy 1.b.4 Provide government support in addition to government tax incentives (to expedite permitting, to make government award sites available, etc.).

DISCUSSION:

The cost and risk (which increases the required return on investment) of developing RE projects are affected by the substantial time and resources necessary to acquire permits and/or access to public sites for RE projects. Strategies related to expediting and/or simplifying permitting for RE projects and related to expediting and/or simplifying access to public sites for RE projects are discussed under barrier grouping 3.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, n, z

OPPONENTS:

NO POSITION: p, krl, w, i, m, k, h, ca, ki, ers

Strategy 1.b.5 Develop and implement a green pricing tariff.

DISCUSSION:

Generally, "green pricing" is a utility rate option under which ratepayers would be given the option of paying "marginally" higher rates in exchange for the utility's commitment to utilize the difference to acquire new renewable resources. This strategy is discussed under strategy 1.e.2.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, p, ki, m, h, n, krl, i, ca, ers, z

OPPONENTS: w

NO POSITION:

Strategy 1.b.6 Energy Wheeling for Counties.

DISCUSSION:

Proponents maintain that for the Counties certain RE resources could be cost effective if wheeling services were provided by the utilities. For example, remote wind turbine generators could match the needs of some of the Counties' water pumping facilities, particularly those with excess reservoir capacity and/or back up generators. While it may not be cost-effective to sell wind power to the utility at wholesale rates and repurchase the power at retail rates, it may be feasible and cost-effective to utilize the wind power through a wheeling arrangement using a reasonable wheeling rate. This wheeling arrangement would only apply to the counties because the counties have the statutory authority to develop renewable energy resources for county facilities.

Opponents of providing wheeling services to the counties maintain that (1) before including retail wheeling as a possible strategy to encourage the development of renewable resources, the pros and cons of retail wheeling must be examined in their broader context, (2) retail wheeling could result in "cream skimming" by the non-utility generators, and (3) providing wheeling services to only the counties would discriminate against other customers (e.g. the state and federal government). Wheeling is discussed in barrier grouping 7.

VEHICLE: PUC proceedings to establish a wheeling tariff for the Counties.

AGENCY: PUC, Utilities, Consumer Advocate, Counties

POSITION OF THE PARTIES:

PROPONENTS: p, i, w, krl, h, ki, r, m, ers, z

OPPONENTS: heco, he

NO POSITION: ca

Strategy 1.b.7 Net Billing Payment Rates for Small RE Systems

DISCUSSION:

Under a Net Billing System ("NBS") each kilowatt-hour of electricity consumed by a customer with a small renewable generating system, such as a residential photovoltaic ("PV") system, is offset, on a one-to-one basis, by each kilowatt-hour of surplus power exported by the customer to the grid. It uses a single meter to measure both electricity purchased from and sold to the utility over a given billing period, using a "reverse the meter" approach. The customer pays the bill for net energy consumed, or receives either a payment or a carry-over credit for net energy produced. Payment for net energy produced during the billing period is at the lower "avoided cost" rate, rather than the retail rate.

Proponents maintain that net billing is a viable demonstration strategy for small scale renewable energy systems because it (1) improves the cost-effectiveness of renewable resources by stimulating market demand, thereby helping to lower production costs, and (2) lowers the cost of demonstrating the performance of distributed systems by leveraging the utilities resources with private investment.

Opponents maintain that (1) net billing would create a subsidy from nonparticipants to NBS customers, (2) the subsidy would distort the market for NBS's, causing customers to install NBS's when they are not cost-effective, (3) net billing would result in payments to NBS energy suppliers above the utility's avoided costs, since the utility's retail energy rates generally include part of the utility's customer (metering, billing, etc.) and demand (generation, distribution and transmission) costs, and these costs are not avoided when the utility purchases energy back from the customer, and (4) may violate FERC's avoided cost cap rulings application to QFs.

VEHICLE: PUC rule-making.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS:	p, krl, i, ers, m, r, h, ki, d, z
OPPONENTS:	heco, ke
NO POSITION:	ca

Barrier 1.c Unresolved avoided cost issues.

DEFINITION:

The "unresolved" question is whether the avoided cost price offered/paid to renewable energy producers actually equals the electric utilities' avoided costs.

DISCUSSION:

Utilities are required to purchase power from Qualifying Facilities at or below their avoided costs (unless a different price is negotiated) pursuant to the Public Utility Regulatory Policies Act of 1978, as amended ("PURPA"), and the Commission's Standards for Small Power Production and Cogeneration in the State of Hawaii (H.A.R. Title 6, Chapter 74), (the PUC's "Avoided Cost Rules"), which implement PURPA and H.R.S. §269-27.2.

As defined in the PUC's Avoided Cost Rules, "avoided costs" means the "incremental or additional costs to an electric utility of electric energy or firm capacity or both which costs the utility would avoid by purchase from the qualifying facility". H.A.R. §6-74-1.

Avoided costs are comprised of two components -- avoided capacity costs and avoided energy costs. Avoided capacity costs include avoided capital costs (e.g., return on investment, depreciation and income taxes) and avoided fixed O&M costs. Examples of costs that may be included in the avoided capacity cost component are firm generating capacity costs, T&D capital costs, fixed O&M costs, and T&D demand losses.

Avoided energy costs include avoided fuel costs and avoided variable O&M costs, as well as avoided working cash, avoided fuel inventory and avoided T&D energy losses.

There is no consensus as to whether there is a barrier, or as to the answer to the "unresolved" question. Proponents maintain that avoided cost payment rates understate or may understate a utility's actual avoided costs with respect to renewable resources. Opponents maintain that avoided cost payment rates overstate or may overstate a utility's actual avoided costs.

In general, the questions under this barrier include (1) whether intermittent renewable resources should be paid for avoided capacity costs (i.e., whether "as-available" renewable resources should be paid a capacity adder), and (2) whether the calculation of avoided costs adequately captures the benefits of small, dispersed increments of as-available resources (i.e., whether the avoided cost calculation includes avoided transmission and distribution ("T&D") losses).

Related barriers include (1) barrier 1.e., which addresses the evaluation and consideration of the beneficial impacts of renewable energy use relative to conventional fossil fuel resources in setting power purchase rates, (2) barrier 5.f., which addresses the evaluation and consideration of the beneficial impacts of renewable energy use relative to conventional fossil fuel resources in IRP, (3) barrier 5.e., which addresses the evaluation and treatment of renewable energy resources and independent power producers ("IPPs") in the Integrated Resource Planning ("IRP") process, and (4) barrier 1.f., which addresses the inability of utility operation models and economic models to accurately and adequately model and evaluate renewable energy systems.

STRATEGIES:

Possible strategies include but are not limited to:

Strategy 1.c.1 Reduce the uncertainty regarding avoided costs.

DISCUSSION:

There are pending PUC dockets regarding the determination of short-run avoided energy costs for as-available resources (Docket No. 7310) and of long-run avoided costs for firm capacity resources (Docket No. 94-0079). Resolution of these dockets by the PUC will substantially reduce any uncertainty regarding the determination of avoided costs.

VEHICLE: Resolution of pending PUC dockets regarding the determination of short-run avoided energy costs for as-available resources (Docket No. 7310) and of long-run avoided costs for firm capacity resources (Docket No. 94-0079).

AGENCY: PUC.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, m, h, w, n, krl, i, ers, r, z

OPPONENTS:

NO POSITION:

Strategy 1.c.2 If any avoided capacity costs can be reasonably demonstrated for an as-available resource, the amount of these avoided costs (or some proxy) should be included in determining the value and pricing of the resource.

DISCUSSION:

Some, but not all, as-available renewable generation resources may result in a limited amount of deferral or reductions in utility capital costs. To the extent that any such costs can be reasonably demonstrated, including these costs in the selection of resource mix and the negotiation of power purchase contracts would more accurately represent the full value of these renewable resources. The PUC would have to determine what terms and conditions should be included in PPAs for as-available energy producers for such producers to qualify.

VEHICLE: IRP process, Power purchase contract negotiations

AGENCY: Utilities, Renewable developers, PUC

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, m, h, w, n, krl, ers, ca, i, z

OPPONENTS:

NO POSITION:

Strategy 1.c.3 Perform an analysis of the combined effects of a variety of distributed renewable energy projects in a given service territory.

DISCUSSION:

As part of Phase 3 of the Renewable Energy Resource Assessment and Development Program conducted by R. Lynette & Associates ("RLA") under contract to DBEDT, RLA conducted analyses aimed at identifying the value of intermittent renewable resources to utilities. See RLA, Renewable Energy Integration Plan §4 (Draft March 17, 1995). The analyses include illustrations of utility load matching with renewable energy project output on a diurnal and seasonal basis.

A combination of similarly-sized wind energy projects at different locations might allow significantly more wind energy development in this area than would ordinarily be considered to be feasible or be accepted by the utility.

A computer model has been developed for DBEDT which allows a comparison of utility demand curves with the projected output curves of a variety of renewable energy projects, both individually and in various combinations. This computer program could be modified to increase its flexibility and applicability.

VEHICLE: Modify and utilize existing computer model

AGENCIES: DBEDT; Utilities

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, m, h, n, ca, r, z

OPPONENTS:

NO POSITION: w, p, i, krl, ers

Barrier 1.d — Current fuel adjustment clause passes risk of oil price variability to customers.

DEFINITION:

Hawaii's electric utilities have an energy cost adjustment clause (ECAC). It is used to pass on both increases and decreases in the price of fuel oil and the cost of purchased energy to the utility's customers.

DISCUSSION:

In general, the ECAC allows the utility to pass on the risk of price variability to its customers. The theory of those promoting elimination of the ECAC is that it would force the utilities to more fully consider the risk of fuel price volitility in selecting between resources.

There is no consensus that this is a barrier to the development of renewable resources. There is no consensus that the ECAC should be eliminated.

Proponents maintain that elimination of the ECAC would force the acknowledgment of the costs of variable oil prices and the potential for oil price spikes. For example, during the three month period following the August 1, 1990, Iraqi invasion of Kuwait, energy utility prices in Hawaii rose 35% on average statewide, due solely to the oil price spike that took the price of a barrel of crude oil from approximately $20 to $40. Renewable energy resources are not susceptible to extreme oil price variability. This prime advantage, it is argued, is not fully considered by the utilities since the costs of oil price variability are passed on to customers by the ECAC.

Opponents oppose the elimination of the ECAC. Opponents maintain that the ECAC does not constitute a real barrier to the development of renewable resources and that elimination of the ECAC would have undesirable consequences including higher costs to electric customers and the need for more frequent rate cases.

STRATEGIES:

Strategy 1.d.1 PUC eliminate the ECAC on a forward-going basis.

DISCUSSION:

As noted above there is no agreement that the ECAC should be eliminated.

VEHICLE: PUC rulemaking.

AGENCY: PUC.

POSITION OF THE PARTIES:

PROPONENTS: d, p, krl, i, z

OPPONENTS: heco, ke, ki, m, n, ca

NO POSITION: h, w, ers, r

Strategy 1.d.2 Conduct analysis to determine feasibility of establishing a system to help flatten the risk and impacts on ratepayers of oil price variability.

DISCUSSION:

Proponents maintain that an energy cost impact fund could be created, which could accrue funds from a nominal charge per kWh of electricity sold to be retained and administered by the utilities to make up part or all of the marginal difference when petroleum prices fluctuate. A ceiling could be placed on the amount of dollars to be maintained in the fund and the nominal per kWh charge could be suspended once the fund reaches this ceiling. Alternatively, a customer rebate system could also be examined for feasibility. This strategy is very similar to how Japan reduces the impacts of oil price variability on its national economy. If one of the largest economies in the world can do this, it seems that this approach could be feasible to reduce the economic impacts of energy price variability in Hawaii.

Opponents maintain that the need for and benefits of such an approach have not been identified, and that the creation of such a fund would raise the current cost of electricity for customers, could lead to inequities between current and future customers, and could result in "uneconomic" bypass of the utility system by customers desiring to avoid the surcharge necessary to create a fund.

VEHICLE: Work group to develop specific proposal

AGENCY: DBEDT, Other interested agencies

POSITION OF THE PARTIES:

PROPONENTS: ke, d, r, z

OPPONENTS: heco, ca

NO POSITION: n, ki, m, h, w, p, i, krl, ers

Barrier 1.e — Evaluation and consideration of the beneficial impacts of renewable energy use relative to conventional fossil fuel resources.

DEFINITION:

The payment rates for energy and firm capacity purchased by utilities from RE producers are based on the utilities' avoided costs (subject to the minimum floor rates for energy), and (except for the minimum purchase rates) do not include a premium for the relative benefits of RE resources.

DISCUSSION:

There are several different contexts in which the indirect costs and benefits of resource options can be considered. These indirect costs are sometimes referred to as externalities. The possible contexts in which externalities can be considered include (1) the resource selection process used by the utilities in the development of their integrated resource plans, (2) consideration and evaluation of demand-side management programs and (3) the determination of the rates paid to independent power producers ("IPPs").[1] This barrier addresses the last of these possible contexts for the consideration of externalities.

There is no consensus that the extent of evaluation and consideration of the beneficial impacts of renewable energy resources relative to fossil fuel resources in the determination of avoided costs to IPPs is a barrier to the development of renewable resources. There is also no consensus whether these externalities are sufficiently taken into consideration in the determination of the rates paid to IPPs.

Proponents maintain that some renewable resources have beneficial impacts compared to fossil fuel resources and that these benefits are not sufficiently considered in the determination of the avoided cost price paid to renewable resource developers. In order to fully account for these benefits, it is proposed that payments higher than direct avoided costs should be paid to renewable developers.

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1 The current determination of the avoided cost payment rates is discussed under barrier 1.c. The consideration of RE resources in the utilities' IRP processes is discussed under barriers 1.f., 5.e., and 5.f.

Potential externality benefits of renewables include: (a) a cleaner environment; (b) greater stability in energy prices (renewables, with low or zero fuel costs, can provide a hedge against fuel oil price volatility); (c) enhanced energy security (substantial deployment of renewable technologies could reduce the strategic importance of oil and reduce energy supply risks); and (d) economic benefits."[2]

Opponents maintain that externality costs should not be included in the determination of the avoided costs paid to renewable resource developers, and/or that utilities already pay higher than direct avoided costs for some renewable resources based upon fixed minimum floor rates for purchased energy.[3] Minimum floor rates were required by the legislature in recognition of the desirability of nonfossil fuel resources. Opponents also maintain that there are limitations to state authority to require utilities to pay externality adders or higher than direct avoided costs to nonutility generators.

Externalities and externality adders are addressed by several parties in Appendix B.

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2 The primary environmental benefits are reduced greenhouse gas emissions, reduced risks of oil spills, reduced toxic air emissions, and reduced risks of future environmental regulation. The primary economic benefits are increased employment, reduced supply risk (expressed as an energy security cost), reduced price risk, reduced environmental regulation risk, and improved trade balance. The benefits generally are based on displacing imported fossil fuels used to generate electricity with in-state production of electricity from indigenous renewable energy resources, and are even more compelling if manufacturing of renewable energy conversion systems takes place in-state.

3 Minimum floor rates are discussed under barrier 4.a.

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 1.e.1 Require utilities to pay an externalities adder above avoided cost.

DISCUSSION:

There is no agreement that externality adders should be required. The topic of externality adders is addressed in Appendix B.

VEHICLE: Establishment of externalities adders in the determination of prices paid to non-utility generators for renewable energy resources.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: p, w, n, krl, i, ers

OPPONENTS: heco, ke, h

NO POSITION: ki, m, r, ca

Strategy 1.e.2 Develop and implement a "green pricing" tariff.

DISCUSSION:

Generally, "green pricing" is a utility rate option under which ratepayers would be given the option of paying higher rates in exchange for the utility's commitment to utilize the resulting additional revenues to acquire new renewable resources.

The goal of green pricing is to encourage the development of new renewable resources, and to test customer willingness to pay a higher price for electricity generated from resources that have perceived environmental benefits. Under the green pricing option, customers would optionally pay a marginally higher electric rate over a specified period of time, commonly referred to as a price premium, in exchange for the utility's commitment to utilize the difference to acquire new renewable resources. The price premium could be designed to cover the additional incremental costs of developing the renewable resource relative to conventional fossil fueled utility supply-side resources.

Some perceived benefits associated with green pricing options include:

(1) Assist in the sustained orderly development of renewables;

(2) Customers get renewables over and above what a Least Cost Plan would dictate;

(3) Viewed as a good option to hedge against tightening environmental requirements and global warming concerns; and

(4) Provide an opportunity for customers to voluntarily participate in the development of renewable energy technologies.

Some perceived risks associated with green pricing options include:

(1) the risk of participation in green pricing falling without having generated sufficient revenues to cover the utility's commitment to the new renewable resource,

(2) the risk of the price premium being wrong,

(3) the risk of the fossil fueled supply-side resource avoided cost estimates being wrong,

(4) the risk of program administration costs being too high, especially for smaller systems such as MECO, HELCO, and KE, and

(5) the risk that the utility will have arbitrary authority in determining what RE resources receive a premium on a PPA.

HECO provided the following example of a Pilot Green Pricing Program that it is considering:

1. HECO would include information on green pricing in its Consumer Lines bill insert, and do a series of newspaper advertisements to educate the public on the concept of green pricing.

2. HECO would also conduct a survey of its customers to determine if there is sufficient interest in a green pricing program. The survey would provide necessary information on the type of renewable resources that customers are interested in, and the amount of a price premium and time frame that customers would be willing to commit to under the green pricing option.

3. Based on the survey results, if there appears to be sufficient interest by its customers in green pricing, HECO would proceed with the development of a Pilot Green Pricing Program.

4. The overall basis of the Pilot Green Pricing Program would be to establish a fund for HECO to utilize to acquire new renewable resources. Proceeds from the fund could be used to pay the additional costs of renewable resources over a benchmark avoided cost established for conventional fossil fueled supply-side resources. Provisions could be included for Advisory Group input and/or PUC approval as to how the funds are expended.

5. Once the fund attained a sufficient level, HECO would commence with the acquisition of new renewable resources. If the fund did not achieve a sufficient level to acquire renewable resources, the funds collected to date would be refunded to the contributors.

6. Further details for the Pilot Green Pricing Program would be developed after the survey results have been analyzed and a decision is made by HECO to pursue this strategy.

VEHICLE: Green pricing utility tariff.

AGENCY: HECO Utilities to propose tariff provision for PUC approval. Green Pricing Advisory Group (HECO, HELCO, MECO, KE, CA, DBEDT, PICHTR, RE Developers, Public) to be formed to advise HECO Utilities regarding development of tariff proposal. PUC to review/approve tariff provision.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, p, ki,m, h, n, krl, i, z

OPPONENTS: w

NO POSITION:

Strategy 1.e.3 Consider a production incentive for RE developers funded by a utility customer surcharge.

DISCUSSION:

There is no consensus regarding this strategy.
Production incentives are direct payments to renewable energy developers as incentives for the production of power. For example, the Energy Policy Act of 1992 ("EPACT"), section 1914, provides a 1.5 cent tax credit for each kwh produced by qualifying wind, solar and closed loop biomass facility.

A bill was introduced in the 1994 Legislature (as a "minority" bill resulting from the 1993 Energy and Environmental Summit process) to provide for the establishment of a "Renewable Energy and Energy Storage System Development and Assistance Fund", in order to provide assistance to renewable energy producers and energy storage system developers in the form of a Production Incentive. The bill proposed an initial maximum incentive of 1.5¢/mwh, adjusted quarterly for inflation.

Under the bill, all program costs would be derived from the proceeds of a Renewable Energy/Energy Storage Surcharge on electric utility energy sales. (In contrast, the EPACT production incentive is a tax credit funded by federal taxpayers.) A Production Incentive would be provided to some producers of renewable energy-generated electricity and electricity derived from energy storage systems. A small additional amount (10%) over and above the amount of the Production Incentive would be provided to the utilities for administrative and other associated costs. Utilities, as well as IPPs, would be eligible for the Production Incentive.

The bill was not passed by the 1994 Legislature. However, by SCR 40, SD 1, the Concurrent Resolution which requested the initiation of this docket, the Legislature requested that "particular attention . . . be paid to the production credit proposal developed by the 1993 Energy and Environmental Summit." SCR 40, SD 1 at 5.

While not an explicit avoided cost adder, it is arguable that the placing of the ultimate burden on the ratepayer would run afoul of the apparent FERC prohibition of requiring utility payment to developers in excess of avoided costs.

In lieu of involuntary utility levies, proponents of a production incentive maintain that similar objectives could be satisfied if enough revenue were raised through "green pricing" initiatives (see above) and the funds raised were dedicated to production incentives. Alternative funding methods (e.g., general fund or special tax revenues) could also be investigated.

Opponents of this strategy maintain that (1) the utilities should not be required to levy a surcharge on its customers in order to pay a production credit to renewable energy developers, (2) a surcharge requirement would violate FERC's recent avoided cost cap rulings (see Appendix B, page 13, and (3) taxpayers rather than ratepayers, should pay for any subsidies determined to be appropriate to encourage the development of RE resources. If the utilities pick up the costs, then the impact on ratepayers could be substantial. This would not only have competitive impacts, but would be especially burdensome to utility customers. If the purpose is to provide societal benefits, they should be paid for through taxes (which are generally progressive), rather than through electric rates. At the same time, taxpayers need to be assured that the costs they incur (particularly during periods of fiscal constraints) will produce commensurate benefits.

VEHICLE: An analysis of the potential costs of such a Fund could be made based on ranges of projected development potential and costs of energy for each renewable energy technology. Work conducted by RLA for DBEDT (Resource Supply Curves) would provide a starting point. A determination of whether recent FERC rulings would prohibit the establishment of such a fund should be made.

AGENCIES: DBEDT, RE developers, Utilities, PUC.

POSITION OF THE PARTIES:

PROPONENTS:	**d, n, i, p, krl, ers, r, z**
OPPONENTS:	**heco, ke**
NO POSITION:	**w, ki, m, h, ca**

Barrier 1.f — **Inability of utility system operation models and economic models to accurately and adequately model and evaluate renewable energy systems.**

DEFINITION:

The models and criteria used by the utilities to determine avoided costs and the need for new generation resources could be improved to more accurately evaluate renewable energy systems.

DISCUSSION:

Computerized "production cost models" are used by the utilities to determine quarterly avoided costs and the comparative costs of various resource options in the IRP process and CIP dockets. Also, the utilities use specific generation expansion criteria to determine the timing and need for new generation resources. Several different methods and models are used by the utilities.

The existing models are primarily designed for the analysis of dispatchable, thermal, fuel-consuming resources. The models are not as easily or effectively adapted to the simulation of intermittent resources with no marginal fuel costs. Existing models can be used to simulate renewable resources, but not without some difficulty and not without some limitations.

One aspect of renewable generation that is not taken into account in current practices with the existing models is the contribution of as-available generation to system reliability. Most renewable generation is "as-available" and is not dispatchable in the same sense as conventional generation. Nonetheless, the availability of as-available energy to the utility system does contribute to system reliability. Neither the production cost models used or the capacity expansion criteria used by the utilities recognize the value of the contribution of as-available energy to system reliability.

Some existing models do quantify the "loss of load probability" and the amount of "energy not served". Both of these parameters are sensitive to the contribution of as-available energy to system reliability. However, these parameters are not currently used as criteria for determining the need for additional generation or in the determination of avoided costs. In this sense the limitation of some of the models is not due to the capabilities of the models themselves, but in the manner in which the models are applied.

A limitation of the methods and models used to determine avoided costs is the convention of assessing only short-term avoided costs for as-available energy resources.[4] Large contributions of as-available IPP-supplied energy could reduce the long-term costs of the least-cost mix of utility resources by affecting the optimum resource mix, even if no capacity value is explicitly ascribed to the as-available energy. For example, with enough as-available energy it would cost less for a utility to build less expensive peaking resources to firm up the as-available energy than it would be to build more capital-expensive fuel-efficient resources. In order to capture the full value of as-available generation resources it is necessary to determine the projected impact of the as-available energy on the long-term optimum resource mix. This type of analysis of long-term avoided costs is conducted in the IRP process, but not in the quarterly determination of short-term avoided costs. Even in the IRP process analyses the full value of as-available generation is not captured to the extent that the models used employ capacity expansion criteria that are not sensitive to the contribution of the as-available energy to system reliability.

Some, but perhaps not all, as-available renewable generation resources may result in a limited amount of deferral or reductions in utility capital costs. To the extent that any such costs can be reasonably demonstrated, including these avoided costs in the selection of resource mix and the negotiation of power purchase contracts would more accurately represent the full value of these renewable resources. (This is discussed under possible barrier 1.c.)

There was consensus that the methodologies for quantitatively valuing the positive (and negative) attributes of renewable resources can be improved. Benefits and risks that can be better evaluated include, but are not limited to, distributed generation benefits, resource diversity benefits, resource supply risk, and technology risk. As part of their Supply-Side Action plans, HECO, HELCO and MECO plan to conduct studies to (1) evaluate opportunities for dispersed generation (and remote or off-line generation facilities on the Big Island), and (2) gather and analyze additional information to permit a more thorough assessment of several of the supply-side options identified in their IRP Supply-Side Resource Reports. An agreement between HECO, HELCO and MECO, and EPRI is in place to conduct dispersed generation studies in their service areas. EPRI's consultant, Rumla, Inc. has conducted screening activities, and is conducting detailed analyses for selected sites. HECO and MECO are working with PICHTR and NREL on an Integrated Electric Utilities Project ("IEUP") -- Model Utility.

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4 There is a conventional distinction made between short-term and long-term avoided costs. Short term avoided costs include the fuel and operating costs avoided by the operation of a generation resource. Long-term avoided costs also include any capital costs avoided due to deferral of resource additions or changes in optimum resource mix that result from the availability of a generation resource.

STRATEGIES:

Strategy 1.f.1 The PUC should approve the stipulated agreement of the parties and resolve the outstanding issues in Docket No. 7310.

DISCUSSION:

The PUC has conducted a contested case proceeding, Docket No. 7310, to investigate the methods used to determine the quarterly short-term avoided costs used as the basis for payment by the utilities for as-available generation. The parties in the docket have reached a stipulated agreement on most issues and have filed statements of position regarding outstanding issues. The parties were not able to reach agreement regarding the inclusion of externality costs or avoided capacity costs (under special conditions) in the calculation of quarterly short-term avoided costs. The PUC has not yet issued an Order resolving this docket.

The issues addressed in Docket No. 7310 pertain only to regular short-term avoided cost filings. Resolution of these issues would not prohibit utilities or resource developers from using other methods of determining avoided costs in negotiating a power purchase agreement as long as the costs used could be demonstrated to the PUC to be just and reasonable.

Resolution of the issues raised in Docket No. 7310 would clarify many details regarding the calculation of the quarterly short-term avoided costs filed with the PUC. Utilities and resource developers would still be free to use alternate methods of determining reasonable prices in negotiating power purchase contracts.

VEHICLE: Docket No. 7310

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, m, h, w, n, krl, i, r, ca, ers, z

OPPONENTS:

NO POSITION:

Strategy 1.f.2 Consider modeling conventions and generation capacity expansion criteria that are sensitive to the contribution of as-available generation resources towards system reliability.

DISCUSSION:

Use of more sensitive capacity expansion criteria would more accurately reflect the contribution and value of non-conventional generation resources towards utility system reliability.

There is consensus that it may be possible to improve generation expansion criteria by making them sensitive, or more sensitive (in the case of HECO[5]), to load demand. The use of probabilistic criteria has more merit in the case of dispatchable resources that are not available 24 hours a day. An example would be a battery energy storage plant, which might be available only 1-3 hours a day. There is also consensus that the issues of renewables modeling and capacity expansion criteria should be further addressed (with Advisory Group input) in the IRP processes in the utilities' next IRP Plan cycles, which are beginning at this time.

VEHICLE: Generation Capacity Expansion Criteria, IRP process, Power purchase contract negotiations

AGENCY: Utilities, Renewable developers, PUC, Consumer Advocate, DBEDT, PICHTR, NREL, EPRI

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, m, h, n, i, ers, w, ca, r, krl, z

OPPONENTS:

NO POSITION:

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5 The HECO Utilities generally apply deterministic generation expansion criteria (reserve margin, loss of largest unit, etc.), although HECO does give consideration to a loss load probability ("LOLP") criteria of 4.5 years per day.

Barrier Grouping 2

Apparent limitations on amount of RE power that can be accommodated by electric utilities.

Barrier Grouping 2 **Apparent limitations on amount of RE power that can be accommodated by electric utilities.**

INTRODUCTION:

The ability of a utility to accommodate additional power (whether generated from a renewable or a conventional, oil-fired facility) will depend on the utility's need for power, whether the power is firm or as-available, whether the power is dispatchable or intermittent, the reliability of the power, the extent to which the power will be available (and the extent to which it will be available during yearly and daily peak periods), the physical characteristics of the power (and its impact on the stability of the utility system), and other factors.

Barrier 2.a Minimum load conditions leading to curtailment.

DEFINITION:

Utility system minimum load conditions (during late evening or early morning periods) can result in curtailment of as-available renewable generation and can affect the economic viability and financeability of renewable projects.

DISCUSSION:

As-available renewable resources are currently paid on the basis of delivered energy, rather than on the basis of available capacity.[1] If these resources are curtailed because of minimum load conditions of the utility system, the payments to renewable resource generators are reduced.

Renewable resources that provide firm capacity may also be affected by minimum load conditions. Given the utilities' minimum load constraints, the utilities may require that the firm renewable facilities be cyclable. At the very least, the ability of the firm renewable facilities to load follow and/or cycle off-line under utility dispatch must be given weight in the determination of avoided capacity costs.

The development of energy storage systems (whether utility-owned or owned by RE developers) would allow energy generated during off-peak hours to be stored and used as a source of on-peak energy. For example, (1) HECO[2], HELCO and MECO, as part of their Supply-Side Action Plans, agreed to conduct separate studies to examine the potential for pumped storage hydroelectric within their service areas, and (2) HELCO has studied the feasibility and received two bids for the installation of a Battery Energy Storage Plant on the Big Island.

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1 The circumstances under which as-available QF facilities can be curtailed are established by federal and state rules. H.A.R. §6-74-24, based on 18 C.F.R. 304(f). See Re Hawaiian Electric Co., 81 P.U.R. 4th 419 (Haw. PUC 1986), quoting 45 Fed.Reg. 12214, 12227-28 (Feb. 25, 1980) (FERC Commentary).

2 DLNR, DBEDT and HECO are nearing the completion of a cooperative study regarding the feasibility of a pumped storage hydroelectric project at two sites on Oahu.

There are also utility DSM programs that encourage customer electricity loads to be shifted from on-peak to off-peak hours, thereby increasing the utility's off-peak loads. These can take the form of rate design programs (such as time-of-use rates[3]) or "load-shifting" DSM programs targeted at specific end-uses (such as "cool storage" programs aimed at air conditioning loads).[4]

In addition, the development of off-peak loads could be promoted through "valley-filing" DSM programs. For example, Hawaii's shorter driving distances and temperate climate are conclusive to the use of electric vehicles. Nighttime charging of electric vehicle batteries could provide off-peak load for electric utilities in the future.

There is consensus that minimum load conditions leading to curtailment can be a barrier to the development of as-available renewable resources.

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[3] The HECO Utilities currently offer time-of-use service to large general light and/or power loads (Schedule U) and off-peak service to large industrial processing or pumping loads (Rider M), and plan to continue to study the cost-effectiveness of time-of-use rates for residential and other business customers in their IRP processes.

[4] Customer incentives can be provided by utilities through DSM programs or by government through tax credits. For example, on April 21, 1995 HECO filed an application (Docket No. 95-0092) for approval of a cool storage off-peak contract for St. Francis Medical Center. House Bill 518 pertaining to cool storage air conditioning systems for State buildings and facilities was vetoed by the Governor Cayetano on June 19, 1995, because "it may not generate the energy savings intended, does not add an option that is not already available and commits the State to one industry."

STRATEGIES:

Potential strategies to address off-peak minimum load constraints, include, but are not limited to:

Strategy 2.a.1 Development and implementation of DSM programs that shift load off-peak.

DISCUSSION:

Measures that have the potential to shift existing load off-peak include cool storage and time-of-use rates, and priority peaking rates. DSM measures that have the potential to shift future load off-peak, or "valley filling", include electric vehicle battery storage.

VEHICLE: Utility IRP Processes and DSM Program Design

AGENCY: Utilities

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, i, ca, ers, r, z

OPPONENTS:

NO POSITION: p, w, krl

Strategy 2.a.2 Study and possible implementation of energy storage systems such as pumped hydroelectric and battery energy storage plants.

DISCUSSION:

Energy storage systems (i.e., pumped storage hydroelectric and battery energy storage) provide a warehouse of energy that is filled during the low load periods and is emptied during peak load periods. Energy storage systems provide other benefits to the utility such as: (1) the ability to start up quickly to respond rapidly to load fluctuations; (2) spinning reserve (the ability to restore system frequency to at least 58.5 hertz within 3 seconds after a unit tripout); (3) system frequency regulation; and (4) voltage and power factor corrections.

VEHICLE: Utility IRP Processes

AGENCY: Utilities

POSITION OF THE PARTIES:

PROPONENTS: heco, d, m, h, n, ki, r, ca, w, z

OPPONENTS:

NO POSITION: p, i, krl, ke, ers

Barrier 2.b **Intermittency of some renewable energy resources (non-firm power).**

DEFINITION:

Some types of renewable energy are only available at certain times due to the intermittency of wind, sun and water resources.

DISCUSSION:

The intermittency of certain renewable resources (e.g., wind, solar, run-of-the-river hydroelectric) can pose problems regarding integration of power produced from the resource into the utility system grid and/or limit the value of the power (and the price paid for the power). In the case of wind turbines generators, because the wind is sporadic and not dependable, fluctuations of power continuously occur, which can lead to system stability problems (i.e., voltage and frequency fluctuations). The severity of this problem must be determined on a case-by-case basis. There is consensus that this is a barrier.

STRATEGIES:

Potential strategies to address this barrier include, but are not limited to:

Strategy 2.b.1 Reanalyze the amounts of intermittent renewable energy resource power the utility systems can absorb.

DISCUSSION:

The HECO Utilities have stated that they (and/or RE developers) will undertake or update studies to determine the level of intermittent power that each island system can handle.

VEHICLE: Report on Limitations on Penetration of Intermittent Power.

AGENCY: Utilities, RE Developers

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, r, ca, z

OPPONENTS:

NO POSITION: p, w, i, krl, ers

Strategy 2.b.2 — Study and consider the implementation of energy storage systems.

DISCUSSION:

The HECO Utilities Supply-Side Action Plans address energy storage systems, such as pumped storage hydroelectric and battery electric storage.

VEHICLE: Utility IRP Process and Action Plans.

AGENCY: Utilities, DBEDT, RE Developers

POSITION OF THE PARTIES:

PROPONENTS: heco, d, ki, m, h, n, z, r, ca

OPPONENTS:

NO POSITION: p, w, i, krl, ke, ers

Barrier 2.c. Need to integrate technology with the grid.

DEFINITION:

Power from renewable energy systems, whether produced by utility-owned facilities or by facilities owned by IPPs, must be integrated into the utility transmission and distribution system.

DISCUSSION:

Intermittent resources that are substantial in size compared to the utility system have posed special integration problems, due to the impact on system stability and the need for spinning reserves as the intermittent power levels fluctuate. Spinning reserves are by definition generating unit capabilities connected to the electrical system that are ready to take load or operating below rated level. For intermittent resources, such as wind generated power that fluctuates in relation to wind speed dynamics, spinning reserves may be necessary to maintain the frequency stability of the utility system. For example, prior MECO and HELCO studies have indicated that the amount of wind generated power their systems could absorb was limited.

There is consensus that this is a barrier.

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 2.c.1 Reanalyzing the amounts of RE intermittent power the utility systems can absorb.

DISCUSSION:

This strategy is addressed in the discussion of the preceding barrier.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, r, ca, z

OPPONENTS:

NO POSITION: p, w, i, krl, ers

Strategy 2.c.2 Analyzing the potential for niche applications for renewables resources.

DISCUSSION:

There exists the potential for RE power to be used in niche applications off the utility transmission and distribution grid, such as photovoltaics ("PV") for remote location applications to preclude the need for transmission and distribution line extensions.

See also discussion under barrier 9.b.

VEHICLE: HELCO PV applications program to examine PV for remote service.

AGENCY: HELCO

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, r, ca, z

OPPONENTS:

NO POSITION: p, w, i, krl, ers

Strategy 2.c.3 Study and consider the implementation of energy storage systems.

DISCUSSION:

This strategy is addressed in the discussion of the preceding barrier.

POSITION OF THE PARTIES:

PROPONENTS: heco, d, ki, m, h, n, r, ca, z

OPPONENTS:

NO POSITION: p, w, i, krl, ke, ers

Barrier Grouping 3

Complex and Lengthy Permitting Process; and Limited Land Availability

Barrier Grouping 3 **Complex and lengthy permitting process; and limited land availability**

INTRODUCTION:

A large number of federal, state, and county agencies and authorities have jurisdiction and may grant or deny their approval and issue or withhold permits for a variety of projects in the State.

Affected agencies may disagree as to the requirements to be imposed on each applicant, hearings and data requirements may overlap or duplicate each other, and some agencies may prefer not to act until others take action first.

Barrier 3.a — Complex and lengthy permitting process; and limited land availability

DEFINITION:

Obtaining permits for a project can be very time consuming and costly. Dozens of different permits may be required, and these costs often represent a much greater proportion of total project costs for smaller projects (such as renewable energy development projects). This often inhibits or prevents development of these projects.

DISCUSSION:

Permitting costs and the number of required permits were identified as some of the main impediments to renewable energy development at the 1989 Enhancing Renewable Energy Development in Hawaii Workshop.

Any project in Hawaii involving the use of land or which may have significant environmental or social impact faces a complex and lengthy process to obtain all the necessary government permits and approvals. This serves as a barrier to renewable projects as well.

For example, the Hawaii Integrated Energy Policy Report of 1991 ("HEP") concluded that "there is a need to improve the efficiency of state permitting and approvals required for siting and development of energy facilities." The report recommended, as a near- to mid-term objective, the "create[ion of] a new energy agency ... to improve the efficiency of facilitating the permit process without compromising environmental and other standards."

Permit process facilitation was identified as one of the best ways to facilitate renewable energy development, and one of the consensus pieces of proposed legislation (introduced during the Seventeenth Legislature, 1994, as S.B. No. 2101 and H.B. No. 2634, both entitled, "Making an Appropriation to Implement the Permit Process Facilitation Act").

In 1977, central coordinating agencies were established in each of the four counties. Operation of these central coordinating agencies improved the permit approval process by providing a central source of information on county permit and approval requirements. Based on county experience, improvements can be made in state permit and approval processes. There are opportunities to further facilitate the regulatory process for projects that require permits and approvals from different levels of government.

The Thirteenth State Legislature, Regular Session of 1985, enacted Act 237 (H.B. No. 206), the "Permit Process Facilitation Act of 1985". The purpose of this Act was to authorize the Department of Planning and Economic Development (now the Department of Business, Economic Development & Tourism) to facilitate, expedite, and coordinate state agency and inter-governmental permit processes through a consolidated application procedure, through information services, and through efforts to streamline the permit process.

Act 237 also authorize and established procedures by which federal, state, and county agencies and authorities may consolidate their review and action on permit applications in the State. These procedures were mandatory for state agencies, and voluntary for federal and county agencies.

Hawaii Revised Statutes, Chapter 201, Section 62, Consolidated Application Process, sets forth the consolidated application procedure. Section 63, Information Services, provides guidance regarding the provision of information services. Section 64, Streamlining Activities, provides recommendations regarding the streamlining of the permitting process. And, Section 61, Reporting, sets forth requirements for reporting on a biennial basis.

The actual costs and benefits of permit process facilitation and the status of the DBEDT's efforts are not adequately known at this time.

STRATEGIES: Possible strategies to streamline and simplify licensing and permitting process include, but are not limited to:

Strategy 3.a.1 Amend HRS §201-64 to make implementation of those elements of the Permit Process Facilitation Act of 1985 which have not yet been implemented mandatory rather than discretionary. Determine resource requirement and provide additional funding to conduct any activities which cannot be accomplished through use of existing resources.

DISCUSSION:

The original Permit Process Facilitation Act provided DBEDT with the option, rather than the requirement, of implementing HRS §201-64.

VEHICLE: Legislative amendment

AGENCY: DBEDT, (or OSP) with the assistance of and coordination with affected state agencies, county central coordinating agencies, federal agencies, and members of the public, and legislature

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, n, krl, i, ers, z

OPPONENTS:

NO POSITION: heco, w, ke, ki, h, m, ca

Strategy 3.a.2 Fund and implement the Consolidated Application Permitting process and the Permit Facilitation Act of 1985, amended in 1987.

DISCUSSION:

The permit process facilitation was identified as one of the best ways to facilitate renewable energy development, and was one of the consensus pieces of proposed legislation (introduced during the Seventeenth Legislature, 1994, as S.B. No. 2101 and H.B. No. 2634, both entitled, "Making an Appropriation to Implement the Permit Process Facilitation Act").

This proposed legislation provided for funding implementation of permit process facilitation through a combination of general funds and an increase in current permit fees. Even with a surcharge on permitting fees, the real costs of permitting may actually decrease because of the benefits of the consolidated and streamlined process owing to the need for less time and effort by all parties in the permitting process.

The Permit Process Facilitation Act of 1985, amended in 1987, authorized the Department of Planning and Economic Development (now the Department of Business, Economic Development, and Tourism) to facilitate, expedite, and coordinate state agency and inter-governmental permit processes through a consolidated application procedure, through information services, and through efforts to streamline the permit process. However, this authorization has become an unfunded legislative mandate.

DBEDT has implemented, to some degree, the information services portion of the Permit Process Facilitation Act of 1985. A 1993 Energy and Environmental Summit bill requested an appropriation for this purpose. The bill did not pass. A subsequent Concurrent Resolution asked DBEDT to analyze and report the costs of implementation. Proponents maintain that it may be possible to conduct much of the required implementation work using existing DBEDT resources, but some additional funding may be required. This issue remains to be resolved.

Opponents maintain that it has not been specifically determined (1) what improvements in the permitting process will be accomplished by the implementation of the Permit Facilitation Act of 1985 (amended in 1987), been specifically determined (2) whether DBEDT has adequate existing staff and funding to accomplish the task of coordinating the inter-governmental permitting process, or (3) what level of funding is required.

VEHICLE: Administration's budget request and appropriations from State Legislature to conduct any activities which cannot be accomplished through use of existing resources.

AGENCY: Legislature; administration (DBEDT; DLNR; OSP; etc.)

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, n, z

OPPONENTS:

NO POSITION: p, w, i, krl, ers, m, h, ki, ca

Strategy 3.a.3 Create a Hawaii Energy Commission (similar to the one in California, and the establishment of which has been proposed several times over the last few years) to facilitate renewable energy development (e.g., through: one-stop project siting and permitting; use of plenary jurisdiction; opening and expanding the public participation process; expedited decision-making; integrated planning at the state level; overseeing of research, development and demonstration programs; and aggressive implementation of PURPA).

DISCUSSION:

This strategy did not have consensus.

The 1993 Energy and Environmental Summit Process was convened by the legislature on October 8, 1993, to identify issues and build broad-based support that will move Hawaii forward in the areas of energy and the environment. A number of bills were developed for consideration by the Seventeenth Legislature, 1994. The establishment of a Hawaii Energy Commission was the objective of one of the pieces of legislation developed during the Summit.

The Hawaii Integrated Energy Policy [HEP] report of 1991 concluded that"... there is a need to improve the efficiency of State permitting and approvals required for siting and development of energy facilities" and recommended the "creat[ion of] a new energy agency ... to improve the efficiency of and facilitating the permit process without compromising environmental and other standards."

In January 1995, a Legislative Reference Bureau ("LRB") report entitled "Establishing an Energy Commission: A Feasibility Study" recommended that the establishment of an Energy Commission modeled upon the California Energy Commission is not necessary at this time. The LRB report was conducted in response to Senate Concurrent Resolution No. 62, S.D. 1 (1994). The LRB recommendation is based on three reasons. First, the Energy Commission would likely add yet another bureaucracy and new regulatory or approval requirements to government and result in duplicative effort and regulation. Second, the present State budget crisis imposes financial constraints, and creation of an Energy Commission would be expensive and counterproductive. Finally, the Energy Division's completion of projects intended to provide recommendations to achieve the State's energy objectives is at hand, and the foundation achieved by action on these recommendations will provide Hawaii with vision toward dependable and efficient energy systems and increased energy self-sufficiency.

In California, the State administration has proposed to eliminate the California Energy Commission and to transfer most of the Energy Commission functions to the California Public Utilities Commission and other state agencies. (The status of this action is not known.)

Proponents maintain that a state energy commission which has the capability to do certain energy-related activities not currently under the purview of a single agency is expected to reduce the complex and lengthy permitting process. These activities include: one-stop project siting and permitting; use of plenary jurisdiction; opening and expanding the public participation process; expedited decision-making; integrated planning at the state level; overseeing of research, development and demonstration programs; and aggressive implementation of PURPA. California has established this type of agency and the proposed "Hawaii Energy Commission" could be patterned after the California Energy Commission.

Opponents maintain that an Energy Commission should not be established in Hawaii because:

1) there would be a significant overlap between the responsibilities of the proposed Energy Commission and the Hawaii Public Utilities Commission that could easily result in operational inefficiencies and conflicting directives to electric utilities, and in effect, be a set-back to development of alternate energy development in the State;

2) the "commission" form of government is not appropriate to encourage the development of renewable energy resources. A commission is most appropriate where there are issues to be adjudicated. To encourage the development of renewable energy resources, a "regular" administrative agency would be better suited to successful planning and policy development;

3) considering the State's current financial crisis, the funds required for creation and maintenance of a proposed Energy Commission composed of at least 8 members and other staff members as necessary would be better devoted to other existing State agencies.

4) the counties feel that they are capable of handling the functions of several state agencies (e.g., Land Use Commission, Water Commission, and Office of State Planning) and the establishment of an Energy Commission is not consistent with the counties' position that more planning issues be resolved at the local level; and

5) creation of another layer of bureaucracy is not desirable and would not enhance the development of renewables.

VEHICLE: Legislation patterned after that developed by the 1993 Energy and Environmental Summit.

AGENCY: Legislature; administration (DLNR; OSP; etc.)

POSITION OF THE PARTIES:

PROPONENTS: r, n, i, z

OPPONENTS: heco, d, ki, m, h

NO POSITION: ke, p, w, krl, ers, ca

Strategy 3.a.4 Consider reducing the number of agencies with permitting authority over RE projects.

DISCUSSION:

Examples include the Geothermal and Cable System Development Permitting Act of 1988, HRS, Chapter 196 D; and the Creation of Geothermal Resource Subzones, pursuant to HRS 205-5.1, 5.2.

A large number of federal, state, and county agencies and authorities have jurisdiction and may grant or deny their approval and issue or withhold permits for a variety of projects in the State.

Affected agencies may disagree as to the requirements to be imposed on each applicant, hearings and data requirements may overlap or duplicate each other, and some agencies may prefer not to act until others take action first.

To facilitate the orderly development of geothermal energy in Hawaii, Act 296, Session Laws of Hawaii 1983, was signed into law. Thus, there is an example of one possible approach for permit process facilitation which could be applied to other renewable energy resources.

VEHICLE: DBEDT (or OSP) to organize a working group to identify specific examples.

AGENCY: OSP, DBEDT, utilities, RE developers, permitting agencies, County, governments and State Legislature.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, n, z

OPPONENTS:

NO POSITION: p, krl, i, w, ki, m, h, ca, ers

Strategy 3.a.5 Provide additional resources in the forms of funding, personnel, and training to permitting agencies to allow more timely permit processing.

DISCUSSION:

Proponents maintain that the existing permitting process is complex and lengthy and requires a large number of trained personnel in the affected agencies to make the process operate efficiently. Additional training and personnel would improve the process.

Opponents maintain that streamlining the permitting process, not additional funding or personnel, is the key to solving the complex and lengthy permitting process. If the process were streamlined and existing personnel properly trained, the process would proceed at a faster pace. In many instances, interagency cooperation by sharing personnel and expertise would do much to speed the review process. Instead of each agency working independently, more work would be accomplished with teamwork. Budget shortfalls facing the state will not permit more funding and additional personnel.

VEHICLE: Administration's budget request and appropriations from State Legislature.

AGENCY: Legislature; administration (DBEDT; DLNR; OSP; etc.)

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, r, n, z

OPPONENTS: ki, m, h

NO POSITION: d, p, i, krl, w, ers, ca

Strategy 3.a.6 Consider the establishment of renewable energy subzones (or "energy resource areas") (and "RE Enterprise Zones"), which are areas compatible with renewable energy resource availability and land-use compatibility, and long-range county plans.

DISCUSSION:

DBEDT's Renewable Energy Resource Assessment supplemented with Land Use designation information to identify areas that could be designated as RE development subzones. (Where appropriate these subzones should also be designated as "RE Enterprise Zones".)

Proponents maintain that designating Renewable Energy Resource Subzones or Energy Resource Areas in long-range county plans would be beneficial. Additionally, long-range energy land use planning could help to facilitate the permitting process by providing communities the opportunity to participate early in the process via adoption hearings for the long-range plans. Further the designation of Energy Resource Areas would provide advance warning to potential buyers of property, thus helping to address the NIMBY syndrome.

Establishment of renewable energy subzones possibly associated with certain tax or other incentives, as well as designation of these sites as Renewable Energy Enterprise Zones may speed permitting of projects and ensure land access for renewable energy developers.

Opponents maintain that a term other than "subzone" is preferred (e.g., "energy resource areas") because implicit with the use of a subzone is the need to formulate complex rules and regulations. They further contend that the need for new regulatory subzones to facilitate the development of biomass, solar, and wind energy resources has not been demonstrated. They do, however, recognize the permitting benefits from designating areas of potential energy development in long-range county plans.

VEHICLE:	A DBEDT-organized Working Group could be established. DBEDT would administer the new statute. The Counties would participate in the designation of the RE Development Sub-zones and RE Enterprise Zones within their respective jurisdictions. These efforts could be incorporated into County long-range planning programs.
AGENCY:	Counties with support from DBEDT; Utilities; developers; general public.

POSITION OF THE PARTIES:

PROPONENTS:	heco, d, r, n, z
OPPONENTS:	ki, m, h
NO POSITION:	p, i, krl, w, ers, ke, ca

Strategy 3.a.7 **Consider the establishment of special rules and permitting for small scale projects.**

DISCUSSION:

Obtaining permits for a project can be very costly. Dozens of different permits may be required, and these costs often represent a much greater proportion of total project costs for smaller projects (such as renewable energy development projects). This often inhibits or prevents development of these projects.

It may be possible to waive or simplify the permitting requirements and to develop special rules for renewable energy projects of a given size (e.g., 25-100 kW, depending on the type of resource) provided that it can be established that such projects do not have a significant negative impact on the environment.

VEHICLE: DBEDT led working group to identify specific permitting requirements for which it would be appropriate to add renewable energy project exemptions by statute or rule.

AGENCY: OSP, DBEDT, utilities, RE developers, permitting agencies, and State Legislature.

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n, z, heco

OPPONENTS: ke

NO POSITION: w, p, i, krl, ers, ca

Barrier 3.b **Limited land availability**

DEFINITION:

Land for the development of renewable resources is limited by competing uses.

BACKGROUND:

Hawaii is blessed with numerous renewable energy resources. The land is substantially limited by competing uses such as tourism, agriculture and population growth. Available land is further limited by existing zoning, recalcitrant private landowners, and the difficulty associated with acquiring State lands.

There is consensus that limited land availability in Hawaii is a barrier to the development of renewable resources.

STRATEGIES:

Possible strategies include, but are not limited to:

Strategy 3.b.1 Consider the establishment of renewable subzones.

DISCUSSION:

Refer to previous discussion of this Strategy 3.a.6.

POSITION OF THE PARTIES:

PROPONENTS:	heco, d, r, n, z
OPPONENTS:	ki, m, h
NO POSITION:	p, i, krl, w, ers, ke, ca

Strategy 3.b.2 Develop a renewable energy bidding process for access to State lands.

DISCUSSION:

Refer to previous discussion of this Strategy 3.b.1.

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: heco, ke, w, p, i, krl, ers, ca

Barrier 3.c **Developers may not be granted access to public lands for renewable energy resources.**

DEFINITION:

Developers attempting to develop projects on public lands have frequently done much of the preliminary design and permitting work only to subsequently discover that they have had to bid against other interested developers for access to renewable energy resources.

DISCUSSION:

Several renewable energy project developers (hydroelectric and wind) have tried to develop projects on public lands and/or using publicly-owned renewable energy resources but have subsequently found that they were not guaranteed access.

This has occurred with hydroelectric project developers who spent large amounts of money to work their way to the siting and permitting process (including environmental impact assessments) only to find out that they would have to compete with others for the rights to use the water.

Wind developers have negotiated extensively with the state for access to state lands and later have found that a bidding process might be required.

STRATEGIES

Possible strategies include, but are not limited to:

Strategy 3.c.1 Develop a renewable energy bidding process for access to State lands.

DISCUSSION:

Developers could acquire leases and/or water rights through early contract negotiations. Developers selected would be required to develop a renewable energy project within a specified time frame. Other performance conditions could be set to ensure completion of the project.

Implementing a bidding process to assure access and/or water rights, but with the state protected by project development contract performance conditions, could help assure renewable energy developers that they will have their required access to the project land, while protecting the State from financial loss in the event of the contractor's failure to fulfill the performance conditions of their project development contract with the State.

There have been instances reported in the past that, for example, hydroelectric developers have worked for years and invested large amounts of money to develop a particular project only to have water rights not awarded to them due to interest group opposition or have been awarded to other interested parties. Further, the current bidding process seems to penalize the initial developer who "pioneers" their way through the permitting and lease negotiation process, only to lose the lease of state lands to a competing developer after the investment of large amounts of time and money.

VEHICLE: Public/private working group.

AGENCY: DLNR; DBEDT, Utilities Developers; Government agencies; Public interest groups; interested members of the general public.

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n

OPPONENTS:

NO POSITION: heco, ke, w, p, i, krl, ers, ca

Strategy 3.c.2 Enact legislation to ensure "solar access" for project term.

DISCUSSION:

Proponents maintain that landowners have a right to receive sunlight from directly above their property but not necessarily from across adjacent property. That light can be blocked by their neighbors with impunity. Light from across neighboring land is necessary for efficient operation of solar energy systems. The challenge to legislatures is to encourage private and public remedies of this disparity between what the law provides and what the technology requires.

Opponents maintain that the term "solar access" is too vague to support this strategy without further details, and that an analysis of the impact of such a requirement on the development of adjoining property should be conducted before such legislation is enacted.

Opponents also maintain that this strategy is applicable only to the City and County of Honolulu (Oahu). The nature of development on the neighbor islands does not warrant the consideration of a solar access ordinance at this time.

VEHICLE: A study should first be made, perhaps by the Hawaii Solar Energy Association ("HSEA"), to determine the magnitude and significance of this potential problem. If it turns out to be a significant problem, HSEA should then pursue enabling legislation and changes in county regulations.

The least that a legislature should do is specifically authorize local governments to take access to sunlight into consideration when designing their various land use regulations, including the comprehensive plan. County governments can then incorporate these land use regulations into their zoning ordinances.

AGENCY: Legislature; County governments; HSEA.

POSITION OF THE PARTIES:

PROPONENTS: d, r, n, i

OPPONENTS:

NO POSITION: w, m, ki, h, p, krl, ers, ca, ke, heco

Barrier 3.d **NIMBY syndrome for siting RE projects.**

DEFINITION:

The "not in my backyard" ("NIMBY") syndrome refers to the reluctance of many individuals to have an energy, or other type, facility sited close to their residences, places of work, or recreational areas.

DISCUSSION:

The NIMBY syndrome is a potential barrier to renewable energy projects. Opposition from the neighbors of potential energy projects is not limited to fossil fuel generation as evidenced by the experience with geothermal energy on the Big Island. Virtually any significant project faces the potential of opposition on a myriad of possible grounds plus local opposition to project visibility, audibility, traffic, environmental impacts, social and cultural impacts, air quality impacts, etc.

STRATEGIES:

Possible strategies include, but are not limited to:

Strategy 3.d.1 The general public and public advocates need to be more involved in the energy planning and decision-making process and as early and thoroughly in the process as feasible.

DISCUSSION:

Proponents maintain that the general public has a right to be aware of and to be involved in the energy planning and decision-making process. Failure to inform the public and to solicit their participation often creates additional problems for project developers (e.g., delays, additional costs, opposition, etc.). (See also comments on public participation in Strategy 3.a.6)

Opponents maintain that there has been no showing that the public participation, public information and/or advisory group provisions in the PUC's IRP Framework (§III.E.) are inadequate or that the electric utilities' implementation of these requirements in their IRP processes was in any way inadequate, and question the efficacy of this strategy in addressing the NIMBY syndrome for siting RE projects.

VEHICLE: The utilities should actively recruit neighborhood groups and advocacy groups into IRP advisory groups. There should be greater publicity about IRP advisory groups and meetings. IRP documents should be made available for public review, perhaps through the State Library System.

AGENCY: Utilities; PUC; DBEDT; DCCA; DLNR

POSITION OF THE PARTIES:

PROPONENTS: ke, d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: p, i, krl, w, heco, ers, ca

Strategy 3.d.2 Educate the public about the net benefits of renewable energy projects and conservation.

DISCUSSION:

In order to make informed decisions about competing energy resources, the public needs to be knowledgeable about the comparative environmental effects of fossil fuels, renewable energy, and energy efficiency and conservation.

VEHICLE: Various RE public information media could be used.

AGENCY: PUC, DBEDT, Consumer Advocate, utilities and RE developers.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: p, i, krl, w, ers, ca

Strategy 3.d.3 Location of projects with significant potential impacts on their neighbors as remotely as possible.

DISCUSSION:

Project impacts will be minimized if projects are located as far as possible from people (and from other life forms that might be adversely affected).

VEHICLE: DBEDT to organize a working group to pattern this after work conducted by DLNR for creation of Geothermal Resource Subzones. (See also Strategy 3.a.4.)

AGENCY: OSP; DBEDT; DLNR; Utilities; Developers; Permitting agencies; Counties; and State Legislature.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: p, i, krl, w, n, ca

Strategy 3.d.4 Financial assistance should be provided to participants in Advisory Groups. At least occasional Advisory Group meetings should be held during non-business hours to allow wider participation by the employed public. These meetings could supplement the "regular" Advisory Group's activities at intermediate points during the IRP process.

DISCUSSION:

It is often costly for individuals to participate in utility advisory groups, particularly if these meetings involve inter-island travel. The IRP Framework provides financial assistance for non-governmental parties but not governmental parties. Potential participants may also be unable to participate in these meeting during normal work hours. Costs and work conflicts could minimize or prevent the participation of interested and knowledgeable individuals in various advisory group meetings.

Proponents maintain that financial assistance should be extended to government agencies to cover travel expenses in instances when Advisory Group meetings are located off the island of the utility's main office. Agencies are burdened with the additional travel expenses to represent their constituents off-island. This is becoming a problem in the agencies' tight fiscal environments.

Opponents maintain that there has been no showing that the public participation, public information and/or advisory group provisions in the PUC's IRP Framework (§III.E.) are inadequate or that the electric utilities' implementation of these requirements in their IRP processes was in any way inadequate, and question the efficacy of this strategy in addressing the NIMBY syndrome for siting RE projects.

VEHICLE: Some portion of advisory group meetings could be held during non-business hours (i.e., evenings and weekends). For those meetings which cannot be held during non-business hours, limited financial assistance could be made available to allow additional participation. PUC rule-making to allow financial assistance to government agencies.

AGENCY: PUC; DCCA; Utilities; and State Legislature.

POSITION OF THE PARTIES:

PROPONENTS:	ki, m, h, p, krl, i, ers, r, z
OPPONENTS:	heco, ke
NO POSITION:	d, w, n, ca

Barrier 3.e **Potential negative environmental and social impacts of RE development projects**

DEFINITION:

There may exist perceptions that certain RE development projects will have negative environmental and social impacts. In some cases, this is true, and they may range from minor to severe. These impacts generally depend on the proposed site of the proposed RE development project.

DISCUSSION:

Unfortunately, these impacts are sometimes either over- or understated. In which case, the public may become distrustful of the development of renewable energy projects in general. The previously envisioned development of large-scale geothermal energy on the Big Island for possible export to Oahu is an example of a proposed project which had serious social impacts, as evidenced by strident opposition to it. Public education in the preliminary planning stage of proposed projects may help to reduce the degree of concern and mitigate the opposition to RE projects.

STRATEGY:

Strategy 3.e.1 Design and conduct public education programs to be initiated during the preliminary planning of RE projects which explain the actual expected environmental and social impacts of the project and provide an opportunity to the local community to provide additional information for consideration by project developers and government.

VEHICLE: Public discussion workshops should be convened to discuss the potential negative environmental and social impacts of fossil fuels and renewable energy technologies. Discussion should focus on the relative impacts and ways to mitigate these impacts. Discourse between the public and developers should be emphasized.

AGENCY: RE Developers; Utilities, appropriate Government Agencies; and general public.

POSITION OF THE PARTIES:

PROPONENTS: d, ki, m, h, n, r, ke, z

OPPONENTS:

NO POSITION: p, i, krl, w, heco, ers, ca

Barrier Grouping 4

Form of the price offered to renewable developer/producers may not facilitate financing.

Barrier Grouping 4 **Form of the price offered to renewable developer/producers may not facilitate financing.**

INTRODUCTION:

Renewable projects generally are capital-intensive, and their on-going resource production costs generally are relatively low. At the same time, the prices paid for as-available energy produced by renewable facilities generally are based on the utility's filed avoided energy costs, which vary with the price of oil. Thus, there is a potential mismatch between the as-available renewable energy producer's cost structure, and the revenue stream for the renewable project. Moreover, even though the projected revenue stream may exceed the producer's projected costs, the uncertainty of the oil-price based revenue stream may make it difficult to obtain debt financing for the project.

Barrier 4.a — Tying the value of, and payments for, renewable generated electricity directly to the price of oil and other fossil fuels.

DEFINITION:

Generally, renewable projects are characterized as having high capital ("capacity") costs with relatively low production ("energy") costs when compared with oil-fired power plants. The prices paid for as-available energy produced by renewable facilities are based on the utility's filed avoided energy costs. There is no component for avoided capacity costs in the utility's filed avoided energy costs. Thus, there is a mismatch between the as-available renewable energy producer's cost structure, and the revenue stream for the renewable project.

DISCUSSION:

There is consensus that this is a barrier to the deployment of certain as-available renewable technologies.

Renewable projects generally are capital-intensive, and their on-going resource production costs generally are relatively low. At the same time, the prices paid for as-available energy produced by renewable facilities generally are based on the utility's filed avoided energy costs, which vary with the price of oil. Thus, there is a potential mismatch between the as-available renewable energy producer's cost structure, and the revenue stream for the renewable project. Moreover, even though the projected revenue stream may exceed the producer's projected costs, the uncertainty of the oil-price based revenue stream may make it difficult to obtain debt financing for the project.

The current legislatively-mandated mechanism for encouraging as-available renewable energy projects is the minimum floor rate. Under the PUC's Avoided Cost Rules, minimum floor rates are based on the avoided energy costs at the time as-available energy contracts are approved. H.A.R. §6-74-1 (definitions), 6-74-22(a). The minimum floor price does assure the project financing parties of a minimum cash flow (subject to the ability of the project to actually produce the energy projected for the project). However, minimum floor rates are not related to the cash flow necessary to make projects financeable. During periods of temporarily high short-run avoided costs, the mechanism may encourage the development of projects that would not otherwise be cost-effective in the long-run. During periods of temporarily low short-run avoided energy costs, the mechanism may be ineffective in encouraging the development of renewable energy projects that would otherwise be cost-effective in the long-run.

H.R.S. §269-27.2(c) provides that, if a public utility and supplier of nonfossil fuel generated electricity ("nonfossil fuel producer") do not reach agreement on purchase rates, the rates shall be prescribed by the PUC (and shall not be less than 100% of the utility's avoided costs). The subsection further provides that, in "determining the amount of the payment in relation to avoided cost," the PUC "shall consider, on a generic basis the minimum floor a utility should pay . . . ."

The PUC amended its Avoided Cost Rules in 1985 to implement this requirement. H.A.R. §6-74-22(a) requires that the rates payable for purchases from QFs be not less than 100% of avoided cost and not less than the minimum purchase rates, which are defined as the avoided energy costs in effect on the date that a legally enforceable obligation (which is defined as a binding contract, approved by the PUC) becomes effective.[1] The PUC has allowed some leeway in selecting the date used to establish the minimum rates.[2]

The application of the minimum rates has resulted in payment rates in excess of the utilities' filed avoided energy costs. Thus, the requirement for minimum purchase rates for nonfossil fuel producers may violate FERC's recent avoided cost cap rulings. See Re Connecticut Light & Power Co., Docket No. EL93-55-000, Order Granting Petition for Declaratory Order (FERC Jan. 11, 1995).

The Federal Energy Regulatory Commission ("FERC") has held that jurisdiction over the rates charged by QFs for sales at wholesale (which includes sales to public utilities) is vested in FERC, and that PURPA preempts state statutes or regulations that would require the payment of a rate in excess of avoided cost (determined in accordance with the FERC rules, as implemented by the States) to QFs. (FERC also held that its decision would not have retroactive effect, and that FERC will not entertain requests to invalidate pre-existing contracts where the avoided cost issue could have been raised, but was not.[3])

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1 H.A.R. §6-74-1. Although the rule, on its face, applies to QFs, the HECO utilities have taken the position that minimum purchase rates apply only to nonfossil fuel producers. This issue has been raised in a number of dockets, but has not been decided by the PUC.

2 Compare Re Hawaii Electric Light Co., Docket No. 6956, Decision and Order No. 11333 (Oct. 28, 1991) (Wailuku River Hydroelectric Power Co.) with Hawaiian Electric Co., Docket No. 6944, Decision and Order No. 11611 (May 7, 1992) (U.S. Windpower, Inc.)

3 Re Connecticut Light & Power Co., Docket No. EL93-55-000, Order Granting Petition for Declaratory Order (FERC January 11, 1995). The

The issue is whether a pricing structure can be developed that (1) facilitates the financing of capital-intensive renewable energy projects, and (2) is reasonable to the utility and its customers (i.e., provides power at a cost that is just and reasonable and provides assurances that the project will be sustainable in the long-term).

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 4.a.1 Continue and/or modify the application of minimum purchase rates for as-available renewable resources.

DISCUSSION:

If the minimum floor rate currently required by PUC rule is invalidated, Utilities could consider offering to as-available renewable energy developers a negotiated base energy rate over the term of the PPA that will act as a floor to protect the developer against declining oil prices and a corresponding declining avoided energy cost. In exchange for providing the security of a floor price, the Utilities could offer a schedule of ceiling rates over the term of the PPA based on a negotiated escalation rate. The schedule of ceiling rates would be below the forecast of avoided costs over the term of the PPA. This would provide protection to the utilities and its ratepayers against excessive payments to renewable resource projects which are not dependent on oil as the primary fuel, should oil prices rise dramatically.

The renewable resource developer would be paid the avoided energy cost calculated at the time of energy delivery (the quarterly filed avoided cost), subject to the bounds of the base energy rate and the ceiling rate over the term of the PPA.

VEHICLE: PPA negotiations, subject to PUC approval

AGENCY: Utilities, RE developers, PUC

FERC decision could be appealed to the United States Circuit Court of Appeals.

POSITION OF THE PARTIES:

PROPONENTS:	heco, ke, d, r, ki, m, h, n, z
OPPONENTS:	w
NO POSITION:	p, i, kri, ers, ca

Strategy 4.a.2 **Implement PPAs with fixed or more predictable (i.e., formula) payment streams for capital-intensive, as-available renewable resources.**

DISCUSSION:

Utilities and RE developers could consider payment rates for renewables (which tend to be capital intensive) that more closely track the producer's cost structure, rather than the utility's oil-based avoided costs.

Fixed or formula rates based on overly pessimistic forecasts of fossil fuel prices have resulted in current PPA prices in other jurisdictions, such as California[4], that now exceed the utilities' current avoided costs in some cases, by a factor of four. As a result, utilities are reluctant to agree to long-term PPAs with fixed or formula rates unrelated to the utilities' avoided costs. See also discussion of front-end loaded prices under strategy 4.b.3.

VEHICLE: PPA negotiations, subject to PUC approval

AGENCY: Utilities, RE developers, PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, i, krl, w, n, ers, z

OPPONENTS: heco, ke

NO POSITION: ki, m, h, ca

4 In the mid-1980's, California added a substantial amount of as-available renewable energy to its utility systems by requiring standard offer contracts with a fixed capacity component and a fixed (but escalating) energy component based on its forecasts of future oil and gas prices.

Strategy 4.a.3 Apply an adder to filed avoided energy costs.

DISCUSSION:

There is no consensus that externality adders can be required. The topic of externality adders is addressed in Appendix B.

POSITION OF THE PARTIES:

PROPONENTS:	d, p, w, krl, i, r, ers, z
OPPONENTS:	heco, ke
NO POSITION:	ki, m, n, h, ca

Barrier 4.b High initial costs of RE projects.

DEFINITION:

As discussed under barrier 4.a., renewable projects generally are capital-intensive. As a result, they tend to have high initial costs, which results in substantial financing requirements.

DISCUSSION:

There is consensus that the high initial costs of RE projects can make financing for such projects more difficult.

IPP projects are generally financed on a "project-finance" basis. As a result, the security available to lenders is the project itself, and the income stream under a power purchase agreement ("PPA").

The prices paid for as-available energy under such PPAs generally are based on filed avoided energy costs, which (in Hawaii) vary with the price of oil. As a result, potential lenders may discount the expected income streams under such PPAs, due to uncertainty with respect to future oil prices.

The current legislatively-mandated mechanism for encouraging the development of as-available renewable energy projects is a minimum floor rate. The rationale is that a minimum floor price assures the project financing parties of a minimum cash flow. However, as stated in the discussion of barrier 4.a., the requirement for minimum purchase rates for nonfossil fuel producers may violate FERC's recent avoided cost cap rulings. See Re Connecticut Light & Power Co., Docket No. EL93-55-000, Order Granting Petition for Declaratory Order (F.E.R.C. Jan. 11, 1995).

STRATEGIES:

Strategy 4.b.1 Use of tax credits that reduce the initial cost for RE projects.

DISCUSSION:

There are existing State tax credits based on the installation cost of certain renewable technologies. These should be maintained and/or improved. Tax credits are discussed under barrier 1.a.

VEHICLE: Legislation.

AGENCY: RE developers; Legislature.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, h, krl, i, n, r, ers, z

OPPONENTS:

NO POSITION: m, w, ca

Strategy 4.b.2 Use of special purpose revenue bonds that reduce financing costs.

DISCUSSION:

Special purpose revenue bonds (which have lower interest rates due to exemptions from federal and Hawaii state income taxes) have been made available to certain IPP RE projects by Legislative authorization pursuant to H.R.S. Ch. 39A, Part V (assisting industrial enterprises). However, the amount of special revenue bonds is limited. Thus, RE developers would have to compete with the utility (which uses special purpose revenue bonds to develop their oil fueled power plants) and each other.

VEHICLE: Legislation.

AGENCY: RE developers; Legislature.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, krl, i, ki, m, h, n, r, ers, z

OPPONENTS:

NO POSITION: w, ca

Strategy 4.b.3 Consider front-end loaded prices, if adequate security is available.

DISCUSSION:

A fixed or formula price will often initially exceed current avoided costs, but result in projected prices that are lower than projected avoided costs. The PUC has approved firm capacity contracts with such pricing structures, where the total projected contract costs (on a discounted present value basis) were less than or equal to the total projected avoided costs (on a dpv basis). The PUC has also determined that a front-end loaded pricing structure for an as-available energy producer is not prohibited by its Avoided Cost Rules, and could be negotiated by the utility, subject to PUC approval on a contract-by-contract basis.[5]

The HECO utilities have not offered front-end loaded as-available energy contracts, maintaining that (1) the producer has no commitment (backed by a bond or security) to provide power in the tail-end period when the contract prices are projected to be below avoided costs, (2) the developer may be faced with increasing maintenance and decommissioning costs, (3) the ability to take over an abandoned facility would not be adequate security --the utility would inherit the problems which caused the project to be abandoned, as well as site clean-up liability, and (4) utilities (and their customers) should not have any obligation, in general, to make renewable projects financeable on a highly leveraged basis (i.e., with high debt/equity ratios).

KE has entered into front-end loaded PPAs with hydroelectric developers. KE indicated that it proceeds with this type of agreement cautiously, and that it attempts to minimize the risk associated with front-end loaded contracts by (1) investigating thoroughly the track record of the renewable producer, (2) by ensuring that the resource is a proper technology, and (3) contractually crafting safeguards to the utility and its customers.

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5 Re Maui Electric Co., Docket No. 6742 (Zond Pacific), D&O 12118 at 7.

RE developers requesting front-end loaded prices have maintained that (1) PPAs with such pricing structures would enable them to finance projects (which will be cost-effective in the long-term) during periods when oil-based avoided costs are temporarily low, (2) utility customers will benefit in the long-term when oil-based avoided costs are higher than the PPA prices, and (3) the project financing parties will ensure that the projects are viable in the long-term.

VEHICLE: PPA negotiations, subject to PUC approval.

AGENCY: Utilities, RE developers, PUC.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, krl, i, ki, m, h, n, r, ers, z

OPPONENTS:

NO POSITION: w, ca

Strategy 4.b.4. Consider the demonstrable life of the underlying asset of the RE project within reasonable limits, in determining the term of a PPA with a RE developer.

DISCUSSION:

Some RE projects, such as hydroelectric power plants, are expected to have substantial operational lives. PPAs with longer terms would allow the RE developer to seek financing for a longer term. The PUC's decision in Docket No. 7956 indicates that the service life of power purchase facilities should be considered in determining the duration of PPAs.

Some parties maintain that the term of a power purchase agreement should depend on factors other than the expected life of an RE project. Moreover, there will be reasonable disagreement over the expected life of a specific RE project. For example, there is limited experience with the new generation wind technologies and there are questions related to the life of the geothermal resource.

VEHICLE: PPA negotiations, subject to PUC approval.

AGENCY: Utilities, RE developers, PUC

POSITION OF THE PARTIES:

PROPONENTS: heco, p, krl, i, ke, d, w, n, r, ers, z

OPPONENTS:

NO POSITION: m, h, ki, ca

Barrier Grouping 5

New renewables are not included in utility resource plans.

Barrier Grouping 5 New renewables are not included in utility resource plans.

INTRODUCTION:

The PUC adopted a Framework for Integrated Resource Planning ("IRP Framework") in 1992.[1] Hawaii's electric utilities submitted their first integrated resource plans ("IRP Plans") in 1993.[2]

The preferred 20-year IRP Plans submitted by the electric utilities did not include new renewable resources.[3] The IRP Plans submitted by the utilities do include DSM measures, such as residential solar water heating measures, that utilize solar energy to reduce electric utility load demand and produce energy savings. The 5-year Program Implementation schedules (or "Action Plans") submitted by the utilities do include activities and budgets to study the feasibility and benefits of various renewable resources and energy storage facilities.[4]

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1 See Re Integrated Resource Planning, Docket No. 6617, Decision and Order No. 11523 (March 12, 1992) ("D&O 11523"), as amended by Decision and Order No. 11630 (May 22, 1992) ("D&O 11630").

IRP requires the consideration of both supply-side and demand-side resources. See IRP Framework ¶¶II.B.3, IV.D.1, IV.H3, IV.I.1. "The goal of integrated resource planning is 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." IRP Framework, ¶II.4.

2 The plans were also modified by the utilities during the course of PUC proceedings to review the plans in 1994.

3 See Re Integrated Resource Planning, Docket No. 7257, Decision and Order No. 13839 (March 31, 1995) ("HECO") ("D&O 13389"); Re Integrated Resource Planning, Docket No. 7260, Decision and Order No. 14026 (July 28, 1995) (KE) ("D&O 14026"). Each of the electric utilities currently purchases power produced from renewable resources.

4 See Re Integrated Resource Planning, Docket No. 7257, Decision and Order No. 13839 (March 31, 1995) ("HECO") ("D&O 13389"); Re Integrated Resource Planning, Docket No. 7260, Decision and Order No. 14026 (July 28, 1995) (KE) ("D&O 14026").

There is no consensus that the non-inclusion of new renewable resources in the utilities' IRP Plans is a barrier to the development of renewables.

Barrier 5.a **Long-term reliability of the renewable energy technology.**

DEFINITION:

When renewable energy technology is utilized the question that arises is what is the life cycle of the unit and the reliability of the technology.

DISCUSSION:

There was no consensus that this is a barrier.

Proponents maintain that renewable energy resources, such as wind energy and solar energy, are still in the development stage. For instance, wind energy has been in large scale, commercial operation for a relatively short period of time (i.e., approximately twelve years). "Advanced generation" wind energy systems, which appear to be more cost-effective and compatible with electric utility systems than prior generations of wind machines, are just being commercially tested at a number of mainland sites. These advanced wind turbines will have to be operated a number of years to prove their long-term reliability. Recent accounts of blade failures and other startup problems of these advanced wind turbines reinforces the need for any technology undergoing a step improvement in design to operate for an extended period of time in order to prove its reliability.

Opponents maintain that owing to RD&D and early commercialization attempts wind technology has progressed rapidly and costs have fallen dramatically over the last 10-15 years. Although there have been problems with the commercialization of wind in Hawaii, the wind industry has learned from the mistakes made in wind turbine design and siting, not only in Hawaii, but on the mainland as well.

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 5.a.1 Monitor on-going RE developments.

DISCUSSION:

Generally, on-going RE developments are monitored through membership and active participation in various renewable energy associations and working groups; communication with other utilities, national laboratories, vendors, universities, etc.; attendance at conferences and workshops; visitations to operating commercial and demonstration projects; and subscriptions to RE journals and magazines.

VEHICLE: Monitor on-going renewable energy demonstration projects and technology developments through continued application of the above approaches.

AGENCY: Utilities, Developers, Government agencies, Public Interest groups, Interested members of the General Public.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, ki, m, h, n, ca, z

OPPONENTS:

NO POSITION: p, i, krl, ers

Strategy 5.a.2 Actively participate in RE demonstration projects applicable to Hawaii.

DISCUSSION:

This is generally accomplished by entities exploring and developing opportunities to take part in joint research, development, demonstration activities, etc.

VEHICLE: To the extent that funds are available the Utilities will use a portion of their respective RD&D budgets to attempt to develop and implement a limited number of pilot RD&D demonstration projects targeted to renewable technologies applicable to their service areas. To be effective utility dollars should be leveraged with public and private dollars. (See also Barrier Grouping 1, Strategy 1.e.2, Green pricing utility tariff.)

AGENCY: Utilities, PUC, State and Federal governments, Developers, and Third Party Investors

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, ki, m, h, n, ca, z

OPPONENTS:

NO POSITION: p, i, krl, ers

Barrier 5.b Lack of incentives to utilities to purchase renewable energy.

DEFINITION:

The utilities have no incentive to purchase renewable energy from non-utility generators.

DISCUSSION:

No consensus was reached on this Barrier.

Proponents maintain that stockholders of utilities receive dividends primarily through the return on investment allowed by the PUC. Absent a directive from the PUC that the utility utilize renewable resources, a utility will always choose to build fossil fuel plants based on a lower economic risk profile. The return generally available to an electric utility is not commensurate with the risk of investing in renewable projects. To overcome the higher economic risk associated with renewable resources would require a monetary incentive to be paid to a utility. Providing the utility with a monetary incentive to buy or invest in renewable energy projects would act as a further disincentive for the development of renewable energy because that would only result in a higher costs. This incentive would be in addition to the already high initial cost to develop renewable projects. The higher cost would narrow the group of consumers willing to pay for electricity produced by renewable energy.

Opponents maintain that the lack of an incentive is not an actual barrier to the development of renewable resources, although it may be a perceived barrier. However, there are disincentives that discourage utilities from purchasing power, which should be eliminated. In particular, utilities should not be required to enter into PPAs on terms and conditions that shift risks from the NUGs to the utilities, and certainly should not be required to do so without being compensated for any risks they are required to assume.

Strategy 5.b.1 Develop a standard offer contract for renewable energy sales to utilities.

DISCUSSION:

No consensus was reached on this strategy. A standard offer contract is a contract that has standard contract provisions and a standard method of calculating avoided cost. In most cases, the standard offer contract has been preapproved by the PUC, thus, getting approval of the contract should be proforma.

Proponents maintain that (1) California has become a world leader in the development of renewable resource and efficient cogeneration projects to meet its electricity needs, due largely to bidding for independent power projects and the development and use of standard offer contracts, (2) without greater price certainty and experience with the contract provisions, these projects were extremely difficult to finance due to lender concern about uncertain revenue flows. As a result, the CPUC directed parties to develop a contract option in the spring of 1983 that provided fixed payments for both energy and capacity over a period time to allow projects to obtain financing, and (3) the CPUC opted for a portfolio of contracts in order to provide options to match the diverse needs of the array of generation technologies and independent power applications available.

Opponents maintain that (1) standard offers and/or standard form contracts may or may not encourage the implementation of renewable resources, depending on the terms and conditions of the standard offers and/or contracts,[5] (2) Hawaii utilities generally have made "standard offers" for as-available energy projects, based on their filed avoided energy costs and form contracts[6], but RE developers have often sought prices, terms and conditions that differ from the "standard offers", resulting in extended negotiations, and (3) the unique production and power supply characteristics of the different renewable technologies require flexibility in contract provisions and terms, which makes it difficult to develop form contracts for firm capacity PPAs.

VEHICLE: Investigation or initiation of a PUC Docket to consider the institution of a standard offer contract.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: ke, d, r, p, ki, m, h, w, n, krl, i, ers, z

OPPONENTS: heco

NO POSITION: ca

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5 California is the best example of a state that implemented standard offers and/or contracts. Standard offers and/or contracts spurred the development of renewables in California, primarily due to the high prices they included. These offers included fixed, escalating prices based on projections of avoided costs. The assumption was that oil prices, and avoided costs, would continue to escalate at a rapid rate through the 1980s and 1990s. As a result, California utilities are now paying prices for purchased power that are as much as four times greater than their current avoided costs.

See, e.g., HELCO Application filed September 18, 1995 in Docket No. 95-0319 for approval of a Schedule Q Contract. Schedule Q applies to QF facilities rated at 100 kW or less.

6 See, e.g., HELCO Application filed September 18, 1995 in Docket No. 95-0319 for approval of a schedule Q Contract. Schedule Q applies to QF facilities rated at 100 kW or less.

Strategy 5.b.2 If any avoided capacity costs can be reasonably demonstrated for an as-available resource, the amount of these avoided costs (or some proxy) should be included in determining the value and pricing of the resource.

DISCUSSION:

See discussion under Strategy 1.c.2

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, ki, m, h, w, n, krl, i, ers, z, ke

OPPONENTS: heco

NO POSITION: ca

Barrier 5.c — Lack of incentive to utility sufficient to overcome risk of producing RE.

DEFINITION:

This is a barrier to utility investment to build its own renewable energy projects. The potential return on an investment must be commensurate with the investment risk. The return generally available to an electric utility is not commensurate with the risk of investing in renewable projects.

BACKGROUND:

This barrier did not have consensus.

Proponents maintain that utilities should be provided incentives, such as those potentially available for DSM programs, under appropriate circumstances in order to overcome the higher risk associated with investing in RE projects.

Opponents maintain that incentives provided to utilities would result in higher costs for the development of renewable energy, which would act as a disincentive to the development of renewable energy.

STRATEGIES

Possible strategies include, but are not limited to:

Strategy 5.c.1 Consider providing incentives to utility shareholders for investing in RE facilities or in RE RD&D projects.

DISCUSSION:

This strategy did not have consensus. The nature of any incentive mechanism may vary depending on resource technology, ownership arrangements, and other project specific characteristics.

Proponents maintain that utilities should be provided incentives, such as those potentially available for DSM programs, under appropriate circumstances in order to overcome the higher risk associated with investing in RE projects.

Opponents maintain that incentives provided to utilities would result in higher costs for the development of renewable energy, which would act as a disincentive to the development of renewable energy.

VEHICLE: The HECO Utilities to work with the Consumer Advocate and other interested parties, as part of the Utilities IRP process, to develop a specific incentive proposal.

AGENCY: HECO Utilities, Consumer Advocate, and other interested parties.

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n, z

OPPONENTS: w

NO POSITION: heco, p, i, krl, ke, ca, ers

Strategy 5.c.2 Consider utility investment in joint ventures to develop renewable resources.

DISCUSSION:

There is no prohibition against Hawaii utilities (or their nonregulated affiliates) participating in joint ventures to develop renewable projects. However, the PUC still would have jurisdiction over the arrangement between the utility and the project entity for the purchase of power (which would generally be a PPA).

VEHICLE: The PUC (and the Consumer Advocate) could provide general guidance (absent the details of a specific renewable project proposal) on whether it would view such joint ventures positively or negatively.

AGENCY: PUC and Consumer Advocate

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, p, ki, m, h, w, n, krl, i, ers, z

OPPONENTS:

NO POSITION: ca

Barrier 5.d   Lack of equal transmission access to independent power producers and wholesale and retail wheeling.

DEFINITION:

Only the utility is able to sell directly to the consumers.

DISCUSSION:

This barrier did not have consensus. See barrier grouping 7.

Barrier 5.e Inadequate evaluation and treatment of renewable energy resources and independent power producers in the Integrated Resource Planning (IRP) process.

DEFINITION:

The preferred Integrated Resource Plans ("IRP Plans") submitted by the electric utilities in their initial IRP cycles did not include new renewable supply-side resources, and did not differentiate between utility owned and non-utility owned generation. See Appendix D.

DISCUSSION:

The IRP Framework requires that the utility consider all feasible supply-side options appropriate to Hawaii and available within the IRP horizon to meet the IRP objectives, which includes RE resources. IRP Framework ¶¶1 ("Supply-Side Programs"), IV.D.1.

The supply-side resources considered by utilities in their IRP processes include resources that are or may be supplied by persons other than the utilities (e.g., resources that may be supplied by non-utility generators). IRP Framework, ¶IV.D.2.

Proponents of this barrier maintain that the evaluation and treatment of RE resources and independent power producers ("IPPs") in the utilities' IRP processes was inadequate in light of the clear State policy supporting development and utilization of renewable energy, and that the exclusion of otherwise preferable RE resources that the utility would not build itself can result in a reduction in the avoided cost price (based on the preferred IRP Plan) available to such RE resources.

Opponents of this barrier maintain that their IRP Plans address the objectives of the State Plan through energy efficiency DSM Programs and supply-side action activities, that supply-side resources were generally characterized and considered without regard to ownership in the utilities' IRP processes, that their preferred IRP Plans are consistent with the potential ultimate implementation of alternate plans that include RE resources, and that IPPs are free to submit proposals to implement, replace or defer the supply-side resources included in the utilities IRP Plans, as the PUC found in the HECO IRP docket.

There is no consensus that the extent of evaluation and treatment of RE resources and IPPs in the IRP process is a barrier to the development of RE resources. There is also no consensus whether RE resources and IPPs are sufficiently taken into consideration in the IRP process.

STRATEGIES:

Possible strategies include but are not limited to:

Strategy 5.e.1 Consider quotas, set-asides or targets which mandate the purchase of a specified amount of renewable energy within a time certain.

DISCUSSION:

There is no agreement that quotas, set-asides or targets should be required. The topics of quotas, set-asides and targets is addressed by several parties in Appendix C.

VEHICLE: Establishment of quotas, set-asides or targets by legislation, PUC rule, or in the IRP process.

AGENCY: Legislature or PUC.

POSITION OF THE PARTIES:

PROPONENTS: d, p, ki, n, krl, i, ers, r, ca, z

OPPONENTS: heco, ke

NO POSITION: m, w, h

Strategy 5.e.2 Consider preferential consideration of renewables within the resource planning context.

DISCUSSION:

The IRP Framework requires mandatory consideration of renewable resources in the IRP process, based on the IRP goals and objectives. There is consensus that the utilities can develop a "green" IRP plan as one of the alternative plans evaluated in their IRP processes. The HECO utilities also have stated that they will consider, with IRP Advisory Group input, formation of a Renewables Subgroup (or Focus Group)[7] However, there is no consensus that a preferential consideration requirement (such as those discussed in Appendix C), which would apply to the selection of the Preferred IRP Plan, should be established.

VEHICLE: Establishment of preference by legislation, PUC rule, or in the IRP process.

AGENCY: Legislature or PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, ki, n, krl, i, ers, z

OPPONENTS: heco, ke

NO POSITION: h, w, m, ca

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[7] The Subgroup could include representatives from the utilities, developers, regulators, environmentalists, State and County planners, customers and technology experts.

Strategy 5.e.3 Consider competitive bidding, either in the form of "Green RFPS" which limit competition to renewables for fixed amounts of power, or, open competitive bidding which credits renewable sources to acknowledge and accommodate the environmental, social and cultural benefits inherent in their use.

DISCUSSION:

There is no agreement that Green RFPs should be required, or that renewables should receive an externalities credit if there is an open competitive bid process. The topics of Green RFPs and externality adders are addressed in Appendices C and B, respectively. In addition, there is no consensus as to whether (1) requiring the competitive acquisition of new resources would encourage or discourage the development of RE resources[8] (2) competitive bidding would be an appropriate strategy, or (3) non-price factors (i.e., externalities) can legally be considered or should be considered in a competitive process.[9] However, the PUC has stated that it will open a generic investigation into electric utility regulation in a competitive environment, which will include the subject of competitive bidding.[10]

VEHICLE: PUC docket.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, p, ki, m, h, n, krl, i, ers, r, ca

OPPONENTS: heco, ke, z

NO POSITION: w

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8 e.g., can RE resources effectively compete with fossil-fueled resources in a competitive market?

9 See Appendix B.

10 Re Hawaiian Electric Co., Docket No. 7257, Decision and Order No. 13839 (March 31, 1995) at 15-16.

Strategy 5.e.4 Consider retail wheeling in order to permit direct service provision by renewable energy developers.

DISCUSSION:

There is no consensus that retail wheeling should be considered. Wheeling is addressed in barrier grouping 7.

POSITION OF THE PARTIES:

PROPONENTS: d, w, p, i, krl, n, ki, h, m, r, z, ers

OPPONENTS: heco, ke

NO POSITION: ca

Barrier 5.f — Evaluation and consideration of beneficial impacts of renewable energy use relative to conventional fossil fuel resources.

DEFINITION:

Although there are externality costs associated with renewable resource technologies[11], renewable resources generally have or are believed to have, lower externality costs than fossil-fueled resources.

The Utilities determined that it was not feasible to monetize externalities in the first IRP cycle.

DISCUSSION:

There are several different contexts in which the indirect costs and benefits of resource options can be considered. These indirect costs are sometimes referred to as externalities. The possible contexts in which externalities can be considered include (1) the resource selection process used by the utilities in the development of their integrated resource plans, (2) consideration and evaluation of demand-side management programs and (3) the determination of the rates paid to independent power producers ("IPPs").[12] This barrier addresses the first of these possible contexts for the consideration of externalities. The current determination of the avoided cost payment rates is discussed under barrier 1.c. The consideration of externalities in the determination of the rates paid to IPPs is discussed under barrier 1.e. The consideration of RE resources in the utilities' IRP processes is also discussed under barrier 5.e.

There is no consensus that the extent of evaluation and consideration of the beneficial impacts of renewable energy resources relative to fossil fuel resources in the utilities' IRP processes is a barrier to the development of renewable resources. There is also no consensus whether these externalities are sufficiently taken into consideration in the utilities' IRP processes.

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11 The externality costs vary with the resource, the generation technology, and the location of the resource. See, e.g. the discussion of barrier grouping 8.

12 This issue has arisen in the context of whether "avoided costs" should include avoided externality costs and whether nonfossil fuel producers should be paid an externalities adder above avoided utility costs.

There is consensus that externalities should be considered in the utilities' resource selection processes[13], and that the manner in which externalities are considered can be improved. However, there is no consensus regarding the value of the externalities benefits and costs of RE resources (relative to those of fossil-fueled resources), or as to how the relative externalities should be considered.

Proponents maintain that some renewable resources have beneficial impacts compared to fossil fuel resources and that these benefits are not sufficiently considered in the utilities' IRP processes. In order to fully account for these benefits, they propose that externalities be quantified, and that mechanisms (such as set-asides, quotas, preferences, etc.) be established to ensure that renewables are included in utility resource plans.

Opponents agree that externalities should be quantified to the extent required by the PUC's IRP Framework, but maintain that utility resource planning should be governed by the IRP Framework, which requires the balancing of externality considerations and renewables benefits with other specified goals and objectives, and that the establishment of set-asides or quotas would violate the principle of least cost planning.

Externalities and externality adders, and set-asides, quotas and green RFPs, are addressed by several parties in Appendices B and C, respectively.

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13 The PUC's IRP Framework requires that external costs and benefits be considered in the integrated resource planning process, but does not specify the weight to be given externalities in selecting the utility's preferred integrated resource plan ("IRP Plan"). Re Integrated Resource Planning, Docket No. 7257, Decision and Order No. 13839 (March 31, 1995) at 25.

As discussed under possible barrier 4.a., FERC's avoided cost cap ruling may preclude the payment of an externalities adder to an RE producer, but it does not appear to preclude the consideration of externalities in the selection of a utility resource plan (which could include renewable resources, or which could form the basis for a higher utility avoided cost determination for purchased power resources, including renewable resources, that provide equivalent externalities benefits).

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 5.f.1 — Improve the methodologies to value the benefits of renewables.

DISCUSSION:

Methodologies for quantitatively valuing the positive (and negative) attributes of renewable resources can be improved. Benefits and risks that can be better evaluated include, but are not limited to, distributed generation benefits, resource diversity benefits, resource supply risk, and technology risk.

As part of their Supply-Side Action plans, HECO, HELCO and MECO plan to conduct studies to (1) evaluate opportunities for dispersed generation (and remote or off-line generation facilities on the Big Island), and (2) gather and analyze additional information to permit a more thorough assessment of several of the supply-side options identified in their IRP Supply-Side Resource Reports.

An agreement between HECO, HELCO, and MECO with EPRI is in place to conduct dispersed generation studies in their service areas. EPRI's consultant, Rumla, Inc. has conducted screening activities, and is conducting detailed analyses for selected sites. HECO and MECO worked with PICHTR and NREL on an Integrated Electric Utilities Project ("IEUP") --Model Utility.

VEHICLE: IRP Process

AGENCIES: Utilities, Utility IRP Advisory Groups, PUC

POSITION OF THE PARTIES:

PROPONENTS: ke, d, p, ki, m, h, w, n, krl, i, heco, r, ers, ca, z

OPPONENTS:

NO POSITION:

Strategy 5.f.2 Proceed with the quantification of externalities.

VEHICLE: HECO Utilities' Externalities Action Plan.

The HECO Utilities have proposed to jointly participate in an Externalities Action Plan, whose objective is to develop a process which incorporates external costs and benefits into the planning process on a level playing field among resources. The PUC approved the HECO Utilities Externalities Action Plan, finding HECO's strategy for quantifying externalities to be reasonable.

An Externalities Advisory Group ("EAG") was formed, and a series of informational workshops on externalities have been held. The HECO Utilities are in the process of selecting, with Advisory Group input, an externalities consultant. In Phase One, the utilities will attempt to identify the externalities, provide guidelines for monetization, and determine how externalities will be used in the decision making process. In Phase Two, the utilities will attempt to develop Hawaii specific monetized values, and develop an IRP externalities workbook. In Phase Three, the utilities will utilize the external costs and benefits in the integration process. The PUC must approve the values derived for externalities.

AGENCY: HECO Utilities, HECO Utilities EAG, PUC

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, w, ca, z

OPPONENTS:

NO POSITION: p, n, krl, i, ers

Strategy 5.f.3 Establish "Green" requests for proposals ("RFP"s).

DISCUSSION:

There is no agreement that Green RFPs should be established. The topic of Green RFPs is addressed by several parties in Appendix C.

VEHICLE: Requirement for Green RFP.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, ki, n, krl, i, ers, z

OPPONENTS: heco, ke

NO POSITION: h, w, m

Strategy 5.f.4 Establish renewable set-asides.

DISCUSSION:

There is no agreement that set-asides should be established. The topic of set-asides is addressed by several parties in Appendix C.

VEHICLE: Establishment of set-asides for renewables in IRP.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, ki, n, krl, i, ers, z

OPPONENTS: heco, ke

NO POSITION: w, m, ca, h

Strategy 5.f.5 Consideration of competitive bidding.

DISCUSSION:

The PUC has stated that it will open a generic investigation into electric utility regulation in a competitive environment, which will include the subject of competitive bidding.[14]

VEHICLE: PUC docket regarding electric utility regulation in a competitive environment.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, p, ki, n, krl, i, h, ers, r, m, ca

OPPONENTS: heco, ke, z

NO POSITION: w

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14 Re Hawaiian Electric Co., Docket No. 7257, Decision and Order No. 13839 (March 31, 1995) at 15-16.

Barrier 5.g Lack of adequate, high-quality renewable energy resource data.

DEFINITION:

Lack of adequate, long-term, high quality renewable energy resource data has been listed as an impediment to renewable energy resource development. Such data are critical for predicting the performance and cost effectiveness of renewable energy systems. Although short term, high-quality data have been collected, additional long-term data is needed.

DISCUSSION:

Renewable energy resource data has long been recognized as important to identifying potential locations and options for renewable energy development. The lack of a data base with which to analyze renewable energy options was identified as an issue by the DBEDT-sponsored Hawaii Integrated Energy Program in 1991. Since 1991, several significant actions have been taken to improve on the availability of renewable energy resource data. A study entitled, Comprehensive Review and Evaluation of Hawaii's Renewable Energy Resource Assessments was completed. It summarized existing assessments; determined the suitability, currency, and quality of existing resource data; and determined additional resource data requirements, including possible monitoring sites, monitoring methods, and instrumentation needs.

Building on the Comprehensive Review, in 1992, the Renewable Energy Resource Assessment and Development Program was initiated by DBEDT as part of the Hawaii Energy Strategy Program. The three-phase renewable energy component, completed in July 1995, provided the best-yet compilation of renewable energy resource data. The state, with the aid of a major federal grant, has provided a valuable tool for the utilities and potential renewable energy developers. It will be made available through the State Library system and interested parties will be able to make copies from reports checked out from the DBEDT Energy Division.

STRATEGIES:

Strategy 5.g.1 — Consider funding publication of additional copies of the DBEDT Renewable Energy Resource Assessment and Development Program final report.

DISCUSSION:

Additional copies of DBEDT's final report would be distributed to the utilities, local renewable energy developers, and other potential renewable energy developers on the mainland and in certain foreign countries. Publication of additional copies of DBEDT's final report would be contingent on resource/fund availability and the Administration's budget priorities.

VEHICLE: Budget

AGENCY: DBEDT

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: p, w, krl, i, ers, ca

Strategy 5.g.2 The utilities and potential developers should assume a greater monetary role in further resource assessment.

DISCUSSION:

Proponents maintain that cooperative resource data collection by the private sector, on a cost-sharing basis with the state, could yield further data in the public domain.

Opponents maintain that (1) the utilities have undertaken and are continuing to undertake substantial efforts to improve the body of renewable energy resource data in Hawaii (particularly through their IRP Supply-Side activities and participation in RE demonstration projects), and (2) there are limits to which the private sector will contribute to the cost of a cooperative resource data collection effort, if the collected data becomes "public domain" (which is shared with developers that did not contribute to the cost of developing the data).

VEHICLE: Increased private sector funding.

AGENCY: Utilities, RE Developers, and DBEDT

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: heco, ke, w, p, krl, i, ers, ca

Barrier Grouping 6

Lengthy purchase power agreement negotiations

Barrier Grouping 6 **Lengthy purchase power agreement negotiations**

Utilities are required to purchase power from Qualifying Facilities at their avoided costs (unless a higher or lower price is negotiated) pursuant to the Public Utility Regulatory Policies Act of 1978, as amended ("PURPA"), and the PUC's Standards for Small Power Production and Cogeneration in the State of Hawaii (H.A.R. Title 6, Chapter 74), (the PUC's "Avoided Cost Rules"), which implement PURPA and H.R.S. §269-27.2. Contracts for such purchases are, for the most part, dependent upon satisfactory negotiations between the utility and IPP.

H.R.S. §269-27.2(c)[1] and H.A.R. §6-74-15(c)[2] authorize the PUC to resolve certain disputes concerning the rate or terms of purchase between electric utilities and IPPs.

Proponents of this barrier grouping maintain that (1) negotiations between utilities and IPPs in Hawaii have taken as long as five years, which is a disincentive to the development of renewable energy by IPPs, (2) utilities actively delay the consummation of negotiations in order to avoid having to purchase IPP-generated power, which permits avoidance of the law without expressly violating it, and (3) utilities discourage the execution of PPAs through their non-utility generator policies.

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1 H.R.S. §269-27.2(c) provides, among other things, that:

> In the event the public utility and the supplier fail to reach an agreement for a rate, the rate shall be as prescribed by the public utilities commission according to the powers and procedures provided in this chapter.

2 H.A.R. §6-74-15(c) states that:

> In the event the electric utility and qualifying facility has failed to reach an agreement on the rate or terms of purchase within seventy-five days after the qualifying facility first offers to sell energy or capacity to the electric utility, the electric utility shall submit a petition to the PUC requesting a hearing on the matter.

Opponents of this barrier grouping maintain that (1) electric utilities in Hawaii have entered into numerous PPAs with renewable power producers,[3] (2) there have been fewer PPAs with renewable producers in recent years, due in substantial part to lower avoided costs as a result of lower oil prices, (3) it may take a substantial period of time to successfully conclude PPA negotiations with an executed, PUC-approved PPA (citing the Puna Geothermal Venture and H-Power PPAs), (4) lengthy negotiations generally have been the result of the utility's willingness to continue negotiations despite the developer's request for a price above avoided costs, and (5) renewable producers dissatisfied with power purchase negotiations may petition the PUC for relief.

3 For example, electric utilities in Hawaii have entered into PPAs for the purchase of firm capacity and energy with sugar cane processing companies; as-available energy contracts with sugar producers, run-of-the-river hydroelectric producers, wind power producers, a methane-from-landfill producer, and a geothermal producer; and firm capacity PPAs with woodchip biomass producers, and a geothermal producer.

Barrier 6.a Lack of Incentives to utilities to purchase renewable energy

DEFINITION:

See discussion under barrier 5.b.

DISCUSSION:

See discussion under barrier 5.b.

STRATEGIES:

Possible strategies include, but are not limited to:

See discussion under barrier 5.b.

Barrier 6.b **Implementation of existing statutes and regulations**

DEFINITIONS:

S.C.R. No. 2 (S.D.1) (1994) requests that the PUC initiate rulemaking proceedings to amend H.A.R. § 6-74-15(c).

Section 269-16.2, H.R.S., requires the approval by the PUC of any rules, guidelines or other standards of a public utility which interpret federal or state laws governing nonutility generators before adoption.

DISCUSSION:

S.C.R. No. 2 (S.D.1.) (1994) requests that the PUC amend H.A.R. §6-74-15(c) to allow a qualifying facility to petition the PUC for a hearing when the electric utility and the qualifying facility have been unable to reach an agreement on the rates and terms of a power purchase agreement within 75 days from the date that the qualifying facility first offers to sell energy or capacity to the electric utility. To date, the PUC has not initiated the requested rulemaking. As amended, HAR §6-74-15(c) will read substantially as follows:

> (c) In the event the electric utility and qualifying facility have failed to reach an agreement on the rate or terms of purchase within seventy-five days after the qualifying facility first offers to sell energy or capacity to the electric utility, the electric utility shall, and/or the qualifying facility may submit a petition to the PUC requesting a hearing on the matter. The PUC shall act expeditiously upon the petition.

There is no consensus that this is a barrier. Proponents maintain that (1) it is the PUC's obligation and duty to resolve, in a fair and expeditious manner, disputes concerning failures of the electric utility and the QF to reach agreement on the rates or terms of power purchase agreements, but that under the current rule, only an electric utility is allowed to petition the PUC for a hearing, that utilities do not always petition the PUC when an impasse is reached, and that there is no penalty for the utility's failure to comply with the rules, (2) that a QF's only alternative in the face of a utility unwilling to petition the PUC is to file its own complaint, (3) this is an inadequate remedy because it, too, takes too long, and (4) the proposed changes to H.A.R. §6-74-15(c) will assist in accomplishing the objective of resolving disputes between the QF and the utility.

Opponents maintain that the failure to amend H.A.R. § 6-74-15(c) is not a barrier, that the PUC cannot "make" purchase power agreements between developers and utilities, that reliance on the PUC to negotiate such agreements would overburden the PUC and probably further delay negotiations, and that renewable producers dissatisfied with power purchase negotiations may already petition the PUC. Opponents do not object to the specific modification of the rule, as proposed in S.C.R. No. 2 (S.D.1), but maintain that (1) the modification is unnecessary, and (2) if the PUC does modify H.A.R. §74-15(c), it should establish strict guidelines (particularly in the case of firm capacity offers) to ensure that petitions are not submitted until developers have submitted a full and complete offer, and can obtain site control.
H.R.S. §269-16.2 provides that:

> Any rules, guidelines, or other standards of a public utility which interpret federal or state laws governing non-utility generators, or which make a non-utility generator monetarily responsible for the public utility's costs and profits of doing business as a public utility, shall be approved by the public utilities commission before adoption.

There is no consensus that this is a barrier. Proponents maintain that unilateral utility guidelines, such as certain provisions included in HECO's "Guidelines for Integration of Non-Utility Generation (NUG)", have traditionally been unfair and frustrate the purpose of PURPA to provide a level playing field during negotiations between the utility and a qualifying facility, and that the lack of any PUC approval or submission of the matter by the utility to the PUC represents a frustration of the law, and cite the PUC decision in Docket No. 7956 in support of their position.

Opponents maintain that the H.R.S. §269-16.2 is inapplicable to the underlying issue inasmuch as the law applies only when a utility seeks to "adopt" a rule, guideline, or other standard. Opponents further maintain that the few provisions within the various guidelines which are subject to the law are already the subject of recent and pending PUC proceedings. The PUC's decision in Docket No. 7956 addressed a number of the NUG guidelines to which NUGs have objected (e.g., parallel planning costs, credit quality impact, etc.). Re Hawaii Electric Light Co., Docket No. 7956, Decision and Order No. 14030 (July 31, 1995).

STRATEGIES: Possible strategies include, but are not limited to:

Strategy 6.b.1 The PUC to implement the provisions of S.C.R. No. 2 (1994) which requests the PUC to initiate rulemaking procedures to amend H.A.R. §6-74-15(c) to facilitate and expedite the execution of utility purchase power agreements with Qualifying Facilities.

DISCUSSION:

See discussion under barrier 6.b.

VEHICLE: Rulemaking proceedings

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, w, n

OPPONENTS: heco, ke

NO POSITION: ki, m, h, ca, p, i, krl, ers

Strategy 6.b.2 The PUC to enforce the current rule (HAR §6-74-15(c)) to ensure that negotiations between the utility and qualifying facilities are concluded in an expeditious manner. If necessary, the commission should utilize the services of a hearing officer/arbitrator to conduct the hearing.

DISCUSSION:
There is no consensus on either the barrier (as discussed above) or the efficacy of the proposed strategy. Proponents maintain that, contrary to the rules purpose, the rule as currently implemented does not ensure that negotiations are completed in an expeditious manner. Opponents maintain that the rule is currently being enforced, and that enforcement to the satisfaction of the proponents is impractical and unwise.

VEHICLE: PUC action enforcing existing rules

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, w, n, krl, i, ers

OPPONENTS: heco, ke

NO POSITION: kl, m, h, ca

Strategy 6.b.3 PUC to implement the requirements of H.R.S. §269-16.2.

DISCUSSION:

There is no consensus that the PUC has failed to enforce H.R.S. §269-16.2.

VEHICLE: PUC enforcement of existing law.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, w, n

OPPONENTS: heco, ke

NO POSITION: ki, m, h, ca, p, i, krl, ers

Barrier 6.c **Protracted time to negotiate with RE developers**

DEFINITION:

All sides to a PPA benefit from an expeditiously negotiated agreement which provides needed power at a fair price. Developers of renewable energy maintain that negotiations to obtain a PPA take too long.

DISCUSSION:

There is no consensus as to the underlying proposition that PPAs take "too long" or, even, "a long time" to negotiate. Proponents maintain that PPA negotiations take too long to negotiate, that utilities discourage the execution of PPAs through their NUG policies, and that utilities prefer utility-owned oil-based generation.

Opponents maintain that this is a perceived barrier and that it may take a substantial period of time to successfully conclude PPA negotiations with an executed, PUC-approved PPA. Opponents also maintain that lengthy negotiations have generally been the result of the utility's willingness to continue to review proposals from a project developer, despite the developer's request for a price above avoided cost.

STRATEGIES: Possible strategies include, but are not limited to:

Strategy 6.c.1 Initiate rulemaking proceedings to adopt rules to enforce mandates (Federal and State laws, and Legislative Resolutions) and to promote fair and expedient negotiations between utilities and developers.

DISCUSSION:

There is no consensus on the existence of the barrier (See Background to barrier 6.b.) or on the question of whether the proposed strategy is appropriate assuming the existence of the identified barrier. The positions of the proponents and the opponents of this strategy are summarized within the background, barrier 6.b.

VEHICLE: PUC-initiated rulemaking

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS:	r, p, w, n, krl, i, ers, z
OPPONENTS:	heco, ke
NO POSITION:	ki, m, h, d, ca

Strategy 6.c.2 **Streamline regulatory approval process for renewable power purchase agreements.**

DISCUSSION:

There is no consensus on the existence of the barrier (see discussion referenced above) or on the question of whether the proposed strategy is appropriate assuming the existence of the identified barrier. To the extent that proponents refer to matters addressed under barrier 6.b., proponents and opponents have stated their positions at those locations. To the extent that proponents refer to some other, unidentified, form of streamlining the regulatory approval process for PPAs, the opponents offer no response in the absence of further detail.

VEHICLE: PUC-initiated rulemaking

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS:	r, p, w, n, krl, i, ers, z
OPPONENTS:	heco
NO POSITION:	ki, m, h, d, ca, ke

Strategy 6.c.3 **Enforce current rules regarding negotiations between the utility and qualifying facilities to ensure that negotiations are fair and that the utility is not allowed to leave the renewable developer in an indefinite state of impasse.**

DISCUSSION:

See discussion under barrier 6.b.

VEHICLE: **PUC enforcement of existing rules.**

AGENCY: **PUC**

POSITION OF THE PARTIES:

PROPONENTS: **d, r, p, h, w, n, krl, i, ers, z**

OPPONENTS: **heco, ke**

NO POSITION: **ki, m, ca**

Strategy 6.c.4 **Initiate rulemaking pursuant to S.C.R. No. 2 to facilitate and expedite the execution of utility power purchase agreements with qualifying facilities.**

DISCUSSION:

See discussion under barrier 6.b.

VEHICLE: **PUC-initiated rulemaking.**

AGENCY: **PUC**

POSITION OF THE PARTIES:

PROPONENTS: **d, r, p, w, n, krl, i, ers, z**

OPPONENTS: **heco, ke**

NO POSITION: **ki, d, h, ca**

Strategy 6.c.5 Utilize the services of a hearing officer/arbitrator to conduct the hearing in enforcing H.A.R. §6-74-15(c), if necessary.

DISCUSSION:

There is no consensus on the existence of the barrier (see discussion above) or concerning the propriety of the identified strategy assuming the existence of the barrier. Proponents maintain that the PUC should retain the services of a hearing officer or arbitrator to conduct the hearings necessary to accomplish those rules should the PUC's heavy schedule prevent it from presiding over those hearings. Opponents maintain that the PUC is already effectively enforcing the identified rule. Opponents, furthermore, hesitate to advise the PUC as to which internal matters the PUC should expend its scarce dollar resources on.

VEHICLE: PUC employment of hearing officer or arbitrator

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: r, p, m, w, n, krl, i, ers, z

OPPONENTS: heco, ke

NO POSITION: h, ki, m, ca

Strategy 6.c.6 Implement the requirements of H.R.S. §269-16.2 requiring Commission approval of any rules, guidelines or standards of public utilities regarding non-utility generators.

DISCUSSION:

See discussion under barrier 6.b.

VEHICLE: PUC enforcement of existing law.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, w, n, krl, i, ers, z

OPPONENTS: heco, ke

NO POSITION: ki, m, h, ca

Strategy 6.c.7 Rulemaking to require that when a complaint is filed by the utility or qualifying facility regarding negotiations, a decision and order shall be issued within sixty days.

DISCUSSION:

See discussion under barrier 6.b.

VEHICLE: PUC-initiated rulemaking or legislation

AGENCY: PUC / Legislature

POSITION OF THE PARTIES:

PROPONENTS: r, p, m, w, n, krl, i, ers, z

OPPONENTS: heco, ke

NO POSITION: ki, d, h, ca

Strategy 6.c.8 Expedite the contracting process by promptly reviewing and responding to a contract proposal, and specifying for the qualifying facility all of the problems which the utility has with the offer within seventy-five days.

DISCUSSION:

There is no consensus as to the existence of the barrier (see discussion above) or concerning the propriety of the identified strategy assuming the existence of the barrier. Proponents maintain that the seventy-five day period provided for in the regulation represents the PUC's expectation of a reasonable time period in which PPAs can be negotiated, that the absence of a meaningful deadline allows utilities to prolong negotiations indefinitely, and that utilities can expedite the negotiation process by being more forthcoming about their concerns with a contract proposal, and allowing the qualifying facility the timely opportunity to address the utility§ concern. Opponents maintain that the referenced seventy-five day limitation applies only to completed offers under the rules. HAR §6-74-15(c). Opponents further maintain that it is unrealistic to expect that negotiations can be completed within 75 days in the case of a firm capacity PPA, and that submission to the PUC within 75 days will slow down rather than expedite PPA negotiations.

VEHICLE: Utilities enacting the strategy

AGENCY: Utilities

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, ki, m, h, w, n, krl, i, ers

OPPONENTS: heco, ke

NO POSITION: ca

Strategy 6.c.9 Develop a standard offer contract for renewable energy sales to utilities.

DISCUSSION:

There is no consensus as to the existence of the barrier (see discussion above) or concerning the propriety of the identified strategy assuming the existence of the barrier. Proponents maintain that standard offers and/or standard form contracts will expedite the PPA negotiation process, and that such contracts are appropriate in the case of the relatively less complicated and less controversial as-available projects. Opponents maintain that standard offers and/or standard form contracts may or may not encourage (citing California as an example) the implementation of renewable resources, depending on the terms and conditions of the standard offers and/or contracts.

VEHICLE: PUC-initiated rulemaking

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: ke, d, r, p, ki, m, h, w, n, krl, i, ers

OPPONENTS: heco, z

NO POSITION: ca

Strategy 6.c.10 Reduce the uncertainty regarding the determination of avoided costs.

DISCUSSION:

See discussion barrier 1.c.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, p, ki, m, h, w, n, krl, i, ers, r, ca

OPPONENTS:

NO POSITION:

Barrier Grouping 7

Electric Utility Regulatory Structure

Barrier Grouping 7: Electric Utility Regulatory Structure

INTRODUCTION

Across the nation, a critical issue facing the regulated electric utility industry is how to accommodate competition. As has been the case in telecommunications, the regulated monopolies are confronting technological and administrative efficiencies which permit non-utility competitors to offer cheaper and ostensibly better services to consumers.

National grid interconnection has made any seller's surplus capacity a source of alternate power for any jurisdiction that is prepared to purchase and transmit such electricity. Since consequent savings can presumably passed on to consumers, regulators have embraced "wheeling" as a means by which efficiencies in generation might directly benefit the ratepayer. Wheeling generally takes two forms. In "wholesale" wheeling regulated utilities are compelled to purchase and transmit the lowest price available power even if this means that utility owned generation facilities are not utilized or are underutilized. Utilities are thus threatened to be left with "stranded" assets if the costs associated with such utility owned capacity might not be effectively recovered.

In "retail" wheeling, in a situation analogous to inter-lata telecommunications (and increasingly, intra-lata service as well), consumers would be provided with the opportunity to contract directly with providers other than the local utility. The local utility's role would then be reduced to providing access and transmission of such consumer purchased power. Optimally the utility would receive a fair (but not prohibitive) compensation for such access and transmission. Transmission facilities would remain subject to regulation. Access and use of the transmission infrastructure would be mandated since duplication would be wastefully redundant and their development was a product of ratepayer assured returns on investment.

Hawaii has not yet become a part of this trend, largely because our grids are not interconnected so surplus capacity or economies of scale are not accessible to our systems. So, for the most part, the evolution taking place on the mainland is not likely to effect our utilities for quite some time.

Proponents maintain that the concept of retail wheeling is of potential benefit to the use of renewables. In this view, the utility monopolies are barriers between potentially willing sellers and buyers of power generated by renewable energy systems. Today, even if there is a willing buyer and seller for the direct transmission and use of such power, there is simply no regulatory vehicle for the consummation of a transaction. The opponents opposition to retail wheeling makes a fairly negotiated resolution improbable. Proponents therefore argue that regulation should both permit and facilitate "retail wheeling", at least insofar as it applies to renewables.

Opponents of retail wheeling maintain that (1) before including retail wheeling as a possible strategy to encourage the development of renewable resources, the pros and cons of retail wheeling must be examined in their broader context,[1] (2) there has been no demonstration that RE power can compete with fossil-fueled power in an open-access market,[2] and (3) retail wheeling could result in "cream skimming" by the non-utility providers (i.e., high volume/high profit markets might be skimmed by non-utility providers thereby leaving the utility, and its residential and small business customers, with the economic burden of ensuring the capacity and infrastructure to less profitable markets).[3]

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1 Numerous issues have been raised in other jurisdictions, including: (1) jurisdictional issues (e.g., whether there are any federal limitations on the state's authority to require retail wheeling, whether there are any limitations to a state's authority to regulate price, terms, and conditions of retail service in a retail competitive market); (2) technical issues (e.g., impact of electrical utility restructuring on system reliability, ensuring power quality in a restructured industry); (3) long range planning issues (e.g., how the benefits of integrated resource planning would be delivered in a restructured industry, whether efforts should be made to perform long-range planning and minimize long-run costs under a model which includes retail competition); (4) energy efficiency and renewable energy issues (e.g., how energy efficiency should be delivered in a restructured industry, strategies to overcome market barriers to cost-effective energy efficiency and renewable generation in a restructured industry); (5) public interest issues (e.g., universal service at reasonable rates should be a goal in the restructured industry, what is the best method to avoid or mitigate negative environmental impacts in a restructured industry); and (6) transition issues (e.g., what is the role of the Commission in managing change in the electric industry, how should stranded costs and other transition costs be treated, strategies needed to ensure customer protection during and after transition, how long will the transition take). - See, e.g., Re Structural and Regulatory Issues in the Electric Utility Industry, 160 Pub. Util. Rep. 4th 506 (Minn. PUC May 1995), Re Emerging Competition in the Electric Utility Industry, 159 Pub. Util. Rep. 4th 341 (Iowa PUC Feb. 1995).

2 The same barriers that impact sales to utilities (cost, characterization and reliability of the power, etc.) could impact direct customer purchases, and direct customers would incur the additional costs (for standby power, etc.) necessary to mitigate the rises and uncertainties of dealing directly with the renewable developer.

3 This could result in higher costs to such markets without providing them with any meaningful access to the benefits of competition.

Barrier 7.a **Absence of renewable specific retail wheeling mechanisms or opportunities.**

DEFINITION:

Direct sale "retail wheeling" of renewables is viewed as a possible means of facilitating consumer access to renewable power.

DISCUSSION:

During the first round of integrated resource planning, the utilities' preferred integrated resource plans did not include new RE resources, whether owned by the utilities or by NUGs. See discussion under barrier 5.e.

With respect to retail wheeling, proponents of these strategies maintain that a renewable-specific retail wheeling mechanism would facilitate utility consideration of renewables because of (1) the desire to avoid competition would provide an incentive to the utilities; (2) the existence of any such mechanism would have to be accommodated in their plans; and (3) actual competition resulting from wheeling would have to be acknowledged and addressed.

Proponents further maintain that there has been no demonstrated need to date for retail wheeling of renewable energy because there has been no mechanism in place which would allow this. A demand for such wheeling is quite feasible if the supplier is able to deliver this power to an and-user at a cost below the current retail utility rate, but above the avoided energy cost price offered by utilities.

Opponents maintain that (1) that in an incorrect perception that renewable projects will not be developed unless they are included in the utilities' IRP plans; (2) the claimed benefits of wheeling for RE development are entirely speculative; (3) wheeling, in general being price sensitive, would harm, rather than facilitate the use of renewables; and (4) since the PUC has already indicated that they will be considering electrical utility competition, the issue would be better considered in that docket.

STRATEGIES: Potential strategies include, but are not limited to:

Strategy 7.a.1 Include in the framing of the electric utilities competition docket specific issues relating to providing renewable developers with reasonable terms and conditions regarding access, access charges, net billing etc.

VEHICLE: PUC electric utilities competition docket.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, p, w, n, krl, i, h, m, ki, ers, r

OPPONENTS:

NO POSITION: heco, ke, ca

Strategy 7.a.2 — Instead of forcing the utility to invest in or buy energy from renewable energy sources, NUGs should be allowed to transmit and distribute renewable energy to consumers who are willing to pay the price.

VEHICLE: A docket should be opened by the PUC to investigate or the commission should initiate a rulemaking proceeding.

AGENCY: PUC

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, w, n, krl, i, z

OPPONENTS: heco, ke

NO POSITION: ki, h, m, ca

Strategy 7.a.3: Permit county governments to engage in renewable specific retail wheeling.

DISCUSSION:

See discussion under Strategy 1.b.6.

POSITION OF THE PARTIES:

PROPONENTS: d, p, ki, m, h, w, n, krl, i, ers, r

OPPONENTS: heco, ke

NO POSITION: ca

Barrier Grouping 8

Environmental and Social Impacts

Barrier Grouping 8 Environmental and Social Impacts.

Renewable resources have potential negative environmental and societal impacts that can be barriers to implementation.

Barrier 8.a Potential negative environmental and social impacts.

DEFINITION:

Renewable resources have potential negative environmental and societal impacts that can be barriers to implementation.

DISCUSSION:

Renewable resources are commonly perceived to have less negative impact upon the environment and society than conventional fossil-fueled generation resources. Nonetheless, renewable resources do have potential negative environmental and societal impacts that can be barriers to implementation. The environmental and societal impacts of renewable resources is very site-specific. Negative impacts may be a real barrier to the development of renewables at certain sites.

Potential negative environmental and societal impacts of various renewable resources may include noise, visual impacts, impacts upon endangered species, extensive land use requirements, destruction of habitat and/or archeological sites, surface and groundwater contamination, toxic emissions, health hazards, and decommissioning impacts.

Even if the permitting processes for the implementation of renewable generation are expedited, the negative environmental and societal impacts of renewables should be taken into consideration. In some cases these impacts can be mitigated. In some cases the negative impacts of renewables may make implementation unacceptable at certain sites.

Because the impacts are resource and project specific the strategies applicable to mitigating the impacts generally will be resource and project specific.

STRATEGIES:

Strategy 8.a.1 Negative impacts should be taken into consideration in the siting and selection of renewable resources.

DISCUSSION:

There is no question that the negative impacts of any resource should be taken into consideration in siting and resource selection.

VEHICLE: Siting decisions, IRP process, Permitting processes

AGENCY: Utilities, Renewable Developers, PUC, Permitting Agencies

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, ca, r, z

OPPONENTS:

NO POSITION: p, krl, i, w, ers

Strategy 8.a.2 To the extent practical and cost-effective, negative impacts should be mitigated by appropriate design, location and other means to minimize negative impacts.

DISCUSSION:

There is no question that practical, cost-effective measures should be taken to mitigate negative impacts of any generation resource.

VEHICLE: Renewable project selection and design, IRP process, Permitting processes

AGENCY: Utilities, Renewable Developers, PUC, Permitting Agencies

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, z, ca

OPPONENTS:

NO POSITION: p, krl, i, w

Strategy 8.a.3 The avoided impacts of renewables projects (for example: decreased reliance upon fossil fueled resources) should be considered in assessing the negative impacts of renewables projects.

DISCUSSION:

In the IRP process the costs and benefits of all types of resources are supposed to be taken into consideration in the selection of a preferred resource plan. In most other permitting activities, however, only negative impacts tend to be explicitly considered. Permitting agencies should consider the net benefits of renewable projects as well as negative impacts in permitting decisions.

VEHICLE: IRP process, Permitting processes

AGENCY: PUC, Permitting Agencies

POSITION OF THE PARTIES:

PROPONENTS: d, ki, m, h, n, ca, r, z

OPPONENTS:

NO POSITION: heco, ke, p, krl, i, w, ers

Barrier Grouping 9

Status of development of certain renewable and storage technologies.

Barrier Grouping 9: Status of development of certain renewable and storage technologies.

INTRODUCTION:

Each renewable and storage technology is at a different point in development for commercial implementation. Accordingly, in reviewing the potential barriers to the development and implementation of renewable resources, and the implementation of strategies, it is important to differentiate among the different renewable resources, and the technologies that would utilize such resources.

RE technologies must be mature enough (i.e., sufficiently developed) to be economically viable. Economic viability is discussed in Barrier Grouping 1. Research, development and demonstration provide the stages for reaching a "mature" state. Commercial implementation of "immature" technologies can lead to uncertainty regarding the reliability, sustainability and cost of projects employing the technology.

Technically mature and economically viable RE resources should be developed first. It is unrealistic to expect immature renewable technologies that are not economically viable to be deployed at this time. Based on the assessments provided by DBEDT, and the analyses done by the HECO utilities for their integrated resource planning ("IRP") processes, the following technologies are or appear to be technically feasible, although not necessarily economically viable, at this time:

(1) Biomass (but not biomass gasification);

(2) Geothermal;

(3) Hydroelectric;

(4) Photovoltaic (for "niche" applications); and

(5) Wind (although it is still developing and there are still concerns about the long-term reliability of the newer wind technologies).

Barrier 9.a Limited state and federal funds for RE demonstration projects.

DISCUSSION:

Research, development and demonstration ("RD&D") projects for renewable technologies that are not technically mature require substantial funding to develop the renewable technology to a technically feasible and economically viable level that will support its commercial deployment. The federal and Hawaii state governments have been providing limited funding for RE RD&D through grants and tax credits. Electric utilities have also provided funding for RE RD&D from its own funds and through their membership in the Electric Power Research Institute. However, given the current situation at the federal level, and the state's current financial condition, opportunities to increase the level of State and Federal funds for RE demonstration projects will be limited.

Demonstration projects for renewable resources are important to demonstrate and improve the technical feasibility, commercial viability, and sustainability of RE projects. Thus, current limits on State and Federal funds for RE demonstration projects are a barrier to the ultimate deployment of RE.

The amount of utility money available for RE RD&D projects, including those involving renewable energy resources, is also becoming more limited. At the same time, there are ongoing RE demonstration projects on the mainland with respect to wind energy facilities, and the results of those projects should be closely monitored.

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 9.a.1 Conduct Pilot RD&D projects by utilities

DISCUSSION:

There is limited funding available in Hawaii from federal, state, and private sources for pilot RE RD&D projects. The benefits from these funds can be maximized by targeting a limited number of RD&D projects that offer the maximum potential benefits in Hawaii and do not replicate RD&D projects ongoing in other jurisdictions.

Attempts to develop and implement a limited number of RD&D projects targeted to Hawaii-specific barriers could include a small scale wind/battery demonstration project. Utility dollars would have to be leveraged with state/federal/private dollars, and supported by favorable regulatory treatment of project costs.

VEHICLE: Renewable energy pilot RD&D demonstration projects.

AGENCY: The HECO Utilities will use a portion of their respective RD&D budgets to attempt to develop and implement a limited number of pilot RD&D demonstration projects targeted to renewable technologies applicable to Hawaii. Utility dollars would have to be leveraged with state/federal dollars.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, r, ca, z

OPPONENTS:

NO POSITION: p, i, krl, w, ers

Strategy 9.a.2. Consider "safe harbors" for RE demonstration projects.

DISCUSSION:

Under a "safe harbor" strategy, the PUC would provide guidance (by rule or decision) and set limits within which cost recovery of utility RE expenditures would be reasonably certain (subject to prudent management).

At the present time, a reasonable level of projected RD&D expenses[1] is included in the utility's revenue requirements in rate cases. The projection has generally been based on the utility's Electric Power Research Institute ("EPRI") contribution (which is targeted to RE RD&D).

If a utility changes the nature of its RD&D expenses, there would be uncertainty regarding the recoverability of the expenses without some form of pre-approval mechanism. Under a "safe harbor" strategy, the PUC would provide guidance (by rule or decision) and set limits within which cost recovery of utility RE expenditures would be reasonably certain (subject to prudent management). Deferred accounting (with pre-approval) is an alternative strategy.

Capital investments are treated differently for ratemaking purposes than expenses. Capital projects exceeding $500,000 in estimated cost are subject to pre-review by the PUC. However, the utility does not begin to recover the cost of the project (through depreciation expense) or to receive a return on its investment until the project (1) is placed in service and (2) is included in revenue requirements in a rate case. If the project must be abandoned before commercial operation, or prior to the end of its originally estimated useful life, there is uncertainty regarding the utility's ability to recover project costs (unless they are transferrable to a subsequent project). This is an incentive for the utility to pursue conventional technologies (where the risks are more foreseeable).

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1 RD&D expenses have included utility participation in the funding of demonstration projects.

A possible "safe harbor" would be to assure the utility of recovery of its investment in pre-approved RE demonstration projects (and a return on its unamortized investment), subject to prudent management of the projects. This might require legislation.

VEHICLE: Safe harbor for cost recovery of utility renewable energy expenditures.

AGENCY: The PUC to provide guidance (by rule or decision) and set limits within which cost recovery of utility renewable energy expenditures would be reasonably certain (subject to prudent management by the utility).

POSITION OF THE PARTIES:

PROPONENTS: d, p, ki, m, h, n, krl, i, ers, z

OPPONENTS:

NO POSITION: heco, ke, w, ca

Strategy 9.a.3 Implement a "green pricing" pilot to fund RE RD&D projects

DISCUSSION:

Generally, "green pricing" is a utility rate option under which ratepayers would be given the option of paying "marginally" higher rates in exchange for the utility's commitment to utilize the difference to acquire new renewable resources.[2]

This strategy is discussed in detail under Strategy 1.e.2. In this case, the funds would be used for utility RD&D projects.

POSITION OF THE PARTIES:

PROPONENTS: ke, d, r, p, ki, m, h, n, krl, i, heco, z, ca

OPPONENTS: w

NO POSITION:

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[2] Order No. 13441 at 7.

Barrier 9.b Long-term reliability of the technology.

DISCUSSION:

RE technologies are generally in the development stage and have not yet established a track record from which the RE technology's long term reliability can be demonstrated. Commercial deployment of a RE technology will be facilitated when investors are assured of the long term reliability of the RE technology. Long term reliability can only be demonstrated by each RE technology after it goes through a demonstration period, and possibly, after commercial deployment over a long period.

RE technologies, such as wind energy and solar energy, are still in the development stage. For instance, wind energy has been in large scale, commercial operation for a relatively short period of time (i.e., approximately twelve years). Wind energy systems used in the 1980's experienced operating problems that have resulted in improved designs. "Advanced generation" wind energy systems, which appear to be more cost-effective and compatible with electric utility systems than prior generations of wind machines, are just being commercially tested at a number of mainland sites. These advanced wind turbines will have to be operated a number of years to prove their long-term reliability. Recent accounts of blade failures and other startup problems of these advanced wind turbines reinforces the need for any technology undergoing a step improvement in design to operate for an extended period of time in order to prove its reliability.

The HECO Utilities have stated that they will use a portion of their respective RD&D budgets to attempt to develop and implement a limited number of pilot RD&D demonstration projects targeted to renewable technologies applicable to Hawaii. Utility dollars would have to be leveraged with state/federal/private dollars.

The HECO Utilities also stated that they intend to continue to explore and develop opportunities to take part in joint research, development and demonstration ("RD&D") activities.

With respect to geothermal, HELCO operated the State of Hawaii's geothermal project -- Well Site A ("HGP-A") power plant for about eight years.

HELCO has embarked on a "niche" photovoltaic program. Through local utility RD&D funds, HELCO has installed a small, off-grid photovoltaic demonstration at a County of Hawaii park. HELCO will operate, maintain, and monitor this facility. HELCO is examining the market for off-grid customers and will evaluate the potential for offering an off-grid photovoltaic package to its customers. HELCO secured funds from Sandia National Laboratory and built a photovoltaic trailer for public education purposes. The Utility Photovoltaic Group recently awarded HELCO a grant to install a 20-KW photovoltaic system on a County of Hawaii gymnasium in Kona.

HECO and Ascension Technology submitted a proposal, in March 1995, to EPA as part of their military base photovoltaic program (i.e., installation of 1-18 KW photovoltaic system). This is EPA's third round of solicitations to test the Photovoltaic-Demand-side Management concept both for reducing peak electric demands for buildings and avoiding the air emissions from combustion of fossil fuels used for electrical generation. The total project cost is about $200,000. HECO committed to $65,000 cash and $65,000 EPRI tailored collaboration contribution with the balance of $70,000 requested from EPA. HECO was notified verbally on July 26, 1995 that EPA awarded a grant to Ascension Technology for an 18 KW PV installation at Hickam Air Force Base.

With respect to OTEC, HECO is a team member for a 50 KW closed-cycle OTEC demonstration project with the Natural Energy Laboratory of Hawaii Authority, the center of excellence for Research in Ocean Sciences, PICHTR, and Makai Ocean Engineering.

With respect to wind energy, HELCO plans to accept the transfer from HEI of the Lalamilo Wells Windfarm on the Big Island. As part of HELCO's Supply-Side Action Plan, a study will be conducted to evaluate the feasibility of installing an advanced wind turbine at Lalamilo Wells on a demonstration basis.

STRATEGIES:

Potential strategies include, but are not limited to:

Strategy 9.b.1 Monitor on-going RE developments.

DISCUSSION:

The results of RE developments in other jurisdictions are generally transferable to RE technologies in Hawaii, with consideration of local conditions. Because RE demonstration projects can be very expensive, and because funding for RE demonstration projects are relatively limited, much can be learned from experience in other jurisdictions, without the substantial expense associated with conducting a RE demonstration project.

VEHICLE: Monitor on-going renewable energy demonstration projects.

AGENCY: The Utilities, DBEDT, PICHTR, and others will continue to monitor on-going renewable energy demonstration projects (to gain information on the long-term reliability of renewable energy technologies) through memberships in various renewable energy technical associations such as EPRI, EEI Geothermal Resources Council, American Wind Energy Society, Utility Photovoltaic Group, and the American Solar Energy Society.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, z, ca

OPPONENTS:

NO POSITION: p, krl, i, w, ers

Strategy 9.b.2 Actively participate in RE demonstration projects.

DISCUSSION:

The HECO Utilities currently monitor RE developments through their membership and active participation in various renewable energy associations and working groups, such as the (1) Utility Wind Interest Group ("UWIG"), (2) EPRI's Wind Users Group, (3) Utility Photovoltaic Group ("UPVG"), (4) Photovoltaics for Utility Scale Application ("PUSA"), (5) Geothermal Resource Council, (6) EPRI's Geothermal Working Group, (7) EPRI's Renewables & Hydroelectric Business Unit, (8) State's Photovoltaic for Utilities ("PV4U"), (9) Utilities Renewable Resource Association ("URRA"), (10) American Solar Energy Society ("ASES"), (11) American Wind Energy Association ("AWEA"), (12) EEI's Renewable Technologies Subject Area Committee and (13) DLNR's Geothermal Technical Advisory Group. In addition, the HECO Utilities (1) communicate with other utilities, national laboratories, vendors, universities, etc.; (2) attend, when appropriate, conferences and workshops and visit operating systems; and (3) subscribe to RE journals and magazines.

DBEDT, PICHTR, and others also monitor RE developments through professional journals and periodicals.

While monitoring RE developments in other jurisdictions can provide useful information relating to the long term viability of RE technologies, actively participating in RE demonstration projects gives valuable operating experience, in addition to the other benefits accruing from the RE demonstration project.

VEHICLE: Renewable energy pilot RD&D demonstration projects.

AGENCY: Utilities

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, n, r, ca, z

OPPONENTS:

NO POSITION: p, krl, i, w, ers

Barrier 9.c Technical maturity (stage of development) of RE resource.

DISCUSSION:

Many RE resources are not sufficiently mature to be economically viable. The RE resources will be commercially deployed when the technology is technologically mature and economically viable.

The level of technical maturity of the various renewable energy technologies varies considerably. The mature technologies are hydroelectric power, geothermal energy, and biomass technology. There are numerous existing and planned windfarms and wind energy technology continues to make advances. Photovoltaic is mature for "niche" applications.

GEOTHERMAL:

The geothermal industry is essentially a mature technology. Dry steam fields have been exploited commercially since 1904 in Larderello, Italy, and the liquid dominated geothermal reservoir at Wairakei, New Zealand, has been in continuous operation since 1956.

Though geothermal development has a long history, it did not become a significant energy resource in the U.S. until the 1960s, when it was first used to produce electricity at the Geysers in northern California. As of 1994, there were 2,817 MW of geothermal generating capacity installed in the United States.

Several types of geothermal power conversion systems are common, including single and dual flash, binary (Rankine) cycle, and hybrid systems which incorporate flash steam and binary cycle to power turbines connected to electrical generators. In general, the selection of a particular generating technology is largely dependent upon the nature of the geothermal resource (fluid phase, temperature, chemical composition, etc.), the capacity of the system, and the economics of development and production. In addition to these mature technologies, several total flow technologies for the removal of energy from saturated liquid are available or under development.

WIND:

Wind energy technology has advanced rapidly over the last two decades. Wind energy has been used to produce electricity since the late 1800s. By the 1920s and 1930s, wind machines were widely used for electricity generation in rural areas of the U.S. However, even as late as 1973, wind power technology suitable for electric utility applications had not been developed.

In California, the installed wind turbines increased from 144 with a total capacity of 7 MW in 1981 to 15,800 with a total capacity of about 1,700 MW in 1994. Older generation wind turbines have been installed in large commercial operations in California. Some of these wind turbines are being repowered with "advanced generation" wind turbines. The advanced wind turbines will have to be operated a number of years to prove their technical maturity.

HYDROELECTRIC:

Hydroelectric power is technically mature as evidenced by the number of commercial operations in the world. Pumped storage hydroelectric systems are technically mature also since the same technology is used. The barrier to pumped storage hydroelectric is finding feasible permittable sites.

Hydroelectric projects transform pressure and kinetic energy contained in falling water into electrical energy through the use of water wheels or hydraulic turbines.

Normal hydroelectric projects use the water on a once-through basis. In a pumped storage system, the water is stored after going through the powerplant once and then pumped back uphill to be used for generating electricity again.

Pumped storage hydro depends on the continuing availability of water to flow through the powerplant for electricity generation. Furthermore, there must be either excess or off-peak power available to provide the pumping energy required. Whereas the storage and pumping aspects of this system eliminate the concern over rainfall and the availability of source water, evaporation rates still need to be considered in the overall scheme. Careful analysis of the availability and scheduling of off-peak power is also required.

BIOMASS:

Biomass energy is technically feasible. There are a number of commercial installations in the United States. Biomass technology is being developed to increase performance and efficiency (i.e., Maui gasifier is a new technology).

Biomass fuels are defined as any organic matter that is available on a renewable basis, i.e., available on a continuous basis without depletion of the resource.

Electric generation using biomass as a fuel can be done using direct combustion, gasification, anaerobic fermentation, and pyrolysis. Only direct combustion is considered commercially available at the utility scale at this time.

In Hawaii, the biomass resources currently used for electricity generation are agricultural residues. The amount of agricultural residues available for electric power generation is determined by the volume and type of agricultural crops, competing uses (e.g., erosion control and nutrient recycling), and constraints on traditional means of disposal (e.g., field burning). Sugarcane bagasse is the only resource currently being used as a fuel in direct combustion electricity generation.

SOLAR THERMAL:

Solar thermal (parabolic trough) is technically feasible. The only commercial operation in the United States is in California. The developer, Luz International, eventually filed for bankruptcy when State and Federal tax credits were not renewed in a timely manner. Large power tower concepts and parabolic dishes are still in the developmental/demonstration stage.

The three main concepts for the design of solar receivers are parabolic trough, central receiver, and parabolic dish. The parabolic trough, was carried to commercialization with significant technical success by Luz International before financial difficulties stopped future development. Although development of new systems has stopped, the installed systems continue to be operated. The other technologies, the parabolic dish and the central receiver, are considered to have great potential for utility scale plants because of their higher operating temperatures and efficiencies but are not yet commercially available.

PHOTOVOLTAIC:

Photovoltaic is technically mature for "niche," small scale applications. New photovoltaic cells with higher efficiencies are being developed and tested.

Crystalline silicon is the most mature cell material and represents the largest installed base. The cells are stable and exhibit relatively high efficiencies. In the late 1970s, polycrystalline silicon, produced from ingots or ribbons, was developed as a lower cost alternative to single-crystal silicon. The cell and modules fabrication techniques are similar to those for single-crystal cells.

Thin-film PV cells fabricated by deposition or growth of semiconductor films onto a suitable substrate promise lower cost due to reduced materials usage and automated, continuous fabrication and packaging. Thin-film PV modules are used primarily for consumer products. Thin-film silicon is the leading thin-film technology commercially available, although several other materials are showing great promise at the developmental stage. In 1992, the world production of photovoltaic cells was 57 MW.

Concentrating PV technology, believed by some to have the greatest potential for cost competitive utility scale application at sites with high direct insolation, is not yet cost competitive.

OCEAN:

Ocean thermal energy conversion ("OTEC") technology is in the research and development stage. No commercial OTEC plants are currently operating. However, experimental plants demonstrating the OTEC concept have recently been constructed and tested in both the U.S. and Japan.

An OTEC plant uses the temperature difference between warm surface water and cold deep water to generate electricity.

Closed-cycle OTEC (CC-OTEC) systems use the warm surface seawater to evaporate a working fluid, such as ammonia or Freon, which drives the turbine generator. Cold seawater condenses the working fluid in a continuous, closed cycle.

Open-cycle OTEC (OC-OTEC) systems use the warm surface seawater directly as a working fluid. The seawater boils in a chamber under partial vacuum, creating low-pressure steam that drives the turbine generator. Cold seawater condenses this steam.

Hybrid-cycle OTEC (HC-OTEC) plants have been described which combine the principles of both open- and closed-cycle OTEC systems. The binary cycle of the closed-cycle process is used for electricity generation, and features of the open-cycle process are used for freshwater production. No operating prototypes of the hybrid-cycle system have been built.

Ocean energy is not technically mature. There are only a few kilowatt size demonstrations in the world.

The barrier is lack of funds for technical development of this technology.

STRATEGIES:

Possible strategies include, but are not limited to:

Strategy 9.c.1 Monitor and/or conduct RE demonstration projects. This strategy is addressed under Strategy 9.b.3 to 9.b.6.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, ki, m, h, n, ca, z

OPPONENTS:

NO POSITION: p, krl, i, w, ers

Strategy 9.c.2 Conduct IRP supply-side studies.

DISCUSSION:

The availability of high quality RE resource data will facilitate the technical development of RE resources.

As part of their IRP Supply-Side Action Plans, the HECO Utilities have identified a number of RE related studies. These studies include biomass crop assessments, pumped storage hydroelectric feasibility studies, a battery energy storage plant evaluation, hydroelectric studies and other renewable energy activities.

VEHICLE: High quality renewable energy resource data.

AGENCY: Renewable energy developers, DBEDT, and the HECO Utilities will continue to monitor and exchange information on the development status of renewable energy technology. In addition, the HECO Utilities Supply-Side Action Plans have studies planned for pumped storage hydroelectric, dedicated biomass crop feasibility, and dispersed generation.

POSITION OF THE PARTIES:

PROPONENTS:	heco, ke, d, r, ki, m, h, n, ca, z
OPPONENTS:	
NO POSITION:	p, krl, i, w, ers

Strategy 9.c.3 Conduct Pilot RE RD&D projects by utilities. (See discussion under 9.a.1)

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, ki, m, h, n, ca, z

OPPONENTS:

NO POSITION: p, krl, i, w, ers

Strategy 9.c.4 Consider "safe harbors" for RE demonstration projects. (See discussion under 9.a.2)

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, krl, ki, m, h, n, i, ers, z

OPPONENTS:

NO POSITION: ke, heco, w, ca

Strategy 9.c.5 Implement a "green pricing" pilot to fund RE RD&D projects. (See discussion under 9.a.3)

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, r, p, ki, m, h, n, krl, i, ca, ers, z

OPPONENTS: w

NO POSITION:

Priority 10

Segmented Governmental Commitment to Renewable Energy

Barrier 10.a Conflicting objectives of, and lack of coordinating between, various government agencies and departments regarding formulation and implementation of energy policy.

DEFINITION:

At times, various state agencies appear to be pursuing different objectives which are not all necessarily supportive of renewable energy development.

DISCUSSION:

There was no consensus on this barrier.
Chapter 196, HRS, appoints the Director of the Department of Business, Economic Development, and Tourism as Energy Resources Coordinator responsible for state-wide energy planning and coordination, and as energy advisor to the Governor, the Legislature, industry, and other levels of government. The State of Hawaii Energy Policy Statement, developed with the cooperation of the Hawaii energy community members of the Energy Policy Advisory Committee, stresses the importance of renewable energy as follows:

The State shall encourage the development of its renewable energy resources in a socially and environmentally sensitive and cost effective manner. Renewable energy research, development, and demonstration activities will be prioritized to advance those resources which have high commercialization potential and high benefit/cost ratio. The incorporation of renewables and alternative fossil fuels shall be considered in determining a practical energy strategy. DBEDT clearly supports renewable energy, but must also support overall Administration policy. The Administration policy may vary depending on each individual agency's goal. For example: the Department of Taxation has the mission of maximizing revenues and supporting the Governor's budgetary goals. Thus during the 1994-1995 legislative session, the Tax Department proposed elimination of tax credits for alternative energy. While the Consumer Advocate represents the ratepayers whose primary interest may be monetary cost of service, due to the current absence of a process that actually internalizes social, economic, cultural, and environmental externalities.

STRATEGIES:

Strategy 10.a.1 The Director of DBEDT should assert his role as Energy Resources Coordinator.

DISCUSSION:

Proponents maintain that, based upon the Governor's guidance as to the priority of renewable energy in this Administration, the role of incentives and tax credits, and other aspects, Administration agencies should adopt consistent policies, as coordinated by the Energy Resources Coordinator. The legislature, as a separate body of government, has established the statutory authority and appropriate roles of the Energy Resources Coordinator and should therefore be consulted regarding policies relating to renewable energy development.

Opponents maintain that agencies must always take into consideration their different statutory functions.

VEHICLE: DBEDT Action

AGENCY: DBEDT

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: ke, heco, p, i, krl, w, ers, ca

Strategy 10.a.2 Convene a workshop of all affected agencies to resolve the conflicting objectives and develop a streamlined, coordinated effort to promote the development of renewable energy resources.

DISCUSSION:

This could include the above agencies plus the permitting agencies and the Department of Budget and Finance. It could help to implement the Consolidated Application Permitting process supported by the Administration, as well as the Permit Facilitation Act of 1985, amended in 1987, and provide a means of resolving conflicting policies.

VEHICLE: Workshop

AGENCY: DBEDT or OSP

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n, z

OPPONENTS:

NO POSITION: ke, heco, p, i, krl, w, ers, ca

Strategy 10.a.3 The Administration or Legislature should establish clearly stated renewable energy and diversification goals to support the State of Hawaii Energy Policy Statement.

VEHICLE: Legislation

AGENCY: Administration and/or Legislature

POSITION OF THE PARTIES:

PROPONENTS: d, r, ki, m, h, n, z

OPPONENTS: heco

NO POSITION: ke, p, i, krl, w, ers, ca

Strategy 10.a.4 Set-asides or procurement targets for renewable energy could be set by the Administration or Legislature. (See Appendix C)

DISCUSSION:
This strategy did not have consensus.

Proponents maintain that defined goals are necessary to accomplish the stated policy.

Opponents maintain that the IRP process is the proper context for setting these goals for electric utilities.

VEHICLE: Executive order or legislation

AGENCY: Administration or Legislature

POSITION OF THE PARTIES:

PROPONENTS: d, r, p, ki, m, krl, i, ers, z

OPPONENTS: heco, ke

NO POSITION: m, w, h

Barrier 10.b — Fragmentation of state efforts and overlap of functions of various organizations with respect to renewable energy research, development, demonstration and commercialization.

DEFINITION:

A variety of state or largely state-funded organizations are involved in renewable energy research, development, demonstration, and commercialization. These include DBEDT, HNEI, NELHA, various departments at UH, and PICHTR.

DISCUSSION:

One of the findings of the Hawaii Integrated Energy Policy process in 1991 was that: Hawaii's extensive renewable energy research and development activities are not being conducted within a coordinated and comprehensive frame-work. Numerous public and private institutions receive state funding to advance the commercial status of renewable energy and energy efficiency. However, there is limited coordination, and in some cases overlap of responsibility among these institutions activities. Moreover, many renewable energy technologies have not progressed beyond the demonstration stage. If renewable energy technologies are to make a significant impact in Hawaii, better coordination of funds and activities is needed. Grid-connected technologies need electric utility involvement to determine the feasibility and compatibility with existing systems.

The administration is currently taking steps to enhance coordination of renewable energy research, development, demonstration, and commercialization. However, unless and until a coordination mechanism is established, this will remain a barrier.

STRATEGIES:

Strategy 10.b.1 The Energy Resources Coordinator should take the lead in coordinating all state-funded energy research, development, and demonstration activities. This is within his charter.

POSITION OF THE PARTIES:

PROPONENTS: d, ki, m, h, n, z

OPPONENTS:

NO POSITION: heco, ke, p, krl, i, w, ers, ca

Strategy 10.b.2 An analysis and restructuring of involved agencies should be led by DBEDT to develop a streamlined, coordinated effort to conduct the research and development of renewable energy.

POSITION OF THE PARTIES:

PROPONENTS: d, ki, m, n, z

OPPONENTS:

NO POSITION: heco, ke, p, krl, i, h, w, ca, ers

Strategy 10.b.3 Utilities, renewable energy developers, and the state should jointly encourage and support research to improve the performance of renewable energy systems, lower their costs and demonstrate the technologies.

VEHICLE:

1. Organizational analysis of state-funded RE research & development organizations and restructuring plan with proposed legislation, as required by law.
2. Cost-shared RE research, development, demonstration and commercialization projects.

AGENCY:

1. DBEDT with approval from the Governor and State Legislature.
2. DBEDT, Utilities, RE developers, University of Hawaii, PICHTR, NELHA, and federal funding agencies.

POSITION OF THE PARTIES:

PROPONENTS: heco, ke, d, ki, m, h, z

OPPONENTS:

NO POSITION: p, krl, i, w, n, ca, ers

Appendix A

Avoided Cost

Compiled by HECO based on information provided by collaborative parties

APPENDIX A

Avoided Cost

As-available energy prices are treated differently than firm capacity prices.

As-available avoided energy costs are filed with the PUC on a quarterly basis pursuant to H.A.R. §6-74-17(b). The filed on-peak and off-peak as-available energy costs are determined by the proxy method established by the PUC in 1985 in Docket No. 4569. The filed avoided energy cost rate includes an avoided fuel cost component and an avoided variable O&M component.

For a number of years, qualifying facilities ("QFs") and nonfossil fuel producers subject to the PUC's avoided cost rules have maintained that the filed avoided energy cost rates understate the utilities' actual avoided energy costs, while the electric utilities have maintained that the filed rates overstate their avoided energy costs. The PUC examined this issue in a generic proceeding, Docket No. 7310. Most of the issues in the proceeding were resolved, subject to PUC approval, by a Stipulation To Resolve Proceeding filed on March 4, 1994. Under the Stipulation, the parties agreed that (1) the proxy method should be discontinued, (2) avoided fuel costs should be determined based on a computer production simulation model, except for Lanai and Molokai (for which the service areas are too small), (3) avoided generation O&M costs should include consumables, working cash and fuel inventory, (4) an allowance should be made for transformer losses for QFs that utilize synchronous (but not induction) generators and are metered on the "high-side" of the step-up transformer, and (5) transmission line losses should be determined on a case-by-case basis. The PUC has not yet approved the Stipulation. However, once the new calculation procedure is implemented, the avoided energy costs may be lower for HECO and MECO, and about the same for HELCO, even though additional elements will be included in the avoided energy cost calculation. The precise avoided energy costs will not be known until the calculation procedure is implemented.

The parties did not reach agreement as to whether the electric utilities would avoid any capacity costs as a result of the purchase of energy on an as-available basis, or as to whether an environmental externalities adder should be included in determining avoided energy costs (see barrier 1.e.). These issues were submitted to the PUC for consideration.

Capacity Adder for As-Available Resources

Certain jurisdictions that have diversified, as-available energy resources (and which utilize a capacity planning criteria based on loss of load probability or unserved energy), such as California, have recognized an avoided capacity value for as-available energy resources.

Much of the work relating to the capacity credit or capacity value of wind power has used numerical methods based on empirical load and wind speed duration curves (or probability distributions). Other work employed analytical models allowing a qualitative investigation of the variation of capacity credit with a wide range of grid, aerogenerator, and load parameters. The simplest measure of capacity credit is the Equivalent Firm Capacity.

The impact of wind plants on system reliability is very system-specific, however, depending to a large degree on the size of the utility's reserve margin. The size of the resources in the system will also affect the capacity value. Thus, the capacity value of a wind plant will be system-specific as well as resource-specific. Wind plant capacity values cannot reliably be generalized across utilities and resources. As a result, there is, as yet, no consensus on the proper framework for assessing just what the system reliability impact - or "capacity value" of a wind plant is.

The NUG parties in Docket No. 7310 proposed that capacity credits be provided to as-available energy producers based on the equivalent load carrying capability of their generating units. They maintained that a first order approximation would be the plant's on-peak capacity factor multiplied by the nameplate capacity of the plant, and recommended that the PUC set a rebuttable presumption that the capacity value for as-available energy would be equal to 100% of the annual cost of a combustion turbine per on-peak kwh, for kwh actually delivered on-peak, until the utilities perform an equivalent load carrying capability analysis.

The CA in Docket No. 7310 proposed that as-available producers be allowed a much smaller payment based on the reliability benefits provided by as-available resources. The proposed "premium" would be based on the on-peak capacity factor of the producer in the prior year times 50% of the annual fixed capital and O&M costs of a peaking resource of equal nameplate capacity. The CA also proposed two conditions to be met by as-available producers to qualify for the premium: (1) the developer should commit the output of their resources to the utility for a minimum of five years -- although the as-available producer would still be under no obligation to deliver energy to the utility if there is no output in any given period, and (2) the developer should be required to take reasonable steps to coordinate the maintenance of the resource.

The HECO Utilities and KE maintain that they do not avoid capacity additions as a result of as-available energy purchases. In Docket No. 7310, the HECO Utilities based their position on their capacity planning criteria, the definition of firm capacity in the PUC's Avoided Cost Rules (which includes scheduled amounts of capacity which a QF has a legally enforceable obligation to make available under utility dispatch), and the terms and conditions of existing as-available energy contracts (under which as-available energy suppliers have no obligation to deliver power and energy when it is needed by the companies and no continuing obligation to maintain production levels).[1] In their view, as-available energy purchases can provide additional reliability value, but this form of "capacity" value is speculative. In order to consider the "equivalent load carrying capability" of such resources, they maintained that it would be necessary to consider (1) the degree to which a specified quantity of as-available energy would be guaranteed for any year, (2) appropriate penalties for non-performance, (3) the term of the commitment to provide as-available energy, and (4) the load and capacity situation of the utility, and the ability of the utility to defer new supply-side resources.

The Department of Defense also took the position that utilities do <u>not</u> avoid any capacity costs when energy is purchased on an as-available basis.

<u>Firm Capacity</u>

Capacity payments have only been made for firm capacity, which is defined as scheduled capacity made available under utility dispatch. H.A.R. §6-74-1 ("Firm capacity).

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1 In their view, a small utility without interconnections cannot afford to design its generating system (i.e., to select between baseload and peaking units) on the basis of minimal commitments on the part of as-available energy producers.

The HECO Utilities use the differential revenue requirements ("DRR") methodology to calculate long-term avoided costs with respect to proposed firm capacity PPAs.[2] The DRR methodology uses a base (least cost) utility plan to determine the capacity, fuel and O&M cost. The base utility plan is compared to a Non-Utility Generator ("NUG") proposal. An alternate plan is developed with the NUG unit installed based on the developer's proposal. The difference in the utility's costs for the base utility plan and the alternate plan represents the costs that HELCO can avoid by implementing the NUG alternative. The DRR methodology utilizes a capacity planning model,[3] a production simulation model,[4] and a revenue requirements model.

The calculation of avoided capacity costs for firm capacity PPAs has been more of an issue with qualifying cogeneration facilities, than with renewable energy producers. The PUC has approved avoided capacity costs derived using the DRR methodology in a number of dockets in which firm capacity PPAs were approved by the PUC. In addition, there are two recent proceedings in which the PUC has resolved or is expected to resolve other issues regarding the calculation of avoided cost for firm capacity PPAs. These include Docket Nos. 7956 (Kawaihae Cogeneration Partners) and 94-0079 (Enserch Development Corporation). See Re Hawaii Electric Light Co., Docket No. 7956, Decision and Order No. 14030 (July 31, 1995).

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2 The DRR, or "planning methodology", is one of three generally accepted methodologies to determine avoided costs. The other two avoided cost methodologies are the peaker method and the proxy plant method. The peaker method is a marginal cost approach. It is referred to by several names including the component method and short-run marginal cost. In applying the method, avoided capacity costs are set equal to the cost of a new peaking unit (or lower if there is surplus capacity) and avoided energy costs are determined as system marginal energy costs. The proxy plant method identifies the next unit that would be added by the utility. Both capacity and energy costs are set based upon the cost of the proxy unit.

3 The capacity planning model uses the utility's capacity planning criteria to determine unit additions in the base and alternate plans to model the impact of the NUG unit on the utility's unit addition plans.

4 The production simulation model captures the impacts of the NUG unit on the utility's system energy and O&M costs.

Avoided transmission and distribution ("T&D") losses

Electric power systems that generate, transmit and distribute electricity are not 100% efficient. The potential for more energy loss exists with each additional unit of electricity demanded at any given moment or over a period of time. The farther away from the generating source the demand for electricity is, the greater these losses become as a percentage of that demand. Thus, the total input into an electrical system must be larger than the sum of the system's customer demands. Conversely, the avoidance of load at the point of consumption also avoids the upstream losses that would have occurred had that power required transmittal to the customer.

Electrical systems experience losses due to inherent resistance in the transmission and distribution lines, generator and transformer windings, and the magnetic circuits of the electrical equipment involved. Most of these losses vary in proportion to the square of the load. Losses associated with magnetic circuits are fixed losses. These are equipment dependent.

Losses occur within each stage of power transmittal on the electric system; transmission, sub-transmission, primary distribution, and secondary distribution. These losses affect the calculation of a system's avoided costs because they imply necessary increases in the gross power capacity and energy generation to serve the utility's net consumer load at the point of consumption. Avoided net load at the meter avoids the additional fraction of capacity and energy that would have been necessary to supply (for losses) had the avoided customer load been served across the system.

Decentralized generators could improve the overall efficiency of a system because less energy would be lost in transmitting electricity across long distances.

The PUC's Avoided Cost Rules provide that avoided energy costs included "line loss costs when presented in a specific proposal from a qualifying facility to the electric utility." H.A.R. § 6-74-1 (definitions). The addition of renewable resources to the utility system can result in decreases or increases in the utility's system-wide losses, depending on factors such as the location of the RE projects relative to the utility's loads.

Appendix B

Externalities

Compiled by HECO based on information provided by collaborative parties

APPENDIX B

Externalities

There is consensus that externalities should be considered in the utilities' resource selection processes, and that the manner in which externalities are considered can be improved. However, there is no consensus regarding the value of the externalities benefits and costs of RE resources (relative to those of fossil-fueled resources), or as to how the relative externalities should be considered.

I. EXTERNALITIES

IRP Framework

The PUC's IRP Framework requires that external costs and benefits be considered in the integrated resource planning process, but does not specify the weight to be given externalities in selecting the utility's preferred integrated resource plan ("IRP Plan"). Re Integrated Resource Planning, Docket No. 7257, Decision and Order No. 13839 (March 31, 1995) at 25.

External costs are direct or indirect costs to or negative impacts on the activities of entities outside the utility. Under the IRP Framework, external costs include "environmental, cultural and general economic costs." In general, societal costs are equal to utility costs plus external costs (less "transfer" payments, which are payments from the utility, such as taxes, to society in general).

Consideration of "externalities" would include the consideration of direct and indirect external benefits, as well as external costs.[1] For example, (1) proponents maintain that the development of Hawaii's renewable resources would result in more economic development within the State than would the development of fossil-fueled resources (which the fuel must be imported), while (2) opponents maintain that development of lower-utility cost fossil-fueled resources could result in lower utility rates, more disposable income, and a stronger state economy.

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1 The IRP Framework and the State Plan both refer to costs and benefits. See, e.g., IRP Framework ¶II.E. and H.R.S. §226-18(c)(4).

The IRP Framework provides that the goal of integrated resource planning is 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. Among the governing principles included in the IRP framework are statements that IRP Plans (1) shall comport with state and county environmental, health and safety laws and formally adopted state and county plans, (2) shall be developed upon consideration and analyses of the costs, effectiveness, and benefits of all appropriate, available, and feasible supply-side and demand-side options, and (3) shall give consideration to the plans' impacts upon the utility's consumers, the environment, culture, community lifestyles, the State's economy, and society.[2]

The IRP Framework provides that the utility (1) shall develop a number of alternative plans, each representing optimization from a different perspective, (2) shall describe each plan's impact on both the utility and its customers, and on external elements -- the environment, people's lifestyle and culture, the State's economy, and society in general, (3) shall rank the various alternative plans based on such criterion as it may establish with the advice of its advisory groups, and (4) shall designate one of the plans as its preferred plan.[3]

Quantification (Monetization) Of Externalities

The IRP Framework requires that the costs and benefits for each feasible resource option, shall to the extent possible and feasible, be quantified and expressed in dollar terms. When it is neither possible nor feasible to quantify any cost or benefit, such cost or benefit shall be qualitatively measured.[4] The PUC has indicated that it considers quantification to be infeasible if it is not reasonable to quantify a cost or benefit, in the sense that it is not meaningful or useful or is unduly burdensome to do so.[5]

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2 IRP Framework ¶¶II.A. and II.B. 2, 3, 4.

3 IRP Framework ¶¶IV.I.2, 4.

4 IRP Framework, ¶IV.E.2.

5 D&O 11630 at 13; 134 P.U.R.4th at 67.

The HECO utilities maintained that it was not feasible to monetize externalities in their first IRP cycle, and that a more complete analysis was possible using a qualitative assessment methodology.[6] One way in which externalities were considered was through the multi-attribute analysis system, which was used to evaluate and screen 20 candidate plans to produce final candidate plans. The attributes identified by HECO included (1) a corporate/financial attribute (based on total capital costs for new supply-side resources), (2) a customer/economic attribute (based on total resource costs with end-effects and 20-year utility costs), (3) an energy efficiency/self-sufficiency attribute (measured by accumulated DSM energy impacts, accumulated energy supplied by alternative renewable resources, and the total amount of oil used over the 20-year planning period), and (4) an environmental/social attribute (based on the total tons of six different air pollutants).

In D&O 13839, the PUC concluded that:

> We also agree with HECO that quantification of externalities is a complex issue. We note that there is substantial uncertainty and disagreement even among experts in the field as to the proper quantification and valuation of externalities. Further, we continue to harbor those uncertainties we expressed in Decision and Order No. 11523 concerning the appropriateness and impact of adders. Thus, we find that HECO's qualitative approach taken in this initial integrated resource planning cycle to be a reasonable approach and conclude that HECO has adequately considered the external impacts of its preferred plan. We expect HECO to quantify externalities in subsequent integrated resource planning cycles.

D&O 13839 at 26.

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6 HECO's preferred IRP Plan was not the absolute least-cost plan on a utility or total resource cost basis. HECO included a 180 MW coal-fired facility as its next generating unit, based in part on qualitative externality considerations such as reducing Hawaii's dependence on fuel oil.

The HECO utilities also proposed to jointly participate in an Externalities Action Plan, whose objective is to develop a process which incorporates external costs and benefits into the planning process on a level playing field among resources. In Phase One, the utilities will attempt to identify the externalities, provide guidelines for monetization, and determine how externalities will be used in the decision making process. In Phase Two, the utilities will attempt to develop Hawaii specific monetized values, and develop an IRP externalities workbook. In Phase Three, the utilities will utilize the external costs and benefits in the integration process. See D&O 13839 at 31-32.

In D&O 13839, the PUC concluded as follows:

> We conclude that HECO's strategy for quantifying externalities is reasonable. HECO shall submit its findings and recommendations regarding identification, quantification, and utilization of externalities for commission approval. HECO shall secure such approval before incorporating the results of its efforts in any future integrated resource planning process.

[D&O 13839 at 32.]

The HECO Utilities have formed an Externalities Advisory Group, and have retained a consultant for the first two phases of the Externalities Action Plan.

Weight To Be Given Externalities

Proponents of giving equal weight to externalities in considering renewables in the IRP process base their position on State policies and IRP goals supporting the use of RE resources, increased energy self-sufficiency, greater energy security and the consideration of externalities, and on the net externality benefits of RE resources (relative to fossil-fuel resources).

The State of Hawaii's policy strongly supports the development and utilization of renewable energy resources. The Hawaii State Constitution, Article XI, section 1, provides in relevant part:

> Section 1. For the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawaii's natural beauty and all natural resources including land, water, air, minerals and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self sufficiency of the State.

This commitment is further developed in the Hawaii State Planning Act, as amended, H.R.S. ch. 226, which identifies as among the State's goals:

> (2) Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased; and
>
> (3) Greater energy security in the face of threats to Hawaii's energy supplies and systems.

H.R.S. §226-18(a). These goals are further manifested in the following policies,

H.R.S. §226-18(c) to:

> (1) Support research and development as well as provide the use of renewable energy resources; . . . [and]
>
> (3) Base decisions of least-cost supply-side and demand-side energy resource options on a comparison of their total costs and benefits when a least-cost is determined by a reasonably comprehensive, quantitative and qualitative accounting of their long-term, direct and indirect economic, environmental, social, cultural and public health costs and benefits . . . .

This commitment is supported by H.R.S. §269-27.2. H.R.S. §269-26.2(b) mandates that the PUC "investigate and determine the extent to which electricity generated from nonfossil fuel sources is available to public utilities that supply the public" and provides discretionary authority to the PUC to "direct public utilities. . . to arrange for the acquisition of and to acquire electricity generated from nonfossil fuel sources . . . and to employ and dispatch the nonfossil fuel generated electricity in a manner consistent with the availability thereof to maximize the reduction in consumption of fossil fuels in the generation of electricity to be provided to the public."

H.R.S. §269-27.2(c) allows the PUC to prescribe the rate to be paid to a nonfossil fuel producer, and directs the PUC, in determining the just and reasonable rate to be paid to such a producer, to:

> consider, on a generic basis, the minimum floor a utility should pay, giving consideration not only to the near-term adverse consequences to the ultimate consumers of utility provided electricity, but also to the long-term desirable goal of encouraging, to the greatest extent practicable, the development of alternative sources of energy.

In recognition of the possibility that firm capacity payments to such producers may result in higher costs to the utility, H.R.S. §269-27.2(d) provides for expedited interim rate increase procedures specifically for firm capacity payments to nonfossil fuel producers.

Potential externality benefits of renewables include: (a) a cleaner environment; (b) greater stability in energy prices (renewables, with low or zero fuel costs, can provide a hedge against fuel oil price volatility); (c) enhanced energy security (substantial deployment of renewable technologies could reduce the strategic importance of oil and reduce energy supply risks); and (d) economic benefits. The primary environmental benefits are reduced greenhouse gas emissions, reduced risks of oil spills, reduced toxic air emissions, and reduced risks of future environmental regulation. The primary economic benefits are increased employment, reduced supply risk (expressed as an energy security cost), reduced price risk, reduced environmental regulation risk, and improved trade balance. The benefits generally are based on displacing imported electricity with in-state production, and are more compelling if renewable energy manufacturing takes place in-state.

Opponents of giving externalities equal weight with utility costs (or total resource costs) in the assessment and optimization of utility resource options base their position on the potential rate impact of giving equal weight to externality costs in selecting resources, the "perverse" effects that a piecemeal approach to externalities may cause[7], and the uncertainty or speculative nature of externality values (if supply-side or other resource options with lower utility costs, but higher societal costs, are rejected in favor of options with lower societal costs, but higher utility costs.)

In addition, issues have arisen in other jurisdictions as to whether utility regulatory commissions can or should impose additional costs (which must be paid by utility customers) to further control environmental or other societal impacts beyond the level of control required by existing law.[8]

For example, New York electric utilities have applied an adder for certain air emissions as part of their complex bid evaluation processes, which consider price and non-price factors.[9]

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7 Customers with self-generation and cogeneration opportunities may elect to bypass the utility system due to the higher rates resulting from the utility's consideration of such costs, and total emissions (from the self-generator/cogenerator plus those from the utility) may actually increase.

8 For example, the Supreme Judicial Court of Massachusetts recently held that the Massachusetts Department of Public Utilities ("DPU") exceeded its authority in requiring consideration in its integrated resource management processes of environmental externality values (i.e., monetized values for certain air emissions) that may not reasonably be expected to have an effect on a utility's costs and, hence, on the rates that its customers must pay. Massachusetts Electric Co. v. Department of Public Utilities, 419 Mass. 239, 643 N.E.2d 1029, 158 P.U.R.4th 162, 165 (1994).

9 The adder used in the bid evaluation process does not translate into an equal adder to the price New York utilities are willing to pay for power from non-emitting resources. The New York practice is also of questionable legality in light of FERC's recent avoided cost rulings.

However, an Administrative Law Judge ("ALJ") has ruled in a recommended decision in a New York Public Service Commission ("N.Y. PSC") docket that "the uniform use of monetized externality adders should not be mandated at this time", that the current use of such adders in competitive bid evaluations be discontinued, and that such adders "not be used in any calculation of the prices to be paid to IPPs." The N.Y. ALJ cited the potential for significant rate impacts, the potential for negative environmental consequences (due to the potential for bypass of the utility system), the availability of environmental benefits at lower cost, the potential for rate inequities, and other factors. Re Proceeding to Determine Whether to Incorporate Environmental Costs into the Long-Run Avoided Costs for the State's Electric Utilities and Whether and in What Context Estimates of the Value of Externalities Should Be Utilized, Case 92-E-1187, Recommended Decision (ALJ Apr. 12, 1995).[10] The ALJ concluded that:

> The above analysis suggests that there is a material risk that both social welfare and overall environmental quality will be harmed by requiring the utilities to utilize a specifically monetized externality factor in all planning and decision-making. It also suggests, however, that the utilities would be unreasonable and imprudent to ignore such factors. Between those two extremes lies a fairly broad range of approaches to considering externalities, each of which could be deemed reasonable depending on the circumstances. Within this range, the utilities should be allowed to exercise their management judgment, the reasonableness of which will be tested by either the regulator's prudence jurisdiction or the potentially harsher judgment of the competitive market, if and when such a market is created. There may well be circumstances when the public interest would be served by increasing the environmental compliance of the utilities beyond that mandated by the environmental laws or by internalizing costs not otherwise required, but the current state of the State's economy suggests that those circumstances do not now exist.

Id. (footnote omitted).

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10 The ALJ ruling is being reviewed by the N.Y. PSC.

II. EXTERNALITY ADDERS

Minimum Floor Rates

The current legislatively-mandated mechanism for encouraging as-available renewable energy projects is the minimum floor rate.

H.R.S. §269-27.2(c) provides that, if a public utility and supplier of nonfossil fuel generated electricity ("nonfossil fuel producer") do not reach agreement on purchase rates, the rates shall be prescribed by the PUC (and shall not be less than 100% of the utility's avoided costs). The subsection further provides that, in "determining the amount of the payment in relation to avoided cost," the PUC "shall consider, on a generic basis the minimum floor a utility should pay . . . ."

The PUC amended its Avoided Cost Rules in 1985 to implement this requirement. H.A.R. §6-74-22(a) requires that the rates payable for purchases from QFs be not less than 100% of avoided cost and not less than the minimum purchase rates, which are defined as the avoided energy costs in effect on the date that a legally enforceable obligation (which is defined as a binding contract, approved by the PUC) becomes effective.[11] The PUC has allowed some leeway in selecting the date used to establish the minimum rates.[12]

The application of the minimum rates has resulted in payment rates in excess of avoided costs. In 1992, 1993 and 1994, the HECO utilities paid approximately $10 million, $10 million and $14 million in excess of their filed avoided energy costs for purchased energy, generally due to the inclusion of minimum purchase rates in their power purchase agreements for non-fossil fuel producers. Thus, the requirement for minimum purchase rates for nonfossil fuel producers may violate FERC's recent avoided cost cap rulings. See Re Connecticut Light & Power Co., Docket No. EL93-55-000, Order Granting Petition for Declaratory Order (FERC Jan. 11, 1995).

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11 H.A.R. §6-74-1. Although the rule, on its face, applies to QFs, the HECO utilities have taken the position that minimum purchase rates apply only to nonfossil fuel producers. This issue has been raised in a number of dockets, but has not been decided by the PUC.

12 Compare Re Hawaii Electric Light Co., Docket No. 6956, Decision and Order No. 11333 (Oct. 28, 1991) (Wailuku River Hydroelectric Power Co.) with Hawaiian Electric Co., Docket No. 6944, Decision and Order No. 11611 (May 7, 1992) (U.S. Windpower, Inc.)

The Federal Energy Regulatory Commission ("FERC") has held that jurisdiction over the rates charged by QFs for sales at wholesale (which includes sales to public utilities) is vested in FERC, and that PURPA preempts state statutes or regulations that would require the payment of a rate in excess of avoided cost (determined in accordance with the FERC rules, as implemented by the States) to QFs. (FERC also held that its decision would not have retroactive effect, and that FERC will not entertain requests to invalidate pre-existing contracts where the avoided cost issue could have been raised, but was not.[13]) According to the FERC ruling, state commissions could require payment rates in excess of avoided costs for entities that are not QFs or public utilities (under the Federal Power Act).

Externality Adders In Hawaii

In MECO Docket No. 6742, Zond Pacific proposed an "enviromental and security premium" pricing structure, based on what it alleged to be avoided externality costs. The PUC determined that a QF and a utility are not prohibited from negotiating a contract containing an "avoided external cost pricing structure", citing H.A.R. §6-74-15(b)(1).[14] H.A.R. §6-74-15(b)(1) provides that electric utilities and QFs may agree to terms and conditions that differ from those that would otherwise be required by the Avoided Cost Rules. However, the PUC cautioned that "any such contract must receive the PUC's approval if the utility is to recover any payments it makes under the contract from its ratepayers. In its review of such a contract, the PUC must determine, among other things, whether the rates and pricing structure are just and reasonable and in the overall best interest of the general public."[15] The PUC further noted that consideration of external costs in determining a utility's resource costs would be fully explored in

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13 Re Connecticut Light & Power Co., Docket No. EL93-55-000, Order Granting Petition for Declaratory Order (FERC January 11, 1995). The FERC decision could be appealed to the United States Circuit Court of Appeals.

14 Re Maui Electric Co., Decision and Order No. 12118 (January 7, 1983), as amended by Order No. 12122 (January 12, 1993).

15 D&O 12118 at 7.

Docket No. 7310 and in the IRP dockets for the various utilities.[16] Thus, the PUC stated that "Zond's proposal to negotiate a power purchase contract that includes an environmental and security premium pricing structure appears to be premature."[17]

The issue of whether an externality adder should be included in determining the avoided energy cost rates payable to as-available energy producers has been raised in Docket No. 7310. The parties to Docket No. 7310 (HECO, HELCO, MECO, KE, CA, the Department of Defense, Hawaiian Sugar Planters' Association, and Mauna Kea Power Co.) were not able to reach agreement on the issue of whether an externality adder should be included in determining avoided energy cost rates for as-available energy producers. Each party submitted to the PUC a Statement of Position covering unresolved issues in this proceeding, which included the issue of an externality adder.

In Docket No. 7310, the NUG parties proposed that an externalities credit be paid to new renewable resource projects (and existing projects that were unsuccessful in negotiating a credit), and that the PUC include as a placeholder an externality value of 5 mills/kwh until the value of avoiding externality costs from clean new utility generation is determined. The CA recommended that a blank line be included in the avoided cost formula to allow the formula to reflect avoided externality costs when and if issues related to quantifying externalities are resolved in the future.

The HECO Utilities opposed payment of externality credits based on their position that (1) there is no basis in the Avoided Cost Rules for requiring electric utilities to pay an externalities adder, (2) payment of such an adder would not be "just and reasonable to the electric consumer", (3) any externalities adder would be limited to nonfossil fuel producers with demonstrable net externality benefits, and such producers are already paid more than avoided costs as a result of the provision of minimum rates, (4) the requirement of an externalities adder would be premature pending determination of the weight to be given externalities in the IRP process, and (5) any externalities adder would be speculative pending determination of the appropriate method to be used in quantifying and monetizing externalities.

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16 <u>See</u> Order No. 12122 at 1.

17 D&O 12118 at 7-8.

Externality Adders In IRP

In its IRP Framework decision, the PUC declined to adopt adders to give a cost advantage or credit for resource actions that have essentially no external costs over options that have external costs, although the PUC reserved its authority to revisit the issue of adders at a later time. Among other factors, the PUC indicated that it was unclear as to the appropriateness of adders, it was uncertain about the ramifications and impact of the inclusion of adders, and percentage adders appear to have little relationship in fact to the external costs sought to be minimized or avoided. Re Proceeding to Require Energy Utilities in Hawaii to Implement Integrated Resource Planning, Docket No. 6617, Decision and Order No. 11523 (March 12, 1992) at 22-24.

In its recent decision in HECO IRP Docket No. 7257, the PUC did not accept the DSM cost credit or adder proposed by one of the parties, and stated that the IRP Framework does not require that external costs and benefits and internal (utility and ratepayer) costs and benefits be given equal weight. D&O 13839 at 25.

FERC's Avoided Cost Cap Ruling

FERC's recent avoided cost cap rulings appear to preclude the payment of an externalities adder to an RE producer. FERC has indicated that, "in setting avoided cost rates, a state may only account for costs which actually would be incurred by utilities," and that a state "may not set avoided costs rates . . . by imposing environmental adders or subtractors that are not based on real costs that would be incurred by utilities." Re Southern California Edison Co., Docket No. EL95-16-000, Order on Requests for Reconsideration (F.E.R.C. June 2, 1995).[18]

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[18] States may choose to provide taxpayer subsidies for renewable energy, not utility avoided cost adders. Rates for QF power that exceeds avoided cost do not violate PURPA if they are offset by a "dollar-for-dollar tax credit, calculated and credited to the utility on a month-by-month basis, that equals the amount by which rates . . . exceeded the utility's avoided cost." Re CGE Fulton, L.L.C., Docket No. EL95-27-001, 70 F.E.R.C. ¶61,290, 1995 FERC Lexis 404 (F.E.R.C. March 15, 1995), reconsideration denied, 71 F.E.R.C. ¶61,232, 1995 FERC Lexis 1027 (May 25, 1995).

However, the FERC rulings do not appear to preclude the consideration of externalities in the selection of a utility resource plan (which could include renewable resources, or which could form the basis for a higher utility avoided cost determination for purchased power resources, including renewable resources, that provide equivalent externalities benefits).[19]

Positions Of The Parties

Some of the parties maintain that externality adders should be considered and/or adopted to accommodate the environmental and/or societal benefits inherent in the use of RE resources.

Some of the parties that would otherwise support an externality adder recognize that FERC's recent rulings have called into question the legality of State externality adders. In general, they either urge that any uncertainty regarding the application of the FERC rulings to Hawaii be resolved by application for declaratory ruling, or that further consideration of externality adders be deferred until the State's authority to impose them has been clearly established.

Some of the parties maintain that utilities and their customers should not be required to pay more than avoided costs for power generated from renewable resources in order to promote the expedited development of renewables or to promote other societal goals (such as a cleaner environment). At the same time, such parties agree that customers should be offered the opportunity to voluntarily pay a "green pricing" premium.

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[19] The qualitative consideration of externalities can have an impact in increasing the avoided cost available to renewable resources. For example, HECO did not adopt the least utility-cost plan as its preferred IRP Plan in Docket No. 7257. HECO adopted a somewhat more expensive plan, from a utility-cost standpoint, that included coal-fired generation in order to reduce HECO's dependency on fuel oil. To the extent that a renewable resource can provide equivalent benefits, the renewable resource could receive a price higher than that based on the utilities least utility-cost plan (which might include only oil-fired generation).

Appendix C

Set-Asides

Compiled by HECO based on information provided by collaborative parties

APPENDIX C

I. SET-ASIDES

A number of states have used some form of "set-aside" requirement to promote the development of RE resources. Order No. 13441 identifies mandatory renewable set-asides as a possible programmatic strategy aimed at utilities, and identifies renewable energy procurement targets as a possible procedural strategy. A mandatory RE set-aside policy would identify a specific amount of RE capacity that must be acquired within a given timeframe.[1] An RE procurement target could involve the setting of a non-binding "goal" to serve as a guideline in utility and regulatory decision making. Another alternative would be to frame RE development requirements in terms of desired effect (such as a desired level of energy independence), rather than dictating the manner in which these effects are to be achieved.

An alternative to a set-aside policy would be to require that renewables be given preference in the integrated resource planning ("IRP") process, without imposing a fixed purchase requirement or prohibiting consideration of alternatives.

A "green" request for proposals ("RFPs") would involve the competitive solicitation of a fixed amount of RE capacity.

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[1] The amount of the set-aside requirement could take the form of a fixed number of megawatts, or of a percentage of new capacity.

II. OTHER JURISDICTIONS

Arizona

The Arizona Corporation Commission adopted short-term set-asides totaling 19 MW for four electric utilities (including a set aside of 12 MW for Arizona Public Service Company or "APS") to be included in IRP Plans due to be filed by December 31, 1995 for implementation by December 31, 2000.[2] The Commission encouraged the utilities to consider green RFPs for renewables as a means of implementing the goals. During the hearings, the utilities indicated that they were willing to strive toward the indicated goals.

New York

A 1991 State Energy Plan recommended that the New York Public Service Commission ("New York PSC") require electric utilities in N.Y. to develop a market test/demonstration program to procure 300 MW of a diverse range of renewable resources by January 1, 1994 (to be on-line by 1998). The New York PSC opened an investigation in October 1992 to consider the recommendation. A settlement agreement (supported in varying degrees by the numerous parties) was approved by the New York PSC in November 1994.[3] Under the settlement agreement, seven investor-owned electric utilities agreed to acquire a total of 303-387 MW of renewable resources by 2001, either as utility projects (220-282 MW) or through RFP bids (81-105 MW). The contemplated projects include a small amount of wind (12-36 MW), hydro (incremental re-licensing (60-70 MW), photovoltaic (2 MW), methane from landfills (83-133 MW), and other resources (50 MW).[4] The stipulation does not prohibit the abandonment of the contemplated projects.

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[2] The set-aside goals represent a relatively small percentage of the utilities' system loads. A goal of 12 MW for APS, which had a system peak of about 3,851 MW as of January 1, 1994, would be comparable to a goal of 4 MW for HECO, which had a system peak of 1,174 MW as of January 1, 1994. The comparable goal for HELCO and MECO would be much smaller given their smaller system peak loads (HELCO -- 155 MW; MECO Consolidated -- 167 MW).

[3] Four of the utilities filed a motion in May 1995 requesting that the New York PSC terminate the settlement.

[4] The seven investor-owned utilities had an aggregate non-coincident peak load of approximately 25,000 MW as of January 1, 1994.

Florida

The Florida Public Service Commission ("PSC") now sets numeric conservation/DSM goals for Florida electric utilities pursuant to the Florida Energy Efficiency and Conservation Act, and the PSC's rules implementing the act. In its 1994 decision, the PSC set overall conservation goals for each utility based on DSM measures that passed both the Participant and Ratepayer Impact Measure ("RIM") tests.[5] However, the conservation measures that can be used to meet the goals are not limited to energy efficiency or load management DSM measures, and may include photovoltaics, high efficiency on-site cogeneration, and renewable resources. Since solar water heating and other renewable measures did not pass the RIM test, the PSC stated that the utilities should consider green pricing options (under which customers voluntarily choose to donate money on their monthly bills for the utility to engage in the procurement and implementation of renewable technologies) to promote the installation of solar water heating and other renewable measures. See Re Florida Power and Light Co., 156 P.U.R.4th 333 (Fla. PSC 1994).

Minnesota

Minnesota's IRP statute requires that utilities periodically file resource plans with the Minnesota Public Utilities Commission ("PUC"), which may be approved, rejected, or modified by the PUC. As a part of their resource plan filings, utilities are required to include the "least cost" plans for meeting 50% and 75% of all new and refurbished capacity needs through a combination of conservation and renewable energy resource. The statute also provides that the PUC "shall not approve a new or refurbished nonrenewable energy facility in an integrated resource plan or a certificate of need . . . . unless the utility has demonstrated that a renewable energy facility is not in the public interest." See Minn. Stat. §216B.2422 (1994).

Indiana

> Indiana has adopted an IRP rule that specifies that the utility - must demonstrate that the utility's resource plan utilizes, to the extent practical, all economical load management, conservation, nonconventional technology relying on renewable resources, cogeneration and energy efficiency improvements as sources of new supply . . . .

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[5] The PSC set overall numeric goals for the residential and commercial/industrial sectors.

California

The California Public Utilities Commission ("PUC") has included a requirement for a "Green" RFP in its Biennial Resource Plan Update ("BRPU") program. However, in a decision deciding two dockets, FERC recently held that the 1992 California PUC BRPU program violated PURPA and FERC's implementing regulations, because the California PUC did not consider all sources in reaching its avoided cost determinations. Re Southern California Edison Co., Docket No. EL95-16-000, Order on Petition for Enforcement Action Pursuant to Section 210(h) of PURPA (F.E.R.C. Feb. 23, 1995), reconsideration denied, Order on Requests for Reconsideration (June 2, 1995).

According to the decision, the BRPU process has three stages. In the first stage, the utilities filed a resource plan identifying potential resource additions and the California PUC determined what new resources the utilities would add. In the second stage, the California PUC determined the utilities' assumed costs, known as "benchmark prices", for the resource additions, and determined which of the additions can be avoided. In the third stage, QFs were allowed to bid against the utilities' benchmark prices, and the utilities were directed to enter into standard offer contracts with the winning bidders (if bids were received that were below the benchmark prices) at prices equal to the price bid by the second lowest bidder.

In the Southern California Edison ("SCE") case, Docket No. EL95-16-000, the deferrable resources identified by the California PUC included two new geothermal plants, a windfarm, and the repowering of an existing steam plant. The identified deferrable resources ("IDRs") would cost much more than constructing new gas-fired turbines, but the California PUC concluded that the IDRs were economic by imputing "massive" environmental compliance costs to the alternative gas-fired resources. The California PUC, implementing a California statute, also required that one-half of the capacity for three of the four IDRs be reserved solely for renewable bidders. Under the California procedure, winning bidders would be paid an air emissions adder/subtractor based on the difference in projected emissions between the bid-winning QF project and the IDR. SCE claimed that lower-cost alternatives were available for 4.0¢/kwh or less, even though it was required to execute contracts with QFs at initial rates as high as 6.6¢/kwh. San Diego Gas & Electric Co. ("SDG&E") raised similar claims in Docket No. EL 95-19-000.

In its decision, FERC stated that the QF industry is now a developed industry and the need for integration of policy objectives under PURPA and other federal electric regulatory policies is pronounced, particularly given the fact that the electric utility industry is in the midst of the transition to a competitive wholesale power market. QF rates that exceed avoided cost will give QFs an unfair advantage over other market participants (non-QFs), which will hinder the development of competitive markets and hurt ratepayers.

FERC held that the California PUC's method of determining avoided cost is inconsistent with PURPA and FERC's regulations. FERC held that regardless of whether the State regulatory authority determines avoided cost administratively, through competitive bidding, or some combination thereof, it must in its process reflect prices available from all sources able to sell to the utility whose avoided cost is being determined. If the State determines avoided cost by relying on competitive bidding, the bidding cannot be limited to QFs.

At the same time, FERC acknowledged California's ability under its authority over electric utilities subject to its jurisdiction to favor particular generation technologies over others. FERC stated that, under State authority, a State may choose to require a utility to construct generation capacity of a preferred technology or to purchase power from the supplier of a particular type of resource, so long as such action does not result in rates above avoided cost.

III. POSITIONS OF THE PARTIES

Proponents of set-asides maintain that (1) set-aside requirements would recognize the net benefits of renewables, which they maintain are not given adequate reconsideration in the utilities' resource selection processes,[6] (2) preferential treatment of renewables in the utilities' IRP processes (citing Minnesota and Indiana as examples) would comport with State policies and IRP goals supporting the use of RE resources, increased energy self-sufficiency, greater energy security, and the consideration of externalities, and (3) questions regarding the legality of specific set-aside approaches could be resolved by the PUC.

Opponents of mandatory set-asides requirements maintain that (1) mandatory set-asides could violate the Public Utility Regulatory Policies Act of 1978, as amended, ("PURPA"), (2) set-aside requirements would be arbitrary and would violate principles of least-cost planning (because they would be analogous to agreeing to buy something without knowing the price, either for what is being purchased or for the alternatives), (3) utility resource planning should be governed by the PUC's IRP Framework, which they maintain appropriately permits consideration of a number of alternatives for achieving objectives such as a reduction in Hawaii's dependence on fuel-oil (including DSM programs, RE resources, coal-fired generation, and more efficient oil-fired generation). The IRP Framework requires utilities to consider all feasible supply-side (including

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6 <u>See</u> Barriers 1.e., 1.f., 5.e., and 5.f., as well as Appendix A.

renewables) resources and demand-side resources appropriate to Hawaii,[7] and provides specific goals and objectives for utility resource planning.[8] The IRP process also takes into consideration utility operational and system reliability considerations.[9]

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[7] The HECO Utilities have included DSM programs in their IRP Plans, and these programs have estimated energy and capacity savings associated with them. While these estimated savings are sometimes referred to as targets, goals or objectives, they do not represent set-asides. The estimated savings are based on the forecast and planning assumptions explicitly stated in the IRP process, and are expected to change over time as new forecast and better planning assumptions are developed.

[8] The IRP process is broad enough to allow consideration of specific, targeted objectives, such as a specified reduction in the use of imported oil (see IRP Framework, ¶III.B.2), and consideration of alternative integrated resource plans that include a greater percentage of renewable resources. For example, the HECO Utilities generally have developed a "green" IRP plan as one of the alternative plans evaluated in their IRP processes.

[9] Generating facilities are not interchangeable. Some provide dispatchable, baseload, cycling or peaking capacity and energy, while others provide intermittent, non-dispatchable energy.

APPENDIX D

Evaluation and Treatment of Renewable Energy Resources and Independent Power Producers in the Integrated Resource Planning Process

Compiled by HECO based on information provided by collaborative parties

APPENDIX D

EVALUATION AND TREATMENT OF RENEWABLE ENERGY RESOURCES AND INDEPENDENT POWER PRODUCERS IN THE INTEGRATED RESOURCE PLANNING PROCESS

Consideration of Renewables in IRP Processes

The PUC adopted a Framework for Integrated Resource Planning ("IRP Framework") in 1992.[1] Hawaii's electric utilities submitted their first integrated resource plans ("IRP Plans") in 1993.[2] The preferred 20-year IRP Plans submitted by the electric utilities did not include new renewable resources.[3]

The IRP Framework requires that electric utilities consider all feasible supply-side options appropriate to Hawaii and available within the IRP horizon to meet the IRP objectives, which includes RE resources. IRP Framework ¶¶I ("Supply-Side Programs"), IV.D.1. The supply-side resources considered by utilities in their IRP processes include resources that are or may be supplied by persons other than the utilities (e.g., resources that may be supplied by NUGs[4]). IRP Framework, ¶IV.D.2.

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[1] See Re Integrated Resource Planning, Docket No. 6617, Decision and Order No. 11523 (March 12, 1992) ("D&O 11523"), as amended by Decision and Order No. 11630 (May 22, 1992) ("D&O 11630").

[2] The plans were also modified by the utilities during the course of PUC proceedings to review the plans in 1994.

[3] Each of the electric utilities currently purchases power produced from renewable resources. The 5-year Supply-Side Actions Plans submitted by the HECO Utilities include activities and budgets to study the feasibility and benefits of various renewable resources and energy storage facilities. KE's IRP Plan update included a "Renewable Energy Resource Implementation Plan", which identifies as required steps (1) improving information on RE resources and conversion technologies, (2) educating the public to maximize meaningful community input, and (3) developing hands-on experience through demonstration projects, and which indicates that KE will seek sources of funding to implement the steps.

[4] Non-utility generators ("NUGs") or independent power producers ("IPPs").

A number of parties in the IRP proceedings (arising out of the electric utilities initial IRP Plan filings in 1993) maintained that the electric utilities did not adequately consider renewables.

In HECO's IRP process, supply-side resources were considered in the supply-side screening processes and the early phases of the integration process without distinction as to ownership. In the HECO IRP proceeding, Docket No. 7257, a wind producer and DBEDT maintained that HECO did not adequately consider wind energy in its preferred IRP Plan (based on contentions that HECO overestimated the cost of producing energy from wind energy facilities and did not correctly characterize certain aspects of such facilities).

HECO disagreed with the factual claims, and indicated that it did not plan to construct wind energy facilities itself at this time, even if the cost was lower than HECO had estimated, given (1) the still-developing nature of the technology, (2) the risk of investing in such facilities versus the return available to HECO as a utility, (3) the as-available nature of wind energy, and (4) its need to proceed with the planning and implementation of other demand-side and supply-side resources. HECO also maintained that its cost estimates for and characterization of new wind power resources would not determine whether new wind resources were added to HECO's system, because (1) there is no shortage of potential wind power developers, and if wind energy facilities are cost-effective under the PUC's avoided cost rules, HECO will purchase energy from such facilities at its avoided cost, and (2) the utility's preferred plans were consistent with the potential ultimate implementation of alternate plans that include renewable resources.

The CA maintains that HECO "made its assessment of the supply-side resources without distinction as to the ownership of the resources", but this approach was taken only with regard to HECO's initial assessment of supply-side resources in the screening process and the early phases of the integration process. At a certain point in the assessment of supply resources HECO rejected certain (renewable) options from further assessment on the basis that these options would not be built by the utility, but would be built by IPP's. On this basis renewables were not considered in the utility resource plans. It is not correct, the PUC's order notwithstanding, that resources were assessed without distinction to ownership. In the end, renewable resources were rejected based solely upon the basis of ownership.

The results of HECO's policy of not including renewables in its IRP because the resources would not be built by the utility is of much more than academic concern. If the multiple attributes considered in the utility IRP would indicate that a renewable resource were part of the preferred resource mix, the utility could include the resource in its preferred plan and could build the resource at the price of the resource - even if the resource would cost more than the avoided costs of the least-dollar-cost plan. By leaving the resource out of its plan on the basis that other independent providers would build the renewable resource, the preferred plan is instead based upon least-dollar-cost resources. The avoided costs of these least-dollar-cost resources do not provide enough revenue to build the renewable resource. Thus even if the multiple attributes considered in the IRP process indicate that a renewable resource is the best resource, the elimination of renewables from IRP serves as an effective barrier. HECO's approach of eliminating renewables from its plan serves as an effective barrier to the implementation of the renewables by independent power producers.

The PUC addressed the absence of wind energy or other renewable resources in HECO's current IRP Plan. The PUC indicated that the results of the study it is conducting in the IRP docket:

> "should assist in HECO's consideration of wind energy and other renewable resources in its future integrated resource planning cycles. At this time, we find HECO's assessment of wind energy as a conventional, supplemental resource providing intermittent, generally non-dispatchable, as-available, energy to be reasonable."

D&O 13839 at 16-17. The issue of whether new renewables should have been included in the utilities' preferred IRP Plans was also raised in the MECO and HELCO IRP proceedings, which have not yet been decided by the PUC.

In its first IRP analysis (filed in October 1993), KE did not consider new renewables to be feasible for use in the near-term:

> KE classified possible supply-side options into two categories: "technologies feasible for mid-term use" and "technologies suitable for future consideration." KE included in the latter category those options that are technologically feasible, but "not as politically or economically attractive to KE as other options that are presently available." It considered these options as options "that may become desirable in the future." KE identified the following as resource options for future consideration: hydro and pumped storage, solar, wind, biomass, fuel cells, and waste-to-energy. Except to identify them and to describe the implementation difficulties associated with each of them (such as difficulties in siting, permitting, and assuaging environmental concerns), KE did not subject any of these resource options to cost-benefit and cost-effectiveness analyses.[5]

The PUC found that "the fact that these resources are not 'politically or economically attractive' or that there may be land use or other similar barriers to their full deployment are not reasonable bases for rejecting the resources for further consideration", and that "KE should have subjected them to cost-benefit, cost-effectiveness, and resource optimization analyses." D&O 14026 at 13. However, since KE would not require any new supply-side resources for at least five years, the PUC did "not require KE to incorporate additional funding for renewable energy development in its current IRP. However, we expect KE to consider renewable energy resource options and subject them to rigorous cost-benefit, cost-effectiveness, and, as appropriate, resource optimization analyses in its future integrated resource planning efforts." D&O 14026 at 15.

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[5] Re Kauai Electric Division, Docket No. 7260, Decision and Order No. 14026 (July 28, 1995) ("D&O 14026") at 13.

Consideration of IPPs in IRP Processes

A number of parties in the IRP proceedings maintained that the electric utilities did not adequately consider NUGs. In the HECO IRP proceeding, HECO maintained that (1) the candidate list of supply-side resource options included supply-side alternatives (including renewable resources), which were evaluated without regard to individual ownership subject to the criteria established in the supply-side resource assessment phase, and (2) the utility's preferred plans were consistent with the potential ultimate implementation of alternate plans that include renewable resources.

The PUC addressed this issue in Docket No. 7257, finding:

> Several parties, however, contend that HECO's IRP is defective for not considering non-utility generation as a resource option. Contrary to these parties' contentions however, HECO did consider and assess a broad range of supply-side resource options in its IRP analysis, including biomass and wind energy. It does not appear that HECO omitted any important supply-side resources from its analysis.
>
> We acknowledge that there are no NUG specific projects or programmed for implementation by HECO in its 20-year planning horizon. However, this does not mean that there will be no NUG-operated facility during the period covered by the IRP. HECO made its assessment of the supply-side resources without distinction as to the ownership of the resources. NUGs are free to submit proposals to HECO for evaluation to implement, replace, or defer the resource options included in HECO's IRP.
>
> The IRP framework does not specifically address the role of NUGs in the development or acquisition of the resources deemed appropriate in the IRP. However, the framework, at section IV.D.2, provides that the utility, in the development of its integrated resource plan, shall consider supply-side and demand-side resource options that "are or may be supplied by persons other than the utility." This provision was deliberately intended to leave to the implementation phase the determination of who should build and operate the resources included in

the IRP. NUG-supplied resources should be in conformance with the utility's IRP.

The commission intends shortly to institute an investigation into electric utility regulation in a competitive environment. In that investigative docket, we intend to address more specifically the role of NUGs in a utility's IRP. To be included in the investigation is the issue of competitive bidding, proposed by several parties in this docket, as a mechanism for the acquisition of the resources specified in a utility's IRP.

D&O 13839 at 14-16 (ft. nt. omitted).

Appendix E

Statement of Positions

E

CITIZENS UTILITIES COMPANY, KAUAI ELECTIC DIVISION'S "STATEMENT OF THE PARTIES"

Introductory Comment

Citizens Utilities Company, Kauai Electric Division ("KE"), though one of only two electric utility companies operating in the State of Hawaii, faces unique circumstances in its operation on Kauai. KE is a utility so small that it is, in many respects, governed by special exemption provisions in the federal PURPA regulations. KE, like its parent Citizens Utilities Company which focuses significant corporate assets on operation of smaller, rural electric and other utilities, has found it to be a more productive strategy to cooperate, and many times to lead, in the purchase, development and use of renewable energy resources.

KE has long been committed to renewable resources. KE has no preference for fossil fuel over renewable resources, or, for that matter, company-owned resources over developer-owned non-fossil fuel resources. KE's commitment to renewables was made plain in December 1994 when the company filed its Renewable Energy Resource Implementation Plan in Docket No. 7260. KE was the first utility in Hawaii to update its IRP. The Renewable Plan amounted to an implementation plan for KE to follow in order to reach full IRP framework compliance.

The Renewable Plan identified barriers to development of renewable resources on Kauai and highlighted local resource options which KE had considered in coming to its IRP, and to which additional attention would be paid as KE considered future generation options. The Renewable Plan dramatically evidences KE's interest in pursuing renewable resource options.

Statement Of Position

Strategies 1.b.1 (Pursue deployment of renewables that appear to be cost effective and monitor others) and **1.b.2** (Improve cost effectiveness of renewables through rd&d).

KE supports the goals embodied in these strategies but, as with other strategies involving the expenditure of money collected from KE's customers, most of whom do not have surplus sources of cash to fund the development of alternate energy sources, KE's agreement must be limited to project expenditures which can be fit within the company's budget and which affect KE's customers directly.

Strategy 1.b.6 (Energy wheeling for counties).

Wheeling will not promote the implementation of renewable resources. The subject has been considered repeatedly in jurisdictions on the mainland; the results of which makes clear that whatever value wheeling might have, it is neither an effective or desirable strategy for the promotion of renewable resources. While this particular strategy is limited to wheeling by the counties, KE is concerned with, among other things, the discrimination inherent in allowing wheeling to the counties and the recovery aspects of potential stranded investment.

Strategy 1.b.7 (Net billing payment rates for small RE systems).

Net billing programs are inappropriate as ordinarily designed inasmuch as they do not recognize that the utility buys and sells energy during different time periods at different prices. KE would support "netting out" the bill of a customer who both sells electricity to and buys electricity from the utility, as long as the time of day and price differences are respected.

Strategy 1.c.2 (Include reasonably demonstrated avoided capacity costs in determining value and pricing of as-available resources).

KE's agreement here is dependent on the critical phrase "reasonably demonstrated" avoided capacity costs. KE recognizes the propriety of paying avoided capacity costs in return for any capacity actually avoided. KE, however, has no experience which supports, and is aware of no studies or research establishing, the proposition that as-available energy resources avoid the need for the utility to plan for and obtain firm energy resources. Until capacity costs can reasonably be demonstrated to be avoided by as-available resources, KE will object to paying as-available resources any avoided capacity costs.

Strategy 1.c.3 (Analyze combined effects of distributed RE projects in given service territory).

KE's agreement is limited to project expenditures which can be fit within the company's budget and which affect KE's customers directly.

Strategy 1.d.1 (PUC prospectively eliminate ECAC)

KE strongly disagrees with the proposal to eliminate the "energy cost adjustment clause" ("ECAC"). Eliminating the ECAC will have two initial consequences: 1) electricity prices will rise as consumers are required to pay for the "risk" now avoided by the use of the ECAC; and 2) utilities will file rate cases much more frequently, resulting in increased rate case expenses which will be matched by the additional costs accruing to the commission and the Consumer Advocate. Eliminating the ECAC will not result in KE assuming the risk of price fluctuations, rather it will result in consumers paying up front for the risk which KE is forced to assume. In addition, eliminating the ECAC will serve as a *disincentive* as KE evaluates purchase power agreements inasmuch as a rate case filing will be necessary before KE can recover the cost associated with the risk inherent in the proposed purchased power source.

Strategy 1.d.2 (Analyze feasibility of flattening risk of oil price variability).

KE's agreement is limited to supporting and participating in the analysis of the feasibility of flattening the risk of oil price variability. KE does not presently support the concept of disconnecting its costs (the price of oil) from its revenues. KE shares the concerns of opponents of this strategy: 1) that the need for and benefits of this approach have not been identified; 2) that the creation of a fund would raise the current cost of electricity for customers; 3) that the creation of a fund could lead to inequities between current and future customers; and 4) that the creation of a fund could result in the uneconomic bypass of the utility system by customers desiring to avoid the surcharge necessary to create the fund.

Strategy 2.a.2 (Study/implement energy storage systems).

KE's "no position" is premised on the fact that the company has no spinning reserves, while its (relatively) small system is already able to start up quickly, and has experienced no problem with system frequency regulation or the need for voltage/power factor corrections.

Strategy 2.c.3 (Study/consider implementing energy storage systems).

KE's "no position" is premised on the fact that the company has no spinning reserves, while its (relatively) small system is already able to start up quickly, and has experienced no problem with system frequency regulation or the need for voltage/power factor corrections.

Strategy 4.a.2 (Fixed or more predictable payment streams).

KE understands the need of RE developers for more predictable payment streams in order to make the project more attractive to potential investors and financiers. While KE has, in the past, entered into front-end loaded contracts (allowing the hydro-electric developer to recover more of its costs up front, thus making the project appear more secure from the investor's perspective), and is sensitive to the RE developers' need for additional price security, the fact that renewable resources are capital-intensive, and the risk associated with projects of the sort should not be borne or subsidized by the utility customer. KE has in the past, and will likely continue in the future, to work with RE developers to make their projects more attractive, but only within the context of a safe and secure arrangement for the utility's customers.

Strategy 4.a.3 (Apply adders to filed avoided energy costs).

There are a number of policy reasons, including the speculative nature of the adder, to object to the application of adders to filed avoided energy costs. Beyond policy, however, the Federal Energy Regulatory Commission's recent avoided cost cap rulings appear to flatly preclude the payment of an externalities adder to a RE producer. FERC has said that "in setting avoided cost rates, a state may only account for costs which actually would be incurred by utilities," and that a state "may not set avoided cost rates . . . by imposing environmental adders or subtractors that are not based on real costs that would be incurred by utilities." *Re Southern California Edison Co.*, Docket No. EL95-16-000, Order on Requests for Reconsideration (F.E.R.C. June 2, 1995).

Strategy 5.a.2 (Actively participate in RE demonstration projects applicable to Hawaii).

KE's agreement is limited to project expenditures which can be fit within the company's budget and which affect KE's customers directly.

Strategy 5.b.1 (Develop standard offer contract for RE sales to utilities).

KE's support is offered in view of its belief that standard offer contracts can be developed and used effectively if developed with specific technologies in mind. KE agrees in principle with the strategy, but standard offer contracts must follow the technology under consideration. KE anticipates that there would be developed multiple standard contract versions.

Strategy 5.b.2 (Include reasonably demonstrated avoided capacity costs in determining value and pricing of as-available resources.

KE's agreement here is dependent on the critical phrase "reasonably demonstrated" avoided capacity costs. KE recognizes the propriety of paying avoided capacity costs in return for any capacity actually avoided. KE, however, has no experience which supports, and is aware of no studies or research establishing, the proposition that as-available energy resources avoid the need for the utility to plan for and obtain firm energy resources. Until capacity costs can reasonably be demonstrated to be avoided by as-available resources, KE will object to paying as-available resources any avoided capacity costs.

Strategy 5.e.1 (Consider quotas, set-asides, or targets).

KE opposes the imposition of quotas, set-asides or targets (depending on their nature) inasmuch as those strategies would likely violate the Public Utility Regulatory Policies Act of 1978 ("PURPA"); would be arbitrary and would violate the principles of least-cost planning; and would remove utility resource planning from the PUC's IRP Framework which permits careful consideration of the panoply of alternatives for achieving objectives such as reducing Hawaii's dependence on fuel oil.

Strategy 5.e.4 (Consider retail wheeling).

Wheeling will not promote the implementation of renewable resources. The subject has been considered repeatedly in jurisdictions on the mainland; the results of which makes clear that whatever value wheeling might have, it is neither an effective or desirable strategy for the promotion of renewable resources.

Strategy 5.f.2 (Proceed with quantification of externalities).

KE concurs with the strategy to the extent that it is already participating, and will continue to participate, in the HECO Utilities Externalities Action Plan working group. Initiation of the Plan and the Working Group do not guarantee that externalities will ultimately be determined to be quantifiable; they do guarantee, however, that the subject will be carefully examined by a variety of interests.

Strategy 5.f.4 (Establish renewable set-asides).

KE opposes the imposition of set-asides inasmuch as that would likely violate the Public Utility Regulatory Policies Act of 1978 ("PURPA"); would be arbitrary and would violate the principles of least-cost planning; and would remove utility resource planning from the PUC's IRP Framework which permits careful consideration of the panoply of alternatives for achieving objectives such as reducing Hawaii's dependence on fuel oil.

Strategies 6.b.1 (PUC to implement provisions of SCR No. 2 (1994)), **6.b.2** (PUC to enforce current rule (HAR §6-74-15(c))), **6.b.3** (PUC to implement requirements of Act 176 (1994), **6.c.1** (PUC to initiate rulemaking to adopt rules to enforce mandates), **6.c.3** (PUC to enforce current rules re negotiations between utilities and QFs), **6.c.4** (PUC to initiate rulemaking pursuant to SCR No. 2 (1994), and **6.c.6** (PUC to implement requirement of Act 176).

KE opposes each of these strategies inasmuch as they represent unwarranted attacks on the Hawaii Public Utilities Commission which, if adopted, would do nothing to address the problem of lengthy PPA negotiations. RE developers, understandably, would prefer that utilities accept the developers' proposals without interposing objections. The utilities' failure to readily agree to the developers' proposals, however, says nothing about the reasonableness of the utility position in the absence of some consideration of the reasonableness of the developers' offer. The PUC has no power to "make" contracts between utilities and RE developers. The strategies proposed are unnecessary, and will not accomplish the proponents' goals of shortening the period over which PPAs are negotiated.

<u>**Strategy 6.c.8** (Expedite contracting process).</u>

KE opposes the strategy in light of its absolute lack of detail. KE would support the strategy if included with the strategy was some guarantee that RE developers would propose completed offers at prices at or below the utility's avoided cost.

<u>**Strategy 6.c.9** (Standard offer contracts for RE sales to utilities).</u>

KE's support is offered in view of its belief that standard offer contracts can be developed and used effectively <u>if developed with specific technologies in mind</u>. KE agrees in principle with the strategy, but standard offer contracts must follow the technology under consideration. KE anticipates that multiple standard contract versions would be developed.

Strategies 9.a.1 (Conduct pilot rd&d projects by utilities), **9.b.2** (Actively participate in RE demonstration projects), **9.c.1** (Monitor/conduct RE demonstration projects), **9.c.3** (Conduct pilot rd&d projects by utilities), and **10.b.3** (Utilities, developers and state should jointly support research).

KE's agreement is limited to project expenditures which can be fit within the company's budget and which affect KE's customers directly.

DOCKET NO. 94-0226

RENEWABLE ENERGY RESOURCE INVESTIGATION

STATEMENT OF POSITION OF THE CONSUMER ADVOCATE

October 23, 1995

ROLE OF THE CONSUMER ADVOCATE

The Division of Consumer Advocacy (Consumer Advocate) is a state agency with a statutory responsibility to represent the interests of Hawaii's consumers of utility services in all matters that come before the Hawaii Public Utilities Commission (Commission). In this capacity, the Consumer Advocate examines and advises the Commission regarding most matters that affect Hawaii's electric utilities, including the selection and implementation of generation resources.

The Consumer Advocate is a participant in the "collaborative" group of parties in the Renewable Energy Resource Investigation, Docket No. 94-0226. As a member of the collaborative group, the Consumer Advocate assisted with the drafting of the Collaborative Document.

GENERAL STATEMENT OF POSITION REGARDING RENEWABLE ENERGY RESOURCES

Renewable energy resources should be implemented to the extent that they can be demonstrated to be reasonable according to sound analysis. If renewable resources are to be funded by Hawaii's utility ratepayers, these resources should provide benefits commensurate with the required costs. Both direct and indirect costs and benefits should be taken into consideration in the assessment of renewable resources.

For Hawaii's electric utilities, the Integrated Resource Planning (IRP) process is the proper and most appropriate context for the evaluation of renewable resources. IRP is a mandatory process required of all Hawaii energy utilities by the Commission. It is the most thorough existing long-term utility resource planning process in Hawaii. IRP includes formal requirements that require life-cycle evaluation of resources taking into consideration both direct and indirect costs and benefits. It is mandatory that all available resources are considered in the IRP process including renewable and as-available resources. It is the position of the Consumer Advocate that the IRP process is the most appropriate context in which to determine the reasonableness of renewable energy resources.

Each of Hawaii's utilities has completed its first Integrated Resource Plan and will prepare and submit additional plan's every three years. After the first "round" of IRP in Hawaii, several deficiencies in the process have been identified. It is the position of the Consumer Advocate that any deficiencies in methods or procedures of the IRP process should be addressed and resolved and the process should be improved.

The Consumer Advocate has formally taken the position that there are deficiencies in the treatment of renewables in the IRP analyses of Kauai Electric and the HECO utilities. These deficiencies should not result in any conclusion that the IRP process does not have the potential to facilitate the implementation of renewable resources. To the extent that problems are identified, the process can be and should be improved to satisfactorily consider renewable energy resources.

Sufficient treatment of renewables in the IRP process will require, among other things:

(1) a meaningful treatment of renewables in utility plans (even if the utility does not intend to build and/or own the renewable resources),

(2) a more methodical and clearly explained preferred plan selection process, and

(3) further consideration by the Commission of the methods used to acquire resources subsequent to approval of the preferred integrated resource plan.

In order to encourage improvements in the IRP process the Consumer Advocate plans to participate pro-actively and assertively in the ongoing IRP process of each utility. The Consumer Advocate also strongly endorses the Commission's stated intention to open a docket to consider, among other methods, competitive bidding as a means to facilitate effective implementation of the resources identified in each utility's approved IRP.

STATEMENT OF POSITION REGARDING THE PROPOSED STRATEGIES

The position of the Consumer Advocate is identified in the Collaborative Document for each proposed strategy. The Consumer Advocate does not state a formal position regarding many of the strategies identified in the Collaborative Document. There are several reasons for this.

First, the Collaborative Document represents a collection of concerns from a wide variety of parties, all having some role in the development and implementation of renewable resources in Hawaii. Many of the barriers and strategies identified in the Collaborative Document are outside of the scope of the direct responsibilities of the Consumer Advocate. On many of these matters the Consumer Advocate does not take a formal position.

Second, on matters which involve action by the Commission or involve Hawaii's electric utilities, the Consumer Advocate does have a direct concern and may ultimately take a formal position. Even on some of these matters within the scope of the Consumer Advocate's responsibilities, however, it is premature to determine whether particular courses of action are in the best interests of Hawaii's consumers of energy services. In many cases the merits of a strategy will depend upon the specific details regarding the implementation of the strategy. For example, the Consumer Advocate favors the consideration of a "green pricing" tariff. It is premature, however, to determine whether this strategy is advisable without first examining and determining the important details regarding the design and implementation of the tariff.

The position of the Consumer Advocate on some particular strategies is clarified below:

Barrier Grouping 4 addresses the form of prices offered to renewable energy producers.

All of the strategies listed under this barrier grouping merit consideration. In most cases the merits of each of the strategies must be considered on a case by case basis. It is premature to make any definitive determination regarding the merits of most of these strategies.

The Consumer Advocate has stated "no position" regarding all of the suggested strategies listed under this barrier to indicate that its position is reserved until the merits of each strategy can be examined in more detail in the context of a specific proposal.

Barrier 5.e addresses the adequacy of the treatment of renewable resources in the IRP process.

The Consumer Advocate concurs that there are shortcomings in the treatment of renewable resources in the IRP process. Some of these concerns are identified in Appendix D of the Collaborative Document.

Several strategies are identified under Barrier 5.e that would enforce a particular remedy or would recommend intervention in the IRP process by the legislature. The Consumer Advocate supports resolution of identified deficiencies in the IRP process. However, the resolution of these deficiencies (1) should be determined only after careful consideration and (2) should be determined by the Commission in the context of the IRP or related proceedings.

The Consumer Advocate has stated "no position" regarding these strategies. Although the intent of the strategies may have merit, the identified vehicles are not completely appropriate.

Retail wheeling has been suggested as a strategy to promote the implementation of renewable resources.

Retail wheeling is being considered (with much adieu) in many jurisdictions on the mainland. The Consumer Advocate has not taken any formal position regarding retail wheeling. In this investigation of renewable energy resources, however, it is clear that retail wheeling is not an effective or desirable strategy for the promotion of renewables. Because retail wheeling would strongly focus the power market upon the minimization of energy prices, it would not be conducive to conservation or renewables programs which require any forms of subsidy. For this reason the Consumer Advocate has stated its disagreement with retail wheeling as a strategy for the promotion of renewable resources.

Strategy 1.b.6 proposes a form of retail wheeling that would be limited to implementation by the Counties. The Consumer Advocate is not opposed to an examination and consideration of this concept, but is uncertain at this time regarding the merits of this strategy.

Stephen K. Yamashiro
Mayor

Diane S. Quitiquit
Director

County of Hawaii
DEPARTMENT OF RESEARCH AND DEVELOPMENT
25 Aupuni Street, Room 219 • Hilo, Hawaii 96720-4252 • (808) 961-8366 • Fax (808) 935-1205
KONA: (808) 329-5226 • Fax (808) 326-5663

STATEMENT OF POSITION - COUNTY OF HAWAII
RENEWABLE ENERGY RESOURCES
DOCKET NO. 94-0226

October 30, 1995

INTRODUCTION

In 1994, over 41% of total utility electric power generated on the Big Island was from non-fossil fuel facilities; 19% from geothermal power and 22% from biomass, hydro-electricity and windpower. Despite the loss of the contribution from biomass in 1995 due to demise of the power exporting sugar plants, Hawaii County will still have a relatively high degree of resource diversification. Further deployment of renewable energy resources is supported in the interests of promoting the stated energy goal of the Hawaii County General Plan to strive towards energy self-sufficiency as well as the goal of maintaining and, if feasible, improving the existing environmental quality of the island. Geothermal power is seen as playing an increased role in providing a cost effective means to achieve these goals for the Big Island.

The issues discussed here fall into four categories:

- energy resource selection
- permitting issues
- development of renewable energy and energy storage technologies
- regulatory issues

ENERGY RESOURCE SELECTION

Support is given to initiatives aimed at correctly evaluating energy resources within the Integrated Resource Plans of the utilities in Hawaii, including:

- Quantitative evaluation of externalities (including the price and supply risks inherent in oil-based generation)
- Use of competitive bidding/green RFP's to provide input to the selection process in addition to that provided by the utility itself
- Determination of capacity values for renewables, and improved modeling of generation expansion criteria.

Given a reasonable resolution of the treatment of renewable energy resources within the IRP mechanism, there should be no need to resort to more arbitrary measures for promoting the use of renewables such as set-asides, procurement targets or quotas for RE resources.

PERMITTING ISSUES

Strategies are supported aimed at streamlining and facilitating the permitting process without short-circuiting the public's right to participate. Merit is seen in identifying renewable energy resource sites on County General Plans and in Community Development plans in an effort to minimize the development of incompatible land uses, improve the planning of utility infrastructure and involve community input at an early date. The discretionary permits involving public opinion can often be the determining factors in project development; if pre-planning can reduce the time, expense and risk that such permits involve, it should be encouraged.
Working up from community concerns rather than down from governmental initiatives is likely to have a more positive outcome on resource development, and strategies for involving and educating the public in energy issues should form an integral part of the planning process.

DEVELOPMENT OF RENEWABLE ENERGY AND ENERGY STORAGE TECHNOLOGIES

Further deployment of intermittent renewable energy resources in Hawaii County is hampered by minimum load conditions on the grid. For this reason, strategies for re-analyzing the amount of RE power that can be absorbed by the grid, load shifting through DSM programs, and the development of energy storage systems are especially important to the Big Island. It is felt that the PUC should encourage utility RD&D initiatives in these areas, and develop a supportive framework by providing safe harbors and shareholder incentives for responsible RD&D investments by the utilities.

REGULATORY ISSUES

County Retail Wheeling. Retail wheeling for counties is supported as a way for the County to meet the energy needs of certain facilities (e.g. water pumping) while promoting its stated objectives of increased diversification of energy resources and protection of the environment.

Green Pricing. HECO's proposed plan to embark on a green pricing program is supported. If feasible, this program should be made simultaneously available to all HECO utility affiliates with administrative costs spread across the entire rate base; if this cannot be done, the response from ratepayers on one island should not be taken as necessarily indicative of that from ratepayers on other islands.

Net Billing. Net billing is supported as a mechanism for promoting the demonstration and use of small scale renewable energy generating systems.

CONCLUSION

A telephone survey conducted among Big Island residents by HELCO[1] has shown the broad base of support for increased development of renewable resources, with 72% strongly favoring solar power, 50% strongly in favor of wind power and 44% strongly in favor of biomass and hydro-electric power generation. It is felt that the strategies supported in this position statement can provide an equitable means for improved evaluation of renewable energy resources and their increased utilization where cost effective, thereby better responding to the community support that has been expressed for renewable energy resources.

ACKNOWLEDGMENTS

The County of Hawaii thanks the Public Utilities Commission for instituting Docket No. 94-0226 and for providing an opportunity for interested parties to participate in an informal but constructive manner. The dedication and hard work of a number of participants is greatly appreciated, as well as the guidance given by the collaborative facilitator, Ms. Jane Yamashiro.

[1] Hawaii Electric Light Company IRP Technical Reference Report, Book 3, October 1993

MARYANNE W. KUSAKA
MAYOR

GERALD W. DELA CRUZ
DIRECTOR

COUNTY OF KAUAI
OFFICE OF ECONOMIC DEVELOPMENT

4280-B RICE STREET
LIHUE, KAUAI, HAWAII 96766
TELEPHONE (808) 241-6390
FAX (808) 241-6399

STATEMENT OF POSITION OF THE COUNTY OF KAUAI

RENEWABLES DOCKET NO. 94-0226

INTRODUCTION

Kauai was once the State leader in the amount of total utility electrical generation from renewable energy resources, primarily hydroelectric and biomass power. Our best year was in 1982, when approximately 55% of the island's electricity was produced from non-fossil fuel sources. However, since this peak, our electrical self-sufficiency has dropped steadily to 36% in 1988 and to 20% in 1994. This has been due to growth and the lack of any new renewable energy resources coming on-line.

The Lihue Power Plant currently provides approximately 14 megawatts of firm power from biomass, while run-of-river hydroelectric plants owned by the plantations provide intermittent power to the utility grid. As the sugar plantations phase out operations, the amount of power supplied by the smaller hydroelectric plants is sure to decrease. No new renewable energy resources are scheduled to be on-line in the foreseeable future.

Energy self-sufficiency through the use of renewable energy resources supports Chapter 226, Hawaii State Planning Act and is also consistent with Section 7-3.6 (Ordinance No. 461) of the Kauai County Code which states that "programs shall be developed which will make the County more self-sufficient in producing energy and less dependent on use of imported energy sources."

INCLUSION OF RENEWABLES IN THE IRP PROCESS

The first IRP plans filed by the utilities, did not give extensive consideration to renewable energy resources. Support and encouragement should be given to all utilities to further improve their cost-benefit, cost-effectiveness, and resource optimization analyses in the IRP process and give more consideration to renewable energy resources. As the County of Maui has noted, true avoided cost payments for renewables should be based upon the cost of like renewables, not fossil energy resources. The proper inclusion of renewables would minimize the need to have alternate price support mechanisms such as subsidies, adders, etc. The primary strategy should be to cure the illness, rather than using arbitrary solutions to treat the symptoms. However, we also caution that existing support mechanisms should not be eliminated until an alternate system is well in place.

LOCAL DECISION MAKING

It is important to problem solve and not create more problems. Streamlining/consolidation of the permitting process is a worthy goal as long as local permitting controls are not bypassed and the public is not precluded from participation in any review process. Although the "not in my backyard (NIMBY)" syndrome was highlighted as an important barrier, we emphasize that the county governments' role and the public's involvement must not be compromised and placed in a secondary position in any streamlining or permit consolidation process.

COUNTY GENERAL PLAN/COMMUNITY DEVELOPMENT PLAN UPDATES

The General Plan establishes policy governing long-range, comprehensive development and allocation of land and water resources within the county. In addition, the General Plan establishes the goals of such use, development and allocation, and the measures, methods and parameters to be utilized in implementing these goals. It also identifies certain environmental characteristics as criteria for the determination of use and development suitability. Energy planning should be an important component in the General Plan and Community Development Plans.

The inclusion of high potential renewable energy "designated areas" in county and community development plans is good, comprehensive land use planning, but must be developed with input from local government and the citizens of the respective county. The delineation of areas of high RE potential would alert planners, landowners, developers and residents that these areas have high renewable energy potential and could be used for RE resource developments, thus possibly minimizing potential conflicts.

Public education and involvement in the early stages of development are also essential ingredients in the process, and success will not be possible without local government and public support. The emphasis has shifted in recent years from one of bureaucratic decisions to community-based decisionmaking. The state should not streamline the process or create rules through any legislative/statutory process that directly impact local government or communities without consultation with and support of the counties and its constituents.

The County of Kauai is also opposed to the creation of a Hawaii Energy Commission as presented in the strategies. The counties have long held the position that more decisions should be made at the local level. The creation of an all-powerful super energy agency with permitting and development control works against the strongly supported concept of community-based decisionmaking.

UTILITY INITIATIVES

Utility initiatives in the areas of green pricing and research, development and demonstration (RD&D) of renewable energy should be encouraged and supported. Public Utilities Commission support is critical to further progress in these areas and is strongly supported.

WHEELING

The County has taken a "no position" on the strategy to allow non-utility generators (NUGs) the opportunity to transmit and distribute renewable energy directly to customers who are willing to pay for these services. The impact of such wheeling opportunities are unknown and must be studied further. We are not opposed to including the topic of wheeling in any Public Utilities Commission docket to examine these specific issues, especially the impacts of wheeling to the ratepayers and to the utility.

The County's support to permit county governments to engage in wheeling is based on HRS 46-19 which allows counties to "participate in the development of alternative energy resources defined as geothermal, solar, wind, ocean power, biomass and solid wastes in joint venture with an end user or public utility pursuant to a plan for the direct utilization of the energy sources by an end user or public utility; provided that should a joint-venture partner not be available the counties may proceed with the development of alternate energy resources for their own consumption or for the furtherance of a plan for direct utilization by an end user or public utility." With this distinct possibility supported by state law, county wheeling provisions and opportunities are supported.

COORDINATION AND WORKING AS A TEAM

The permitting problem highlighted as a major barrier can be improved dramatically with interagency cooperation, better communication and better training for permit reviewers. More funding and additional personnel are not necessarily the best or only solutions, especially in these tough economic times. A workshop of all affected agencies should be convened, and should be attended by the top decisionmakers who are authorized to make changes. The many permitting agencies working independently create time delays, duplication of efforts and turf battles. Better results would be accomplished with TEAMWORK.

CONCLUSION

Kauai County supports the development of renewable energy projects that are responsive to local government concerns and have broad citizen support. Many of the strategies supported in this report (such as the proper determination of avoided cost and the quantification of externalities) will, if properly conceived and implemented, provide renewable energy resources with a chance to be evaluated and to compete on a more even footing with oil-fired generation. However, measures such as streamlining and improving the existing permitting system must be done with much forethought and deliberation so as not to eliminate critical safeguards, especially at the local level.

This collaborative report should serve, not as a final product, but as the beginning of new initiatives to enhance renewable energy development in Hawaii.

ACKNOWLEDGEMENTS

The County of Kauai extends its gratitude to the Public Utilities Commission for instituting this renewable energy docket and in assigning a staff member to observe the collaborative meetings. The strong commitment from the PUC did a lot to focus the participants on the common goal of promoting renewables. We are hopeful that the information provided and the suggested strategies will be studied carefully and the responsible parties will implement an action agenda for positive results.

Our efforts would not have been as successful without the help of our dedicated and skilled facilitator, Ms. Jane Yamashiro. Special thanks go to her for putting up with us. Additional mahalos go to the other members of the collaborative process who contributed specific essentials to make the meetings go smoothly and in the preparation of the final report. The relationships that have been forged from this effort will continue to yield positive momentum and further dialogue in enhancing the development of more renewable energy resources in Hawaii.

LINDA CROCKETT LINGLE
Mayor

ROBERT T. JOHNSON
Economic Development Coordinator
TELEPHONE: (808) 243-7710
FACSIMILE: (808) 243-7995

OFFICE OF ECONOMIC DEVELOPMENT
COUNTY OF MAUI
200 SOUTH HIGH STREET, 6TH FLOOR
WAILUKU, MAUI, HAWAII USA 96793

STATEMENT OF POSITION BY THE COUNTY OF MAUI

Introduction

The Collaborative Document contains many recommendations that could enhance the development of renewable energy resources in Hawaii. However, taken as a whole, the Collaborative Document is not a coherent strategy; some strategies address root problems, others address symptoms, while some strategies may create even more problems. This Statement of Position reflects what we feel is the most meaningful course of action; four strategies that would create near term developmental opportunities for renewables. Our recommendations are based upon which renewable energy resources are ready for development in the County of Maui and how the key stakeholders can support the development of those resources.

Which renewable energy resources?

Wind Energy: Wind energy appears to be the most viable utility-scale renewable energy resource for near term development. Wind energy could also be viable for the County to develop if the County could wheel the power to its facilities.

Biomass Energy: Biomass energy constitutes the majority of Maui Electric Company's renewable energy portfolio. Further conventional, utility-scale development of this resource could be viable in the near to mid term. Biomass gasification testing was recently conducted on Maui and further demonstration of this technology could be supported by a utility Net Billing System. Biomass gasification energy systems or refuse-derived fuel energy systems could become commercially viable through a joint venture arrangement with the County. Small to mid scale biogas (from anaerobic digestion) energy systems are also being tested on Maui and further demonstration of this technology could be advanced by Net Billing Systems.

Solar Energy: Small scale photovoltaic (PV) energy systems could be viable for the utility in niche applications. Also, small scale PV and hybrid systems (PV, wind, and micro-hydro combinations) could be developed and demonstrated by some customers through a Net Billing System.

How can key stakeholders support the development of the above resources?

A. By changing the basis for determining avoided cost so that avoided cost is appropriately priced for renewables. This can be done by properly including renewable energy resources in integrated resource plans.

Avoided cost payments are currently based upon the cost of the fossil energy resources in the utilities' current integrated resource plans. However, the cost structures and operating characteristics between fossil and renewable energy resources are so different, that the avoided cost payments based upon fossil energy resources are usually insufficient to finance wind, biomass, and solar energy resources (see Appendix D, pp. 3-4).

Properly including renewables in integrated resource plans would generally increase the avoided cost payments for renewables with similar externality benefits (see Appendix C, p. 18 footnote). For example, if renewables were properly included in a utility integrated resource plan, a utility would either pay market value to develop the renewable energy resource itself or pay its avoided renewable energy capacity costs and avoided energy costs to an IPP to develop the same or similar renewable energy resource. (Note: In this instance, avoided renewable energy capacity costs refer to both firm and non-firm capacity. Accordingly, "avoided costs", as defined in the PUC's Avoided Cost Rules, may need to be changed to indicate that capacity costs apply to both firm and non-firm resources.) Therefore, for renewables to be financeable, avoided cost payments should to be based upon the cost of like renewables, not on lower costing fossil energy resources. This would then de-emphasize the need to have other price support mechanisms, like tax subsidies, production incentives, and externality price adders.

Only fossil-fueled supply-side resources are currently in the utilities' integrated resource plans because of *the inadequate evaluation and treatment of renewable energy resources and independent power producers in the Integrated Resource Planning (IRP) process (see Barrier 5.e.).* We feel that the currently low and inappropriately based avoided cost price offered to IPPs a primary barrier to the development of utility-scale renewable energy systems. Changing the basis for determining avoided cost would address the root cause of this problem. This would require that renewables and IPPs be properly included in integrated resource plans. To accomplish this, we recommend that the following two strategies be implemented.

1. Strategy 5.f.1: Proceed with the quantification of externalities.

We recommend this strategy because in order to properly include renewables in integrated resource plans, the IRP process needs to properly account for the externalities associated with all energy resources. This would then allow for the proper valuation of all energy resources and lead to the development of integrated resource plans that are responsive to customer preferences--plans that provide customers the most value for the amount of money they are willing to spend.

Follow-up recommendation for the PUC: This strategy is currently being implemented by the HECO Utilities in the context of their Externalities Action Plan. We further recommend that the PUC judge the results of this effort by both its ability to capture customers' preferences and then by its ability to integrate those preferences into the resource mix of utility integrated resource plans.

2. **Strategy 5.e.3: Consider competitive bidding, either in the form of "Green RFPs" which limit competition to renewables for fixed amounts of power, or, open competitive bidding which credits renewable resources to acknowledge and accommodate the environmental, social and cultural benefits inherent in their use.**

This strategy is an important complement to the above strategy because the proper consideration of quality-of-life externalities cannot be meaningfully addressed without knowing the specific site locations and project costs of energy facilities. Competitive bidding or Green RFPs would provide project specific data and allow the valuation of energy resources to be based upon actual projects, rather than on hypothetical scenarios. This would then eliminate concerns about the correctness of market assumptions and lead to the development of plans that best respond to utility and customer preferences.

B. By encouraging utility customers to demonstrate the viability of small scale renewable energy systems in distributed applications. This could be accomplished by establishing Net Billing Systems (NBS).

Some homeowners in the state and some government agencies on the mainland have developed small scale renewable energy systems to meet their energy demands. In order to further encourage *"Renewable Energy Pioneers"* to demonstrate the distributed application of renewables for utilities, we recommend the following strategy:

3. **Strategy 1.b.7: Net Billing Payment Rates for Small RE Systems.**

We recommend Net Billing because government funds for demonstration projects are becoming very limited and because NBS would create near term opportunities for customers to develop and demonstrate the use of renewables without creating unreasonable rate impacts. Additionally, NBS are desirable because: 1) it would stimulate market demand for renewable technologies, thereby helping to reduce market costs; 2) it would lower the utility's cost of demonstrating the performance of distributed systems by utilizing non-utility investments, and 3) it would help support the state's renewable energy service companies. Net Billing Systems are currently offered in eight states (MA, MN, NH, OK, PA, RI, TX, & CA).

While there have been some concerns expressed about NBS, they seem pertinent only to non-demonstration applications. Further, we feel that NBS can be established to address any other utility concerns (i.e., unacceptable rate impacts by setting reasonable program limits).

C. *By encouraging government agencies, particularly the counties, to develop renewable energy projects with high societal value.*

While the utilities are undertaking other activities, like the first two strategies above, the counties could be encouraged to take action and pursue the cost effective development of renewables. We specifically suggest that the counties have a role to play in developing renewables because by state statutes, the counties have the expressed authority to develop renewables for county facilities (HRS Section 46-19). This authority is more similar to allowing small municipal renewable energy utilities to service county facilities, rather than it is to setting a precedent for general wholesale or retail wheeling. Since wind, solar, and biomass resource areas are not typically adjacent to county facilities, we recommend the following to further the intent of HRS Section 46-19:

4. Strategy 1.b.6: Energy Wheeling for Counties.

We feel that reasonable, county-only wheeling rates would allow the counties to pursue cost effective, joint venture arrangements with renewable energy power producers. Also, county-only wheeling would allow the counties to match the development of intermittent renewable energy resources with loads that do not require firm power, thus maximizing the effectiveness of the renewable energy resource. For example, the energy from remote wind turbine generators could be matched with the demands of some of the Counties' water pumping facilities, particularly those with excess reservoir capacity and/or back-up generation.

We currently do not support general wholesale or retail wheeling, only wheeling for the counties. Therefore, we feel that most of the concerns expressed about wheeling in general do not apply to situations involving county-only wheeling, and that any remaining concerns can be accommodated in the design of a county-specific wheeling rate.

<u>What does not need to be done at this time?</u>

A. *Implementing major modifications to the permitting process.*

No specific concerns have been identified relating to the permitting of wind, biomass, or solar energy resources in the County of Maui. Therefore, we do not recommend any changes and suggest that efforts would be better focused on the above four strategies. The County and Maui Electric Company can help to prevent future permitting difficulties by improving and integrating their long range energy planning activities. However, the strategy for renewable energy subzones will not adequately improve permitting and more consideration is needed.

We have many serious concerns about the efficacy of many of the strategies under Barrier 3.a. However, rather than detailing our concerns here, we will address those concerns in the proper forum if they are pursued. Further, we have collaborated with the Counties of Hawaii and Kauai and endorse their discussion of these issues in their Statements of Position.

Conclusion

Our Statement of Position reflects our belief that the development of renewable energy resources is the shared responsibility of utilities, IPPs, utility customers, and government agencies. Therefore, a prudent course of action would enhance the opportunities for all to develop renewable energy resources. Also, since the roles of the developers are highly interdependent upon the actions of other stakeholders; like other developers, regulatory agencies, energy service companies, and public interest groups; development activities must be coordinated to complement the efforts of all parties. Lastly, since human and financial resources are becoming more limited, stakeholder efforts should be limited and focused on resolving the fundamental challenges that would lead to the near term development of renewables.

The primary vehicle by which the PUC can coordinate and focus the efforts of utilities and other key stakeholders is the IRP process. The Division of Consumer Advocacy also identify the importance of the IRP process and we support their more thorough discussion of this matter in their Statement of Position.

Our first two strategy recommendations are intended to customize the IRP process and address the two main issues affecting renewables in this process: value via externalities and cost via competitive bidding.

Our third strategy recommendation, Net Billing Systems, may be the cheapest way for utilities to implement demonstration programs on the distributed effects of small scale renewable energy systems. Net Billing programs can also be incorporated into the IRP process.

Our last strategy recommendation, County wheeling, is intended to maximize the public benefit from renewables: to develop renewables for the highest public value at the lowest cost. This also could be coordinated through the IRP process to prevent adverse utility impacts and to maximize public benefits.

In conclusion, we feel that the PUC can coordinate and focus the efforts of the utilities and others on a few key issues. We hope and trust that our suggestions will help the PUC to accomplish this.

Acknowledgements

We would like to express our gratitude to three main facilitator of this docket. First, we appreciate the efforts of Brian Nakamura of PICHTR, for obtaining funding for a group facilitator and for initiating informal topical discussions. Second, we thank Jane Aus Yamashiro for facilitating a difficult collaborative process; a process marked by complex issues and established positions. Third, our mahalo to Carl Freedman of the State Division of Consumer Advocacy, for facilitating the preparation of the Collaborative Document.

STATE OF HAWAII 1959

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

BENJAMIN J. CAYETANO
Governor
SEIJI F. NAYA
Director
RICK EGGED
Deputy Director

ENERGY DIVISION, 335 MERCHANT ST., RM. 110, HONOLULU, HAWAII 96813 PHONE: (808) 587-3800 FAX: (808) 587-3820

433:940226 #3

October 31, 1995

MEMORANDUM

TO: All Participants in Hawaii's Public Utilities Commission Docket No. 94-0226, Relating to Renewable Energy

FROM: Maurice H. Kaya, Energy Program Administrator

SUBJECT: Statement of Position

Because of Hawaii's over dependence on oil for its electricity and other energy requirements, the State strongly supports cost-effective diversification of its energy supplies. The State of Hawaii's Energy Policy Statement, 1992, states with regards to renewable energy development:

> *The State shall encourage the development of its renewable energy resources in a socially and environmentally sensitive cost-effective manner. Renewable energy research, development, and demonstration activities will be prioritized to advance those resources which have high commercialization potential and high benefit/cost ratio. The incorporation of renewables and alternative fossil fuels shall be considered in determining a practical energy strategy.*
>
> *Hawaii's utilities sector, whose dependence upon petroleum as its source of fuel far exceeds the national average, is significant because it presently has the greatest potential for improvement in the efficiency of energy use as well as for a major shift from oil to other sources in the near term. . .*

The basis for Hawaii's Energy Policy Statement is found in Hawaii's energy policy objectives, codified as Chapter 226-18 (a) of the Hawaii Revised Statutes (HRS), as amended by Act 96, Session Laws of Hawaii, 1994, which states these objectives as follows:

- *Dependable, efficient, and economic state-wide energy systems capable of supporting the needs of the people;*
- *Increased energy self-sufficiency* ***where the ratio of indigenous to imported energy use is increased*** *(emphasis added); and*
- *Greater energy security in the face of threats to Hawaii's energy supplies and systems.*

Equally important is one of the statutory energy policies designed to facilitate achievement of these policy objectives, Chapter 226-18 (c) (3), HRS:

> *Base decisions of least-cost supply-side and demand-side energy resource options on a comparison of their total cost and benefits when a least-cost is determined by a reasonably comprehensive, quantitative, and qualitative accounting of their long-term, direct and indirect economic, environmental, social, cultural, and public health cost and benefits.*

In short, the State seeks to maximize cost-effective commercial application of renewable energy resources, especially in the electricity generation sector. It is our position that when a cost/benefit analysis as described in the statute above is conducted, many current renewable energy technologies are cost-effective for implementation now. It is imperative to stress the immediate need to include renewable energy resources in Hawaii's utilities' plans, because when a typical fossil-fueled power generation facility is built, its expected life is approximately 30-50 years. This is particularly relevant, since the integrated resource plans of the electric utilities delineate that all of the new generation facilities within the next 1-10 years are fossil-fueled. On the Neighbor Islands, these planned generation units are all oil-fired. Construction of these facilities will preclude the need for additional capacity for many years to come, thereby inhibiting broader commercial application of renewable energy technologies which are currently cost-effective and technologically mature.

The State of Hawaii through its Hawaii's Energy Strategy (HES) Program conducted and produced a state-wide renewable energy resource assessment and implementation plan. For candidate renewable energy resources (e.g., solar, wind, biomass, etc.), this study identified areas with high resource development potential. This project also developed a renewable energy resource supply curve computer model, by which site-specific cost estimates can be produced by resource and technology for the purpose of estimating the cost-effectiveness of a particular development project. This information has been provided to all of Hawaii's utilities and the HES reports will be made widely available through the State Library System and other means.

The HES Renewable Energy Study found generally:

> *In Maui County, supplying future increases in electrical energy demand could be accomplished with renewable projects that are cost-effective even under the most conservative assumptions. In Hawaii and Kauai Counties, this could be accomplished with projects that are cost competitive under nominal scenarios. If conservative assumptions were used Hawaii and Kauai could still obtain 50% and 25%, respectively, of their projected energy demand growth from renewable energy projects. On Oahu, under nominal assumptions, renewable energy projects could meet over 30% of projected electricity demand increases . . .*

The following are statements of clarification regarding the reported positions of the Department of Business, Economic Development, and Tourism (DBEDT) in the Docket Report's Executive Summary Matrix, received in a meeting of the Collaborative Group, October, 26, 1995; the reader is cautioned that strategy numbers may vary from those in the final report due to editorial revisions made in finalizing the report:

NO.	STRATEGY	COMMENT
1.a.2	Support and maintain existing RE tax credits to the extent appropriate.	DBEDT will have to support the Administration's ultimate position.
1.a.3	Examine efficacy of additional state incentives to encourage RE.	DBEDT supports an analysis to determine the feasibility of such incentives.
1.b.2	Improve cost effectiveness of renewables through RDD&D.	When funds are available.
1.b.3	Increased/refocus government tax incentives.	Subject to the availability of adequate resources and Administration's budget priorities.
1.b.6	Energy wheeling for counties.	We support PUC proceeding to determine feasibility.
1.e.1	Require utilities to pay an externalities adder above avoided cost.	Provided such adders can withstand the "Federal Energy Regulatory Commission test" (see appendix on adders).
3.a.1	Amend HRS 201, Part IV, the Permit Facilitation Act of 1995.	Subject to the availability of adequate resources and Administration's budget priorities.
3.a.2	Fund Consolidated Application Permitting Process and Permit Facilitation Acts.	Subject to the availability of adequate resources and the Administration's budget priorities.
3.a.7	Special rules for permitting small projects.	Subject to the availability of adequate resources and the Administration's budget priorities.
3.d.1	Public education programs.	Subject to the availability of adequate resources and the Administration's budget priorities.
4.a.3	Apply adders to filed avoided energy costs.	Provided such adders can withstand the "Federal Energy Regulatory Commission test" (see appendix on adders).

NO.	STRATEGY	COMMENT
4.b.1	Use of tax credits that reduce initial costs of RE projects.	Subject to the availability of adequate resources and the Administration's budget priorities.
5.e.4	Consider retail wheeling.	Concur with docket analysis to determine feasibility, but do not support retail wheeling this time.
5.g.1	Consider funding additional copies of DBEDT Renewable Energy Resource Assessment Report.	Subject to the availability of adequate resources and the Administration's budget priorities.
7.a.2	Allow RE NUGs to transmit and distribute RE to customers willing to pay.	Concur with docket analysis to determine feasibility.
7.a.3	Permit County Governments to engage in RE retail wheeling.	Concur with docket analysis to determine feasibility.
9.c.1	Monitor and/or conduct RE demonstration projects.	Concur with monitoring projects, but conducting demonstration projects will be contingent on the availability of adequate resources and the Administration's budget priorities.
10.a.2	Convene workshop of affected agencies to resolve conflicts, streamline, etc.	Subject to the availability of adequate resources and the Administration's budget priorities.

Thank you for the opportunity to provide this statement.

ENERGY RESOURCE SYSTEMS

TO: PARTICIPANTS IN PUC RENEWABLES COLLABORATIVE
FROM: JOHN J. CROUCH, ENERGY RESOURCE SYSTEMS
SUBJECT: STATEMENT OF POSITION

HPUC DOCKET # 94-0226

October 24, 1995

With all due respect for everyone's efforts to identify specific barriers (actual or perceived) and develop strategies for removing those barriers that restrict greater use of renewables by our utilities, I am still beset with the conclusion that the real barrier is the fact that the energy utilities have no means of earning a fair return on the development or use of renewables and therefor have no real incentive to include Renewables in anyway in their mix of energy production. Only by economic advantage or regulatory policy will barriers to the use of Renewables be removed.

AND, If the state government continues its "head-in-the sand" approach to new business development, at the expense of sound business practices, by using a policy of maintaining the employment of the masses, and perpetuating a non cohesive governmental approach to development of Renewables, those presently in the renewable energy industry, as well as other embryonic businesses, will die a slow death and those interested in coming to Hawaii will keep on going to other Pacific Island and Asian countries.

One possible solution is the development of a utility **"Priority Peaking Period"** market for renewables. Renewables stored as battery, hydro, hydrogen, or fly wheel power, made available at **PPP**, would garner the price they need to encourage private investment and help solve the peaking power problem that exists with most electric utilities.

Goals with actual quantifiable numbers must replace unaccountable present state policy of **"Supporting Renewable Energy Where Economically Practical"**.

Priorities need to characterize our plans and attitude. Are we going to be leaders in renewable energy and develop an exportable expertise of technology and experience or are we just going to talk about the opportunity, well into the 21st century?

John J. Crouch

P.O. Box 38-4276 • Waikoloa, HI 96738
Phone (808) 883-9411 • Fax (808) 883-9119 • Mobile 936-5709

RENEWABLES STATEMENT OF THE HAWAIIAN ELECTRIC UTILITIES

RENEWABLE ENERGY DOCKET NO. 94-0226

EXECUTIVE SUMMARY

The Hawaiian Electric Utilities[1] strongly encourage and support the goal of "actual implementation" of reliable, sustainable, cost-effective renewable energy ("RE") resources. That support has been backed up by numerous power purchase contracts with RE developers, a multi-million dollar program to encourage the installation of solar water heaters, and the commitment of substantial dollar and manpower resources to acquire and apply RE resource data in their Integrated Resource Planning ("IRP") processes.

The Hawaii Public Utilities Commission ("PUC") has determined that this proceeding should focus on the "formulation of specific, concrete strategies" to encourage the development of Hawaii's renewable resources. To that end, the Hawaiian Electric Utilities set forth an RE Action Plan -- which incorporates new initiatives developed as a result of this proceeding, as well as on-going IRP and other activities:

1. Implement demand-side management ("DSM") programs that utilize solar renewable resources, and that shift load from on-peak to off-peak periods.

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1 Hawaiian Electric Company, Inc. ("HECO"), Maui Electric Company, Limited ("MECO"), and Hawaii Electric Light Company, Inc. ("HELCO").

Implement Solar Water Heating Component of DSM programs on all islands as soon as PUC approval is obtained.[2]

Pursue DSM programs such as cool storage, to shift load off-peak.

2. Streamline and simplify the permitting process for renewable resources.

Work with DBEDT through working groups and workshops to develop means to simplify and streamline the various permitting processes.

3. Facilitate (through the purchase of power) the implementation of renewable projects that are currently cost-effective.

Work with wind developers to finalize PPAs for specific wind project proposals, using a base rate/price cap avoided cost pricing structure to facilitate developer financing without unduly shifting risks to utility customers and/or utilities.[3]

Purchase additional firm capacity from Puna Geothermal Venture ("PGV") as additional, sustainable increments of capacity are made available at avoided cost.[4]

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2 The Residential Water Heating Programs for the three Hawaiian Electric Utilities are expected to reduce their system demands by an estimated 32 MW and their customers' energy usage by an estimated 134,000,000 kilowatthours, at a budgeted 5-year program cost of $51.7 million. A substantial percentage of the savings (and costs) are expected to come from the installation of an estimated 28,000 solar water heaters.

3 The Hawaiian Electric Utilities are negotiating with potential wind developers with respect to possible projects at a number of different sites on Oahu, Maui and Hawaii.

4 HELCO is negotiating with PGV for the purchase of an additional 5 MW of firm capacity, as stated in its Generation Resource Contingency Plan.

Negotiate with developers for other possible RE projects.[5]

4. Participate in and monitor on-going renewable energy research, development and demonstration ("RD&D") projects, and carry-out supply-side study activities included in the Hawaiian Electric Utilities' approved IRP Plans.

5. Develop and implement a limited number of RD&D projects targeted to Hawaii-specific barriers.

Utility dollars would have to be leveraged with state/federal dollars, and supported by favorable regulatory treatment of project costs.

6. Implement a "green pricing" program.

With the assistance of an Advisory Group, develop a "green pricing" proposal to be reviewed and approved by the PUC.[6]

7. Improve evaluation and consideration of beneficial impacts of RE resources in utility resource planning processes.

Quantify externalities in IRP process, if and to the extent feasible, with input of Externalities Advisory Group.

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5 For example, Tenneco Gas Corp. and Arkenol, Inc. have publicly announced that they are considering a joint venture to do a biomass-to-ethanol project, using grass feedstock to be grown on about 12,000 acres of sugar land at Ka'u on the Big Island. The ethanol would be marketed as automobile or other fuel, and the biomass waste would be burned to produce about 20 MW of power for sale to HELCO. Act 199 (1994) requires incorporation of ethanol in gasoline sold in Hawaii (after July 1, 1996), at least to the extent sufficient quantities of "competitively-priced" ethanol are available to meet the 10% requirement.

6 A green pricing program would provide utility customers with the opportunity to pay more for power produced from renewables, which could provide funds to pay a premium to RE resource developers, or to fund further RE RD&D activities.

Consider (in IRP) models and criteria that are sensitive to contribution of as-available renewable resources (such as wind) and distributed generation to system reliability.

Participate in and monitor RE demonstration projects, and analyze the potential for niche applications for photovoltaics.

Undertake or update studies to determine the level of intermittent power that each island system can absorb.

Continue IRP analyses of energy storage systems.

HAWAII RENEWABLES

The significant renewable resources available in Hawaii include (1) wind, (2) photovoltaics, (3) solar thermal, (4) hydroelectric (which in Hawaii, generally would be run-of-the-river), (5) biomass, (6) wave, (7) ocean thermal and (8) geothermal, to the extent that it is determined to be truly renewable.

In reviewing the potential barriers to the development and implementation of renewable resources, and the implementation of strategies, it is important to differentiate among the different renewable resources, and the technologies that would utilize such resources. For example, (1) dedicated biomass developers face the challenge of obtaining a sustainable, cost-effective biomass feed stock; (2) geothermal developers face permitting challenges, and questions regarding the environmental, social and cultural impacts of developing the resource and the identification and sustainability of the resource; (3) wave and ocean thermal energy conversion ("OTEC") systems are still in the RD&D stage; (4) "newer generation" wind energy systems, which appear to be more cost-effective and compatible with electric utility systems than prior generations of wind machines, are being commercially tested at a number of mainland sites; and (5) photovoltaic systems may be cost-effective in "niche", but not large-scale, applications.

The barriers applicable to the various renewable resources, and the appropriate strategies, will depend on the maturity of the technology, whether the resource is intermittent or firm, and numerous other factors. Assuming that the technology is commercially available, then the degree to which the resource is utilized should be a function of (1) the availability of the resource, (2) the permitability of the resource, (3) the net cost of producing power from the resource (including any subsidies available in the form of tax credits, etc.), (4) the price available to be paid for power produced by the resource, and (5) the risks attendant to developing, owning and operating the facilities necessary to produce power from the resource (versus the return available to the producer).

ACTUAL BARRIERS

There are a number of real barriers impeding the implementation of renewable resources, and there are concrete strategies that can be implemented to address these barriers. These actual barriers include:

1. Some RE resources are not cost-effective at this time.

The expected cost of producing power from the resources exceeds the expected price for the power. Recommended strategies to address this barrier include:

(a) <u>Pursue the deployment of renewables that appear to be currently cost-effective through power purchase negotiations</u>. If the assumption is correct that oil prices will increase faster than the cost of renewable resources, then additional renewable resources may become cost-effective in the near-term.

(b) <u>Support and maintain tax credits that reduce the cost to developers (not to society) of developing RE resources</u>. At the present time, production tax credits are provided by the Energy Policy Act of 1992 ("EPACT"), and state tax credits are provided by H.R.S. §235-12. The Hawaiian Electric Utilities recognize that the State's financial resources are limited, and that the benefits of maintaining state energy tax credits may have to be evaluated against other state funding requirements. However, taxpayers rather than ratepayers, should pay for any subsidies determined to be appropriate to encourage the development of RE resources. If the utilities pick up the costs, then the impact on ratepayers could be substantial. This would not only have competitive impacts, but would be especially burdensome to utility customers. If the purpose is to provide societal benefits, they should be paid for through taxes (which are generally progressive), rather than through electric rates. At the same time, taxpayers need to be assured that the costs they incur (particularly during periods of fiscal constraints) will produce commensurate benefits.

HECO also supports the strategy of establishing a working group, under DBEDT's direction, to review the existing tax credits for renewable energy projects and energy conservation measures, to examine the benefits to the state derived from these subsidies, and to consider legislation to increase or refocus the government tax support in order to increase the level of renewable energy projects.

(c) Develop and implement a "green pricing" tariff. "Green pricing" is a utility rate option under which ratepayers would be given the option of paying higher rates, with the difference between the higher rates and normal rates used to acquire new renewable resources. For purposes of this proceeding, HECO authored and provided to the collaborative an illustrative Pilot Green Pricing Program. HECO also proposed that a Green Pricing Advisory Group (which would include the utilities, the Consumer Advocate, DBEDT, PICHTR, and others) be formed to advise the Hawaiian Electric Utilities regarding development of the tariff proposal to be submitted to the PUC for approval. This would allow broad-based input into the form of this significant initiative.

If an RE resource is not cost-effective, even when subsidized by state and federal tax credits, the alternatives are to wait for the cost (in real dollars) to decrease, or to artificially increase the price paid to acquire the resource.

In the view of the Hawaiian Electric Utilities, utility customers should not be required to pay more than avoided costs for power generated from renewable resources in order to promote societal goals.[7] At the same time, customers should be offered the opportunity to voluntarily pay a "green pricing" premium.

2. Although certain as-available RE resources may be projected to be cost-effective in the long-term (based on projected increases in fuel oil prices), the form of the price offered to potential developers of the resources (based on the utility's oil-based avoided energy cost) may not facilitate financing of the projects.

As-available RE projects generally are capital-intensive, but their on-going resource production costs are relatively low. At the same time, the prices paid for the as-available energy produced by the facilities may be based on the utility's filed avoided energy cost, which vary with the price of oil. As a result, there may be a potential mismatch between the as-available renewable energy producer's cost structure, and the revenue stream for the RE project. The uncertainty of the oil-priced based revenue stream may make it difficult to obtain debt financing for the project.

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7 The PUC has recognized that renewable PPAs must be reasonable to the utility's customers. For example, in the case of the HC&S PPA, the PUC approved the PPA subject to a reduction in the capacity payment agreed to between MECO and HC&S to a level based on MECO's then-current avoided capacity costs. Re Maui Electric Co., 117 P.U.R.4th at 136-37.

The legislatively-mandated mechanism for encouraging financing for as-available renewable energy projects is the minimum floor rate. Under the PUC's Avoided Cost Rules, minimum floor rates are based on the avoided energy costs at the time as-available contracts are approved. The minimum floor price does assure the project financing parties of a minimum cash flow (subject to the ability of the project to actually produce the energy projected for the project). However, minimum floor rates are not related to the cash flow necessary to make projects financeable -- they may be too high or too low. Moreover, minimum floor rates set during periods of temporarily high short-run avoided costs have resulted in payment rates in excess of avoided costs. In 1992, 1993 and 1994, the Hawaiian Electric utilities paid approximately $10 million, $10 million and $14 million, respectively, in excess of their filed avoided energy costs for purchased energy, generally due to the inclusion of minimum purchase rates in their power purchase agreements for non-fossil fuel producers. Thus, the requirement for minimum purchase rates for nonfossil fuel QFs violates the avoided cost cap imposed by PURPA, which preempts inconsistent State law. See Re Connecticut Light & Power Co., Docket No. EL-93-55-000, Order Granting Petition for Declaratory Order (FERC Jan. 11, 1995).

In order to facilitate financing for such projects (without unduly shifting risks to utility customers and/or utilities), the Hawaiian Electric Utilities are willing to negotiate, on a voluntary basis, a base energy rate that will act as a floor if oil prices (and, therefore, avoided energy costs) decline below a minimum level.[8] In exchange for providing the security of a floor price, the utilities would expect to obtain, for the benefit of their customers, a ceiling rate. Thus, the RE developer would be paid the avoided energy cost calculated at the time of energy delivery (the quarterly filed avoided energy cost), subject to the bounds of the base energy rate and the ceiling rate over the term of the PPA.[9]

3. <u>There are real and significant limitations on the amount of RE power that can be accommodated by electric utilities</u>.

The ability of a utility to accommodate additional power will depend on (a) the utility's need for power, (b) whether the power is firm or as-available, (c) whether the power is dispatchable or intermittent, (d) the reliability of the power, (e) the extent to which the power will be available (particularly during yearly and daily peak periods), (f) the

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8 This will provide RE financing parties with some assurance of a minimum cash flow for RE projects. RE developers will have to ensure that project cash flows are adequate to attract debt financing by developing cost-effective projects with sufficient equity investment.

9 The Hawaiian Electric Utilities do <u>not</u> believe that it is either necessary, or just and reasonable to their customers, to offer fixed or formula rates to as-available producers (based on long-term projections of avoided cost) rather than current avoided energy costs. Fixed or formula rates based on overly pessimistic forecasts of fossil fuel prices have resulted in current PPA prices in other jurisdictions, such as California and New York, that now exceed the utility's current avoided costs by as much as a factor of four.

physical characteristics of the power and its impact on the stability of the utility system, and (g) other factors.

Utility system minimum load conditions (during late evening or early morning periods) can result in curtailment of as-available renewable generation, which can affect the economic viability and financeability of renewable projects. Moreover, some types of renewable energy are only available at certain times due to the intermittency of wind, sun and run-of-the-river hydro resources. The intermittency or variability of the resources can lead to system stability problems (i.e., voltage and frequency fluctuations, especially for wind resources), and limit the value of the power in avoiding future capacity additions.

In order to address these concerns, the Hawaiian Electric Utilities have indicated that they (and/or RE developers) will undertake or update studies to determine the level of intermittent power that each island system can handle. Prior MECO and HELCO studies have indicated that the amount of wind generated power their systems can absorb is limited.

The Hawaiian Electric Utilities are also analyzing the potential for "niche" applications for photovoltaics ("PV"). PV has the potential to be used in remote locations to preclude or reduce the need for transmission and distribution line extensions. HELCO's PV applications program is examining the use of PV for remote service.

In addition, the Hawaiian Electric Utilities recognize that the development of energy storage systems (whether utility-owned or owned by RE developers) would allow energy generated during off-peak hours to be stored and used as a source of on-peak energy. HECO[10], HELCO and MECO, as part of their Supply-Side Action Plans, agreed to conduct separate studies to examine the potential for pumped storage hydroelectric within their service areas. HELCO has studied the feasibility of and received two bids for the installation of a Battery Energy Storage Plant on the Big Island.

Utility DSM programs that encourage customer electricity loads to be shifted from on-peak to off-peak hours increase the utility's off-peak loads. These can take the form of rate design programs (such as time-of-use rates[11]) or "load-shifting" DSM programs targeted at specific end-uses (such as "cool storage" programs aimed at air conditioning loads).[12]

The development of off-peak loads also could be promoted through "valley-filling" DSM programs. For example, Hawaii's shorter driving distances and temperate climate are conducive to the use of electric vehicles. Nighttime charging

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10 DLNR, DBEDT and HECO completed a cooperative study regarding the feasibility of a pumped storage hydroelectric project at two sites on Oahu.

11 The Hawaiian Electric Utilities currently offer time-of-use service to large general light and/or power loads (Schedule U) and off-peak service to large industrial processing or pumping loads (Rider M), and plan to continue to study the cost-effectiveness of time-of-use rates for residential and other business customers in their IRP processes.

12 For example, on April 21, 1995, HECO filed an application (Docket No. 95-0092) for approval of a cool storage off-peak contract for St. Francis Medical Center.

of electric vehicle batteries could provide off-peak load for electric utilities in the future.

4. <u>Some RE technologies are not technically mature enough (i.e., sufficiently developed) to be economically viable at this time</u>.

Commercial implementation of "immature" technologies can lead to uncertainty regarding the reliability, sustainability and cost to projects employing the technology. Research, development and demonstration provide the stages for reaching a "mature" state. The federal and Hawaii state governments have provided limited funding for RE RD&D through grants and tax credits. Electric utilities have provided funding from their own RD&D efforts and through their membership in Electric Power Research Institute. However, the funding for RE RD&D projects is limited.

Therefore, it is important to monitor on-going RE RD&D developments. The results of developments in other jurisdictions are generally transferrable to RE technologies in Hawaii, with consideration of local conditions. RE demonstration projects can be very expensive, and much can be learned from experience in other jurisdictions <u>without</u> the substantial expense associated with conducting an RE demonstration project.[13]

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13 The Hawaiian Electric Utilities currently monitor RE developments through their membership and active participation in various renewable energy associations and working groups, such as the (1) Utility Wind Interest Group ("UWIG"), (2) Wind Users Group, (3) Utility Photovoltaic Group ("UPVG"), (4) Photovoltaics for Utility

(footnote continued on next page)

At the same time, actively participating in RE demonstration projects provides valuable hands-on operating experience, in addition to the other benefits of conducting such projects. The Hawaiian Electric Utilities intend to continue to explore and develop opportunities to take part in joint RD&D activities. For example, (a) HELCO operated the state's geothermal project -- Well Site A (HGP-A) power plant for eight years, (b) MECO has operated and maintained the PV USA 20 kW photovoltaic system on Maui since October 1989, (c) HELCO has installed and is operating, maintaining and monitoring a small, off-grid photovoltaic demonstration project at a Hawaii County park, (d) the Utility Photovoltaic Group recently awarded HELCO a grant to install a 20-kW photovoltaic system on a Hawaii County gymnasium in Kona, (e) HECO and EPRI have cost-shared $130,000 out of a total of approximately $330,000 for the installation of an 18 kW PV installation at Hickam Air Force Base as part of EPA's military base photovoltaic program, (f) HECO is a team member for a 50 kW closed-cycle OTEC demonstration project with a number of other

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Scale Application ("PUSA"), (5) Geothermal Resource Council, (6) EPRI's Geothermal Working Group, (7) EPRI's Renewables & Hydroelectric Business Unit, (8) State's Photovoltaic for Utilities ("PV4U"), (9) Utilities Renewable Resource Association ("URRA"), (10) American Solar Energy Society ("ASES"), (11) American Wind Energy Association ("AWEA"), (12) EEI's Renewable Technologies Subject Area Committee and (13) DLNR's Geothermal Technical Advisory Group. In addition, the Hawaiian Electric Utilities communicate with other utilities, national laboratories, vendors, and universities; attend conferences and workshops and visit operating systems; and subscribe to RE journals and magazines.

organizations, and (g) HELCO plans to accept the transfer of the Lalamilo Wells Windfarm from HEI, which will offer an opportunity to possibly install an advanced wind turbine on a demonstration basis.

The Hawaiian Electric Utilities intend to use a portion of their respective R&D budgets to attempt to develop and implement pilot R&D demonstration projects targeted to Hawaii-specific renewable technologies. The amount of funding available for such projects will depend on the extent to which utility dollars can be leveraged with state/federal dollars. It is also possible that the funds obtained through the green pricing program can be used for RE RD&D projects.

5. <u>The complex and lengthy permitting processes for all energy projects, including RE projects, are a very real barrier to the implementation of certain RE resources</u>.

The Hawaiian Electric Utilities have committed to participating in work groups to facilitate simplifying and streamlining the permitting process. Regardless of this effort, it is essential that the State provide adequate resources in the forms of funding, personnel and training, to permitting agencies to allow more timely permit processing.

<u>NON-BARRIERS</u>

There are also a number of <u>perceived</u> barriers to the implementation of RE resources, which have <u>not</u> been demonstrated to be actual barriers.

1. The inclusion of renewables in IRP Plans.

As the PUC is aware from the utilities' IRP dockets, a number of parties believe that RE resources and/or non--utility generators ("NUGs") must be included in the utilities' Integrated Resource Plans ("IRP Plans") for renewables to be developed. As the PUC found, this is simply not the case. The utilities' preferred plans are consistent with the potential ultimate implementation of alternate plans that include renewable resources. Moreover, the PUC explicitly found that "NUGs are free to submit proposals to [the utilities] for evaluation to implement, replace, or defer the resource options included in [the utilities' IRP Plans]."[14]

Some consideration was given in the collaborative process to whether incentives should be provided to utility shareholders for investing in RE facilities or for purchasing power from RE developers. The Hawaiian Electric Utilities have not supported or proposed such incentives. They will purchase power from RE developers, as they have on numerous occasions in the past, if the terms and conditions of the PPAs are just and reasonable for their customers. They also will consider investing in cost-effective RE projects if the potential returns are commensurate with the risk. In addition, they will consider joint ventures to develop certain RE projects, if the PUC provides some indication that it does not consider such joint ventures to be inappropriate.

14 Re Hawaiian Electric Co., Docket No. 7257, Decision and Order No. 13839 (March 31, 1995) at 15.

At the same time, the Hawaiian Electric Utilities recognize that it is possible to improve the manner in which renewables are considered in the IRP processes. Methodologies and models for quantitatively valuing the positive (and negative) attributes of renewable resources can be improved. Benefits and risks that can be better evaluated include distributed generation benefits, resource diversity benefits, resource supply risks, and technology risks.[15]

The Hawaiian Electric Utilities also have agreed that the acquisition of additional renewable energy resource data would facilitate their evaluation of RE resources in the IRP process. They have undertaken and are continuing to undertake substantial efforts to improve the body of renewable energy resource data in Hawaii, particularly through their IRP Supply-Side Action Plans (which include activities and budgets for biomass crop assessments, pumped storage hydroelectric feasibility studies, a battery energy storage plant evaluation, hydroelectric studies and other RE activities), and through participation in RE demonstration projects.

2. <u>The calculation of avoided costs</u>.

Over the years it has been claimed without substantiation that "true" avoided costs are higher than the

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15 As part of their Supply-Side Action Plans, the Hawaiian Electric Utilities are conducting studies to evaluate opportunities for dispersed generation. They also have indicated in this proceeding that issues relating to renewables modeling and capacity expansion criteria should be further addressed (with Advisory Group input) in the utilities' next IRP Plan cycles, which are beginning at this time.

avoided cost prices offered by utilities. This is simply not the case.

As-available <u>energy</u> producers are paid on the basis of the avoided energy costs filed quarterly with the PUC based on the PUC-directed proxy method. This method will be changed to a more accurate production simulation method if the PUC approves the stipulation of the parties filed in Docket No. 7310. However, even though additional elements will be included in the avoided energy cost calculation once the stipulation is approved, the utilities' avoided energy costs generally will <u>not</u> increase.

The calculation of avoided <u>capacity</u> costs for firm capacity PPAs generally has been more of an issue with QFs burning oil, than with RE producers.

The fact is that RE producers are currently paid <u>more</u> than avoided costs as a result of the application of legislatively mandated minimum purchase rates, and the coupling of long-term avoided capacity costs with short-term avoided energy costs in power purchase agreements ("PPAs") with firm capacity RE producers.[16]

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16 Most of the firm capacity PPAs have included a capacity price based on long-term avoided capacity costs, and an energy price based on filed, short-run as-available energy costs. Generally, this has resulted in a higher energy price than if the producer were paid on the basis of the avoided energy cost directly associated with the capacity avoided by the PPA. The PUC has now expressed its preference that the avoided energy cost be associated with the avoided capacity. <u>See</u> <u>Re Maui Electric Co.</u>, 117 P.U.R.4th 122, 135 (Haw. PUC 1990).

3. Power purchase negotiations.

Some independent power producers have also tried to perpetuate the myth that the utilities are unwilling to negotiate PPAs with RE producers. This myth is demonstratively false -- the utilities have negotiated numerous PPAs with RE producers. These include PPAs for: (1) the purchase of firm capacity and energy from sugar cane processing companies, including HCPC, Hamakua Sugar, Puna Sugar, and HC&S; (2) as-available energy contracts with sugar producers, including Oahu Sugar, Waialua Sugar and Pioneer Mill; (3) a firm energy PPA, succeeded by a firm capacity PPA, with a waste-to-energy producer, H-Power; (4) firm capacity PPAs with woodchip biomass producers, including Puna Sugar after it terminated its sugar operations, and Onsite Energy; (5) an as-available energy PPA with a run-of-the-river hydroelectric producer, Wailuku River Hydroelectric Power Company; (6) as-available energy contracts with wind power producers, including Kamaoa Wind Energy Partners, Lalamilo, Makani Uwila, Kahua Ranch, and U.S. Windpower; (7) an as-available energy PPA with a methane-from-landfill producer; (8) a firm capacity PPA with a geothermal producer, PGV; and (9) an as-available energy contract with a geothermal producer, True/Mid-Pacific Geothermal Venture.

There have been fewer PPAs with RE producers in recent years, but this has been due to lower avoided costs (as a result of lower oil prices) or permitting problems, not to difficulties in negotiating PPAs. In fact, the Hawaiian

Electric Utilities have gone beyond the requirements of the PUC's Avoided Cost Rules in some instances to facilitate the development of proposed hydroelectric and wind projects. For example, in order to encourage renewable energy projects, the Hawaiian Electric Utilities agreed on two occasions in 1991 to base the minimum energy purchase rate on the filed avoided energy costs in effect at the time the PPA was executed, rather than the filed avoided energy costs in effect at the time the PPA was approved by the PUC (as specified by HAR ¶6-74-1).[17]

On occasion, it has taken a substantial period of time to successfully conclude PPA negotiations with an executed, PUC-approved PPA. (This was the case with the PGV PPA.) However, lengthy negotiations generally have been the result of the utilities' willingness to continue to review proposals from project developers, despite the developers' request for prices above avoided costs.

In order to overcome this alleged barrier, some of the parties have proposed retail wheeling strategies that would permit RE developers to sell power directly to large customers, such as the counties, using the utilities' transmission systems. These proposals ignore the numerous problems associated with retail wheeling, and incorrectly assume that RE

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17 The PUC (and the Consumer Advocate) accepted this departure from the Commission's avoided cost rules in the case of the Wailuku Hydroelectric Power Company PPA, but not in the case of the U. S. Windpower PPA (because of the undeveloped nature of the project.) Compare Re Hawaii Electric Light Co., Docket No. 6956, Decision and Order No. 11333 (October 28, 1991) with Re Hawaiian Electric Co., Docket No. 6944, Decision and Order No. 11611 (May 7, 1992).

power can compete with fossil-fueled power in an open access market.

"QUICK FIXES"

The Hawaiian Electric Utilities support concrete strategies to promote the development and implementation of cost-effective renewables. At the same time, they strenuously oppose "quick fix" strategies directed at forcing the implementation of renewables that are not cost-effective. Examples of inappropriate strategies include proposals to (a) require utilities and their customers to pay a premium above avoided cost for renewables (by means of a so-called externalities adder), (b) mandate arbitrary "set-asides" or quotas for renewables,[18] (c) artificially inflate the costs of fossil-fueled power by eliminating the fuel adjustment clause, and (d) require unjustified giveaways in power purchase contracts.

In other jurisdictions, these "fixes" can and have resulted in payments to renewables producers well above the utility's avoided costs, higher rates to utility consumers, uneconomic bypass of the utility system by those large industrial customers that can add fossil-fuel-fired self-generation or cogeneration to avoid the higher rates (resulting in still higher rates for small business and

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18 Mandatory set-aside requirements for QFs would violate PURPA, would be arbitrary and would violate principles of least-cost planning (because they would be analogous to agreeing to buy something without knowing the price, either for what is being purchased or for the alternatives.)

residential customers without bypass options), and a less competitive economy.

Utility resource planning should be governed by the PUC's IRP Framework, which appropriately permits consideration of a number of alternatives for achieving objectives such as a reduction in Hawaii's dependence on imported oil.[19] The IRP process is broad enough to allow consideration of specific targeted objectives, and consideration of alternative IRP Plans that include a greater percentage of RE resources.[20]

Externalities can and should be considered in the IRP process, as the PUC's IRP Framework requires. The Hawaiian Electric Utilities are jointly participating in an Externalities Action Plan, whose objective is to develop a process which incorporates external costs and benefits into the planning process on a level playing field among resources. The PUC has approved the Externalities Action Plan, and an

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19 There are a number of ways to reduce Hawaii's reliance on oil for electric end-uses. These include (1) conservation strategies (which the HECO utilities are actively pursuing in the form of energy-efficiency DSM programs), (2) the use of coal (which is currently being burned at the AES Barbers Point 180 MW facility on Oahu and the HCPC facility on the Big Island), (3) the promotion of renewable resources, and (4) the introduction of combined cycle facilities (on Maui and Oahu) that recover waste heat from oil-fired generation to generate additional power. As indicated at the January 26, 1995 PUC renewable energy workshop, the amount of fuel oil used to produce electricity by HECO on Oahu has decreased significantly from 1990 to 1993, despite an increase in the production of electricity by HECO.

20 For example, to facilitate consideration of such resources, the Hawaiian Electric Utilities generally have developed a "green" IRP Plan as one of the alternative plans evaluated in their IRP process

Externalities Advisory Group is actively participating in the externalities quantification process.

The consideration of externalities, however, does <u>not</u> warrant the payment of an externalities adder to an RE producer. Such an adder (in the case of a QF) would violate FERC's recent avoided cost cap rulings, would result in higher rates, would encourage uneconomic bypass of the utility system, could result in degradation of the environment (as a result of the installation of oil-fired generation by customers seeking to avoid the higher rates), and would negatively impact the State's economy.

<u>CONCLUSION</u>

The Hawaiian Electric Utilities strongly support the goals of increased energy self-sufficiency and greater energy security, but believe that these goals should be obtained without sacrificing the goal of dependable, efficient, economical statewide energy systems capable of supporting the needs of the people. The concrete strategies included in the RE Action Plan proposed by the Hawaiian Electric Utilities will foster the implementation of sustainable, reliable, cost-effective renewables.

INTER-ISLAND SOLAR SUPPLY

345 NORTH NIMITZ HWY. HONOLULU, HAWAII 96817 PHONE (808) 523-0711 FAX (808) 536-5586

STATEMENT OF CULLY JUDD

I think the Commission should note that the only strategy which received the unanimous support of the collaborative was strategy 1.a 2, "support and maintain existing solar energy tax credits."

The support of the collaborative is understandable because:

1. the technologies (principally solar water heating) which are the beneficiaries of credits effectively forward the State's renewable energy policy while many other government and private sector initiatives are either too controversial or ineffective.

2. the credits complement the interests of both the utilities and renewable energy developers.

3. the credits are net income producers for the State government.

4. elimination of the credits would threaten or destroy one of the only locally based successful components of the renewable energy industry in Hawaii.

For a number of reasons, the collaborative process was unable to reach agreement on any substantial new initiatives or strategies to facilitate renewable resources in Hawaii. The fact that unanimous support could be gotten from such diverse and sometimes hostile parties should be a clear indication to the Commission and legislature as to the value and wisdom of retaining the existing credits.

In addition to supporting the retention of existing credits, the Commission could have an immediate impact on the health and survival of Hawaii's solar energy industry by expediting consideration and resolution of HECO's demand side management filing. Because HECO's proposed program includes rebates for the purchase of energy efficient devices and solar water heating, consumers are deferring the purchase of such improvements. These deferrals threaten the survival and solvency of some of the small businesses which cannot similarly defer their expenses. At present no one can even suggest when, or if, the Commission will permit HECO to initiate the program. So we--consumers and providers--all remain in an unsatisfactory limbo.

H.M. RICHARDS
MANAGER

KAHUA RANCH LTD.

P.O. BOX 837
KAMUELA, HAWAII 96743

PHONE (808) 882-4646
FAX (808) 882-4444

STATEMENT ON COLLABORATIVE DOCUMENT PUC NO. 94-0226

On January 26, 1995, I participated in the panel representing Independent Power Producers (IPPs) at the first workshop held by the Commission in connection with this docket. In my remarks at that time, I presented charts prepared by the National Association of Regulatory Utility Commissioners (NARUC) and National Renewable Energy Laboratory (NREL) which identified Hawaii's performance with respect to 12 statutory and regulatory mechanisms for forwarding renewable energy use by way of contracts with IPPs. At that time I called attention to the fact the Hawaii was a sorry 1 for 12 in terms of adopting these initiatives, and urged the Commission to examine them and adopt them as appropriate. The Commission subsequently identified the "collaborative" as a means of examination and asked that we identify strategies upon which there is consensus.

Now that the collaborative process is finished, the sad but predictable outcome is that, with respect to the 11 unadopted strategies identified by NREL and NARUC: 1) each of them are listed and considered in the collaborative document as potential strategies; 2) none of them received support by consensus; 3) *each of them are opposed by the utilities; and 4) the utilities are using this docket as a means to begin questioning the validity of the one strategy that is a part of Hawaii's laws (minimum floor rates).*

I think that these results confirm what many of us believe as a matter of experience: That the utilities have an unspoken policy against the promotion of renewable resources and contracting with independent power producers even if it is required by law. Whether we are buried in minutia, outgunned by superior legal an technical resources, or simply delayed beyond our ability to bear, the utility has systematically worked at making meaningless our State's commitment to energy independence and renewable resources.

Unfortunately, this "collaborative process" has turned out to be almost a perfect reflection of our State's inability to keep its energy promises. Thousands of dollars, hundreds of hours, and tens of potentially productive ideas have been lost in over 200 pages of inconclusion, distraction and argument that does almost nothing to effect the status quo.

In examining this document, I urge the Commission to see, not merely what it says, but what it means about the nature of the intentions, relationships and strategies of those of us involved in renewable energy in Hawaii. And I urge the Commission to act upon these understandings.

Position Statement

of

David Rezachek, Ph.D., P.E.

Regarding

Docket No. 94-0226 Renewable Energy Resource Investigation

General Comments

The subject renewables docket is an informational one. One of the principal purposes of this docket is to provide the Hawaii Public Utilities Commission (PUC) with enough information for them to make informed decisions about the most appropriate regulatory strategies to facilitate the development of renewable energy resources in Hawaii. An additional purpose of this docket is to identify and recommend legislative, policy and personal initiatives or strategies which should also be implemented.

Towards this end, the PUC has solicited the participation of both local and national experts in this area. Numerous presentations have been made on various facets of this topic. Participants have been provided an opportunity to comment freely and to share their knowledge, experience, ideas, and opinions. Attempts have been made to achieve consensus on many issues.

The comments presented here draw heavily on the information presented by invited experts and other reference sources as well as the author's knowledge, experience, and training. This information, as well as a consideration of Hawaii's unique energy situation, should serve as guide for PUC decision making.

The following are this author's "priority strategies" which should greatly facilitate renewable energy development in Hawaii:

1. **An accurate determination of "real" avoided cost through incorporation of all relevant avoided cost components and provision of an avoided cost price which reflects this.**

2. **Implementation of the Permit Process Facilitation Act.**

3. **Development of Renewable Energy Resource Subzones (or "energy resource areas") (and "RE Enterprise Zones"), which are sites compatible with renewable energy resource availability and land-use compatibility, and long-range county plans.**

4. **A fair and expeditious PPA contracting process using standard form contracts.**

5. **Continuation and improvement of Energy Conservation Income Tax Credits and additional incentives for renewables** (e.g., net energy billing, production incentives and Green Pricing).

6. **An Hawaii Energy Commission** (or, at a minimum adoption of the some of the functions and authority of the California Energy Commission which have assisted in the rapid renewable energy development in California).

7. **Development of realistic long-term renewable energy development goals, and programs to meet these goals.** (For example, Appendix A of this Position Statement shows the author's estimate of Renewable Energy Potential in Hawaii. This Appendix could serve as the basis for the establishment of preliminary renewable energy development goal. The task then is to prioritize and implement strategies developed in this Docket which can achieve this goal.)

8. **Utility leadership and strong state support.**

Specific Comments

Note: Specific comments are made only for those Barriers and/or Strategies which the author believes warrant additional discussion.

Barrier Grouping 1 **Current avoided cost price offered to renewable developer/producers may be insufficient.**

Barrier 1.a **Uncertainties regarding the applicability and availability of state income tax credits to large-scale renewable energy projects.**

STRATEGIES:

Strategy 1.a.2 **Support and maintain existing RE tax credits to the extent appropriate.**

Studies conducted by the Hawaii Solar Energy Association (HSEA), and others, show that the tax benefits, alone, from Energy Conservation Income Tax Credits exceed the apparent costs of the tax credits. This positive benefit/cost ratio does not include environmental, energy security, or balance of trade benefits, which are substantial.

The HSEA has long-term data which show the severe adverse impacts that reductions and/or elimination of tax credits can have. These data show that a total loss of credits can decimate the solar industry. The industry may not be able to recover from another severe setback. The State should evaluate the impact of elimination of eliminating tax credits as well as the relative benefits and costs of alternative support programs.

Government incentive programs for renewables (such as income tax credits) are susceptible to budgetary fluctuations and the changing policies of different administrations. Even the discussion or proposal to eliminate such tax credits or a delay in their implementation has the potential to adversely affect the financing and development of renewable energy projects.

Efforts should be directed at maintaining or extending these tax credits. Renewable energy proponents and developers must lobby hard to maintain these federal tax-related tax incentives.

Strategy 1.a.3 Examine the efficacy of additional State incentives to encourage RE.

Other incentive programs such as low- or no-interest loans, subsidized loans, utility rate surcharges, and green pricing programs may be just as or more cost effective than tax credits. These types of incentive program should be thoroughly investigated.

The relative benefits and costs of various alternative incentive programs should be compared to determine which are the more cost effective and beneficial. However, the State should not eliminate or significantly modify existing incentive programs before proposed replacements are in effect.

<u>Barrier 1.b Cost effectiveness issues of RE resources.</u>

The "cost-effectiveness" of various renewable energy technologies should not and cannot be based solely on the avoided cost price that utilities are willing to pay. A better measure of cost-effectiveness would be the "true" avoided cost or value to the end user.

Some of the renewable resources which do not appear to be "cost-effective" from a "utility cost" perspective at this time, may be "cost-effective" from other end-users' perspectives." A resource may be cost-effective to an end-user if the externalities benefits of the use of these renewables are considered, and/or if the expected life-cycle costs to the end-user of these renewables are less than the displaced cost of competing energy sources."

STRATEGIES:

Strategy 1.b.3 Increase/refocus the government price incentives currently available.

There is a lack of a "level playing field." Fossil fuels and nuclear energy have received and continue to receive far more direct and indirect subsidies than do renewable energy resources (e.g., tax credits and favorable tax treatment; resource depletion allowances; RD&D funding; defense expenditures; public subsidies of externality costs; liability waivers and limitations; fuel transportation and handling infrastructure development costs; etc.).

Strategy 1.b.6 Energy wheeling for counties.

While use of energy wheeling may counties may be some of the most appropriate applications, other entities should also be provided the opportunity to take advantage of this. For example, Hawaiian Home Lands is currently developing a number of residential communities. The energy requirements of these communities could, in many instances, be served by renewable resources on, or near, the development sites (e.g., wind energy at Anahola, Kauai). In those instances where renewable energy resources and communities are not co-located, it might be possible to wheel renewable energy from Hawaiian Home Lands where the resource exist to residential communities nearby.

Strategy 1.b.7 Net Billing Payment Rates for Small RE Systems.

A number of states offer net billing to customers with relatively small-scale (e.g., <25 kW) renewable energy systems, such as PV, wind or micro-hydro. California is one of the most recent states to offer this. These states have recognized that such small-scale, distributed renewable energy systems provide significant benefits at relatively insignificant costs.

In the vast majority of cases, these systems would not produce a net surplus of power. Most of the systems would not be cost-effective at the current avoided energy cost price, but would be cost-effective at the retail rate for that customer if the time of use and time of supply could be better matched. (This might eliminate or reduce the need for energy storage.)

The net cost to and rate impact on utility customers would be relatively insignificant. For example, if one very optimistically assumes a total of 10,000 renewable energy systems with an average capacity of 5 kW, an annual capacity factor of 0.23, and 50% of the electricity is exchanged with the utility, the total amount of electricity exchanged is only 50 million kWh/yr. Assuming that the net difference in cost is ~2/3 the retail rate, a weighted statewide average retail rate of $0.132/kWh, and a total state generation of 10 billion kWh/yr, the annual cost to consumers is only $4.4 million. This represents only 0.5% of total electricity production and 0.33% of total sales.

It is also unlikely that customers would install systems which are not cost-effective in order to "take advantage" of the relatively low avoided energy cost price provided for surplus electricity generated. Opponents concerns regarding avoided cost cap rulings are probably not applicable here since it is unlikely that customers would go through the effort and expense of becoming a QF for such a small facility.

Barrier 1.c Unresolved avoided cost issues.

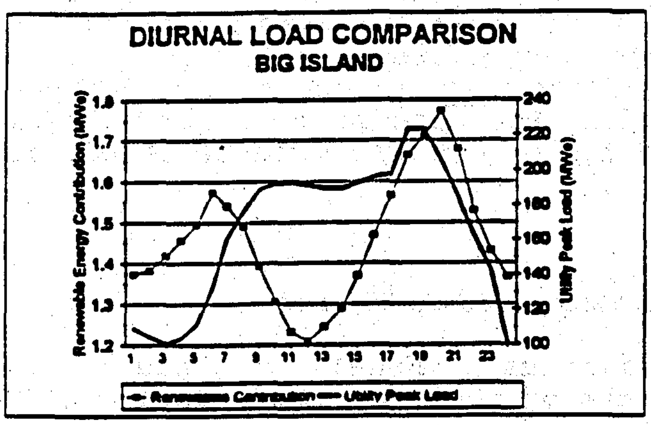
Opponents maintain that utilities in Hawaii "... are currently paying amounts in excess of their avoided costs ..." However, they provide no specific examples and documented costs to substantiate this claim. The "true" avoided cost contains a number of additional components which are not currently included in the utilities' avoided cost price. (Here, the "avoided cost price" which the utility pays is distinguished from the actual or "real" avoided cost.) Several studies have shown that the sum of these additional avoided cost components can approach, or even exceed, the avoided energy cost price.

Unless, and until, utilities have determined and considered all of these avoided cost components, it is not possible for them the categorically state that they have been paying more than their avoided cost for purchased power from renewable energy resources. In order to clarify this issue, the Public Utilities Commission should require the utilities to determine and report these avoided cost components in their service territories. The utilities may find, in some cases, that they have actually been less than the true avoided cost for renewable energy-generated electricity.

STRATEGIES:

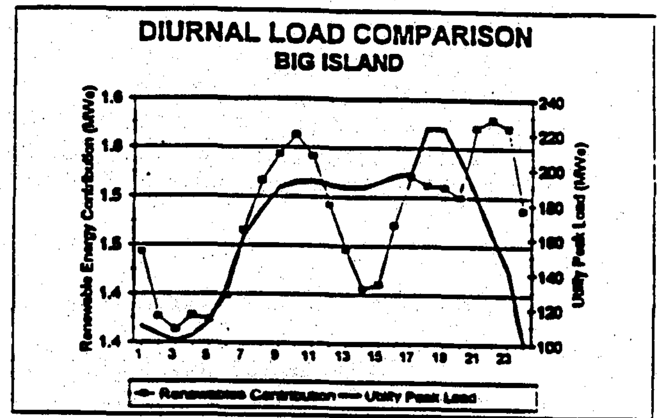
Strategy 1.c.3 Perform an analysis of the combined effects of distributed renewable energy projects in a given service territory.

A recent DBEDT study shows that a combination of similarly-sized wind energy projects located at Hawi, Kahua Ranch and Lalamilo on the Big Island would provide a combined output which more closely matches the HELCO demand profile than any of the projects individually. Such a combination might allow significantly more wind energy development in this area than would ordinarily be considered to be feasible or be accepted by the utility. The following figures show this graphically.



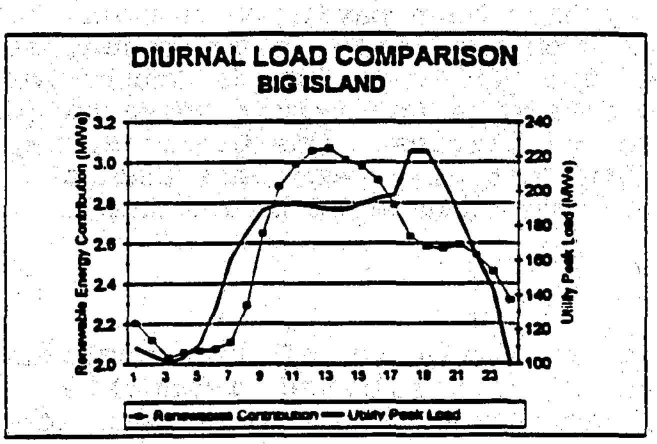
Renewable energy projects included in this graph are listed below.

Wind: Kahua Ranch: 5 MW



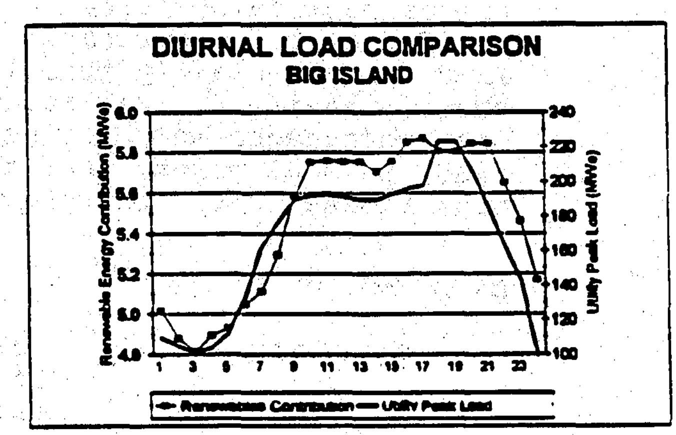
Renewable energy projects included in this graph are listed below.

Wind: Lalamilo Wells: 3 MW



Renewable energy projects included in this graph are listed below.

Wind: N. Kohala: 5 MW



Renewable energy projects included in this graph are listed below.

Wind: Kahua Ranch: 5 MW
Wind: Lalamilo Wells: 3 MW
Wind: N. Kohala: 5 MW

Barrier 1.e **Evaluation and consideration of the beneficial impacts of renewable energy use relative to conventional fossil fuel resources.**

STRATEGIES:

Strategy 1.e.3 **Consider a production incentive for RE developers funded by a utility customer surcharge.**

A Production Incentive was proposed as a near-term means to provide support to renewables and energy storage systems while at the same time avoiding the controversy concerning the appropriate methods for defining, evaluating, monetizing and applying the externality benefits of renewables. An externalities study is underway, but the results, if any, will not be available for some time.

This program was intended to be revenue neutral with all program costs being derived from the proceeds of a Renewable Energy/Energy Storage Surcharge.

The Production Incentive would be provided to some producers of renewable energy-generated electricity and electricity derived from energy storage systems. Not all technologies or projects would require additional revenues from a Production Incentive and those technologies and projects which did require it would be supported at varying levels.

As with many other emerging technologies, future development in renewable energy and energy storage systems will allow them to more effectively compete with fossil fuel-fired electricity systems and they may no longer warrant or require subsidies. Therefore, once it has achieved its maximum impact, the Fund would be gradually phased out.

In various surveys conducted by the utilities, and others, Hawaii residents have indicated a willingness to pay more for renewable energy-generated electricity. Based on projections of potential levels of utility penetration by renewable energy and energy storage systems, the total cost of this program is expected to be relatively small and not excessively burdensome. As a result, it would probably be acceptable to most utility customers.

Based on studies conducted by R. Lynette & Associates for DBEDT, many renewable energy projects could be developed by the utilities at a cost of energy less than the avoided energy cost price paid (see Appendix A). Thus, utility investment in renewable energy development has the potential to save the ratepayer some money. These same data show that renewables could generate or displace more than 20% of the electricity in Hawaii.

If the Production Incentive is applied to only half, or less, of new production facilities, over the 20-year period of this program, the projected average Renewable Energy/Energy Storage Surcharge will be only around $0.0008 (0.8 mils) per kilowatt-hour or only about 0.7% of the average utility bill. For the average residential utility customer using 600 kilowatt hours per month, this represents an average increase of less than 50 cents per month or $6.00 per year.

Some maintain that green pricing programs may be a preferable alternative to Production Incentives. Unfortunately, unless properly designed and marketed, green pricing programs may not provide sufficient revenues to develop a significant amount of renewables. Therefore, a relatively inexpensive and mandatory Production Incentive program may be more appropriate.

With respect to who should pay any subsidies for renewables, it should be noted that utilities, as an entity, do not bear any costs. Ratepayers ultimately bear all direct utility costs incurred in the production of electricity. And, society as a whole bears many of the associated indirect costs. Ratepayers and taxpayers are both large, generally overlapping subsets of the general population (society).

Using the opponents' logic, society as a whole currently pays the environmental and societal costs created by the generation of electricity for end users (the ratepayers). Then according to this logic, taxpayers, not ratepayers should bear the cost of pollution control devices at utility power plants. One could then logically ask why society should pay for the costs of electricity production which primarily benefits end users (ratepayers). Shouldn't the end users be assessed some sort of impact fee, user fee, or "abuser fee"?

Furthermore, utility DSM programs will be subsidized by ratepayers. Development of renewable energy resources will help to achieve some of the same objectives and should receive similar support.

Barrier 1.f   Inability of utility system operation models and economic models to accurately and adequately model and evaluate renewable energy systems.

STRATEGIES:

Strategy 1.f.2   **Consider modeling conventions and generation capacity expansion criteria that are sensitive to the contribution of as-available generation resources towards system reliability.**

Utility system planning models are generally unable to accurately and adequately model and evaluate renewable energy systems.

Utilities need to conduct comprehensive analyses using actual renewable energy resource data and/or validated computer models. Accurate utility demand data and long-term, high-quality renewable energy resource data are required as data inputs. This, again, emphasizes the need for long-term renewable energy resource modeling.

DBEDT, PICHTR, NREL, and EPRI are all conducting work in this area. A Utility Modeling Workgroup involving knowledgeable representatives of these groups should be formed. These procedures should be evaluated and approved by the PUC before implementation

Barrier Grouping 2   Apparent limitations on amount of RE power that can be accommodated by electric utilities.

Barrier 2.b   Intermittency of some renewable energy resources (non-firm power).

STRATEGIES:

Strategy 2.b.1   **Reanalyze the amounts of intermittent renewable energy resource power the utility systems can absorb.**

Utilities are unable to accept more than a certain amount of intermittent power at various times of the day. The limitations are most stringent during evening, off-peak demand periods. Exceeding these allowable penetration limitations can lead to curtailment of power purchases from independent power producers, and these curtailments can adversely affect the economic viability of a particular renewable energy project. Each utility will have a different penetration limitation, but these penetration limitations have not been absolutely determined.

Utilities need to conduct comprehensive analyses using actual renewable energy resource penetration data and/or validated computer models to determine allowable penetration limits and to establish justifiable curtailment procedures. These limits and procedures should be evaluated and approved by the PUC before implementation.

Utilities should identify potential adverse impacts of excessive penetration by intermittent resources. This will enable developers to address these specific concerns through modifications in system design and operation and control systems and strategies.

Utilities should analyze and evaluate the benefits of incorporating energy storage with intermittent resources and with the utility grid.

Barrier Grouping 3 **Complex and lengthy permitting process.**

Barrier 3.a Complex and lengthy permitting process.

STRATEGIES:

Strategy 3.a.1 **Amend HRS §201-64 to make implementation of those elements of the Permit Process Facilitation Act of 1985 which have not yet been implemented mandatory rather than discretionary. Determine resource requirement and provide additional funding to conduct any activities which cannot be accomplished through the use of existing resources.**

Strategy 3.a.2 **Fund and implement the Consolidated Application Permitting process and the Permit Process Facilitation Act of 1985, amended in 1987.**

Much of the above might be achievable using existing resources. DBEDT, should use existing staff and resources to work with other affected federal, state and county agencies, the general public, and private sector organizations to determine the additional financial costs and manpower requirements, if any; economic and other benefits; and the administrative rules and procedures necessary to implement the Permit Process Facilitation Act of 1985 (HRS Chapter 201, Part IV. Facilitation of Permit Processing, Sections 61-65).

Barrier Grouping 5 **New renewables are not included in utility resource plans.**

Barrier 5.d **Lack of equal transmission access to independent power producers and wholesale and retail wheeling.**

With respect to opponents comments regarding wheeling, the utilities have been willing to purchase power from renewable facilities, but only at the current avoided energy cost price in most cases. An environmentally-conscious consumer might be willing to pay significantly more than the current avoided energy cost price, but less than their current utility rate, if that electricity came from renewable energy resources. Often, a customer and a renewable energy resource are not co-located. In order to get the renewable energy-generated electricity from the supplier to the customer, transmission of this power over the utility-controlled grid is required.

There are a number of renewable energy projects which would be more cost effective and could be developed if independent power producers had equal access to utility transmission grids and could employ wholesale or retail wheeling. Developers would benefit by receiving power purchase rates greater than the utilities current avoided cost and end users may be able to purchase power at less than utility rates (even with a transmission access and use fee).

For example, wind energy can be used for large-scale water pumping, which may not be as adversely impacted by the intermittent nature of the wind resource. This is particularly true if some type of energy storage (such as elevated water storage or battery energy storage system) and a backup power source (such as a diesel generator) were available.

The water pumping customer and the renewable energy provider would not have to be co-located. Power could be wheeled between supplier and end user at some reasonable access and transmission charge determined by the PUC and paid to the utility. The renewable energy provider would have to meet utility standards for power quality, ramp up and ramp down rates and other reasonable system requirements.

Opponents further maintain that there "... has been no demonstration that there is a market for renewable power apart from the utilities." One reason there may be no readily apparent market for such a relationship is the lack of any mechanism for supplying such a market. If something is currently not possible, then it doesn't make a lot of sense to expend too much time and effort to pursue it. However, if wheeling of renewable energy-generated electricity was possible, a market might develop.

In any event, if, as opponents maintain, there is no market, then there would be no detriment to the utilities to provide for wheeling. And, if a market does exist, then those customers who wish to use renewable energy-generated electricity will have an opportunity to do so. A pilot program for wheeling of renewable energy-generated electricity would provide interested customers with an opportunity to demonstrate and evaluate wheeling on a limited scale.

Maui County has demonstrated an interest in wheeling of wind-generated electricity for municipal water pumping. The counties might be the ideal place to demonstrate this concept. At a minimum, a detailed prefeasibility study (technical and economic feasibility) should be conducted. In order for an accurate economic analysis to be conducted, accurate avoided cost data will be required from the utilities. Cost, characterization and reliability of the power, control architectures and strategies, and standby power requirements can also be evaluated at this time.

Barrier 5.e **Inadequate evaluation and treatment of renewable energy resources and independent power producers in the Integrated Resource Planning (IRP) process.**

STRATEGIES:

Strategy 5.e.3 **Consider competitive bidding, either in the form of "Green RFPs" which limit competition to renewables for fixed amounts of power, or, open competitive bidding which credits renewable sources to acknowledge and accommodate the environment, social and cultural benefits inherent in their use.**

Competitive bidding has the potential to save Hawaii's utility customers some money. A good case study might be derived from HELCO where two IPPs are in essence bidding against HELCO for the next increment of fossil fuel-fired electricity generation. This competition may go along way towards determining whether utilities in Hawaii can always provide the most cost-effective electricity. Another potential benefit of such a competition might be a closer look by the utilities of their true cost of electricity production.

Barrier Grouping 6 **Lengthy purchase power agreement negotiations.**

Barrier 6.c **Protracted time to negotiate with RE developers.**

Utilities maintain that they have successfully entered into numerous PPAs with developers. Utilities further maintain that "... lengthy negotiations have generally been the result of the utilities willingness to continue to review proposals from a project developer, despite the developer's request for a price above avoided costs." Developers, on the other hand, maintain that the utilities have not been willing to negotiate and have not acted in an expeditious manner. There is undoubtedly some truth to both claims.

If utilities have negotiated in good faith and in an expeditious manner, they should be able to provide a chronology of PPA contract negotiations which identifies any impediments by either party and a calculation of the average time required. The PUC can then evaluate whether this is a reasonable time. Based on this analysis, they should be able to make more specific recommendations to expedite the contract negotiation process. At the same time, utilities need to recognize that time is money, and any delays will cost developers additional money.

Developers will also have to do some "soul searching" to determine if any of the delays were caused by them. If so, they will need to make an effort to improve their performance. They, too, should be able to make specific recommendations to expedite the contract negotiation process.

Ultimately, however, it is incumbent on the PUC to make sure that the PPA negotiation process is conducted fairly and in an expeditious manner. The PUC should analyze the time required for past negotiations and determine if it is reasonable.

Barrier Grouping 7 — Electric Utility Regulatory Structure.

Barrier 7.a — Absence of renewable specific retail wheeling mechanisms or opportunities.

STRATEGIES:

Strategy 7.a.1 — Include the framing of the electric utilities competition docket specific issues relating to providing renewable developers with reasonable terms and conditions regarding, access charges, net billing, etc.

A Net Energy Billing System will encourage and support the development of small, residential-scale, utility-intertied renewable energy systems which generate electricity.

Small, distributed-generation, renewable energy systems can provide a significant amount of renewable energy-generated electricity and also provide grid support. This may enable the utilities to avoid or defer costly transmission and distribution system upgrades in remote, sparsely-populated areas at a relatively low cost.

At present, owners of small, renewable energy systems are required to purchase any electricity requirements they have, above and beyond the production of their renewable energy systems, at the retail utility rate for their customer class, and have to sell any surplus electricity produced at typically, much lower utility avoided energy cost payment rates.

(See also Strategy 1.b.7)

Barrier 9.c — Technical maturity (stage of development) of RE resource.

STRATEGIES:

Strategy 9.c.2 — Conduct IRP supply-side studies.

There was no mention of any on-going or proposed utility or state programs to gather "high quality renewable energy resource data." The projects mentioned here are technology feasibility assessments. What plans do the proposed agencies have for future resource monitoring programs?

APPENDIX A

RENEWABLE ENERGY POTENTIAL IN HAWAII

Table A-1. Hawaii

Existing Facilities Still Operational in 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Notes
Solar Water Heating	Various Residential 6,930 systems	17.8	31.2	20.0	1
Photovoltaics	Various Residential 2,000 systems	1.5	2.6	20.0	2
Hydroelectric	Wailuku	3.5	10.0	32.6	
Hydroelectric	Wailuku	12.0	34.2	32.6	
Geothermal	Puna	25.0	175.2	80.0	
Total	-	59.8	253.2	48.3	

Potential Additional Renewable Energy Projects

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residential 5,050 systems	13.0	22.7	20.0	-	3
Photovoltaics	Various Residential 1,000 systems	2.0	3.7	20.0	-	4
Wind	North Kohala	15.0	71.2	54.2	0.0257	5
Wind	Lalamilo	30.0	115.7	44.0	0.0280	5
Hydroelectric	Umauma	13.8	40.2	33.3	0.0558	5
Biomass	Hilo Coast	50.0	306.6	70.0	0.0812	5
Geothermal	Puna	25.0	175.2	80.0	TBD	5,6
Total	-	148.8	735.1	56.4	-	

Proposed Additional Renewable Energy Projects for 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residential 5,050 systems	13.0	22.7	20.0	-	3
Photovoltaics	Various Residential 1,000 systems	2.0	3.7	20.0	-	4
Wind	North Kohala	10.0	47.5	54.2	0.0257	5,7
Wind	Lalamilo	20.0	77.1	44.0	0.0280	5,7
Hydroelectric	Umauma	13.8	40.2	33.3	0.0558	5
Biomass	Hilo Coast	25.0	153.3	70.0	0.0812	5,8
Total	-	83.8	344.5	46.9	-	

Total Electricity Production and Displacement in 2005

Type	Annual Output (GWh)	Fraction of Total (%)	Notes
Non-Renewables	580.6	49.3	9
Renewables	597.7	50.7	10
Total	1,178.3	100.0	11

Notes: 1 Estimated prorated share of estimated 60,000 solar water heating systems in state based on island population. Equivalent capacity (in MW) is based on displaced electrical energy (~4,500 kWh per year per system) divided by full-power hours (8,760 hours/year x capacity factor). Capacity factor is assumed and is typical for solar systems.

2 Estimated number of existing systems. Virtually all of these systems are off-grid. Capacity factor is assumed and is typical for solar systems.

3 Assumes that utility DSM programs increase penetration rates (from current 15% to 20%) and based on projected population increase for given island.

4 Assumes that additional off-grid systems will be installed, as well as some grid-connected systems, and that average system size will increase.

5 Excerpted from RLA study "Renewable Energy Resource Assessment and Development Program", Phase 3 report. COE = Cost of Energy.

6 For the purposes of this analysis, geothermal is assumed to be a "renewable" energy resource. TBD = To Be Determined. Capacity factor is an estimate.

7 A smaller wind project (~2/3 of potential) is proposed (to limit penetration of this intermittent renewable energy resource).

8 A smaller biomass project (~1/2 of potential) is proposed to ensure adequate biomass supply.

9 Non-Renewable = Total - Renewables

10 Renewables = Total Utility-Intertied Renewable Energy Production + Displacement Due to Solar Water Heating and Off-grid PV Systems

11 Total = Projected Electrical Energy Demand in 2005 + Displacement Due to Solar Water Heating and Off-grid PV Systems

Table A-2. Maui

Existing Facilities Still Operational in 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Notes
Solar Water Heating	Various Residential 6,020 systems	15.5	27.1	20.0	1
Photovoltaics	Various Residential 100 systems	0.1	0.1	20.0	2
Hydroelectric	Various	5.8	18.3	36.0	3
Total	-	21.4	45.5	24.3	

Potential Additional Renewable Energy Projects

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residential 5,260 systems	13.0	22.7	20.0	-	4
Photovoltaics	Various Residential 500 systems	1.0	1.8	20.0	-	5
Wind	McGregor Point	20.0	49.2	28.1	0.0493	6,7
Biomass	Puunene	37.5	230.0	70.0	0.0547	6,8
Wind	NW Haleakala	10.0	18.7	21.3	0.0590	6,9
Total	-	69.5	323.4	40.5	-	

Proposed Additional Renewable Energy Projects for 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residential 5,260 systems	13.0	22.7	20.0	-	4
Photovoltaics	Various Residential 500 systems	1.0	1.8	20.0	-	5
Wind	McGregor Point	20.0	49.2	28.1	0.0493	6,7
Biomass	Puunene	37.5	230.0	70.0	0.0547	6,8
Wind	NW Haleakala	10.0	18.7	21.3	0.0590	6,9
Total	-	69.5	323.4	40.5	-	

Total Electricity Production and Displacement in 2005

Type	Annual Output (GWh)	Fraction of Total (%)	Notes
Non-Renewables	1,071.3	74.4	10
Renewables	368.9	25.6	11
Total	1,440.2	100.0	12

Notes: 1 Estimated prorated share of estimated 60,000 solar water heating systems in state based on island population. Equivalent capacity (in MW) is based on displaced electrical energy (~4,500 kWh per year per system) divided by full-power hours (8,760 hours/year x capacity factor). Capacity factor is assumed and is typical for solar systems.

2 Estimated number of existing systems. Virtually all of these systems are off-grid. Capacity factor is assumed and is typical for solar systems.

3 Assumes that existing HC&S hydroelectric facilities will continue to be operated, either by HC&S or some other entity.

4 Assumes that utility DSM programs increase penetration rates (from current 15% to 20%) and based on projected population increase for given island.

5 Assumes that additional off-grid systems will be installed, as well as some grid-connected systems, and that average system size will increase.

6 Exerpted from RLA study "Renewable Energy Resource Assessment and Development Program", Phase 3 report. COE = Cost of Energy.

7 A larger wind project is proposed for this site due to its relatively higher average annual wind speed and interest already expressed by Zond.

8 A larger biomass project (~50% > RLA estimate) is proposed for this site. This could be an expansion of current HC&S capacity or a new, larger dedicated biomass facility.

9 A smaller wind project (~x/x of potential) is proposed for this site due to its relatively higher average annual wind speed.

10 Non-Renewable = Total - Renewables

11 Renewables = Total Utility-Intertied Renewable Energy Production + Displacement Due to Solar Water Heating and Off-grid PV Systems

12 Total = Projected Electrical Energy Demand in 2005 + Displacement Due to Solar Water Heating and Off-grid PV Systems

Table A-3. Oahu

Existing Facilities Still Operational in 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Notes
Solar Water Heating	Various Residential 44,110 systems	113.3	198.5	20.0	1
Waste-to-Energy (H-POWER)	Barbers Point	57.0	300.0	60.1	2
Wind	Kahuka	7.4	14.0	21.6	3
Total	-	177.7	512.5	32.9	

Potential Additional Renewable Energy Projects

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residential 19,920 systems	51.2	89.6	20.0	-	4
Sea Water Air Conditioning	West Beach and Waikiki	110.0	53.3	55.3	-	5
Photovoltaics	Various Residential 100 systems	0.2	0.4	20.0	-	6
Biomass	Barbers Point	50.0	306.6	70.0	0.0408	7
Wind	Kaena Point	15.0	31.6	24.0	0.0620	8
Wind	Kahuku	80.0	151.6	21.6	0.0660	8,9
Biomass	Wailua	25.0	153.3	70.0	0.1212	8,10
PV - Tracking	Lualualei	50.0	120.0	27.4	-	8,11
Solar Thermal - Dish Stirling	Pearl Harbor	50.0	84.9	19.4	-	8,12
PV - Tracking	North Ewa Plain	50.0	120.0	27.4	-	8,11
Wave	Makapuu	60.0	224.4	42.7	-	8
Wave	Kahuku Point	60.0	211.2	40.2	-	8

Wave	North East Coast	60.0	205.5	39.1	-	8
Total	-	661.4	1,752.4	30.2	-	-

Proposed Additional Renewable Energy Projects for 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residen. 19,920 systems	51.2	89.6	20.0	-	4
Sea Water Air Conditioning	West Beach and Waikiki	11.7	56.8	55.3	-	5
Photovoltaics	Various Residential 100 systems	0.2	0.4	20.0	-	6
Biomass	Barbers Point	50.0	306.6	70.0	0.0408	7
Wind	Kaena Point	15.0	31.6	24.0	0.0620	8
Wind	Kahuku	80.0	151.6	21.6	0.0660	8,9
Biomass	Wailua	25.0	153.3	70.0	0.1212	8,10
Total	-	233.1	789.9	38.7	-	-

Total Electricity Production and Displacement in 2005

Type	Annual Output (GWh)	Fraction of Total (%)	Notes
Non-Renewables	7,450.1	85.3	13
Renewables	1,288.4	14.7	14
Total	8,738.5	100.0	15

Notes: 1 Estimated prorated share of estimated 60,000 solar water heating systems in state based on island population. Equivalent capacity (in MW) is based on displaced electrical energy (~4,500 kWh per year per system) divided by full-power hours (8,760 hours/year x capacity factor). Capacity factor is assumed and is typical for solar systems.

2 From promotional literature. Gross capacity (includes power produced for internal use). Capacity factor based on projected annual output divided by (8,760 hours per year x Gross capacity).

3 Makani Uwila. 14.0 GWh/yr = 1 x 3,200-kW MOD-5B + 7 x 600-kW Westinghouse = 7,400 kW [at an assumed capacity factor of 21.6%]).

4 Estimated prorated share of estimated 60,000 solar water heating systems in state based on island population. Equivalent capacity (in MW) is based on displaced electrical energy (~4,500 kWh per year per system) divided by full-power hours (8,760 hours/year x capacity factor). Capacity factor is assumed and is typical for solar systems.

5 Assumes: (0.9 kWh/ton-hr) x (0.6 [sea water air conditioning system capacity factor]) x (0.8 [fraction of energy saved]) x (1.0 tons/room) x (8,760 hr/yr) x (15,000 total rooms) = 56.8 GWh/yr. This is equivalent to 11.7 MW of utility generation at a system-wide average capacity factor of 55.3%.

6 Estimated number of grid-connected systems.

7 This biomass facility is designed to accommodate additional municipal solid waste and some dedicated biomass.

8 Exerpted from RLA study "Renewable Energy Resource Assessment and Development Program", Phase 3 report. COE = Cost of Energy.

9 Assumes replacement of existing wind turbines and significant expansion.

10 Dedicated, closed-cycle biomass plantation.

11 Two-axis tracking, non-concentrating PV system,

12 Two-axis tracking, parabolic dish, concentrating, solar thermal-to-electric stirling engine system. Capacity factor is lower due to use of direct normal solar radiation.

13 Non-Renewable = Total - Renewables

14 Renewables = Total Utility-Intertied Renewable Energy Production + Displacement Due to Solar Water Heating and Off-grid PV Systems

15 Total = Projected Electrical Energy Demand in 2005 + Displacement Due to Solar Water Heating and Off-grid PV Systems

Table A-4. Kauai

Existing Facilities Still Operational in 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Notes
Solar Water Heating	Various Residential 2,950 systems	7.6	13.3	20.0	1
Photovoltaics	Various Residential 50 systems	-	0.1	20.0	2
Hydroelectric	Various	8.9	33.2	42.6	3
Total	-	16.5	46.6	32.2	

Potential Additional Renewable Energy Projects

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residential 2,160 systems	5.5	9.7	20.0	-	4
Photovoltaics	Various Residential 250 systems	0.5	0.9	20.0	-	5
Wind	N. Hanapepe	10.0	22.6	25.8	0.0569	6,7
Wind	Port Allen	5.0	9.3	21.2	0.0649	6,8
Hydroelectric	Wailua River	6.6	16.4	28.4	0.0709	6,9
Biomass	Kaumakani	25.0	153.3	70.0	0.0900	6,10
Solar Thermal - Dish Stirling	Barking Sands	10.0	17.2	19.6	0.0973	6,11
Total	-	62.6	229.4	41.8	-	-

Proposed Additional Renewable Energy Projects for 2005

Technology	Location	Capacity (MW)	Annual Output (GWh)	Capacity Factor (%)	Cost of Energy ($/kWh)	Notes
Solar Water Heating	Various Residential 2,160 systems	5.5	9.7	20.0	-	4
Photovoltaics	Various Residential 250 systems	0.5	0.9	20.0	-	5
Wind	N. Hanapepe	10.0	22.6	25.8	0.0569	6
Wind	Port Allen	5.0	9.3	21.2	0.0649	6
Hydroelectric	Wailua River	6.6	16.4	28.4	0.0709	6
Biomass	Kaumakani	25.0	153.3	70.0	0.0900	6
Total	-	52.6	212.2	46.1	-	-

Total Electricity Production and Displacement in 2005

Type	Annual Output (GWh)	Fraction of Total (%)	Notes
Non-Renewables	320.4	55.3	7
Renewables	258.8	44.7	8
Total	579.2	100.0	9

Notes:

1 Estimated prorated share of estimated 60,000 solar water heating systems in state based on island population. Equivalent capacity (in MW) is based on displaced electrical energy (~4,500 kWh per year per system) divided by full-power hours (8,760 hours/year x capacity factor). Capacity factor is assumed and is typical for solar systems.

2 Estimated number of existing systems. Capacity factor is assumed and is typical for solar systems.

3 Assumes that all existing hydroelectric systems will continue to remain operational under present or new ownership.

4 Assumes that utility DSM programs increase penetration rates (from current 15% to 20%) and based on projected population increase for given island.

5 Assumes that additional off-grid systems will be installed, as well as some grid-connected systems, and that average system size will increase.

6 Excerpted from RLA study "Renewable Energy Resource Assessment and Development Program", Phase 3 report. COE = Cost of Energy.

7 Non-Renewable = Total - Renewables

8 Renewables = Total Utility-Intertied Renewable Energy Production + Displacement Due to Solar Water Heating and Off-grid PV Systems

9 Total = Projected Electrical Energy Demand in 2005 + Displacement Due to Solar Water Heating and Off-grid PV Systems

STATEMENT OF POSITION OF WAIMANA ENTERPRISES, INC.

Waimana Enterprises, Inc. ("Waimana") applauds the work of the Hawaii Public Utilities Commission ("Commission") and the Collaborative Group for its efforts and hard work in identifying the barriers that need to be overcome and the necessary strategies that need to be implemented to successfully deploy renewable technologies in the State of Hawaii.

During the workshops sponsored by the Commission and during the collaborative process, we discovered that there are many barriers preventing the successful deployment of renewables in Hawaii. We also discovered, that many of these barriers were surmountable. However, even if we were to overcome most of these barriers, the successful deployment of renewables in Hawaii will not be accomplished until we overcome the greatest barrier to renewable energy in the State of Hawaii.

The greatest barrier to renewable energy in the State of Hawaii are utilities who refuse to buy renewable energy from Qualifying Facilities and/or unreasonably prolong negotiations with developers of renewable energy. These utilities create endless hurdles for the renewable developer, making the deployment of renewables: (i) time consuming; (ii) costly; and, until we have retail wheeling, (iii) impossible. All of the other barriers that we identified during the collaborative process are surmountable, but the successful deployment of renewables in Hawaii will not occur until something is done to overcome utilities who refuse to buy renewable energy from Qualifying Facilities and/or unreasonably prolong negotiations with developers of renewable energy.

Waimana's goal, as a non-utility generator, is to be able to provide reliable renewable energy to the consumer at the lowest possible cost. However, Waimana is not able to meet this goal when it has to deal with utilities that are recalcitrant and refuse to comply with Federal and State laws and policies that endorse the use of renewable energy.

Waimana hopes that we have all learned from this process. More importantly though, Waimana hopes that each one of us will use the knowledge we have learned and use it to successfully deploy renewables in Hawaii.

Zond

ZOND PACIFIC INC

Zond Position Paper Docket #94-0226

ZOND PACIFIC INC.'S "POSITION PAPER" FOR RENEWABLE ENERGY DOCKET #94-0226

Zond Pacific would first like to express its gratitude and respect to the Hawaii Public Utilities Commission for charging those leaders in renewable energy development and the State and county energy officials, along with the utilities, to address the problems and solutions of enhancing the development of Hawaii's renewable energy future. All parties should be commended for their collaborative efforts to bring different and sometimes opposing views into agreement, and sometimes even to consensus.

Many issues, including real and perceived barriers and strategies, were discussed and debated. With limited time and the need to create a definitive collaborative document, many issues were diluted or combined in the final efforts of the Writers' Group.

Although Hawaii's energy future is being guided through this collaborative group, the document produced must be embraced in all seriousness by our governor and legislators.

Hawaii has had a definitive energy philosophy and policy for almost 20 years without enactment of any significant improvements in energy self-reliance. In fact, energy's fossil fuel imports as a percentage of use have increased dramatically due to growth and loss of biomass energy from the sugar companies. As example, Kauai has gone from 55% non-fossil fuel resources for electricity in 1982 down to 20% in 1994 and will continue to fall as renewable energy related to sugar demises.

This is totally unacceptable in a state blessed with RE resources and deprived of fossil fuels! State government needs to realize the strategic, social, and economic benefits associated with the development of our indigenous and renewable resources. Greater use of these resources will improve revenues and the tax base, reduce fossil fuel imports and their associated risks, as well as improve our balance of trade. Every earned dollar to Hawaii that stays in circulation in the local economy rather than going to purchase oil resources has a multiplying effect.

The legislature must take a strong stance, <u>a mandatory effort</u>, to design a synergistic energy plan maximizing Hawaii's renewable energy resources first. Then we must continue the requirements and strategies of conservation by DSM and the greater

P.O. Box 12186
Lahaina, Maui, Hawaii 96761
808/244-9389
FAX - HI 808/244-9539 • FAX - CA 805/822-7880

efficiencies of IRP stressing renewable energy priorities.

A goal of increasing implementations of renewables as a percentage over time is highly encouraged, i.e., 5% a year for the next 20 years. It should be noted that every new combined cycle combustion turbine the utility receives approval for and installs will last at least 30 years, negating the potential for renewable energy penetration in to the resource supply mix.

Additionally, and in expanding on all Hawaii's energy requirements, there needs to be a dedication to mandating non-fossil fuels for ground transportation, i.e., electric or methanol cars. Although Hawaii is almost 93% dependent on fossil fuels for electricity, it is 100% dependent on fossil fuels for transportation. Electric vehicles as well as solar water distillation or wind-aided water pumping are other areas to reduce fossil fuel use while enhancing higher uses of renewable energy resources.

Whether barriers are real or perceived is a matter of energy market position. Remember we the ratepayers pay the utility bills providing captivating profits to our utilities. We as ratepayers, through public meetings, advisory groups, committees, endless dockets, and surveys have expressed great concern about the continuing attempted implementation of large fossil fuel power plants.

It appears that if the utilities were to seriously embrace the viability of certain renewable energies and encourage their success the need for fossil fuel plants would recede dramatically. Regardless of whether we implement, green pricing, externality adders, or retail wheeling, Hawaii needs to take very seriously, our social and economic vulnerability to continuing down the abyss of fossil fuel dependence and continuing endless rate increases.

Remember when oil prices go up the utility has little concern because they are protected by a pass through fuel clause that sends all oil price increases directly to the customers.

EXHIBIT A

STANDING COMMITTEE REPORT NO. 3068

Honolulu, Hawaii

APR 15, 1994

Honorable Norman Mizuguchi
President of the Senate
Seventeenth State Legislature
Regular Session of 1994
State of Hawaii

Sir:

RE: S.C.R. No. 40

Your Committee on Science, Technology and Economic Development, to which was referred S.C.R. No. 40 entitled:

"SENATE RESOLUTION REQUESTING A STUDY ON THE FACILITATION OF RENEWABLE ENERGY RESOURCES UTILIZATION,"

begs leave to report as follows:

The purpose of this Concurrent Resolution is to request that the Public Utilities Commission (PUC) conduct a study on the facilitation of renewable energy resources utilization.

Specifically, this Concurrent Resolution urges the PUC to conduct a systematic examination of other states' regulatory policies and procedures which facilitate the development and use of renewable resources. The final report to the Legislature must contain a summary of the policies examined, identification of elements applicable to Hawaii, and recommendations for implementation of such elements.

Your Committee finds that the State has the willingness and the resources to become energy self-sufficient through the use of renewable sources of energy such as wind, biomass, and solar. Unlike so many other states, Hawaii has not adopted regulatory policies to facilitate and encourage the development of these resources. The study requested by this Concurrent Resolution, together with the legislation and regulatory programs that may result, would substantially forward the State of Hawaii's pronounced goals of energy self-sufficiency and promotion of renewable energy sources.

Testimony in support of this Concurrent Resolution was received from the Department of Business, Economic Development, and Tourism, the Department of Commerce and Consumer Affairs, the Public Utilities Commission, the Consumer Advocate, and the Pacific International Center for High Technology Research.

Your Committee has amended this Concurrent Resolution by incorporating the substance and intent of Senate Concurrent Resolution No. 41, entitled "Urging Hawaii's Electric Utilities to Explore and Utilize Wind Systems to Satisfy a Greater Proportion of Hawaii's Electrical Generation Requirements" and Senate Concurrent Resolution No. 42, entitled "Urging Hawaii's Electric Utilities to Explore and Adopt 'Green Pricing' and Other Administrative and Technological Options Which Would Facilitate the Use and Development of Renewable Energy Systems in Hawaii." These resolutions were similarly supported by the Department of Business, Economic Development and Tourism, the Public Utilities Commission, the Consumer Advocate, and the Pacific International Center for High Technology Research. However, your Committee has concluded that rather than placing the burden of examination and adoption of these renewable energy initiatives upon the electrical utilities, the PUC should be responsible for the study and recommendation regarding renewable energy initiatives. Accordingly, the Concurrent Resolution has been amended by expanding the scope of the study to include the review of:

(1) Regulatory or statutory incentives for utilities to develop, purchase, and use renewable energy sources;

(2) Wind system development to satisfy a greater proportion of Hawaii's energy needs; and

(3) Adoption by the electric utilities of "green pricing" and other administrative and technological options which facilitate the use of renewable energy systems.

Your Committee has also amended the Concurrent Resolution by extending the deadline for the study from 1995 to 1996, to accommodate the expanded scope of the study.

Your Committee on Science, Technology and Economic Development concurs with the intent and purpose of S.C.R. No. 40, as amended herein, and recommends its adoption in the form attached hereto as S.C.R. No. 40, S.D. 1.

Respectfully submitted,

Matt Matsunaga
MATT MATSUNAGA, Chair

Anthony K.U. Chang
ANTHONY K. U. CHANG, Vice Chair

Rosalyn Baker
ROSALYN BAKER, Member

Carol Fukunaga
CAROL FUKUNAGA, Member

Gerald T. Hagino
GERALD T. HAGINO, Member

ANDREW LEVIN, Member

Richard Matsuura
RICHARD M. MATSUURA, Member

STAN KOKI, Member

THE SENATE
SEVENTEENTH LEGISLATURE, 1994
STATE OF HAWAII

S.C.R. NO. 40
S.D. 1

SENATE CONCURRENT RESOLUTION

REQUESTING A STUDY ON THE FACILITATION OF RENEWABLE ENERGY RESOURCES UTILIZATION.

WHEREAS, the State of Hawaii's potential renewable energy resource base in terms of wind, biomass, ocean, geothermal, and solar is one of the best in the nation; and

WHEREAS, the utilization of indigenous renewable resources to satisfy the State's energy needs conform to the identified interests of the State with regard to energy self-sufficiency, economic development, environmental quality, sustained agriculture, and the utilization of technology in a culturally and spiritually beneficial manner; and

WHEREAS, in the late 1970's and early 1980's, the State of Hawaii was among the nation's leaders in recognizing and advancing the values of renewable resources; and

WHEREAS, during this period, the State Plan set a goal of "energy self-sufficiency" through the promotion of the "use of renewable energy sources"; the statutes authorized the PUC to implement this commitment in the planning and pricing of electricity; the State spent more than $70 million in renewable energy research and conservation development; the utilities committed substantial resources to wind and geothermal programs; and the more than 300 mw hours of electricity generated by the sugar industry placed Hawaii among the nation's leaders in renewable energy generation; and

WHEREAS, notwithstanding these efforts, objectives, expressed policies, and resource base, the State's dependence upon imported energy supplies increased during the eighties and the reliance on imported energy supplies will increase rather than decrease in the future since there are no significant plans for the utilization of renewable energy; and

WHEREAS, in the late 1980's and early 1990's, other states, such as California, Colorado, Maine, Minnesota, and Iowa, have developed an array of regulatory tools which resulted in the development of substantial amounts of energy from renewable resources; and

WHEREAS, Hawaii has yet to join this second wave of renewable resource energy policy implementation and has not studied or implemented policies, laws, or regulations which are in place in other jurisdictions; and

WHEREAS, three areas of potential application to Hawaii include: (1) regulatory or statutory incentives for utilities to develop, purchase, and utilize renewable energy sources; (2) the use of wind systems to satisfy a greater proportion of Hawaii's energy needs; and (3) the adoption by electric utilities of "green pricing" and other administrative and technological options which facilitate or use renewable energy systems; and

WHEREAS, other jurisdictions' regulatory or statutory incentives for the development, purchase, and use of renewable energy sources include: the establishment of renewable energy procurement targets, mandatory renewable set-asides, higher rates of return for renewable investments by utilities, mandating pilot renewable energy projects by utilities, direct economic incentives such as tax incentives, standard contracts or guidelines governing renewable energy purchases by utilities, long term contracts with fixed or predictable payment streams, special rates, and the explicit recognition of external values (externalities); and

WHEREAS, the 1993 Energy and Environmental summit substantially supported the concept of a production incentive (consisting of monetary incentives and support) to encourage renewable energy development and specific proposals to that effect were developed; and

WHEREAS, Hawaiian Electric Industries was among the pioneers in the commercial application of windpower as the 1985 Hawaiian Electric Renewable Systems program in Kahuku involved the single largest wind turbine in the nation, however, in 1992 the program was shut down because of major production shortfalls and reliability problems and millions of dollars were probably lost; and

WHEREAS, recent national experience has shown that the failure at Kahuku, while a real reflection of the state of the art at the time, is not an accurate indicator of the potential of the resource as recent advances in the technology have cut costs as much as 75 percent and increased reliability by as much as 35 percent; and

WHEREAS, this is reflected by a virtual boom in wind installations and commitments, for example, in the last twelve months, a Washington state utility issued an RFP for 50 mw of wind generated electricity; a Minnesota utility issued an RFP for 50 mw pursuant to a legislative mandate to develop 100 mw as pilot projects; a Texas utility has awarded a 65 mw windpower contract; recent California solicitations resulted in wind project bids exceeding 1,500 mw; a New York Utilities commission docket settlement is likely to result in the mandatory development of 36 mw of wind projects; Wisconsin recently dedicated a 10 mw utility pilot project; Iowa dedicated a 65 mw facility; and Maine awarded a contract for a 20 mw facility; and

WHEREAS, international plans are even more dramatic, for example Quebec has issued a 100 mw RFP; Finland's policy is to increase wind utilization from its current 3.2 mw to 100 mw in the next ten years; and the European community plans to more than quadruple its wind utilization by the year 2000 to approximately 4,000 mw; and

WHEREAS, these developments have not occurred in a regulatory vacuum but rather because governments have provided mandates and incentives for wind development; and

WHEREAS, in other jurisdictions, electrical utility companies have actively participated in the development and utilization of renewable resources through a number of end user/marketing programs which give the consumer the option of facilitating or using renewable energy systems with the support and assistance of the utility; and

WHEREAS, such options include:

(1) Variations of the "green pricing" concept whereby consumers are given the option of paying a marginally higher rate in exchange for the utility's commitment to utilize the difference to acquire new renewable resources

(e.g. Gainsesville (Fla.) Regional Utilities, Southern California Edison);

(2) "Off-grid photovoltaics" options whereby certain remote users would be given the option of receiving power from a photovoltaic electrical generating system rather than from an extension of the power grid (Idaho Power Co.);

(3) "Rooftop/substation photovoltaic applications" whereby combination photovoltaic/storage systems are installed at local substations in order to ensure constant or consistent power to the participating users; and

(4) Utility supplied "rooftop photovoltaic or solar water" programs whereby photovoltaic or solar water heating systems are purchased by users from the utilities and are paid for through the savings in utility bills;

and

WHEREAS, in addition to end-user based applications and options, there have been developed a number of "niche" applications of renewable on the utility system; and

WHEREAS, such applications include photovoltaic transmission line augmentation, sectionalizing switches, and renewable based small power storage systems; and

WHEREAS, other States, including Colorado and California, have reviewed and adopted appropriate policies related to renewable resources after the opening of informational dockets by utilities commissions; and

WHEREAS, the Legislature finds that it would be consistent with policies and interests of the State of Hawaii for the Hawaii Public Utilities Commission to conduct a systematic public examination of other states' regulatory policies and procedures which facilitate the development and use of renewable resources; and

WHEREAS, it is the expectation of the Legislature that subsequent to such an examination the Public Utilities Commission will adopt and implement those policies and procedures which are appropriate to the State of Hawaii's expressed policies and goals; now, therefore,

BE IT RESOLVED by the Senate of the Seventeenth Legislature of the State of Hawaii, Regular Session of 1994, the House of Representatives concurring, that the Public Utilities Commission is requested to, within sixty days of the adoption of this Concurrent Resolution, initiate and establish an informational docket on the facilitation of renewable energy resource utilization; and

BE IT FURTHER RESOLVED that the informational docket shall include, but not be limited to, a comprehensive review of:

(1) Regulatory or statutory incentives for utilities to develop, purchase, and utilize renewable energy sources, with particular attention to be paid to the production credit proposal developed by the 1993 Energy and Environmental Summit,

(2) The use of wind systems to satisfy a greater proportion of Hawaii's energy needs; and

(3) The adoption by electric utilities of "green pricing" and other administrative and technological options which facilitate or use renewable energy systems;

and

BE IT FURTHER RESOLVED that the Chair of the Hawaii State Public Utilities Commission shall report the results of the status of the informational docket to the legislature sixty days before the convening of the Regular Session of the 1995 Legislature and conclude the study and report on final results sixty days prior to the convening of the Regular Session of the 1996 Legislature; and

BE IT FURTHER RESOLVED that the reports shall include (1) a summary of the activities, policies, regulations, and programs examined, (2) identification of those elements which may be applicable to Hawaii and which will or may be adopted or further examined by the Commission, and (3) recommendations for statutory or policy changes which could be implemented by the Legislature; and

BE IT FURTHER RESOLVED that certified copies of this Concurrent Resolution be transmitted to the Chair of the Hawaii State Public Utilities Commission and the Presidents of each of Hawaii's electric utilities.

I hereby certify that the foregoing is a true and correct copy of Senate Concurrent Resolution No. 40 SD1, which was duly adopted by the Senate of the State of Hawaii on 4-29-94 with the concurrence of the House of Representatives.

Dated: May 18, 1994

Assistant Clerk of the Senate

EXHIBIT B

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF HAWAII

----- In the Matter of -----)) PUBLIC UTILITIES COMMISSION)) Instituting a Proceeding on Renewable Energy Resources, Including the Development and Use of Renewable Energy Resources in the State of Hawaii)	DOCKET NO. 94-0226

ORDER NO. 13441

Filed August 11, 1994

At 3:15 o'clock P .M.

Bertha F. Kurosawa

Chief Clerk of the Commission

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF HAWAII

----- In the Matter of -----)) PUBLIC UTILITIES COMMISSION)) Instituting a Proceeding on) Renewable Energy Resources,) Including the Development and) Use of Renewable Energy) Resources in the State of) Hawaii))	Docket No. 94-0226 Order No. 13441

ORDER

I.

Senate Concurrent Resolution No. 40, S.D. 1 adopted by the 1994 Legislature, requests the public utilities commission (commission) to institute a proceeding on renewable energy resources. The intent of this investigation is to identify the policies, programs, procedures, and incentives necessary for the successful deployment of renewable technologies, such as wind power, biomass, solar, hydro and geothermal in Hawaii.

The resolution requests that the proceeding include, but not be limited to, a comprehensive review of (1) regulatory policies and procedures used in other states to facilitate the development and use of renewable resources; (2) regulatory or statutory incentives for utilities to develop, purchase, and utilize renewable energy sources; (3) the feasibility of using wind systems to satisfy a greater proportion of Hawaii's energy needs; and (4) adoption by electric utilities of "green pricing" and other administrative and technological options which facilitate or use renewable energy systems.

The resolution directs the commission to submit status and final reports on its review, to the Legislature, sixty days prior to the convening of the regular sessions of 1995 and 1996, respectively.

II.

Renewable energy technologies use resources that generally are non-depletable or naturally replenishable, such as heat and light from the sun, the force of winds, falling water and ocean currents, plant materials and geothermal heat. These indigenous sources of natural energy can be converted into usable energy by technologies which are at various stages of development. Some, such as hydropower, dry steam from geothermal wells, and the burning of biomass and waste are well developed; others, including wind turbines, photovoltaics, the use of hot water from geothermal wells and the conversion of biomass into gaseous or liquid fuels are emerging, but already well developed; still others are advanced concepts in the research phase. The applications of renewable technologies include electricity generation, direct solar heating, geothermal heating and cooling, and biomass fuel.

A 1993 study on renewable energy conducted by the Oak Ridge National Laboratory for the U. S. Department of Energy, noted that Hawaii has a legislative mandate for "increased energy self sufficiency," broad goals for acquiring renewable energy, and an economic interest in protecting the environment for tourism. The report goes on to state that Hawaii has an enormous renewable resource base and tens of millions of federal energy R&D dollars have been spent documenting the potential and the benefits associated with encouraging renewable energy development in the islands. According to the Oak Ridge report, Hawaii has completed the most comprehensive resource assessments of any state and one such study completed in 1980 showed that Hawaii could become completely energy self sufficient using renewable resources.

However, despite these efforts, virtually no commercial renewable energy technology has been successfully developed within the past decade. Hawaii's electric sector is over 91% dependent on imported oil and this reliance on imported fuel is expected to increase rather than decrease in the future.

The report cites several barriers and hindrances to the development of renewable energy, including the absence of resource acquisition policies, RD&D commercialization programs, and standard contracts for independent power producers.

III.

A.

The objectives of the investigation are:

1. To examine current state policies on renewal energy resources.
2. To study other jurisdictions' policies, statutes, programs, and implementation strategies in the development and use of renewable energy resources.
3. To identify barriers to the development and use of renewable energy resources in Hawaii.

4. To formulate strategies for the removal of barriers and for the development and utilization of renewable energy resources in Hawaii.

B.

The proceeding shall include and focus on the following components:

1. Examination of current state policies on renewable energy resources, including planning, implementation, and procurement policies.
2. Study of other jurisdictions' policies, statutes, programs, and implementation strategies facilitating the development and use of renewable energy resources.
   a. This portion of the proceeding will inventory the experiences of other jurisdictions, both U.S. and foreign.
   b. The U.S. states often mentioned as leaders in the field of renewable energy are California, Colorado, Maine, Minnesota, and Iowa. Other states involved in renewable energy resources in one form or another are Washington, Texas, New York, and Wisconsin.
   c. Foreign jurisdictions involved in renewable energy resources include Finland, Quebec, and the European community.

3. Identification of the feasible renewable energy resources applicable to Hawaii.

   a. The issue here is to identify those renewable energy resources that are technically feasible or possible in Hawaii. Included as possible technologies for Hawaii are wind and ocean photovoltaics.

   b. This portion of the proceeding will identify all resources deemed by past studies to be technologically feasible and possible for Hawaii. Also of relevance are other emerging technologies that hold potential for development and use in Hawaii.

4. Identification of the barriers to the development and use of renewable energy resources in Hawaii.

   a. The barriers may be classified into the following categories:

      (1) Legal, both statutory and regulatory
      (2) Economic
      (3) Social
      (4) Environmental
      (5) Physical
      (6) Financial.

   b. Other possible barriers include:

      (1) Lack of up-to-date and reliable information on renewables.
      (2) Biased resource acquisition practices.

c. The focus is to ferret out all obstacles of whatever kind that may or tend to impede the development and use of renewable energy resources.

5. Formulation of strategies for the removal of the barriers and for the development and utilization of renewable energy resources. The following policy, programmatic and procedural strategies shall be considered:

a. Policy strategies include statutory and regulatory changes.

b. Programmatic strategies include those aimed at developers, utilities and users.

(1) Developers:

(a) Incentives, including regulatory and statutory incentives (tax exemptions/credits, direct incentives/subsidies, loans or grants.

(b) Production credit proposals (developed by the 1993 Energy and Environmental summit).

(c) Standard offer contracts or guidelines governing renewable energy purchase by utilities.

(d) Long term contracts with fixed or predictable payment streams.

(e) Special rates for renewables.

(2) Utilities:

(a) Mandatory renewable set-asides.

(b) Higher rates of return for renewable investments by utilities.

(c) Mandating pilot renewable energy projects by utilities.

(d) Directing economic incentives (e.g., tax incentives, accounting changes).

(e) Explicit recognition of external values (externalities).

(f) Providing utilities with "safe harbors" for renewable energy demonstration projects.

(3) Users:

(a) Generally: administrative and technological options of facilitating or using renewable energy systems with the support and assistance of the utility.

(b) Regulatory and statutory incentives.

(c) "Green pricing": consumers given the option of paying marginally higher rate in exchange for the utility's commitment to utilize the difference to acquire new renewable resources.

(d) "Off-grid photovoltaics": certain remote users given the option of receiving power from photovoltaics electrical generating system rather than from an extension of the power grid.

(4) Other programs:

(a) Development of "niche" applications of renewables on the utility system.

(b) Photovoltaic transmission line augmentation

(c) Sectionalizing switches.

(d) Renewables based on small power storage systems.

(e) Disbursed renewable systems.

c. Procedural strategies.

(1) Renewable energy procurement targets.

(2) Construction and ownership of renewable energy projects: Development of private sector/utility partnerships and joint ventures.

(3) Transmission line access to renewable resource areas.

(4) Integrated resource planning (IRP) impact.

(5) Implementation of the Public Utility Regulatory Policies Act (PURPA) of 1978 and the Energy Policy Act (EPAct) of 1992.

(6) Government permitting.

C.

The commission shall hold an informal meeting with the parties in order to determine how best to proceed with the docket. Among other options, consideration will be given to the use of an independent consultant selected through competitive bidding to study the components listed in III B above; the use of an independent consultant to examine selected portions of III B, with the remaining sections to be performed by a task force comprised of participants to the docket; and the conduct of an investigation performed by the parties themselves.

IV.

THE COMMISSION ORDERS:

1. A proceeding is instituted to investigate the development and use of renewable energy resources in the State of Hawaii pursuant to the intent and purposes of S.C.R. No. 40, S.D. 1 (1994).

2. Hawaiian Electric Company, Inc. (HECO); Hawaii Electric Light Company, Inc. (HELCO); Maui Electric Company, Limited (MECO); Kauai Electric Division of Citizens Utilities Company (KE); and the Division of Consumer Advocacy (Consumer Advocate) of the Department of Commerce and Consumer Affairs will be made parties to this proceeding. The Department of Business, Economic Development, and Tourism (DBEDT); participants to the 1993 Energy and Environmental Summit; renewable energy developers, vendors, and all interested parties are invited to intervene or participate in this docket.

3. Any person desiring to intervene as a party or to participate in this proceeding shall file a motion for intervention or participation not later than 20 days from the filing of this order--that is, no later than August 31, 1994. Motions to intervene or participate shall comply with HAR §§ 6-61-55 and 6-61-56.

DONE at Honolulu, Hawaii this 10th day of August, 1994.

PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

By ______________________
Yukio Naito, Chairman

By ______________________
Dennis R. Yamada, Commissioner

By ______________________
John F. Spierling, Commissioner

APPROVED AS TO FORM:

____
Joan M. Yamaguchi
Commission Counsel

RENEWABL.si1

CERTIFICATE OF SERVICE

I hereby certify that I have this date served a copy of the foregoing Order No. 13441 upon the following parties, by causing a copy hereof to be mailed, postage prepaid, and properly addressed to each such party.

DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS
DIVISION OF CONSUMER ADVOCACY
P. O. Box 541
Honolulu, HI 96809

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT and TOURISM
Energy Division
Old Federal Building
335 Merchant Street, Room 110
Honolulu, HI 96813

EDWARD Y. HIRATA, VICE PRESIDENT PLANNING
HAWAIIAN ELECTRIC COMPANY, INC.
P. O. Box 2750
Honolulu, HI 96840-0001

WARREN H. W. LEE, PRESIDENT
HAWAII ELECTRIC LIGHT COMPANY, INC.
P. O. Box 1027
Hilo, HI 96720

THOMAS W. WILLIAMS, JR., ESQ.
GOODSILL ANDERSON QUINN & STIFEL
1099 Alakea Street, Suite 1800
Honolulu, HI 96813

THOMAS J. JEZIERNY, PRESIDENT
MAUI ELECTRIC COMPANY, LTD.
P. O. Box 398
Kahului, Maui, HI 96732

BOYD T. TOWNSLEY, VICE PRESIDENT
KAUAI ELECTRIC DIVISION OF
CITIZENS UTILITIES COMPANY
P. O. Box 278
Eleele, Kauai, HI 96705

Bertha F. Kurosawa
Bertha F. Kurosawa
Chief Clerk

DATED:

EXHIBIT C

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF HAWAII

----- In the Matter of ----- PUBLIC UTILITIES COMMISSION Instituting a Proceeding on Renewable Energy Resources, Including the Development and Use of Renewable Energy Resources in the State of Hawaii	DOCKET NO. 94-0226

~~ORDER~~ NO. ~~13849~~

Filed April 10, 1995
At 7:50 o'clock A .M.

Bertha F. Kurosawa
Chief Clerk of the Commission

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF HAWAII

----- In the Matter of ----- PUBLIC UTILITIES COMMISSION Instituting a Proceeding on Renewable Energy Resources, Including the Development and Use of Renewable Energy Resources in the State of Hawaii	Docket No. 94-0226 Order No. 13849

ORDER

I.

By Order No. 13441, filed on August 11, 1994, the commission, pursuant to Senate Concurrent Resolution No. 40, S.D. 1 (1994), instituted an investigation to identify the policies, programs, procedures, and incentives needed for the successful implementation of renewable resource technologies in the State of Hawaii. The commission named as parties to this proceeding the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs; Hawaiian Electric Company, Inc.; Hawaii Electric Light Company, Inc.; Maui Electric Company, Limited; and Kauai Electric Division of Citizen's Utilities Company.

The Department of Business, Economic Development, and Tourism (DBEDT), participants of the 1993 Energy and Environmental Summit, renewable energy developers and vendors, and all interested parties were invited to intervene or participate in the docket.

By Order No. 13609, filed on October 19, 1994, the commission granted intervenor status to the following entities:

(1) DBEDT;

(2) The County of Maui;

(3) The County of Hawaii;

(4) The County of Kauai;

(5) The Honorable Matthew M. Matsunaga;

(6) The Pacific International Center for High Technology Research;

(7) Makani Uwila Power Corporation;

(8) John J. Crouch, dba Energy Resource Systems;

(9) Kahua Ranch, Ltd.;

(10) Hawaiian Commercial and Sugar Company;

(11) Waimana Enterprises, Inc.;

(12) Inter Island Solar Supply; and

(13) TRM/Wind Energy International.

By Orders No. 13741, No. 13746, and No. 13779, filed on January 23, 1995, January 30, 1995, and February 22, 1995, respectively, the commission also allowed David A. Rezachek, Zond Pacific, Inc., and RLA Consulting, Inc. to intervene.

On November 10, 1994, the commission held an informal meeting with the parties to discuss how best to proceed with the docket. The commission subsequently conducted a series of workshops and discussion sessions to assist the parties and commission staff in reaching a common level of understanding of the critical issues relevant to renewable energy resources. Topics covered included state, county, and federal policy; experiences in the State of Hawaii and other jurisdictions with renewable energy resource programs and projects; avoided cost analysis; competitive resource acquisition; integrated resource planning; and contract issues.

II.

The commission believes the parties are now ready to engage in a consensus building process to identify the barriers to renewable resource deployment in Hawaii and formulate specific strategies to remove these barriers. This process is intended to provide the parties with the opportunity to resolve areas of disagreement and reach consensus on as many issues as possible. The expected outcome of the consensus building process is a collaborative document which will outline the following:

(1) All barriers, real or perceived, that impede the utilization of renewable energy resources in Hawaii;

(2) Actual strategies to remove the barriers identified and deploy the utilization of renewable energy resources;

(3) A list delineating strategies upon which the parties agree and disagree, and where agreement could not be reached, the reasons for disagreement and the extent to which compromise or alternative strategies were sought; and

(4) Strategies that require further examination.

In keeping with the objective of this docket, i.e., to work towards the actual implementation of renewable energy resources, the commission recommends that the lion's share of the parties' efforts in consensus building be focused on the formulation of specific, concrete strategies for consideration by the Legislature, the commission, the utilities, and developers and users of renewable energy resources.

Based on information received from the workshops and discussions held in this docket, the commission has compiled a preliminary list of barriers and strategies with respect to renewable energy resource deployment. SEE attached Exhibit A. At this time, we seek input from the parties with regard to the following:

(1) Additional barriers and strategies, if any, that should be discussed in this docket;

(2) Recommendations for appropriate groupings of all barriers and strategies identified; and

(3) A list of outstanding questions and concerns, if any, that require consideration in this docket.

Receipt of this information from the parties will assist in the formulation of a list of barriers and strategies to serve as a springboard for the consensus building process.

III.

THE COMMISSION ORDERS:

1. In preparation for consensus building in this docket, the parties shall submit the following to the commission by April 21, 1995:

a. A listing of barriers and strategies, if any, that should be discussed in this docket and, thus, added to Exhibit A;

b. Recommendations for appropriate groupings of all barriers and strategies identified; and

c. A list of outstanding questions and concerns, if any, that require consideration in this docket.

2. A meeting with the parties will be held in the commission's hearing room on May 11, 1995, from 8:30 a.m. to 4:30 p.m., to discuss and establish the process and procedures for consensus building; develop an agenda and schedule for subsequent meetings; group the barriers and strategies identified by the commission, the discussion session participants, and the parties to the docket; and reach general agreement on the major barriers and strategies to be addressed in consensus building. An experienced facilitator of the collaborative process will be present to lend assistance.

DONE at Honolulu, Hawaii this 10th day of April, 1995.

PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

By (EXCUSED)
Yukio Naito, Chairman

By
Dennis R. Yamada, Commissioner

By
John E. Spierling, Commissioner

APPROVED AS TO FORM:

Joan M. Yamaguchi
Commission Counsel

94-0026.vn

DOCKET NO. 94-0226
INVESTIGATION OF RENEWABLE ENERGY RESOURCES

Summary of Barriers and Strategies Identified During Discussion Sessions

(The following list of renewable energy (RE) barriers and strategies identified during the discussion session has been edited by the Commission staff. The list does it imply the approval or preference of the Commission or any party or intervenor to the docket.)

A. Barriers Identified

1. Legal (Statutory or Regulatory)

   a. Conflicting state/federal policies

   b. Complex and lengthy permitting process

   c. Current treatment of avoided cost

2. Economic/Financial

   a. Uncertain cost effectiveness of RE resources

   b. Lack of utility incentives/customer unwillingness to purchase RE

   c. Current fuel adjustment clause passes risk to customers

   d. Inadequate cost/benefit resource analysis methods

   e. High initial capital cost of RE projects

   f. Limited penetration due to curtailment practices of the utility

3. Social/Environmental

   a. Negative cost impacts on utilities and rates/ratepayers

   b. Need to identify/clarify roles of the utility and the developer

   c. NIMBY syndrome for siting RE projects

EXHIBIT A

d. Potential negative impacts on wildlife and air/water quality

4. Physical

a. Intermittency of RE (non-firm power)

b. Long-term reliability of the technology

c. Need to integrate technology with the grid

d. Limited land availability

B. Strategies Identified

1. Statutory

a. Establish clearly stated RE/diversification goals

b. Establish set-asides/procurement targets

c. Offer tax credits to developers, users

d. Establish a state revolving fund for low- or no-interest loans for RE projects

e. Permit Special Purpose Revenue Bond Financing for RE projects

f. Provide funding for public education

g. Establish fund for research, development, demonstration & commercialization of energy storage systems

h. Streamline and simplify licensing and permitting process

i. Enact legislation to assure "solar access' for projects' lifetimes

j. Mandate cost-effective solar-water heating in public housing

k. Allow licensed solar contractors to do complete solar water heating and PV installations

l. Allow developers to acquire leases and water rights through early contract negotiations (Impose performance conditions to ensure developer is capable of completing project)

m. Develop generic plans and pre-approved sites and simplify and/or waive permit requirements

n. Establish equitable rules for small scale projects

2. Departmental/Agency

   a. Establish measures to weigh how RE supports the public interest

   b. Identify all suitable sites for renewable technologies

   c. Include suitable sites in county community development plans

   d. Investigate potential for dual use of state agricultural and conservation lands for siting RE projects

   e. Promote consumer awareness of existing conservation programs and incentives

3. Regulatory

   a. Mandate pilot programs

   b. Provide utilities with incentives

   c. Establish set-asides

   d. Allow safe harbors for demonstration projects

   e. Allow special rates for renewables (e.g., green pricing)

f. Require utilities to sign standard contracts with capacity and energy conditions for sales to utilities

g. Base long-term contract price on avoided cost of new utility plants

h. Adopt standards/guidelines to enforce mandates and to promote fair negotiations between utilities and developers

i. Encourage use of standard offer contracts with fixed or predictable payment streams

j. Require payment of capacity and energy values to producers; if utility owned, allow fair rate of return

k. Eliminate use of dispatchability or minimum capacity factors in screening resource options

l. Streamline regulatory approval process for renewable power purchase agreements

m. Adopt IRP goals or policies to (1) include RE in the utility generation mix, (2) include Independent Power Producers in the planning process, (3) permit competitive bidding, and (4) recognize externalities and other RE attributes such as fuel diversity

n. Adopt provisions for non-utility generators for use of renewables

o. Investigate niche applications for renewables (transmission and distribution planning)

p. Permit off-grid PV

q. Establish competitive bidding policies for new resources

r. Standardize method of calculating avoided cost and de-couple RE payments from oil prices in avoided cost calculation and payment provisions of power purchase agreements, (i.e., level payment stream over the life of the power purchase agreement which is not pegged to the price of oil)

s. Apply an adder to fossil fuel cost in calculating avoided cost

t. Eliminate the use of a fuel clause on a forward going basis

4. Utility

a. Assume leadership role in efforts to deploy renewable energy; adopt vision to maximize development of renewables

b. Reflect county/community visions (i.e., quality of life goals) in utility long-range plans

c. Support Hawaii's economic efficiency and sustainability by embracing and achieving maximum cost-effective deployment of renewables

d. Offer counties energy choices which match appropriate energy services with renewable energy systems

e. Establish mechanisms of support (i.e., public hearings, customer polls) to assess customer willingness to pay for RE

f. Participate in collaboratives to purchase equipment large-scale

g. Establish customer-oriented programs such as green pricing

h. Include renewables in preferred energy mix

i. Issue green RFPs

j. Initiate R & D pilot programs

k. Adopt net energy billing program

l. Negotiate fixed price oil contracts

m. Pursue load control options (e.g., controlled water heaters, load storage)

n. Expedite the contracting process

5. Developer

   a. Expand implementation schedules to account for pre-development activities

   b. Develop new biomass resources

   c. Develop niche applications

   d. Support cost-shared R & D

CERTIFICATE OF SERVICE

I hereby certify that I have this date served a copy of the foregoing Order No. 13849 upon the following parties, by causing a copy hereof to be mailed, postage prepaid, and properly addressed to each such party.

DEPARTMENT OF COMMERCE AND
CONSUMER AFFAIRS
DIVISION OF CONSUMER ADVOCACY
P. O. Box 541
Honolulu, HI 96809

EDWARD Y. HIRATA, VICE PRESIDENT PLANNING
HAWAIIAN ELECTRIC COMPANY, INC.
P. O. BOX 2750
HONOLULU, HI 96840-0001

THOMAS J. JEZIERNY, PRESIDENT
MAUI ELECTRIC COMPANY, LTD.
P. O. BOX 398
KAHULUI, MAUI, HI 96732

WARREN H. W. LEE, PRESIDENT
HAWAII ELECTRIC LIGHT COMPANY, INC.
P. O. BOX 1027
HILO, HI 96720

THOMAS W. WILLIAMS, JR., ESQ.
GOODSILL ANDERSON QUINN & STIFEL
1099 ALAKEA STREET, SUITE 1800
HONOLULU, HI 96813

BOYD T. TOWNSLEY, VICE PRESIDENT
KAUAI ELECTRIC DIVISION OF
CITIZENS UTILITIES COMPANY
P. O. BOX 278
ELEELE, KAUAI, HI 96705

BRIAN K. NAKAMURA, ESQ.
THE PACIFIC INTERNATIONAL CENTER
FOR HIGH TECHNOLOGY RESEARCH
2800 WOODLAWN DRIVE, SUITE 180
HONOLULU, HI 96822-1843

RICK J. EICHOR, ESQ.
C/O DEPARTMENT OF BUSINESS, ECONOMIC
DEVELOPMENT & TOURISM
ENERGY DIVISION
335 MERCHANT STREET, ROOM 110
HONOLULU, HI 96813

WAYNE L. ROGERS, ESQ.
SANDRA-ANN WONG, ESQ.
PAUAHI TOWER, SUITE 1520
1001 BISHOP STREET
HONOLULU, HI 96813

GERALD A. SUMIDA, ESQ.
2200 PACIFIC TOWER
1001 BISHOP STREET
HONOLULU, HI 96813

SENATOR MATTHEW M. MATSUNAGA
HAWAII STATE SENATE
STATE OFFICE TOWER, ROOM 402
235 SOUTH BERETANIA STREET
HONOLULU, HI 96813

MONTY RICHARDS, GENERAL MANAGER
KAHUA RANCH, LTD.
P. O. BOX 837
KAMUELA, HI 96743

RICHARD CAMERON, GENERAL MANAGER
HAWAIIAN COMMERCIAL & SUGAR COMPANY
P. O. BOX 266
PUUNENE, MAUI, HI 96784

LAWRENCE D. NEUMAN, VICE PRESIDENT
TRM/WIND ENERGY INTERNATIONAL, INC.
315 EAST 68th STREET
NEW YORK, NY 10021

JOHN J. CROUCH, dba
ENERGY RESOURCE SYSTEMS
P. O. BOX 38-4276
WAIKOLOA, HI 96738

J. P. SCHMIDT, ESQ.
HOWARD M. FUKUSHIMA, ESQ.
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HI 96793

CERTIFICATE OF SERVICE Continued

HARTWELL BLAKE, ESQ.
MARGARET HANSON, ESQ.
COUNTY OF KAUAI
4396 RICE STREET
LIHUE, KAUAI, HI 96766

CULLY JUDD, DIRECTOR
INTER ISLAND SOLAR SUPPLY
345 NIMITZ HIGHWAY
HONOLULU, HI 96817

RICHARD D. WURDEMAN, ESQ.
PATRICIA K. O'TOOLE, ESQ.
COUNTY OF HAWAII
HILO LAGOON CENTRE
101 AUPUNI STREET, SUITE 325
HILO, HI 96720

ALAN M. OSHIMA, ESQ.
MICHAEL H. LAU, ESQ.
OSHIMA CHUN FONG & CHUNG
841 BISHOP STREET, SUITE 400
HONOLULU, HI 96813

DR. DAVID A. REZACHEK, P.E.
PRIVATE CITIZEN AND RENEWABLE ENERGY EXPERT
710 LUNALILO STREET, #1107
HONOLULU, HI 96813

KEITH AVERY, VICE PRESIDENT
ZOND PACIFIC, INC.
485 WAIALE ROAD
WAILUKU, HI 96793

KAREN CONOVER, PROJECT MANAGER
RLA CONSULTING
18223 102ND AVENUE, NE., SUITE A
BOTHELL, WA 98011

Bertha F. Kurosawa

Bertha F. Kurosawa
Chief Clerk

DATED: April 10, 1995