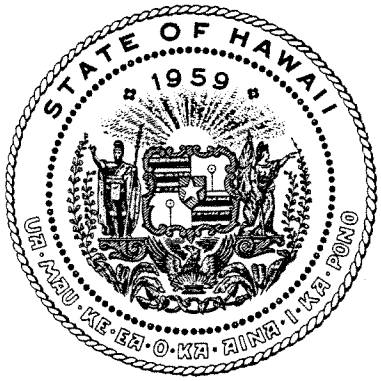
State
Energy Resources Coordinator



Annual Report
1999

State of Hawai'i
Department of Business, Economic Development & Tourism

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State Energy Program Addresses Dependence on Imported Oil

This report is provided to the Hawai'i State Legislature and the general public as a statutory requirement.

The position of Energy Resources Coordinator was created in 1974 by the Legislature to address economic, environmental and energy security issues resulting from Hawai'i being the most oil-dependent of the 50 states.

In 1998, petroleum supplied 89 percent of the State's total energy; all of the oil is imported, primarily from foreign nations with a declining amount coming from Alaska (see Figure 1).

The goals of the State's energy program have been incorporated into the Hawai'i State Plan and codified in the Hawai'i Revised Statutes, which require planning for:

- ✧ dependable, efficient, and economical statewide energy systems capable of meeting the needs of the people;
- ✧ increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased; and
- ✧ greater energy security in the face of threats to Hawaii's energy supplies and systems.

Assisting by implementing programs to meet the State's energy goals, the Energy, Resources & Technology Division (ERTD) is pursuing the complementary objectives of increasing energy efficiency while diversifying energy sources.

Most Oil-Dependent of the 50 States

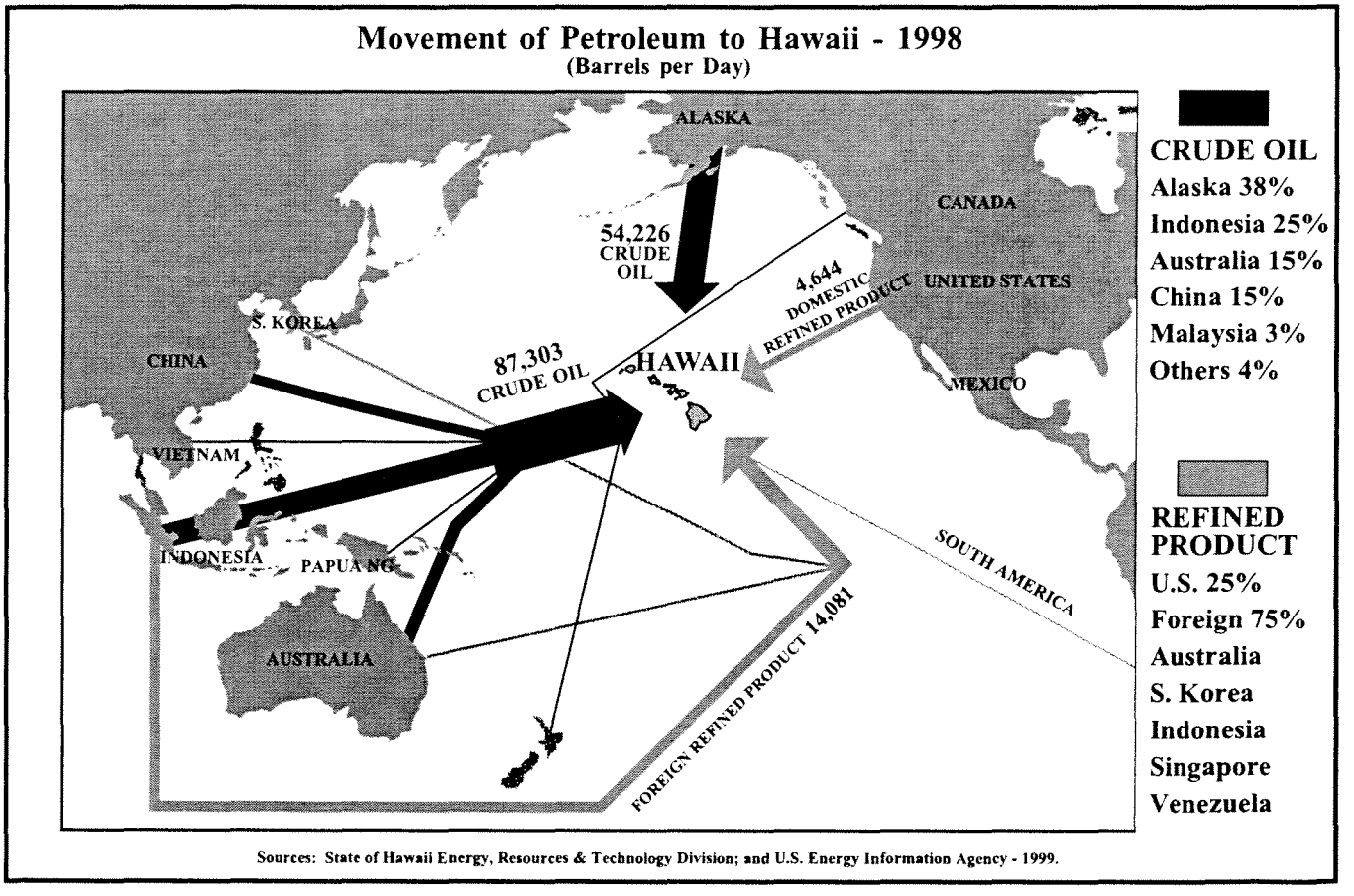

Figure 1. Petroleum Imports

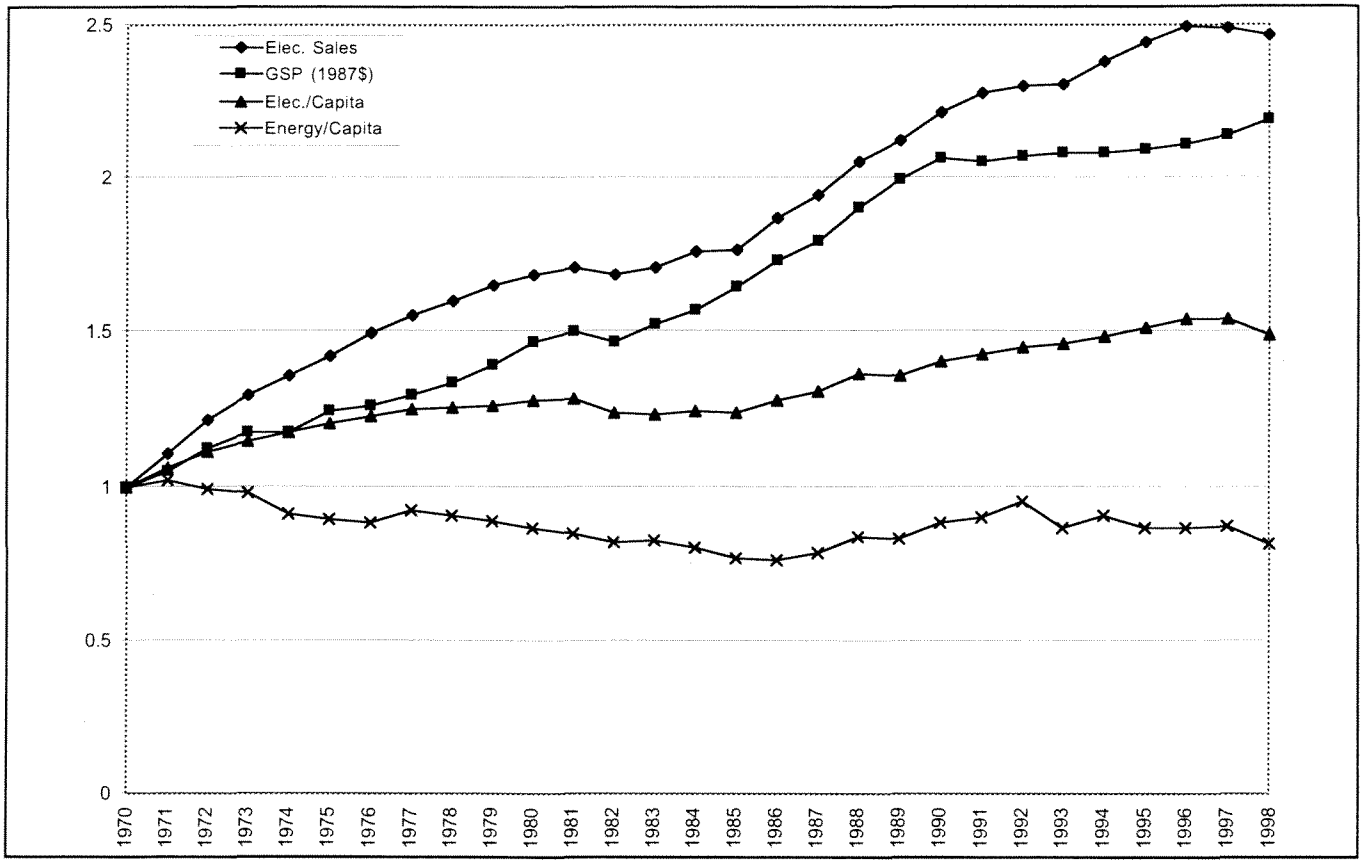

Figure 2. Key Energy and Economic Indicators in Hawai'i, 1970 to 1998

Economic Trends: Efficiency, Electricity Use Increase

Energy continues to be a key factor shaping Hawaii's economy, environment and standard of living. A stable energy supply is essential to continued prosperity.

In 1998, overall energy use per capita (based on de facto population) decreased 4.6 percent from the previous year (see Figure 2). Greater efficiency has resulted in a 19 percent decline in energy use per capita since 1970.

This decline has primarily been in the non-electricity sectors such as transportation, which represent about two-thirds of overall energy use.

In contrast, electricity sales have generally continued to rise faster than the population has grown, and until recently have also risen faster than the Gross State Product (GSP).

During 1998, as shown in Figure 2, electricity sales decreased 0.9 percent compared to GSP (with GSP calculated in constant dollars). This corresponded to a slight decrease in per capita sales, which was less than the rate of de facto population growth. This downtrend started in 1997, reversing the previous trend of increasing per capita sales which began in 1989.

The decrease of electricity sales in 1998 is also a continuation from 1997. Despite this reduction, electricity sales in 1998 were about two-and-a-half times 1970 levels.

In 1998, isle residents and businesses spent $2.44 billion on energy, or about seven percent of the $34.91 billion GSP (in 1998 dollars). An estimated 303 trillion Btu of primary energy was consumed in Hawai'i that year. Petroleum consumption totaled 46.6 million barrels; this is a decrease from 316 trillion Btu and 48.7 million barrels in 1997.

Federal Funds for Efficiency, Technology

DBEDT continues to attract significant out-of-state funds for energy and technology programs which benefit the residential, commercial and transportation sectors of the State's economy.

As Table 1 shows, $1.73 million in federal grants was budgeted during fiscal year 1998/1999 to encourage resource conservation, promote energy efficiency, expand alternative energy use, develop recycling, and continue energy planning by ERTD staff and its partners.

Also during this fiscal year, ERTD received an announcement that more than $352,000 in federal energy conservation grants were awarded to DBEDT by the U.S. Department of Energy (USDOE) which will support programs in future years:

1) $200,000 to develop voluntary guidelines for designing commercial buildings which are even more efficient than currently required under the Model Energy Code;

2) $115,000 for supporting an energy efficient schools project and a University of Hawai'i School of Architecture partnership; and

3) $37,616 to install solar water heaters in a rural community in North Kohala on the Big Island.

Over the past five years, the State has received $2.5 million in competitive USDOE funding for energy-related projects which assist Hawaii's energy conservation, alternative energy, strategic planning and new technology efforts.

Energy efficiency, performance contracting, and demand-side management (DSM) programs also stimulate the state's economy by encouraging local investments and creating employment. Efficiency programs reduce residents' and businesses' energy expenditures, thus generating more discretionary income. Furthermore, improved efficiency in the public sector saves tax dollars.

Kaya Recognized

Maurice Kaya, DBEDT's Energy Program Administrator, has received a Solar Champion Award from the U.S. Department of Energy for leading the State's Million Solar Roofs Initiative. The award was presented in Honolulu during February 1999 at a Million Solar Roofs conference which featured both local success stories and nationally-recognized speakers.

Also receiving Solar Champion Awards from the USDOE were Steve Burns of the Hawai'i Electric Light Company and Cully Judd, representing the Hawai'i Solar Energy Association.

Kaya, who directs DBEDT's Energy, Resources, and Technology Division, has also been appointed by the USDOE to serve on its State Energy Program 21st Century Strategic Planning Committee to develop goals and strategies for the State Energy Program for the first decade of the 21st century.

Description	State Funds	Federal Grants	Total
Education	$1,000	$24,832	$25,832
Transportation	0	$53,960	$53,960
Buildings	0	$342,425	$342,425
Industrial	$35,000	$180,000	$215,000
Utilities	$29,000	$769,724	$798,724
Strategic Technology	$155,319	$354,500	$509,819
TOTAL	$220,319	$1,725,441	$1,945,760

Table 1. ERTD Energy Program Budget for the Fiscal Year Ending 6/30/99

Maui Expected to Adopt Efficiency Code

Hawai'i is Recognized Leader in Code Development

The County of Maui introduced legislation during 1999 to adopt the commercial portion of the Model Energy Code, an energy-efficiency guideline developed by ERTD with assistance from local code officials and private sector design professionals.

Compliance High

The rest of the State's counties have already implemented the commercial buildings section of the Code. An analysis indicates an 87 percent rate of compliance, which is believed to be among the highest in the nation.

The results are printed in ERTD's report, *Energy Code Compliance Study: Honolulu and Hawai'i Counties*, which was released by DBEDT in January 1999.

The Model Energy Code requires energy-efficient design of new and renovated buildings, minimizing energy use without sacrificing either the comfort or productivity of the occupants.

If fully implemented statewide, the Code is projected to avoid $240 million in utility costs and to reduce peak electricity demand by approximately 50 megawatts.

A key Model Energy Code tool, the HiLight software program, assists lighting designers. ERTD has refined HiLight to be readily adaptable by any entity using ASHRAE 90-1-1989 as the basis for its lighting standards. In September 1999, ERTD's consultant presented the improved HiLight program to code officials, engineers and architects in the U.S. Virgin Islands, Puerto Rico, Washington, D.C., and Oregon during a series of one-day workshops. Hawai'i will provide additional assistance as these entities develop or refine their own energy codes.

Update Recommended

The Model Energy Code should be updated to reflect technological advances and refinements. Specifically, the USDOE has sponsored a "Cooling Climates" Task Force to address building conservation issues specific to climate zones where it is far more important to cool buildings than to heat them.

Hawai'i should continue to be an active participant in this Task Force and recommend technology that will optimize building performance in hot, humid climates.

Performance Contract Progress

The installation of energy efficiency measures in 27 fire and police substations under Phase I of Hawai'i County's second retrofit program commenced in October 1999, and was completed in February 2000.

The installation is part of a performance contract inked by the County and Honeywell, Inc., in March, following a successful demonstration at the Hawai'i County Building. The second year of post-retrofit operation of the County Building ended on March 31, 1999; cumulative energy and operational savings exceeded $156,000 which was $7,718 more than the savings stipulated in the contract.

The savings have encouraged the County Department of Water Supply to assess the feasibility of performance contracting for their facilities.

Savings from lighting improvements in Kaua'i County buildings continued to mount, totaling $94,000 for both energy and operational costs after 18 months of operation. An analysis of energy use at the island's wastewater treatment plants, however, showed that retrofits are not presently justifiable.

These projects are partially inspired by the success of one of the State's largest performance contracts at the University of Hawai'i at Hilo, which has thus far resulted in $1,391,000 in cumulative savings.

Performance Contracting uses private expertise and up-front investment to improve efficiency in buildings. It is becoming increasingly popular among government agencies.

Under a performance contract, a private-sector "energy services company" analyzes potential savings and installs efficiency measures such as improved lighting and air conditioning. The contractor is repaid from the utility bill savings resulting from reduced energy use. A certain level of savings is guaranteed, so that these agreements pose little or no risk to the contracting agency.

Rebuild Hawai'i Builds Partnerships

Rebuild Hawai'i, part of the nationwide Rebuild America program, identifies and leverages statewide resources, creates community awareness, builds partnerships, and employs innovative solutions to resolve resource efficiency issues. There are 21 members in the Rebuild Hawai'i Consortium, representing government agencies, utilities and the private sector.

The Consortium focuses on stimulating the economy and achieving cost savings through the increased use of energy efficient technologies in the public and private sectors. Ongoing projects include:

—Performance contracts at the University of Hawai'i at Hilo, County of Hawai'i and County of Kaua'i;

—Small commercial sector energy efficiency market transformation; and

—Support to Hawaii's Rebuild America partners.

There are 10 Hawai'i partners, including the four Counties, the State Department of Education, the State Public Library System, the University of Hawai'i community colleges, and the U.H. School of Architecture.

"Triple Sweep" in National Awards

In August 1999, Hawai'i won three of 11 prestigious U.S. Department of Energy national Energy Champion Awards for its Rebuild Hawai'i Program:

- **1999 Rebuild America State Representative of the Year Award**—Elizabeth Raman of the ERTD received this award for her individual performance in developing the Rebuild Hawai'i Consortium.
- **1999 Rebuild America Award for Energy Excellence in State Government**—The State of Hawai'i was recognized for DBEDT's Rebuild Hawai'i State Program.
- **1999 Rebuild America Award for Energy Excellence in Commercial Buildings**—Consortium partner Hawaiian Electric Company received honors for its achievements in market transformation.

Funding was received in 1999 for several new projects, including a community-sponsored rural solar water heating effort in North Kohala, the "Energy $mart Schools Project" to train high school students as energy auditors, and higher education projects such as the "Greening the Campus" program at six community colleges.

Workshops Support Efficiency Efforts

A *Building Commissioning Workshop* attracted 49 people on April 20 in Honolulu to learn how to commission new installations and existing facilities, as well as to incorporate commissioning into energy savings performance contracts.

The workshop was cosponsored by DBEDT, the USDOE Federal Energy Management Program, Hawaiian Electric Company, and the Association of State Energy Research and Technology Transfer Institutions.

Attendees included representatives from electric utilities, energy service companies, engineering and consulting firms, government facilities energy management staff, equipment suppliers, and government energy agencies.

On April 21 and 22, DBEDT offered another workshop, *Showcase on Energy Efficiency in Federal Facilities*. There were 71 participants. Cosponsored by USDOE's Federal Energy Management Program and the Hawaiian Electric Company, the two-day workshop featured successful energy efficiency projects in federal facilities in Hawai'i and on the mainland, as well as lessons learned in financing and implementation.

Technical presentations focused on renewable energy, energy audits, innovative finance, energy technologies, water conservation, and lifecycle costing.

A four-island series of Model Energy Code workshops attracted a total of 80 participants in September. The half-day training sessions, aimed at county code officials, professional engineers and architects, provided updates on the Code and its application.

Ideas for changes in the Code were also discussed, and special training in the use of the HiLight efficient lighting systems design software was offered.

Trends Mapped in Updated Strategy

The Hawai'i Energy Strategy (HES) program is designed to increase understanding of Hawaii's energy situation and produce recommendations to meet the Energy Resources Coordinator's statutory energy objectives.

A proposed update of HES was presented to the public during a two-day workshop in December 1999. Attended by 100 members of the public, decision-makers, and energy professionals, the workshop refined goals relating to a broad spectrum of energy issues.

A complete listing of the recommendations, as well as the extensive detail and background data supporting them, was published by ERTD as the *Hawai'i Energy Strategy 2000* report.

Recognizing that energy technologies and consumption are key factors in global climate change, HES incorporates actions to mitigate greenhouse gas emissions, 89 percent of which came from energy use in 1990. Hawai'i is a Climate Change Partner in the U.S. Environmental Protection Agency State and Local Climate Change Program.

Energy use for ground, marine and air transportation is also analyzed by HES. Transportation accounts for about two-thirds of the State's total energy use, and will continue to do so. The largest single use of transportation fuel is by aircraft, a sector essential to the State's economy because of its dependence on tourism and interstate commerce. As shown in Figure 3, the use of transportation fuels is declining after steady increases through the 1980s.

Although there was a decline in the number of registered vehicles and in estimated vehicle miles traveled between 1990 and 1997, both gasoline and diesel fuel use increased. The estimated highway fuel efficiency in Hawai'i dropped from 20 mpg in 1990 to 18.4 mpg in 1997. Continuing this trend, gasoline use is expected to grow significantly in the next two decades.

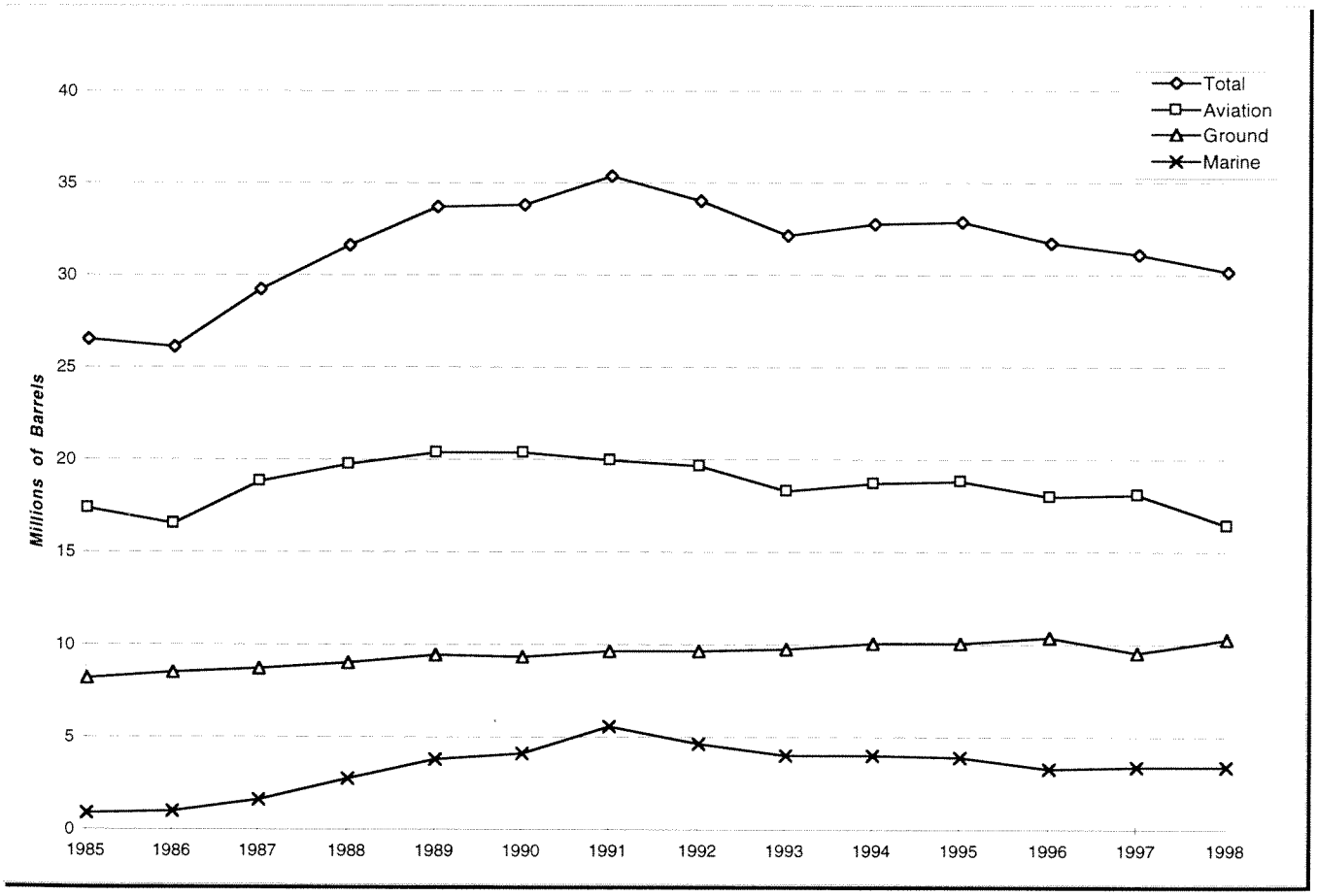

Figure 3. Annual Transportation Fuel Use, All Sectors

More Power on Big Island

New power purchase contracts signed by the Hawai'i Electric Light Company (HELCO) pave the way for the first major new capacity on the island of Hawai'i since 1993, when geothermal and hydroelectric facilities began operation.

Hamakua Plant Approved

In July, the Public Utilities Commission approved an agreement for HELCO to purchase power from a new 60-megawatt plant to be built by Hamakua Energy Partners at the former Hamakua Sugar Company mill site in Haina.

The naptha-fired plant will be constructed in two stages, with the first 22-megawatt unit expected to become operational in mid-2000, with the remaining units on line by fall.

When the Hamakua plant begins generation, HELCO will be able to start retiring older diesel and steam facilities at Keahole, Waimea, and Hilo.

Extension for HCPC

A five-year contract extension between HELCO and the Hilo Coast Power Company (HCPC) was announced in October.

HCPC will continue to supply up to 22 megawatts of electricity generated at Pepe'ekeo, more than ten percent of the island's needs. The agreement is pending approval by the Public Utilities Commission.

Wind Contract Signed

Renewable energy generation also received a boost in September, when HELCO signed a multi-year contract to purchase power from a wind farm to be built at Kahua Ranch in North Kohala. Kahua Power Partners, an affiliate of Zond Pacific, expects to begin power generation in mid-2000.

Plans call for a $17 million, 10-megawatt installation using new wind technology developed for Enron Wind Corporation, Zond Pacific's parent company.

Geothermal's 6th Year

On the other side of the island, Puna Geothermal Venture continued drilling a new deep production well. The 30-megawatt plant celebrated its sixth anniversary of successful operation in 1999.

30% Renewable

On the Big Island, approximately 30 percent of electricity is generated from non-fossil fuel sources. This is a higher percentage than any other island in the State, and is also higher than California. The facilities include HELCO-owned hydroelectric plants on the Wailuku River north of Hilo and its wind facility at Lalamilo.

HELCO also buys power from Puna Geothermal Venture, Wailuku Hydro, and Apollo Energy, a wind farm at South Point.

Waste Oil to Fuels: Two Strategies

The problem of used motor oil and restaurant grease, some of which was formerly burned as a fuel for electricity production at the Waialua Sugar Mill, has been partially resolved by legislation requiring government purchasers to buy re-refined oil products, and by private sector plans to reprocess used oils into diesel fuel. Over 2 million gallons of used oil and restaurant grease are produced annually in the State, causing a disposal problem.

A new State law promotes the use of recycled oil, requiring State and County procurement officers to purchase lubricating and industrial oil from a seller whose product contains the greatest percentage of recycled oil. The application of a preference for recycled oil is an extension of previous regulations encouraging the use of other recycled products by government agencies.

Meanwhile, Unitek Solvent Service, Inc., has announced the construction of a $2 million oil re-refining plant in Campbell Industrial Park to turn spent engine and restaurant oil into fuel for nonhighway diesel engines and marine power plants. While large re-refining systems are not new, the small Unitek facility will be the first of its kind in the U.S.

On Maui, used restaurant vegetable oils continued to be converted to biodiesel, an environmentally-benign fuel which can replace conventional diesel in vehicles without engine modification. During 1999, 7,669 gallons of the fuel, produced by Pacific Biodiesel, were used by heavy-duty trucks in the Maui County fleet.

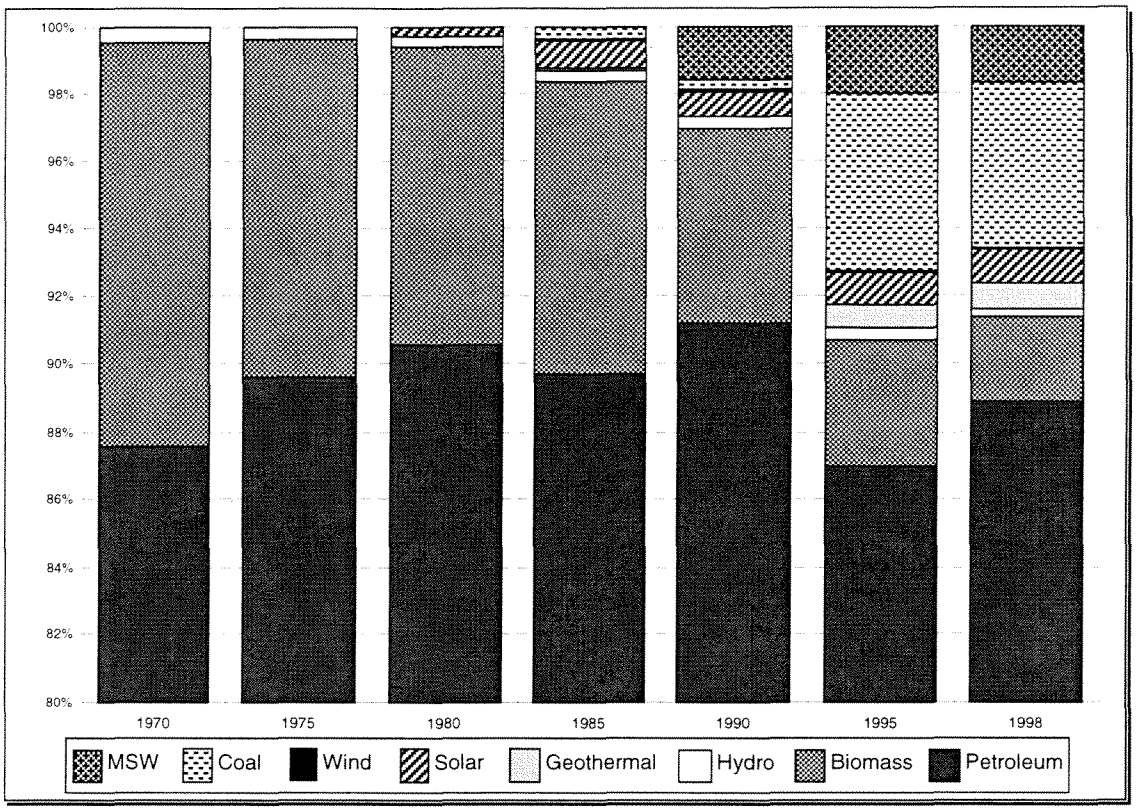

Figure 4. Hawaii's Primary Energy Demand by Type, Selected Years

Response to Vulnerability: Preparing for Emergencies

Energy emergency preparedness has taken a high priority in Hawai'i following recent devastating hurricanes. However, natural disasters are only some of the challenges faced by the State's energy systems; possible Y2K disruptions and dislocations in the international oil market can also severely impact the State.

Hawaii's geographic isolation and dependence on imported oil make Hawaii's citizens critically vulnerable to serious energy shortages. Nearly 90 percent of the state's total energy supply is imported in the form of petroleum products (see Figure 4.)

The state's energy emergency preparedness program is structured to address both market and disaster-related situations, and actively involves the private-sector energy companies which will respond first in emergencies.

In May 1999, a training session intended for both public and private emergency response agencies simulated the impact of a major hurricane. This annual *Makani Pahili* exercise was coordinated by the State Civil Defense agency in cooperation with the Energy Council.

The Council, chaired by DBEDT, is a multi-agency group which regularly meets to facilitate communication between public agencies, utilities, oil refiners, and other entities whose cooperation will be vital in the event of an energy emergency.

As part of its emergency preparedness activities, ERTD participated in a USDOE *Peer Exchange Meeting on Energy Emergencies and Y2K* in Port Orchard, Washington, during September.

The state also attended an *Asia-Pacific Disaster Conference* on Kaua'i later that month, to share emergency response expertise having regional application.

Also in 1999, the State initiated a survey of emergency and essential service facilities with generators, in order to document emergency power requirements and generator technical specifications.

Use of Photovoltaics Expands

Hawai'i once again led the nation in solar installations, with photovolatic power systems and hundreds of solar water heaters installed statewide.

Most of the contribution solar energy makes to the State's energy supply (see Figure 4) is due to the widespread use of solar water heaters—the highest-per capita use in the nation.

In addition, applications of photovoltaics (PV) are increasing. Although most provide power in off-grid applications such as rural homes, street lighting, and emergency communications systems, PVs connected to the utility grid are becoming more common.

International Conference

From February 2-5, 93 representatives of government agencies and private sector interests convened in Kona for the *Solar Business Opportunities Workshop*, coordinated by DBEDT and the Utility Photovoltaic Group.

Participants came from 15 states and three foreign countries, including a delegation of 11 representatives from the Philippines. Sessions focused on the growing demand for energy in Asia and for environmentally sustainable energy in the U.S.

Systems Installed

During the February conference, Phase II of the Mauna Lani Bay Hotel PV project was dedicated. This system provides 110 kilowatts of power to the hotel's two golf maintenance buildings, golf pro shop, club house and restaurant, as well as recharging golf carts. Phase I, a 100-kilowatt rooftop system on the main hotel which was installed in 1998, continued to operate.

On the other side of the Big Island, two PV-powered lights began service at Isaac Hale Park in Puna, a small-boat fishing harbor with no grid-supplied electricity.

The utility-sponsored Sun Power for Schools program logged additional one- to two-kilowatt PV installations at the following high schools statewide: Mililani; Waialua; Castle; and Moloka'i. In addition, a system at Hilo High School, installed in late 1998, was dedicated. While the grid-tied systems provide electricity to the schools, students can access information from data loggers to learn more about their operation. Sun Power for Schools is partly supported by voluntary contributions from electric utility customers on O'ahu, Maui and Hawai'i.

Maui County is in the process of negotiating contracts to install rooftop photovoltaics, along with efficiency upgrades of lighting and HVAC systems, at the Wailuku police station, one of the two largest county-owned buildings.

National Initiative

Hawai'i is a major player in the national Million Solar Roofs Initiative (MSRI). A progress update was offered April 5 and 6 during the *MSRI Partnership and Action Plan Development Workshop*, held in Honolulu. Participants, who included experts from federal agencies, private consultants, and university researchers in addition to the local energy community, participated in brainstorming, identifying potential strategies to achieve Hawaii's goal of over 40,000 installed solar systems by 2010. Since 1996, more than 7,500 systems (mostly solar water heaters) have been installed under utility rebate and State tax incentive programs.

The workshop was followed by a half-day seminar on *Renewable Energy by the Federal Energy Management Program*. Highlights of federal solar projects in Hawai'i were offered by representatives of the National Weather Service, the National Park Service, the U.S. Navy, the Coast Guard, and the Air Force. DBEDT and USDOE cosponsored the sessions.

Emergency Workshops

Recognizing PV's unique capabilities in emergency situations, ERTD sponsored workshops on O'ahu and Kaua'i on *Photovoltaics for Essential Services*. The 103 attendees at the September sessions learned about commercially-available products, system sizing, and the role PV systems can play after a natural disaster.

The workshops should result in additional PV installations as part of contingency planning by public agencies and private essential service providers such as hospitals and utilities.

Policy, Efficiency Projects

Technology Transferred to Philippines

Energy experts from Hawai'i are working with officials of theRepublic of the Philippines to transfer applicable technologies, policies, and standards to the Philippines. This effort also offers opportunities for Hawai'i and other U.S. energy service companies in that country.

ERTD provides policy advisory support on the refinement and enforcement of Philippine energy codes and standards, and assists with the design and implementation of demand-side management and other programs to improve energy efficiency.

Project Completed

The *Hawai'i-Philippines Energy Efficiency Technology Transfer Project for Improving Environmental Protection and Economic Efficiency* was completed in September 1999.

Approximately 100 people attended a February 1-2 update conference in Honolulu, including officials of the U.S. and Republic of the Philippines governments. A dozen Philippines representatives continued on to a Kona conference which focused on photovoltaic technology and opportunities for its application in the Asia-Pacific region.

Final input on the project was solicited from 75 Philippine government and industry officials during a conference held in Manila on May 31 and June 1. The project report, which confirms the tremendous opportunities in the Philippines for Hawai'i businesses having energy efficiency and conservation expertise, has been published and is available on DBEDT's website at **http://www.hawaii.gov/dbedt/ert/pie.**

Efforts to Continue

Additional projects were initiated in September to continue cooperation with the Philippines. Hawai'i received a $39,980 grant from the Council of State Governments to conduct a performance contracting project with the Philippines Department of Energy. Performance contracting was identified in the earlier study as an approach with significant potential. Two workshops on the subject were held during November, one in Cebu City and one in Manila, each attracting 30 individuals from the Philippine government and industry.

Also in November, DBEDT received a $49,500 grant from the USDOE to undertake a Hawai'i-Philippines project on energy efficiency and renewable energy. Two technologies to be emphasized during the one-year study will be solar and geothermal.

Biomass Potential

In partnership with ERTD and the Philippines Department of Energy, the U.H. Hawai'i Natural Energy Institute (HNEI) is conducting a biomass-to-electricity assessment and commercial case study.

This project includes a complete inventory and future projections of the availability of Philippine biomass feedstocks for use as fuel for electricity generation. HNEI is developing recommendations for commercial application of energy conversion technologies for biomass. Economics and environmental responsibility are both key to the recommendations being developed.

Go Online for Energy Documents

Accessing ERTD documents is easy through DBEDT's website. A number of studies, guides, slide shows, factsheets and even student activity books can be browsed or downloaded.

Simply log on to **http://www.hawaii.gov/dbedt/ert/pubs.html.**

New in 1999 are:

- Alternative Fuels Activity Book
- Asia's Energy & Environmental Infrastructure Needs: A Profile
- Energy Code Compliance Study (see article on page 4)
- Energy Efficiency Policy and Technology Transfer: A Hawaii-Philippines Case Study (see article above)
- Energy Technologies Can Support Hawaii's Economic Recovery
- Hawaii's Energy Tax Credits

Efficiency in Homes Starts with Design, Financing, Construction

To ensure that homes in Hawai'i are efficient in terms of both energy and resource use, ERTD sponsored several workshops for professionals, urging them to start planning for efficiency at the beginning of the design process.

The goal of the Hawai'i Advanced Building Technology (HABiT) Program is to make Hawaii's homes more comfortable, healthy, energy-efficient and less expensive to own. Subsequent to a "train the trainers" session, a series of five workshops for architects, developers, contractors and related professionals was scheduled in February 1999. A reference text, *Guide to Resource-Efficient Building in Hawai'i*, was offered to the 180 participants statewide.

Topics at the HABiT workshops included energy efficiency, water conservation, indoor air quality, resource-efficient building materials, construction waste management, and an environmental approach to termite control.

Also accomplished were the development of a mobile display of resource efficient building materials and residential appliances, and a curriculum guide.

A related series of workshops, Financing and Selling Energy Efficient Homes in Hawai'i, was offered in Honolulu during December. Among the topics were case studies of existing home energy rating systems nationwide, and how these ratings work with energy-efficient mortgages. Developers, Realtors, lenders and contractors were among the audience.

The workshops were cosponsored by the U.S. Environmental Protection Agency, the State Department of Health, DBEDT ERTD, U.H. School of Architecture, Hawaiian Electric Company, and others.

Homes that are more comfortable, efficient and less expensive

Conferences On Policy, Technology Supported

ERTD participated in several conferences aimed at providing information and the opportunity to participate in planning to the energy community and general public.

In September, the Pacific Coast Electrical Association conference and exposition was held on Maui. Featuring technical sessions on a variety of topics, the event also offered an opportunity to see efficient lighting, energy management systems, and other products which are commercially available.

Hosted by Hawaiian Electric Company, the event provided updates for energy professionals in both the public and private sectors.

The Energy for the Millennium Conference, sponsored by the non-profit public interest group Life of the Land with financial support from the Cooke Foundation, was held in Honolulu during November.

An opportunity to examine how energy technologies can jump-start the state's economy and protect the environment, the meeting featured presentations on the state of renewable energy, global warming, utility issues and how the community can influence energy policy.

Competitions Spur Student Interest

Stimulating students' interest in science and technology, ERTD staff provided support to the Hawai'i Regional Science Bowl. Cosponsored by USDOE, the Science Bowl is part of a national competition involving the best and the brightest high school students.

ERTD also encouraged local middle and high school students to undertake energy studies through the annual State Science and Engineering Fair in March.

ERTD staff in Honolulu and Hilo served as mentors and judges for the student's research. Awards were presented to the outstanding projects in renewable energy and energy conservation.

Energy lectures and interactive presentations continued to be delivered to the classroom by ERTD energy extension staff. A variety of brochures, coloring books and activity books supplemented the lessons.

Agencies Seek Reduction in Energy Use, Emissions

Federal agencies in Hawai'i, guided by the Energy Policy Act and administration directives, are seeking major reductions in energy consumption, petroleum use, and greenhouse gas emissions with assistance from ERTD. Some of their major successes were profiled in a DBEDT/FEMP workshop in April (see article on page 9).

On June 3, 1999, President Clinton issued Executive Order 13123, entitled, "Greening the Government Through Efficient Energy Management." It set the following goals for government agencies:

- Reduce greenhouse gas emissions by 30% by 2010 compared to 1990;
- Reduce energy use per gross square foot by 30% by 2005, and 35% by 2010, relative to 1985;
- Increase use of renewable energy;
- Reduce use of petroleum and switch to less greenhouse gas intensive energy sources;
- Reduce total greenhouse gas emissions; and
- Conserve water.

As a follow up to the DBEDT-cosponsored workshop on *Energy Efficiency in Federal Buildings* (see article on page 5), ERTD's consultant is helping federal agencies implement energy efficiency projects. For instance, the National Weather Service has potential applications for hybrid photovoltaic/fuel cell systems at up to a dozen remote sites in Hawai'i, Micronesia, Guam and American Samoa. Photovoltaics could run an electrolyzer which generates hydrogen for weather balloons and a fuel cell, plus oxygen for water purification. ERTD's consultant is helping the agency identify an integrated, modular system which can be used in a number of applications.

Other agencies, including the Veteran's Administration, National Marine Fisheries Service, U.S. Coast Guard, and U.S. Air Force, are also receiving assistance.

Counties Involved in Projects, Policy

The counties of Hawai'i, Kaua'i and Maui continued their leadership roles in economic development projects involving energy efficiency and the support of renewable energy technologies.

The counties promote performance contracting, enforce the Model Energy Code, prepare for emergencies, monitor electric utilities' integrated resource planning, and participate in the Rebuild America and Million Solar Roofs initiatives.

ERTD provides financial support to the neighbor island counties for these efforts, with funds from the USDOE. During fiscal year 1998/99, $189,933 was budgeted; the counties provided matching cost-sharing, in-kind services and private grant funds.

The Maui County Council established an Energy Subcommittee which met half a dozen times in 1999 to develop recommendations which range from utility interconnection standards to General Plan amendments.

The County also worked closely with Pioneer Mill to assess its potential as a biomass facility after ending sugar operations. Ethanol production and electrical generation from a dedicated biomass crop, supplemented by municipal refuse, were considered, but were not economically feasible.

Many Clean Fuels Activities

The Honolulu Clean Cities consortium now has 27 member organizations. The consortium continued fleet outreach and demonstrations, provided information for the Cities for Climate Protection meeting of the International Coalition for Local Environmental Initiatives on February 5, participated in the *Energy, Economy and Environment* symposium held in conjunction with the State Science and Engineering Fair on March 30, provided alternative fuel ride-and-drive opportunities at the Hawai'i Transportation Association's Truck and Bus Show at the Blaisdell Center August 14-16, and participated in the Honolulu City Lights Parade on Dec. 4 with two electric and two propane vehicles.