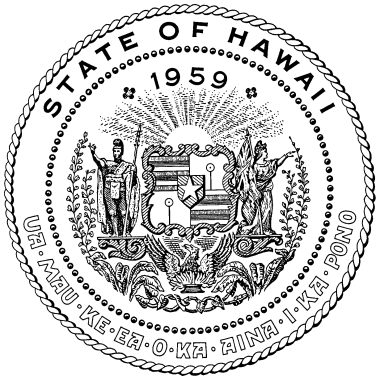
State
Energy Resources Coordinator



Annual Report
2000

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

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State Energy Program Addresses High Dependence on Imported Oil

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 1999, 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 and giving due consideration to all of the following four objectives:

- 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;
- greater energy security in the face of threats to Hawaii's energy supplies and systems; and
- reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.

The fourth of these objectives was signed into law by Gov. Cayetano on June 6, 2000.

By law, the State's energy policy also requires that the total costs and benefits of all energy resource options—including efficiency—be compared. This ensures that economic, environmental and social impacts are all considered. Alternative transportation fuels and efficient transportation practices must also be promoted.

New policies added in the year 2000 include supporting actions that reduce, avoid, or sequester greenhouse gases in utility, transportation and industrial sector applications, as well as through agriculture and forestry initiatives.

The Energy, Resources, and Technology Division (ERTD) implements programs to meet these goals. Achievements for 2000 are detailed in the following pages.

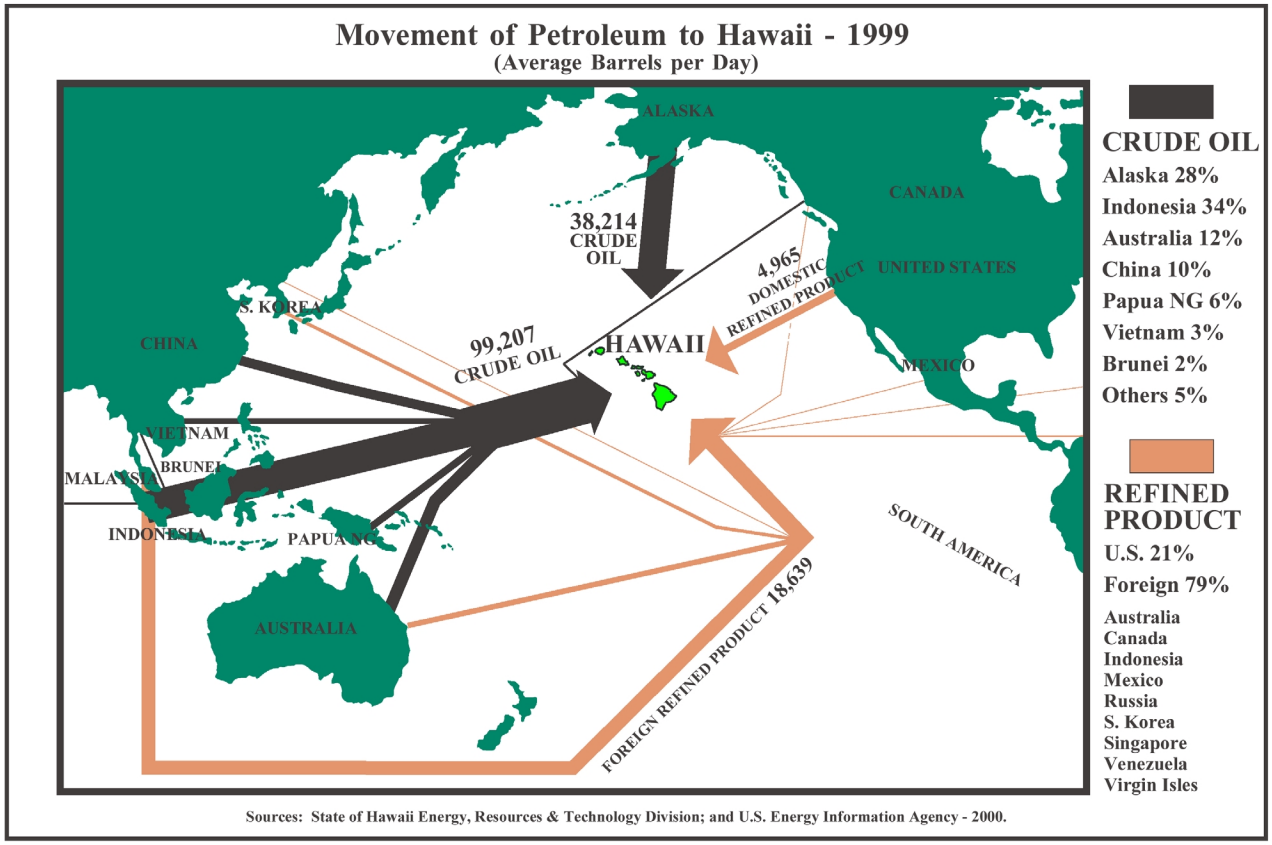

Figure 1. Petroleum Imports

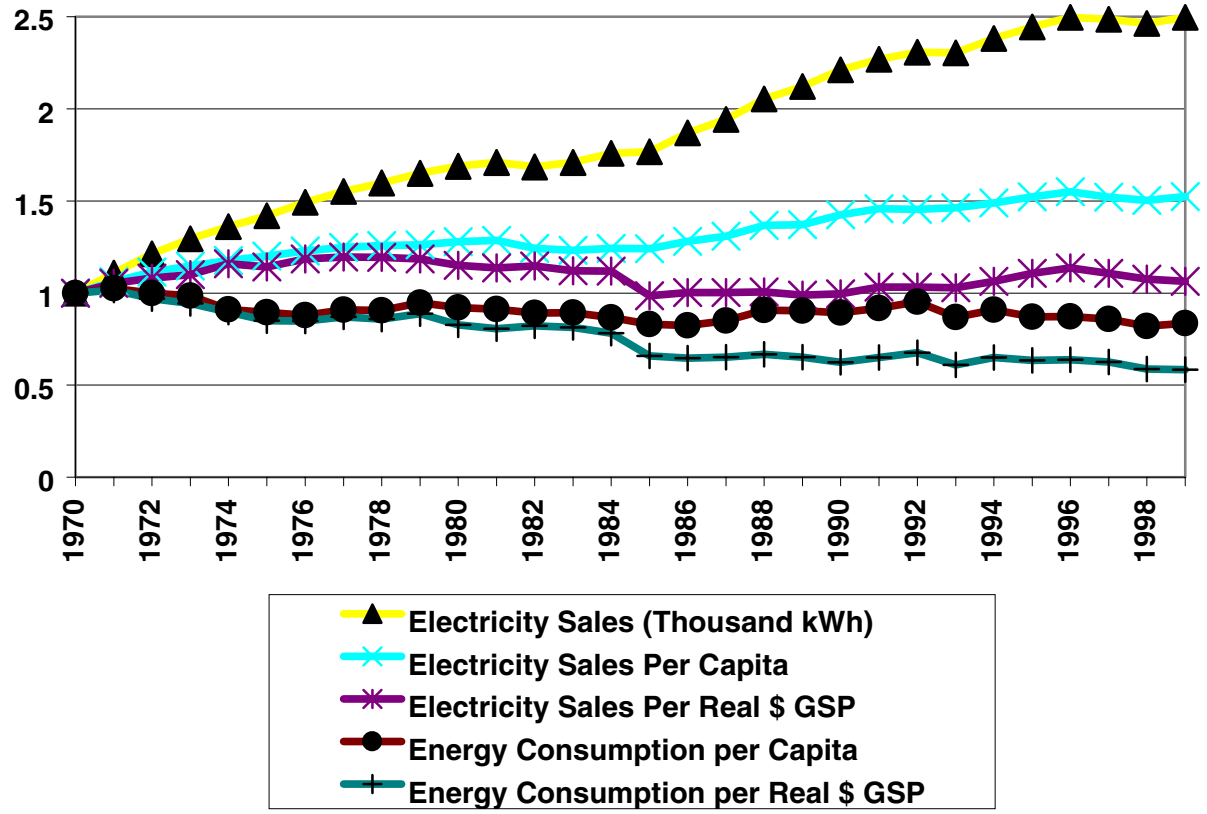

Figure 2. Key Energy & Economic Indicators in Hawai'i, 1970 to 1999

Consumption of Energy, Oil and Electricity Increased in 1999

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 1999, overall energy use per capita (based on de facto population) increased 1.96 percent from the previous year (see Figure 2).

However, over the longer term, efficiency has been improving; there has been a 16 percent decline in energy use per capita since 1970.

In contrast, electricity sales continue to rise faster than the de facto population. Between 1970 and 1999 the average increase in electricity sales was about 3.1 percent, while the average defacto population growth was 1.7 percent.

During 1999, electricity sales increased 1.28 percent from 1998. This also resulted in about a 1.4 percent increase in electricity sales per capita. The increase of electricity sales in 1999 reverses a brief decline in electricity sales experienced in 1997 and 1998. Electricity sales in 1999 were two-and-a-half times 1970 levels.

In 1999, isle residents and businesses spent $2.54 billion on energy, or about seven percent of the $37.8 billion GSP (in 1999 dollars). An estimated 308 trillion Btu of primary energy was consumed in Hawai'i that year.

Petroleum consumption totaled 47.6 million barrels; this is an increase of 3.3 trillion Btu and one million barrels from 1998.

Note that GSP has been recalculated from 1985 to 1999 based on new data from the U.S. Bureau of Economic Analysis.

Energy Funds Support Efficiency, Technology Initiatives

Slightly over $2.5 million in State and federal funds were budgeted for Hawai'i energy programs in fiscal year 99/00, as shown in Table 1.

The Department of Business, Economic Development, and Tourism (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.

In all, the State's energy-related programs leveraged over $2 million from federal sources such as the U.S. Department of Energy (USDOE), a match of more than $10 for every dollar of State funds budgeted.

The largest component of the budget were projects in the Utilities sector, which includes activities in integrated resource planning, the Hawai'i Energy Strategy, energy emergency preparedness, an inventory of emergency generators, a cooperative project with the Republic of the Philippines, petroleum data rule making, and other efforts.

These projects were budgeted at $1,044,764.

Promoting efficient building technologies is the second largest component of the budget.

Programs in the Buildings category include the development of guidelines for efficient residences, financing energy efficient retrofits in state buildings, promulgating the Model Energy Code, and the many initiatives of the Rebuild Hawai'i Consortium.

A total of $916,249 was budgeted for this sector, primarily from competitively-awarded federal grants.

Strategic Technology projects supported by federal funds include the Hawai'i-Philippines performance contracting project. A total of $241,563 was budgeted for Strategic Technology.

In the Industrial sector, ERTD administered projects in waste management, remanufacturing and recycling. These activities were supported by $174,881 in federal and State funds.

Alternative fuels technologies were the focus of the Transportation sector, supported by $89,058 in federal funds.

Special programs such as the Hawai'i Science Bowl and the State Science and Engineering Fair, in addition to a variety of activities in public information and general education, made up the Education sector. Funding for these efforts totalled $63,695.

Description	State Funds	Federal Grants	Total
Education	0	$63,695	$63,695
Transportation	0	$89,058	$89,058
Buildings	$5,000	$911,249	$916,249
Industrial	$75,000	$99,881	$174,881
Utilities	$2,250	$1,042,514	$1,044,764
Strategic Technology	$144,637	$96,926	$241,563
Totals	$226,887	$2,303,323	$2,530,210

Table 1. ERTD Energy Program Budget for the Fiscal Year Ending 6/30/00

Kaya Accepts Appointment as Chair of National Energy Board

Maurice Kaya, Program Administrator of DBEDT's Energy, Resources, and Technology Division, was appointed by U.S. Energy Secretary Bill Richardson to a two-year term as Chair of the federal State Energy Advisory Board.

"Board members are selected because of their experience on energy, environmental, and economic issues as well as their ability to represent the interests of the States, their political subdivisions, and the private and non-profit sector stakeholders and constituents that the Department's State energy efficiency and renewable energy programs serve," said Secretary Richardson. In appointing Kaya to head the STEAB, Richardson praised Kaya for his outstanding service to date on the Board.

The Board was established in 1991 to advise USDOE about the implementation of state energy efficiency and renewable energy programs and the deployment of new technologies.

County Energy Staff Recognized

The energy coordinators for Kaua'i and Hawai'i Counties have received special recognition for their work in conserving energy on their respective islands.

Glenn Sato of Kaua'i County and Raymond Carr of Hawai'i County were presented Certificates of Recognition by the USDOE for their outstanding work in the Rebuild America Program. The awards were announced at the 2000 Efficient Electro-Technology Expo and Conference held in Waikiki during September.

Major Grant to Support Cooling Technologies

The ERTD was awarded $190,000 by USDOE to promote efficient building technologies in "cooling climates."

Cooling climates are marked by high humidity and a predominant air conditioning season. Areas with these characteristics include Hawai'i, the U.S. Territories, the Gulf Coast states, and much of the earth's equatorial zone.

Grant funds will be used to research and evaluate cooling technologies and, if appropriate, incorporate them into Hawaii's Model Energy Code.

A Cooling Climates Task Force consisting of energy officials from the affected states will be convened to cooperate on research and codification of cooling climates technologies.

The technologies to be studied include heat pipes, ultraviolet lamps for AC duct disinfection, low-emissivity southern windows, radiant barriers, daylighting and controls.

Hawai'i a National Leader in Energy Efficiency Improvements

Hawai'i ranks a close second to New York in progress in improving energy efficiency over the last 20 years, according to a study recently released by the American Council for an Energy-Efficient Economy (ACEEE).

Hawai'i led the nation in cutting energy use per capita and reduction in per capita carbon emissions during the 27 years from 1970 to 1997.

Furthermore, on average, each person in Hawai'i uses less energy than in any other state. This suggests that Hawai'i has positioned itself well to minimize the adverse effects of disruptions in the energy market.

ACEEE is a respected source of publications and analyses on policy and technology. The full text of the report is at http://aceee.org/pubs/e001.pdf.

Can Natural Lighting Improve Student Scores, Reduce Energy Costs?

Nationwide studies consistently show that test scores improve by 6-20 percent in "daylit" classrooms compared to artificially lit classrooms. Also, the electrical savings achieved by daylighting can pay for the renovations.

This intriguing topic was the subject of two April 11, 2000 workshops sponsored by ERTD for education decision-makers and energy professionals. Instructor Gary Bailey, AIA, has had 25 years experience designing classrooms that are entirely illuminated by daylight. Cosponsors included the Hawaiian Electric Company, the University of Hawai'i School of Architecture, and the American Institute of Architects.

Bailey also met separately with state officials to discuss revising school building guidelines to daylight Hawaii's schools.

New Law Encourages Alcohol Fuel Production

A new Hawai'i state law provides for an ethanol investment tax credit roughly equal to 30 cents per gallon.

Also authorized was the issuance of special purpose revenue bonds to assist Worldwide Energy Group, Inc. in the planning, design, construction and operation of a Hawai'i sugar ethanol project.

The tax credit is for 30 percent of each $1 million invested per one million gallons per year plant capacity. There is a cap on the credit, depending on the capacity of the facility; the maximum credit is $4.5 million per facility per year, for facilities which can produce over 15 million gallons per year. Smaller facilities have lower caps.

Other requirements and limitations apply; for details, check out the factsheet on ERTD's web site at www.hawaii.gov/dbedt/ert.

The credit will apply to taxable years beginning January 1, 2002 and can be taken for eight or ten years, depending on the cost of the facility. The fuel alcohol facility must be in production before January 1, 2012.

The existing excise tax exemption for the sale of alcohol fuels is to be repealed on Dec. 31, 2006.

Hawai'i Leads Nation in Solar Installations

Hawai'i has completed more rooftop installations of solar thermal and solar electric systems than any other state under the national Million Solar Roofs Initiative (MSRI)—over 80 percent of MSRI systems operating.

As of midyear, these Hawai'i MSRI partners achieved the following goals: US Navy—1,350 solar roofs; US Air Force—21 roofs; US Coast Guard—62 roofs; Kaua'i partnership—108 roofs; Hawai'i partnership—1,053 roofs; Maui partnership (including Moloka'i and Lana'i)—1,572 roofs; and the O'ahu partnership—6,107 roofs.

In 2000, both the Hawai'i Electric Light Company (HELCO) and the Kaua'i Electric Company received MSRI grant awards.

HELCO's $50,000 will fund four initiatives: 1) developing an island of Hawai'i MSRI web site; 2) developing preferred financing resources for solar projects; 3) removing county permitting barriers for the use of photovoltaic systems; and 4) identifying elements of public awareness and technology adoption programs which can be used to more effectively promote solar technologies in Hawai'i.

Kaua'i Electric received $18,400, which will be used to collect data and develop ways to eliminate barriers to the use of solar energy.

Previous MSRI grant awards are still being implemented, including solar electric lighting at Hilo's Bayfront.

More information on the MSRI activities in Hawai'i is available at: http://www.hawaii.gov/dbedt/ert/pv4u/pv4_0005.html.

New Publications Online

Newly posted on ERTD's web site during 2000 are the following useful publications:

- Directory of Environmental Businesses in Hawai'i;
- Ethanol Facility Investment Tax Credit Factsheet;
- Hawai'i Energy Strategy 2000;
- Renewable Portfolio Standards Report;
- Siting Evaluation for Biomass-Ethanol Prduction in Hawai'i; and
- Solar Energy (Photovoltaic) On-Line Calculator for Hawai'i Locations.

These and other references, including case studies, factsheets, directories, guides, slideshows and software, are accessible at http://www.hawaii.gov/dbedt/ert.

Ranch Invests in Renewables for Water Pumping

Parker Ranch's 50,000 head of cattle are drinking water pumped with energy from the sun and wind.

A 175-kilowatt photovoltaic array and five wind turbines are expected to produce over half the energy needed to water the herds.

The operation is expected to save more than 1,000 barrels of imported oil during each year of its expected 30-year life. PowerLight Corporation, producer of the hybrid energy system, has also signed a maintenance performance agreement.

The 225,000-acre ranch has no springs or wells above the 4,000-foot elevation of Mauna Kea, where its cattle graze. Drinking water must be pumped up to the 7,000-foot level.

More Wind Power Capacity Proposed

Despite the continued dominance of fossil fuels in Hawaii's energy supply, renewable resource development continues steadily (see Figure 3).

Efforts to increase wind power sold to the Hawai'i Electric Light Company (HELCO) and Maui Electric Company (MECO) marked milestones during 2000.

In June, HELCO requested Hawai'i Public Utilities Commission approval of a contract to purchase power from a 10-megawatt wind farm planned for North Kohala.

The $17 million facility, to be developed by Kahua Power Partners, an affiliate of Zond Pacific, will be located at Kahua Ranch.

A power purchase agreement with Kahua Power Partners was signed in August 1999, and a study of interconnection requirements completed in April 2000.

A ridgetop wind farm on Maui received a vital vote of approval from the Board of Land and Natural Resources, which approved a permit allowing the use of State land for the project in April.

The 20-megawatt facility would feature 27 wind turbines on Kealaloloa Ridge above Ma'alaea. Public testimony at the hearing indicated support for the highly-visible site. The project developer is Zond Pacific.

Zond and MECO officials have agreed upon a price for the electricity: 5 cents per kilowatt-hour for the first year, with 1.5 percent increases after that. Zond Pacific is seeking a 20-year contract for purchased power with MECO.

Owners of an existing wind project at South Point on the Big Island are seeking a new contract with HELCO. Apollo Energy PPA owns the largest wind turbines currently operating in the State, 37 250-kilowatt Mitsubishis installed at Kamao'a.

In April, a petition requesting a review of the proceedings was filed with the Public Utilities Commission in an attempt to resolve an impasse in negotiations. An evidentiary hearing was held in October, and opening and reply briefs were heard in November.

Hawi Renewable Development, another 10-megawatt wind project in North Kohala, is negotiating a power purchase agreement with HELCO.

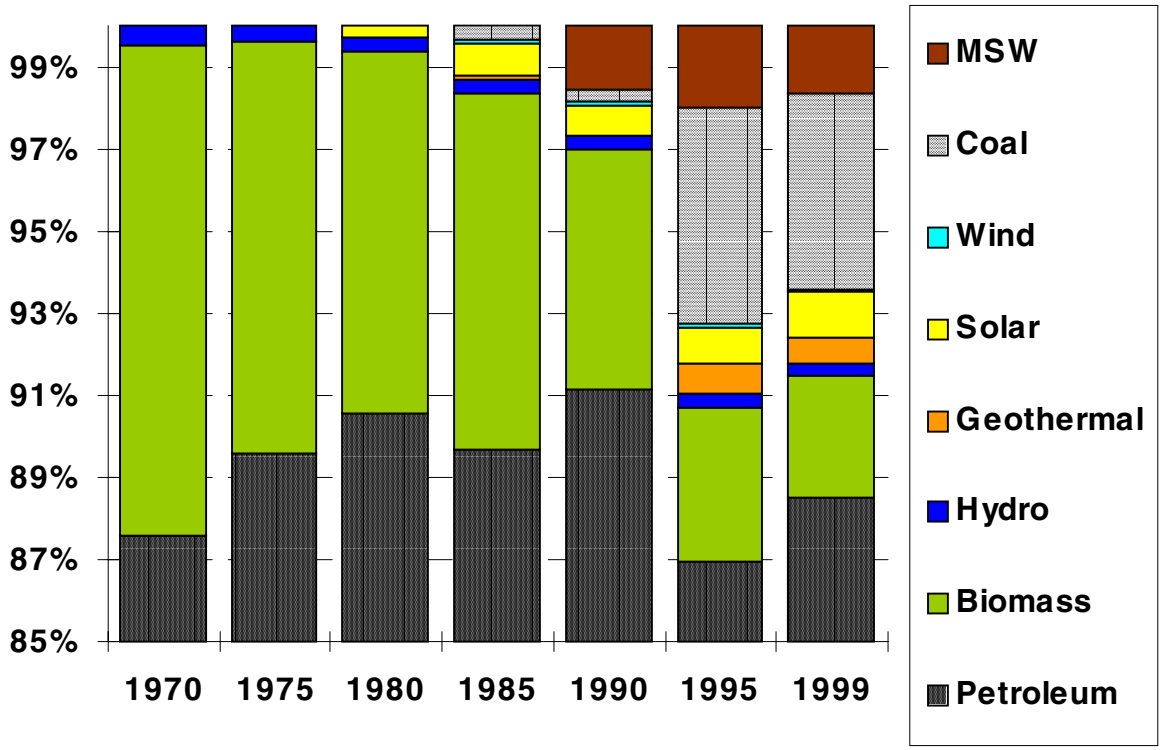

Figure 3. Hawaii's Primary Energy Demand by Type, Selected Years

Puna Geothermal Plant Proposes Doubling Capacity

In July, Puna Geothermal Venture (PGV) announced its desire to double its generating capacity from 30 megawatts to 60 megawatts.

The expansion would begin with an additional 8-megawatt increment, using a new generator and steam from existing wells.

Future expansion to 60 megawatts would require drilling more production wells, as well as receiving a revision to its permit, originally granted in 1989, from the County of Hawai'i.

At a public hearing before the County Planning Commission in October, some Puna residents opposed the expansion, citing health, noise and air quality concerns.

PGV is negotiating with HELCO to purchase the extra power. The plant now produces about 25 percent of the island's electricity. The State's only geothermal power producer, it has been in operation since 1993.

The company has paid $3.39 million in royalties, half of which went to the state, 30 percent to the county and the balance to the state Office of Hawaiian Affairs. PGV has 30 full time employees.

Photovoltaics to aid Kaua'i Water Department

The Kaua'i Department of Water Supply will install solar electric equipment on six large tanks, enabling remote monitoring of water levels at critical sites even during utility power outages.

Ron's Electric was awarded the contract to purchase and install the SCADA (Sensory Control and Data Acquisition) system. The entire system is estimated to cost $4.5 million.

The photovoltaics will run transmitters that will report water levels to the department's main office.

The six tanks supply critical areas, such as those with hospitals. They are located in Waimea, Hanapepe, Koloa, Maha'ulepu, Kalepa and Nounou.

There are about 45 tanks in the entire system. All are expected to eventually have automated reporting systems, but most will be powered by the utility grid.

New Hamakua Power Plant Online

Hamakua Energy Partners (HEP) has begun generating electricity.

HEP's first 22-megawatt unit was connected with HELCO's grid in August. Additional units at the Haina site made the 60-megawatt plant the largest generating facility on the Big Island.

The combined cycle combustion system includes a 19-megawatt steam recovery unit which uses "waste" heat to produce electricity. The two combustion turbines burn naphtha fuel.

Low-Cost Solar Project Initiated in North Kohala

Residents of North Kohala began signing up for low-cost solar water heaters and energy efficiency devices in the fall of 2000 under a Rebuild Hawai'i program sponsored by DBEDT and USDOE.

Na Makani Energy Initiative, a grassroots community planning project, is implementing the effort with assistance from HELCO and other partners.

Up to 100 residences will be able to qualify for solar water heaters and devices such as compact fluorescent bulbs and water-conserving showerheads. Bulk buys of solar equipment, the use of existing storage tanks when possible, and a monetary rebate will reduce costs to the homeowners.

One of ERTD's most popular free publications, *A Home-Owner's Guide to Solar Water Heating,* has been updated. It integrates a sunshine map of O'ahu; similar maps are available separately for the other islands. Currently, more than 70,000 homes use solar water heating in Hawai'i.

Updated Energy Strategy Published

The *Hawai'i Energy Stragegy 2000* (*HES 2000*) was completed in January 2000. The full report is available in Hawai'i State Libraries and on the worldwide web at http://www.hawaii.gov/dbedt/ert/hes2000. A summary is also available on the web.

The purpose of *HES 2000* is to assist State of Hawai'i planners and policy makers, members of the local energy community, and citizens of the State to better understand Hawaii's current energy situation. It develops and analyzes possible future energy scenarios and makes recommendations to enhance Hawaii's energy future.

The report was presented to the public at a workshop in late 1999.

New Law Encourages Performance Contracting in State Facilities

The Hawai'i State Legislature passed a law during its 2000 session which requires all state agencies to evaluate energy efficiency retrofits through performance contracting.

As an incentive, all money saved by the agency as a result of retrofits can be retained in that agency's budget.

Performance contracting uses private expertise and up-front investment to improve efficiency in buildings. 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.

The first performance contract for a State facility was completed in 1996 at the University of Hawai'i at Hilo and Hawai'i Community College campuses. The $2.9 million investment in efficiency is projected to result in over $6.6 million in energy and other cost savings during the term of the contract.

New State performance contracts involve the Hawai'i Army National Guard, the Public Library System, and the Judiciary. In addition, DBEDT is providing technical assistance to the Hawai'i Healthcare Systems Corporation in reviewing its boilerplate master performance contract.

Results of an opinion survey of government personnel involved in performance contracting were reported in April 2000. The respondents indicated that they undertook performance contracting primarily for its economic benefits, and most were satisfied with the performance of the equipment installed, with the savings, and with the maintenance provided by the contractor.

The most important lesson learned by the survey respondents was the need for teamwork and keeping all parties informed to keep the project on schedule.

To support performance contracting, ERTD provides technical assistance, information, model contracts, and spreadsheets to help with measurement and verification of savings. The spreadsheets are in the *Guide to Energy Performance Contracting*, accessible at http://www.hawaii.gov/dbedt/ert.

Police, Fire Stations Receive Energy Improvements

Hawai'i County is completing an aggressive program of energy efficiency retrofits in public buildings through performance contracting. The first project, the Hawai'i County Building, was completed in March 1997 at a cost of $460,000. Energy and operational savings for the third year of the improvements exceeded $75,300.

In February 2000, Hawai'i County completed the $403,000 retrofit of 27 fire and police stations. The installations were financed by a municipal lease and are guaranteed energy and operational cost savings of at least $56,949 per year.

Cumulative energy savings to date from these two performance contracting projects exceed $242,000.

The County is negotiating for lighting, air conditioning and solar water heating work at the Hilo and Kona public safety buildings, a $1.3 million investment. Savings are projected to be $139,000 annually.

The Hawai'i County Department of Water Supply (DWS) continued work on a contract to implement energy efficiency measures. With an annual electricity budget of close to $8 million, DWS is the largest single user of electricity on the Big Island.

Kaua'i Contracts Earn Savings

Kaua'i County completed its second year of performance contract retrofit work in March 2000. During that year, the County saved 342,852 kilowatt-hours and $79,453 in energy and operational costs.

Cumulative savings from the lighting retrofit of 29 County buildings totalled $156,403.

A feasibility study conducted for the Water Department determined that most of its pumps and motors are running close to design efficiencies, so a performance contract is not merited.

Guidelines, Models Developed for Energy Efficient Residences

Voluntary guidelines on designing and building energy-efficient homes, developed with a $225,000 USDOE grant, are now available.

The goal is homes that are comfortable without air conditioning, provide a healthy environment, and are durable and economical.

Also introduced to the public in November was a field guide, which is an illustrated "how-to" manual based upon the guidelines.

A model home featuring solar water heating, radiant barriers and natural ventilation is being built (Figure 4) under a unique public-private partnership.

Consortium "Rebuilds" Hawai'i with Conservation Partnerships

Across America, nearly 300 community organizations—municipalities, state agencies, schools, universities, nonprofit organizations and businesses—have formed partnerships to save money by reducing energy consumption in residential and commercial buildings.

In Hawai'i, there are 12 of these Rebuild America partnerships, including DBEDT. ERTD coordinates the Rebuild Hawai'i Consortium, which encourages participants to share information and work together to implement projects.

Three competitive grant awards from USDOE aggregating $313,000 support these activities.

Figure 4. Ground is broken in Wai'anae for the first energy-efficient Model Home on November 6, 2000 by representatives of cooperating businesses and agencies. Pictured (left to right) are: Peter Dreyfuss, Deputy Chief of Staff, Energy Efficiency and Renewable Energy, USDOE; Raynard C. Soon, Chairman, Hawaiian Homes Commission; Chuck Ehrhorn, AIA, President, Honolulu Chapter, American Institute of Architects; Maurice H. Kaya, Program Administrator, DBEDT ERTD; Audrey Hidano, President, Building Industry Association of Hawai'i; Randy Lau, Owner, Designer Built Systems; Jackie Mahi Erickson, Vice President, Hawaiian Electric Company, Inc.; Terris H. Inglett, President and Chief Operating Officer, Honsador Lumber Corporation.

Among the Rebuild Hawai'i projects completed in 2000 are a market transformation project conducted by the Hawaiian Electric Company (HECO). This effort determined new marketing approaches to overcome barriers to the installation of energy-efficient devices in small businesses.

Also completed was the first phase of Energy $mart Schools, a student energy audit pilot project spearheaded by HECO in two O'ahu high schools.

The Maui Schools Project, a survey of 30 Maui schools, is still underway. Its goal is to recommend ways to finance a lighting retrofit, and assist the schools in implementing the project.

Also in progress is the Green Office Project, which promotes energy efficient office design. An exhibit created in 1999 was refined for use at various events.

Four publications have been drafted and will be published shortly:

- Measurement and Verification of Energy Savings in Energy Performance Contracting;
- Case Study of Performance Contracting at the University of Hawai'i at Hilo;
- Rebuild Hawai'i Consortium Marketing Plan; and
- Energy Efficiency Policies to Promote Sustainable Economic Growth in Hawai'i.

All four Counties, all of the State's gas and electric utilities, the University of Hawai'i system, two federal agencies and several State agencies are Consortium members.

The Consortium meets quarterly to discuss progress. Regional meetings are also scheduled.

Hawai'i Expertise in Efficiency and Renewables Exported to Philippines

In September 1999, DBEDT's Energy, Resources and Technology Division was awarded $89,426 in two federal grants to continue assisting the Philippine government in the fields of energy efficiency and renewable energy.

The new funds were in addition to previous grants of $166,500 received in 1998 to introduce Hawaii's model energy codes to the Philippines.

The new projects are:

• Energy Performance Contracting Project in the Philippines, which received $39,980 from the Council of State Governments and which was implemented and completed in 2000; and

• Hawai'i-Philippines Cooperation Project on Energy Efficiency and Renewable Energy, funded by $85,000 from USDOE, which will run through September 2001.

The first project aimed to establish the Philippines' first performance contracting project using Hawai'i technology and policy expertise. A planning workshop held in Hawai'i during January 2000 supplemented two previous workshops held in November 1999 at locations in the Philippines.

Performance contracting services are now being sought for over a dozen food manufacturing plants operated by Universal Robina Corporation, which released a formal Request for Proposals in July 2000.

A Presidential Executive Order being drafted for President Estrada as part of this project would place energy performance contracting on a fast track in the Philippines.

The second project aims to transfer energy policies and technologies to the Philippines. It is helping to establish a Philippine National Energy Management Program modeled after the U.S. Federal Energy Management Program, or FEMP, which is designed to improve energy efficiencies and reduce energy consumption levels at U.S. government facilities.

As part of this project, DBEDT cosponsored the June 21-23, 2000 International Conference on Energy Efficiency and Renewable Energy in Cebu, Philippines. Altogether 172 people attended. One of the principal objectives was to introduce business opportunities to U.S. and Hawai'i companies in the areas of energy efficiency and renewable energy—including lighting, energy management systems, solar water heating and other technologies. As a result of the conference, ProVision Technologies, Inc., a Hilo-based company, has begun negotiations with Philippine officials to install portable photovoltaic power units in remote villages in that country.

Philippines Biomass Energy Assessment Concluded

Another Hawai'i-Philippines project was concluded in the year 2000. The University of Hawaii's Hawai'i Natural Energy Institute (HNEI) performed a comprehensive assessment of the biomass-to-energy potential in the Philippines.

HNEI also identified ways to enhance the efficiency of two Philippine sugar mills on the island of Negros Occidental, the Victorias Milling Company and the First Farmers Holding Corporation. HNEI researchers identified a number of renovations which would increase the amount of electricity generated at each mill, allowing significant exports to public utilities.

Recommendations included upgrading the sugar processing plants and the steam and power generation equipment in both factories.

Center to Promote Technology Exports to Asia and Pacific Region

DBEDT has established a Center for Asia-Pacific Infrastructure Development (CAPID) in partnership with private companies and other private and public organizations.

CAPID is expected to bring Asia-Pacific officials together with export-oriented, knowledgeable firms and financial funding agencies to meet the infrastructure needs of the Asia-Pacific region.

Its primary mission will be to promote the export of U.S. energy, environmental, transportation and related technologies throughout the region.

Surveys, Exercises Prepare Hawai‘i for Energy Emergencies

Hawai‘i is vulnerable to many natural and political/economic disruptions which could severely impact the availability of fuels for power generation and transportation.

Natural disasters such as hurricanes are only part of the picture; dislocations in the international oil market have also caused shortages and temporary energy emergencies in recent years.

Because of Hawaii's isolation and dependence on imported oil, preparing for energy emergencies is an important function for ERTD and other agencies.

One method of preparing for the worst is to participate in training exercises.

In February, the State of Hawai‘i, USDOE and local oil refiners tested the process for acquiring oil from the nation's Strategic Petroleum Reserve.

This "Eagle-1" exercise simulated the sale and drawdown of SPR oil through Hawaii's assured access provisions. As a result, issues were identified which require clarification and resolution.

The annual "Makani Pahili" meeting and training exercise was held in May 2000. In addition to State emergency planners, County representatives, USDOE officials, and members of the Federal Emergency Management Agency's Regional Interagency Steering Committee met to discuss emergency management issues. The exercise portion of the event simulated each agency's role in responding to a disaster.

A survey to document emergency generator technical specifications was completed in 2000. These decentralized generators, located at emergency and essential service facilities, are vital during an energy emergency. Should they fail, centralized records of their specifications now exist to facilitate their replacement.

This first phase of the project will be supplemented by a study to identify emergency and essential service facilities which need emergency generators. This second phase will be initiated in January 2001.

The assessment will document the minimum power needs of the facilities, which will enable generators to be more effectively allocated in times of critical need.

In a related project, ERTD helped Young Brothers, the interisland barge company, acquire two new 275-kilowatt diesel generators. This action was recommended in the 1996 Hawai‘i Hazard Mitigation Study. The generators will be used to refrigerate containers during an emergency. Young Brothers and FEMA shared the $160,000 cost.

Actions Recommended to Maintain Preparedness

In order to sustain the State's ability to respond to energy emergencies, ERTD recommends the following actions:

- Implement planned improvements for the internal operations of the Energy Council, such as a meeting location with backup power and communications.
- Work with USDOE on rules and procedures which facilitate Hawaii's priority access to the Strategic Petroleum Reserve.
- Through regular exercises, emphasize emergency preparedness on the local (first responder) level.
- Complete emergency generator inventories and database documentation of emergency and essential services to reduce Hawaii's energy system vulnerability.
- Continue to work with the Counties of Hawai‘i, Maui and Honolulu to complete administratively-approved county EEP plans.

Y2K Uneventful in Hawai‘i

The changeover to the Year 2000 was uneventful for Hawaii's energy systems. However, careful planning in anticipation of the Y2K event was conducted by agencies involved in energy emergency preparedness.

The preparation of contingency plans was the purview of the Energy Council, composed of State, County, federal and industry representatives. The Council facilitates dialogue among the agencies with emergency response duties and coordinates public information activities.

Concern Over Utility Sale Motivates Kaua'i County Intervention

On July 7, the County of Kaua'i, the U.S. Department of Defense and the State Division of Consumer Advocacy filed position papers with the Public Utilities Commission (PUC) regarding the proposed sale of Kaua'i Electric to the Kaua'i Island Utility Cooperative.

All parties opposed the sale for various reasons, including the high sales price and the lack of experience of the KIUC Board.

Kaua'i County's main opposition was to the $270 million price to be paid by KIUC and the risk associated with the use of 100% debt financing.

On August 14, the PUC filed a decision concluding that the KIUC was not financially fit to own and operate Kaua'i Electric and that the sale would not be in the public interest.

The county is contemplating the possibility of Kaua'i Electric becoming a municipal utility and has hired a consultant to produce an appraisal of the company.

Varied Activities Support Maui Energy Programs

Maui County continues to pursue energy options which make sense for its residents. Among the technologies the County energy coordinator monitored during 2000 were distributed generation and micro-cogeneration.

Other areas of interest include biomass oil crops, wind energy development, and wave energy.

Maui also sustained its participation in Integrated Resource Planning, attended hearings on a proposed new Maui Electric power plant for Waena, and continued to monitor utility restructuring activities elsewhere in the country.

Workshops and Events Provide Varied Forums for Public Dialogue and Education

Seminars, conferences and other events offered opportunities to learn about energy technologies and share opinions on policy.

In January, an educational workshop on renewable energy and global warming was scheduled on Kaua'i by Representative Mina Morita. As a result, legislation proposing that utilities be required to generate a certain amount of power from renewables was introduced and discussed, but not passed, during the 2000 legislative session.

The Kaua'i Renewable Energy Hui, a community environmental organization, held an evening workshop on August 21.

Kaua'i hosted the Pacific Peer Exchange Workshop on September 5 and 6. The first day included tours of the Marriott Hotel's energy efficiency installations as well as a visit to Gay and Robinson's sugar plantation and factory.

On the second day, officials from American Samoa, the Commonwealth of the Northern Marianas, Guam, the Counties of Kaua'i, Maui and Hawai'i, and ERTD shared updates of their various programs.

Also in September, the Hawaiian Electric Company offered a two-day Efficient Electro-Technology Expo and Conference in Waikiki. Over 300 participants and vendors were offered 30 technical and financial workshops.

On September 12, Kaua'i Community College offered a workshop on fuel cells.

On November 8, USDOE sponsored a roundtable on its industrial technology assistance programs.

A November 9 Energy Efficiency Policy Symposium was hosted in Honolulu by DBEDT, USDOE and eight other sponsors. Topics included the economics of efficiency and renewable energy, and state statutory and regulatory policies.

Students Excel in Science Contests

The Hawai'i Science Bowl, held on January 21, is supported by both ERTD and USDOE. This year, the winning team from Punahou School represented Hawai'i at the national event in Washington, D.C. Punahou's students also won an award for good sportsmanship and were treated to tours of scientific research sites in Colorado.

The State Science and Engineering Fair was held in late March; ERTD staff made nine energy awards for junior and senior division projects.

Througout the year, classroom presentations and assistance to teachers was provided upon request by ERTD's Hawai'i Energy Extension Service.

Transportation Still a Major Consumer

Energy use for ground, marine and air transportation is a dominant force in Hawaii's fuel supply. Transportation accounts for two-thirds of the State's total energy use, and this trend is expected to continue. With only a few, small exceptions such as the use of biodiesel and electricity, the State's transportation sector relies on petroleum fuels.

The largest single use of transportation fuel is by aircraft, a sector essential to the state's economy because of our dependence on tourism and interstate commerce. As shown in Figure 5, the use of aviation fuels is declining from a peak in 1989.

Echoing this trend, overall use of transportation fuels is declining after steady increases through the 1980s. However, the amount of fuel used for ground transportation continues to climb slowly, though it dipped temporarily in 1997.

The number of registered motor vehicles has been rising during the past decade.

Clean Fuels Actions Continue

The Honolulu Clean Cities consortium now has 30 members. Engineers Surveyors Hawaii, Inc. and Travel Plaza Transportation joined 28 other agencies, utilities, non-profits, and private businesses who make up the partnership.

Clean Cities is a voluntary government and industry coalition coordinated by USDOE to achieve a cleaner environment in major U.S. cities. Other goals are to reduce dependence on imported oil, and stimulate local economies by increasing the use of alternative fuels and alternatively-fueled vehicles.

The consortium continued fleet outreach and demonstrations in events such as the Mayor's Pacific Islands Environmental Symposium, held in May, and the Honolulu City Lights parade in December.

Members also supported the Electron Marathon in March, serving as scorekeepers for the event. Nineteen high school teams built and raced electric go-carts in this annual educational competition.

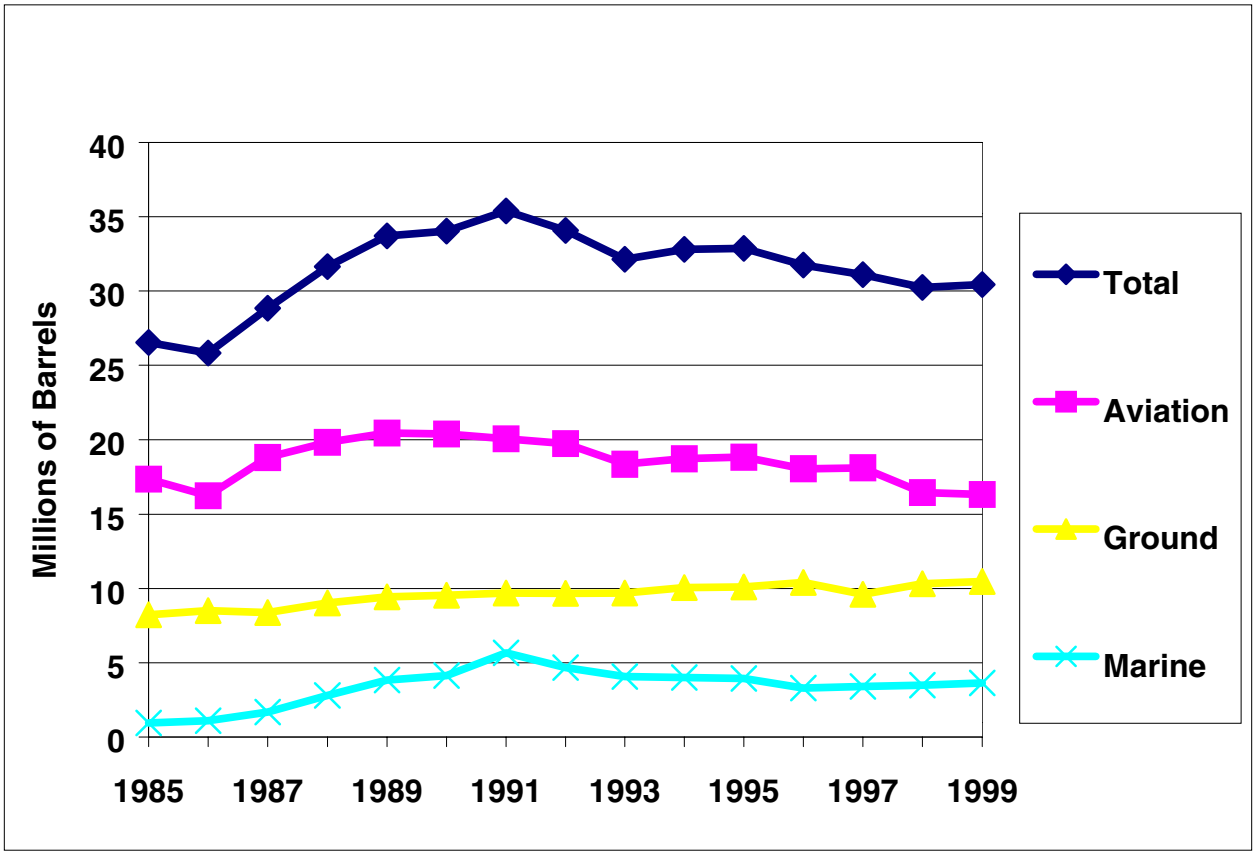

Figure 5. Annual Transportation Use, All Sectors