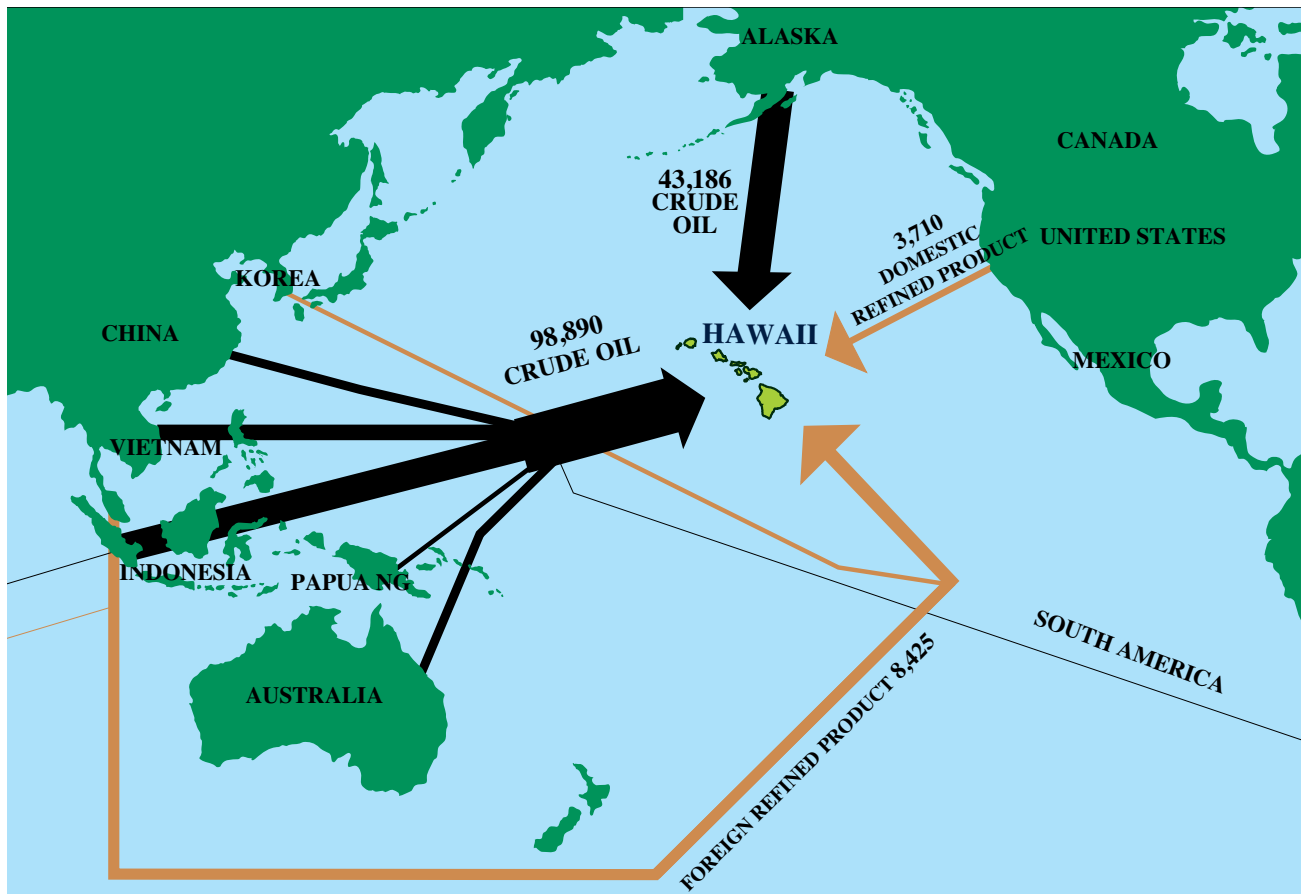


State of Hawaii Energy Resources Coordinator



Annual Report 2002



State of Hawaii
Department of Business, Economic Development & Tourism

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Cover illustration: Movement of Petroleum to Hawaii in 2001 (barrels per day). See page 4.

This report is also available at: <http://www.hawaii.gov/dbedt/ert/erc/erc02.html>

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Hawaii's Energy Program: A Foundation for Economic Health and Security

Energy—its supply and use—is the foundation of Hawaii's economy. How much fuel is imported and how efficiently it is used have impacts which reverberate throughout each resident's personal life and business activities.

In Hawaii, every barrel of oil saved translates to more dollars available to the local economy, in addition to the many environmental benefits.

Hawaii relies on imported petroleum for over 89% of its primary energy (see Fig. 1). All of this oil is imported, primarily from foreign nations, with a declining amount coming from Alaska.

An unusually large percentage of our energy is consumed by aircraft, reflecting the islands' remote, mid-Pacific location. Aviation accounted for over one-third of the oil used in Hawaii in 2001. In comparison, the U.S. uses about 9% of its oil as aviation fuels.

The islands' electricity grids are not interconnected; fuels must be transported interisland by sea.

Hawaii residents pay among the nation's highest costs for electricity and gasoline.

These are among

the challenges facing the Energy Resources Coordinator, whose staff has been working to enhance energy security, improve the state's economy, and reduce dependence on imports.

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. It is held by the Director of the Department of Business, Economic Development, and Tourism (DBEDT).

The goals of the State's energy program have been incorporated into the Hawaii State Plan and codified in the Hawaii 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.

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 efficiency transportation practices must also be promoted.

The Energy, Resources, and Technology Division (ERTD) implements programs to meet these goals. Achievements for 2002 are detailed in the following pages.

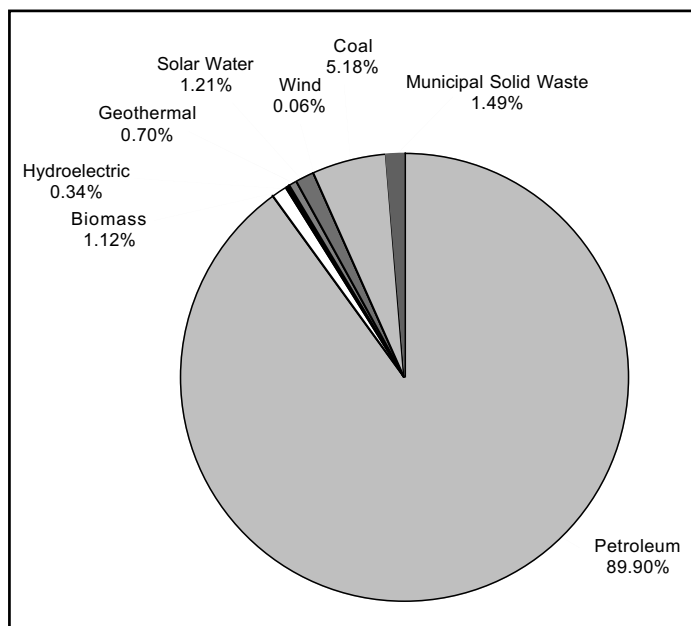


Figure 1. State of Hawaii Energy Resources in Year 2001

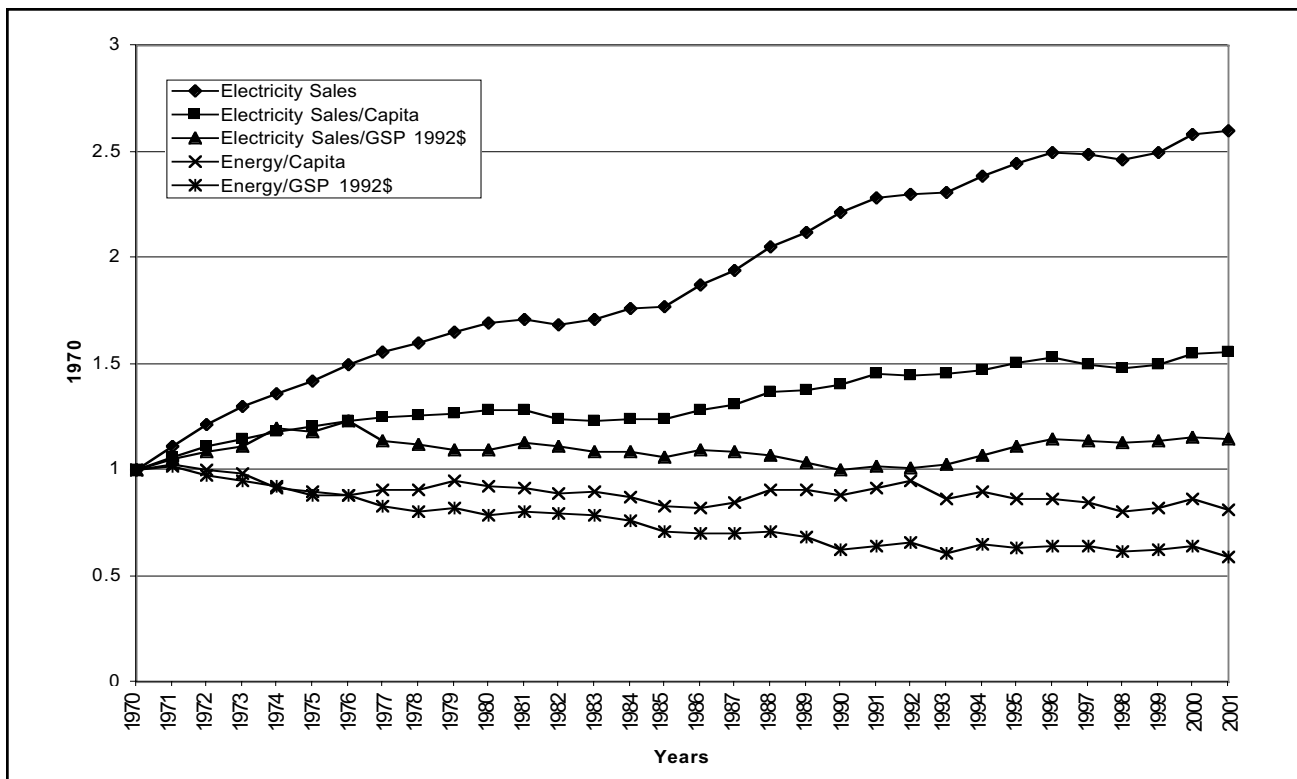


Figure 2. Key Energy and Economic Indicators in Hawaii, 1970-2001

Energy & Oil Consumption Decreased in 2001

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. Energy efficiency also ensures that fewer dollars leave the state for fuel purchases. In addition, reduced expenditures for energy release consumer dollars for other purchases in the State's economy.

Hawaii's economy is significantly more energy efficient than it was in 1970 and Hawaii residents continue to use less energy per capita than they did three decades ago (see Fig. 2).

A slowdown in petroleum use during 2001 was probably influenced by reduced activity in the

visitor industry after September 11, 2001.

Petroleum consumption totaled 48.1 million barrels. This is a decrease of 16.5 trillion Btu and 1.7 million barrels from 2000.

Slight upturns in energy consumption per dollar of the Gross State Product (GSP) appear to be driven by increasing electricity consumption.

In 2001, overall energy use per capita (based on de facto population) decreased 6.44% from the previous year. There has been a 19% decline in energy use per capita since 1970.

In contrast, electricity sales continue to rise faster than the de facto population. Between 1970 and 2001 the average increase in

electricity sales was about 3.2%, while the average de facto population growth was 1.7%.

During 2001, electricity sales increased a modest 0.89% from 2000. This also resulted in about a 0.79% increase in electricity sales per capita. Electricity sales in 2001 were more than two-and-a-half times 1970 levels.

In 2001, isle residents and businesses spent \$3.37 billion on energy, or about seven percent of Hawaii's \$44.2 billion GSP (in 2001 dollars).

This is an increase of two percentage points over the percentage of GSP spent on energy in 2000. An estimated 304 trillion Btu of primary energy was consumed in Hawaii last year.

DBEDT Employs \$1.5 Million in Federal Grants To Support State Energy Initiatives

Nearly \$2 million in State and federal funds were budgeted for Hawaii’s energy programs during fiscal year 2001-02, as shown in Table 1. The State fund expenditures are for projects only; federal figures also include personnel costs.

DBEDT is highly successful in attracting non-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, primarily the U.S. Department of Energy (USDOE). This represents a match of more than \$4 for every \$1 of State funds expended.

The largest component of the budget was the Utilities program area, which includes a variety of energy planning and policy activities as well as emergency preparedness, administrative rulemaking, an analysis of distributed energy, and support for biomass, wind, hydrogen and other renewable energy technologies. These projects were budgeted at \$776,994, of which 75% was federal funds.

The second largest component was the Buildings sector, which focuses primarily on energy efficiency. It includes the myriad activities of the Rebuild Hawaii consortium as well as the promulgation of the Model Energy Code, development of residential building guidelines, the “BuiltGreen Hawaii” project, the promotion of energy efficiency retrofits in State buildings, and a feasibility analysis of using cold sea water in air conditioning. These projects were budgeted at \$641,442, which does not include funds expended by private sector or County partners.

In the Strategic Technology program area, ERTD staff pursued a variety of international technology export initiatives. Augmenting \$120,000 in federal funds, State monies supported the Center for Asia Pacific Infrastructure Development, as well as specific exchanges with the People’s Republic of China.

Resource efficiency and solid waste management programs, which encompass remanufacturing and recycling, as well as technology innovations comprise the Industrial program area. Supported exclusively with federal funds, this sector’s budget was \$100,000.

Transportation initiatives accounted for \$50,000 of the fiscal year budget, primarily focused on renewable fuels such as alcohol.

Federal grants totaling \$7,700 supported special educational programs such as the Hawaii Science Bowl and the State Science and Engineering Fair.

Description	State Funds	Federal Grants	Total
Education	0	\$7,700	\$7,700
Transportation	0	\$50,000	\$50,000
Buildings	\$20,000	\$621,442	\$641,442
Industrial	0	\$100,000	\$100,000
Utilities	\$159,913	\$617,081	\$776,994
Strategic Technology	\$184,000	\$120,000	\$304,000
Totals	\$363,913	\$1,516,223	\$1,880,136

Table 1. ERTD Energy Program Budget for the Fiscal Year Ending 6/30/02

Energy Savings in State Buildings Mandated

A new law, which took effect on May 31, 2002, requires that State buildings significantly reduce their energy consumption in the coming decade.

Act 77 is closely patterned after Executive Order 13123, signed by the President in June 1999. E.O. 13123 affects Federal agencies.

The purposes of Act 77 include saving taxpayer dollars and reducing emissions which contribute to air pollution and global climate change.

Also, it is intended to reduce the use of petroleum-generated energy, expand the use of renewable energy, decrease water consumption, and employ sustainable design principles. Petroleum is the basis for nearly 90% of Hawaii's energy, and all of it is imported, primarily from foreign sources (see Fig. 3).

In the process, Act 77 is expected to create local employment and help foster markets for emerging technologies.

Specific goals include:

- ✓ Reduce greenhouse gas emissions attributed to facility energy use by 30% by January 1, 2012.

- ✓ Reduce energy consumption per gross square foot of all non-laboratory facilities by 20% as of January 1, 2007, and by 30%

by January 1, 2012.

- ✓ Reduce energy consumption per square foot, per unit of production, or per other applicable unit, of laboratory facilities by 15% by January 1, 2007, and 25% by January 1, 2012.

- ✓ After efficiency goals have been met, provide 20% of remaining energy requirements from renewable resources.

Implementing the provisions of Act 77 will result in optimized life-cycle costs, including both environmental and energy costs associated with the entire life of state buildings—from construction through operation and decommissioning.

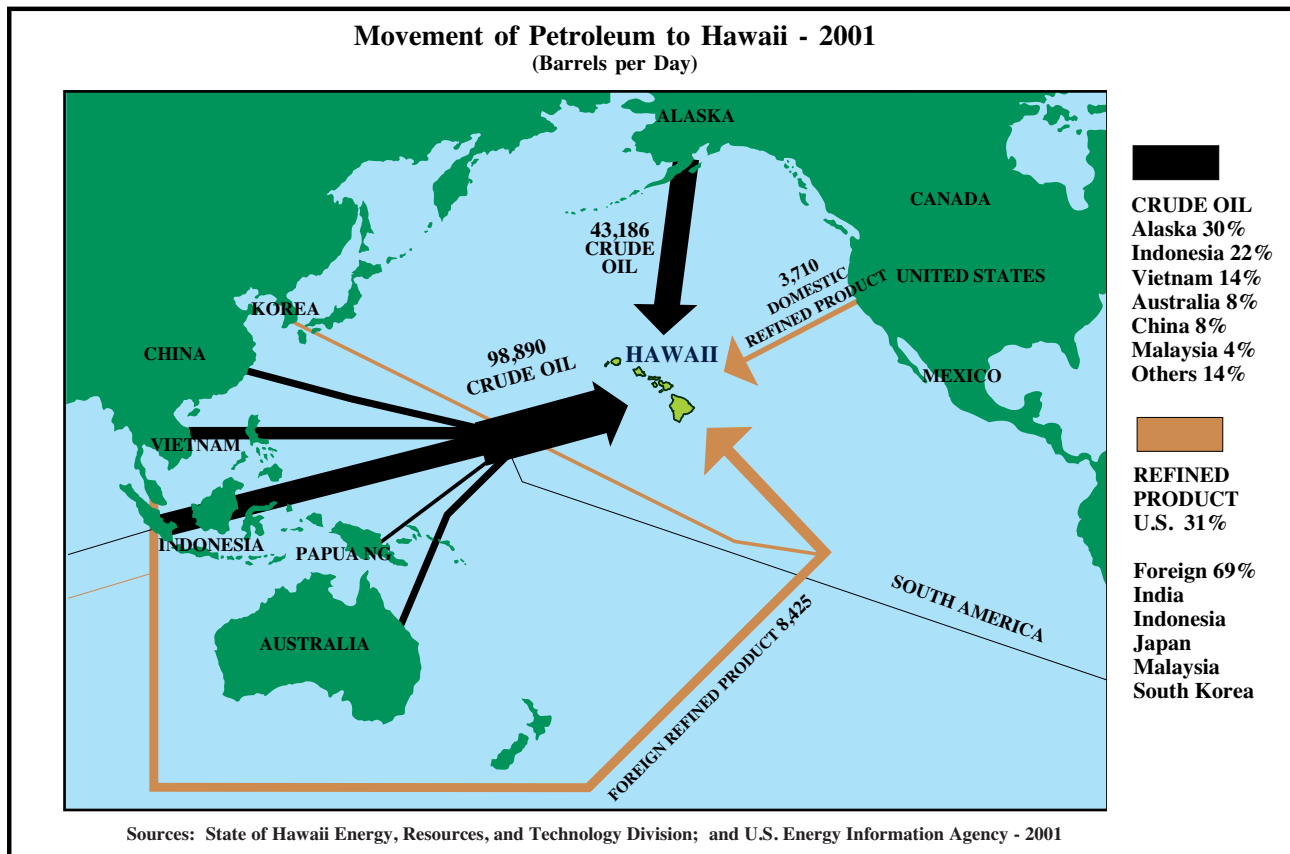


Figure 3. Sources of Imported Petroleum

Analysis Being Prepared

Legislation Requires Cap on Gasoline Prices

As part of Act 77, Session Laws of Hawaii (SLH) 2002, price caps on wholesale and retail gasoline are scheduled to be implemented on July 1, 2004.

In accordance with the new law, ERTD staff and consultants are assessing the effects of the proposed price caps and alternatives in a report for the 2003 State Legislature.

The comprehensive analysis of gasoline markets and policies in Hawaii and other relevant locations includes a review of unsealed documents in recently settled gasoline antitrust litigation as well as other appropriate references. Also, data determining whether Oil Price Information Service or other benchmarks are applicable to Hawaii markets are being gathered.

The law requires the Public Utilities Commission (PUC) to determine the maximum pre-tax wholesale and retail prices of regular unleaded gasoline on a weekly basis. Adjustment factors for the Neighbor Islands provide additional increases over the Oahu figures.

The statutory adjustment factors used to calculate the maximum wholesale and retail margins would apply to the first year after the scheduled 2004 implementation date. For later years, the PUC is required to determine the margins in accordance with procedures set forth in the new law.

Act 77 prohibits regular un-

leaded gasoline sales by petroleum manufacturers, wholesalers or jobbers to either dealer-operated or independent retail service stations, as well as to another jobber or wholesaler, for more than the maximum pre-tax wholesale price.

Retailers may not sell self-service regular unleaded gasoline to the public for more than the established maximum pre-tax retail price. The maximum pre-tax price margin would be the same for retailers statewide.

The law also provides procedures to adjust the maximum prices, and gives the Governor emergency powers to suspend price caps.

In addition, it retains the lease rent cap for dealer operated retail stations. However, as of Decem-

ber 2002, this provision was under judicial review. It had been declared unconstitutional in April 2002, the second such ruling. The first was in November 1998.

The new law also changes the responsibilities of DBEDT's Energy, Resources, and Technology Division. ERTD's Administrator is designated the "State Petroleum Commissioner," and ERTD is now required, rather than allowed, to monitor the oil industry's profit margins in Hawaii and conduct periodic audits and inspections of oil suppliers.

The amount of \$250,000 was transferred from the PUC special fund into the General Fund and then appropriated to DBEDT to support the analysis by ERTD and its consultants.

Cooperative Efforts Enhance Security

Building upon years of cooperation in developing emergency preparedness plans for natural disasters, agencies representing Hawaii's government, law enforcement, military and critical energy sectors have now developed a comprehensive action plan for energy security. Participants in the effort include the State Civil Defense, the National Guard, police and fire departments, military forces, industry, and local government. ERTD staff provide support.

Infrastructure security guidelines have been adopted, including five-stage, color coded threat protection levels. The guidelines incorporate a table of security measures for energy and other infrastructure facilities which can guide the creation of specific security plans.

In addition, critical facilities have been identified and a mission folder assembled for each which will be useful for first responders. Communications security and encryption protocols were enhanced.

Continuing practical training efforts, emergency preparedness procedures were tested during the Makani Pahili 2002 event held in May. State agencies simulated their Emergency Support Function roles, improving management and coordination of resources.

State's Success in Obtaining Federal Funds has Major Impact on Economy, Energy Efficiency

Hawaii's impressive achievements in energy efficiency and conservation are attributable in great part to DBEDT's success in securing State Energy Program (SEP) dollars as well as SEP special funds from the USDOE.

Of the 50 states, Hawaii is among the leaders in securing SEP funds via competitive proposals.

In 2002, DBEDT was awarded special funding for five new energy efficiency and renewable energy projects totaling \$450,000.

Not including these new grants, the SEP has provided over \$991,000 since 1997 for State initiatives including Rebuild Hawaii, performance contracting, the Model Energy Code, and demand side management.

These federal funds leveraged nearly \$2.9 million from non-federal resources and resulted in over \$397 million in total project investment.

This activity created 5,644 jobs and provided nearly \$215 million income to the State.

The projects have saved almost 534 million kilowatt-hours and some \$87 million in energy costs. In addition, carbon dioxide emissions within the state were reduced by 540,000 tons.

Savings from just one component of the State Energy Program, the Model Energy Code, would be enough to power 5,612 homes.

The five new projects will further advance the State's energy

goals. An indication of the quality of the proposals, prepared by ERTD staff, is that funds were awarded for every project proposed.

The five new awards are:

◆ Hawaii Hydrogen Power Park, \$450,000 for Phase 1 of the three-phase project. To initiate the project, \$150,000 has been funded; the balance is anticipated to be obligated with 2003 funds. This hydrogen infrastructure project is expected to be installed at the Natural Energy Laboratory of Hawaii Authority (NELHA) at Keahole Point. Phase 1 will support the design and installation of the hydrogen production and storage systems. Later phases will demonstrate and test hydrogen and fuel cell systems for stationary power generation as well as for transportation. The entire \$3 million project will require USDOE funding of \$1.35 million. Non-state cost sharing in excess of \$1 million over three years has been committed, including \$250,000 per year from the California Energy Commission.

◆ Rebuild Hawaii, \$106,244. These funds will continue to support successful partnership projects outlined on page 8, part of the Rebuild America initiative.

◆ Managing High Saturations of Distributed Energy Resources as a Microgrid on the Big Island, \$100,000. The purpose of this project is to optimize HELCO's utility network to produce the

lowest electrical costs, highest reliability and power quality, and improved emissions levels. HELCO will work with the State to evaluate combinations of hybrid, controllable distributed energy resource systems, including: microturbines; fuel cells; customer-sited storage systems such as flywheels, batteries, and ultracapacitors; hydrogen generation and storage; small wind and photovoltaic systems; and responsive load technologies such as building energy management. Data collection has begun, and will be followed by a screening analysis of various options.

◆ Evaluating Bulk Energy Storage to Relieve Transmission Congestion on the Big Island, \$70,000. This project will foster the increased use of distributed energy facilities, renewable energy systems and new forms of energy storage to alleviate utility transmission and reliability issues. The first task will be to identify and document existing transmission and power quality problems, and to project electrical demand through 2014.

◆ Promulgation of Hawaii Residential Model Energy Codes, \$30,000. In partnership with the Building Industry Association, DBEDT will conduct an educational outreach to building professionals and consumers, encouraging compliance with residential building codes that reduce energy use in new construction.

Hydrogen and Fuel Cells Receive Boost

On January 8, 2002, a new hydrogen fuel cell research facility was dedicated at HECO's Ward Avenue location. In the 4,000 square foot center, HNEI researchers will evaluate the performance and reliability of fuel cells using test stands designed and manufactured by UTC Fuel Cells.

Initial funding was provided via a \$1.5 million Department of Defense appropriation.

The Hawaii State Legislature is also interested in promoting hydrogen. As the result of legis-

lation providing funding for a public-private partnership to advance the use of hydrogen, approximately 50 industry and government experts in hydrogen and distributed energy met for two days during August in Kona.

Proposed projects incorporate wind, geothermal, solar and biomass as primary energy sources. The attendees' ideas will be used to develop a hydrogen implementation plan for the state.

A Hydrogen Power Park for Kona has also been funded (see page 6).

Utility Cooperative Buys Kauai Electric Company

The Hawaii Public Utilities Commission approved the sale of Kauai Electric to a nonprofit business cooperative on September 17, 2002. The sale closed October 31.

Kauai Island Utility Co-op is buying the utility from Citizens Communications Corporation for \$215 million, making it the only nonprofit utility cooperative in the State. Customers can choose to become cooperative members and thus part owners of the utility.

The cooperative is utilizing a federal loan for the purchase.

Asian Initiatives Focus On Business

Collaborative efforts with other Asia/Pacific countries can result in both energy improvements overseas and business opportunities for Hawaii companies.

Several years of a cooperative project in energy management between Hawaii and the Philippines culminated in a major international conference, held June 10-22, 2002 in Manila.

A conference on Energy Management in the Philippines: Lessons for Asia was cosponsored by DBEDT and the Philippines Department of Energy. The attendees discussed the successes and challenges of the Philippines' new Government Energy Management Program, and learned about specific commercial project opportunities for U.S. businesses in the fields of energy management, efficiency, and renewables.

A second major event also focused on the expertise offered by Hawaii companies in energy and environmental services. The Hawaii International 'Sisters' Business Summit, held in July in Honolulu, featured delegations from many of Hawaii's 72 sister states and sister regions. It was attended by 275 people.

A ten-month agreement between DBEDT and the U.S. Embassy in the People's Republic of China climaxed in October with a business mission and forum in Beijing.

The purpose of the "Platinum Key Service" agreement is to introduce new business opportunities in eastern China to Hawaii's energy and engineering community. There is specific interest in developments planned for the 2008 Summer Olympics, to be

held in Beijing.

This effort was funded by the State.

In order to continue service to Hawaii's business community, DBEDT's Center for Asia Pacific Infrastructure Development (CAPID) expanded its website and provided additional leads to potential projects overseas. CAPID also sponsored a series of events, including the "Sisters" summit and a June business mission to Vietnam.

Drawing upon Hawaii's experience in this sector, the Council of State Governments has requested the State's assistance preparing a proposal for a project to promote energy performance contracting in an Asian country. The proposal will be submitted to the Public Private Infrastructure Advisory Board of the World Bank.

Rebuild Hawaii Partnerships Enhance Efficiency

Rebuild Hawaii is part of Rebuild America (RBA), a program made up of over 500 community organizations nationwide which began in 1997. DBEDT is one of 13 RBA partnerships in Hawaii. Newsletters and a website keep the public informed. On-going projects are listed below:

Kauai Lagoons Audit

An engineering audit of energy efficiency options for the Kauai Lagoons golf course was finished in April 2002. Kauai Electric approved rebates for the measures, ensuring payback in less than three years. Kauai Lagoons staff are already implementing low-cost and no-cost options; additional improvements await the decision of the hotel's new owners.

Energy Smart Schools

Managed by the Hawaiian Electric Company (HECO), the Energy Smart Schools program for 2002-03 is engaging 60 9th-grade students from McKinley and Radford High Schools. The students will be involved in

project-based activities about energy, efficiency, business and marketing, culminating in lighting audits to be conducted for their schools and small businesses in their communities.

A parallel Energy Smart Schools effort at the West Hawaii Explorations Academy, coordinated by the County of Hawaii, is training students at this charter school to audit the pumps which maintain their aquaculture facilities. Later, students will offer design recommendations for their future campus.

Classroom Cooling

The University of Hawaii School of Architecture is studying energy losses and comfort levels in the ubiquitous portable classrooms installed on public school campuses statewide. The School of Architecture will be installing data loggers and developing guidelines for use by the State Department of Education.

Contract Training

The City and County of Ho-

nolulu will sponsor a workshop on performance contracting and conduct team building training in early 2003.

Cogeneration

The Gas Company sponsored three workshops on Combined Heat and Power in late 2002, exploring issues such as project economics and emission reductions and featuring case studies.

Maui College Upgrades

Maui Community College is gathering data which will determine the potential savings of cold storage to reduce the peak power demand of its air conditioning system, and also to replace inefficient equipment such as window unit air conditioners. In addition, the college intends to tie the campus energy management system to the classroom use schedule and incorporate energy conservation awareness programs.

Hawaii County Pumps

The County of Hawaii Department of Water Supply is continuing its pump efficiency testing and energy tracking program, which is expected to reduce County energy costs by up to 4%, or over \$250,000 annually.

Sustainable Design

A series of sustainable design workshops will be offered by HECO and the U.H. School of Architecture to train the architectural and engineering design community and increase the number of high performance buildings in Hawaii.

National Award for Rebuild's President Holmes

Steve Holmes, president of the Rebuild Hawaii consortium, received Rebuild America's Partnership Leader of the Year Award at the 2002 RBA National Forum in New Orleans.

Holmes, previously a member of the City and County of Honolulu City Council, has been working to expand and diversify the Rebuild Hawaii consortium, bringing in representatives from local building industry associations, property management companies, hotels, labor unions and local businesses.

This is the fourth Rebuild America award won by partners within the Hawaii consortium.



Figure 4. The steel-framed Speed House not only was erected in a single day, but featured insulated radiant barriers, a solar water heater, a roof ridge vent, vented eaves and other efficiency features.

Building Greener, Building Better

Homes that are better for the environment and more cost effective for homeowners—that’s the goal of the Hawaii BuiltGreen™ Program, developed by the Building Industry Association (BIA) of Hawaii, the American Institute of Architects Honolulu Chapter, DBEDT, and USDOE.

Using the accomplishments of the Residential Energy Efficient Building Guidelines Project as a foundation, the following assistance was offered during 2002:

Steel Speed House. Featuring Hawaii BuiltGreen™ techniques and materials, a steel-framed home was built in a single day during the BIA’s Home Building and Remodeling Show in January (see Fig. 4). The Show also featured a seminar on ERTD’s Model Demonstration Home and a booth with information and publications.

Sick Building Syndrome. A symposium held in February focused on mold prevention and the design and performance of HVAC systems.

Maui Solar Fair. About 2,500 publications were distributed at a

booth featuring information on radiant barriers, insulation and other energy-saving techniques.

Maui Home Show. In addition to staffing an information booth, ERTD offered two seminars on efficient housing at the Maui Contractor’s Association Home Show in June.

Realtors Presentation. Ten Realtors and staff of the Hilo office of Clark Realty attended a presentation on the Hawaii BuiltGreen™ Program.

Housing Award. An orientation for developers on the Energy Value Housing Award, part of BIA’s annual Parade of Homes, provided information on the Hawaii BuiltGreen™ rating system. A user’s manual, rating system checklist and case study fact sheets are under development.

Architects’ Expo. Two presentations on the City and County of Honolulu’s requirement for R-19 or equivalent roof insulation and high performance windows were made to architects, builders, suppliers, and related professionals at the November American Institute of Architects/Construc-

tion Specifiers Institute Expo.

Homeowner’s Guide. A 40-page brochure featuring the most effective techniques to save energy in a high performance home was published. The Homeowner’s Guide to Energy, Comfort and Value emphasizes solar water heating, roof and wall insulation, and natural ventilation, and provides practical information on other techniques.

From Brown to Green

Former sugarcane lands in Anahola will be the site of a “green” community commercial and cultural center.

Currently littered with illegally dumped cars, batteries and appliances, the site will be assessed using \$15,000 awarded by the U.S. Environmental Protection Agency in 2002. The location is considered a “brownfield”—an idled, underutilized and contaminated site.

The new community center will conserve energy, water and materials to create healthy indoor and outdoor environments.

Businesses Encouraged to Buy, Build Environmentally

Aware of benefits to their bottom line, more and more businesses are choosing recycled products and improvements in energy management practices.

Highlighting the importance of conserving energy and resources in our vital visitor industry,

Efficient Equipment Enhances Energy Savings



Commercial building managers have an increasing variety of choices when it comes to saving electricity. Pictured above is the innovative Berkeley Lamp. LED-lit exit signs, below, are among other options which provide quality performance with improved longevity, reduced maintenance, and lower energy consumption.



the state's first Green Business Awards were announced on October 15, 2002.

The Hilton Hawaiian Village, Kahala Mandarin Oriental, and Mauna Lani Resort received the awards. Each hotel addressed sustainability in its business activity by focusing on energy efficiency, water conservation, recycling, and the use of environmentally preferred products.

The Green Business Awards initially focused on hotels because of the large cumulative impact of the visitor industry on Hawaii's environment.

ERTD facilitated technical assistance under the Green Hotel program during July 2002. Site visits to several Oahu hotels examined self-audit checklists, indoor air quality, and other aspects of green building management.

To support buy-recycled efforts, DBEDT has printed an updated Buy Recycled In Hawaii directory and a series of factsheets.

ERTD is also helping establish a nonprofit reuse network called Aloha Shares. Technical assistance included presentations at statewide construction and demolition reuse forums during June, and the preparation of fact sheets on best management practices.

An Environmental Purchasing Conference and Expo was held on July 18, 2002, at the Hilton Hawaiian Village. There were over 200 registrants and more than 40 vendors.

EPA Gives DBEDT Environmental Award

DBEDT has received an Environmental Achievement Award from the U.S. Environmental Protection Agency (EPA) Region IX for developing Aloha Shares, a statewide reuse network for construction and demolition (C&D) waste and other materials as well as for assisting in the development of Baseyard Hawaii, a C&D reuse facility on Oahu.

Companies Lauded for Efficiency Improvements

Seven winners of the 2002 Energy Efficiency Awards were announced on October 24, 2002, by the Hawaiian Electric Company. The fifth annual ceremony took place during the Efficient Electro-Technologies conference and expo at the Sheraton Waikiki.

The Energy Efficiency Project of the Year was awarded to DFS Galleria in Waikiki, which completed a major expansion and renovation of its mechanical and lighting systems. Despite increasing actual air conditioned space by 44%, DFS Galleria achieved a 31% annual electricity reduction and expects to save \$400,000 each year.

Other awards recognized the Waikiki Beach Marriott Resort, Queen's Medical Center, Palama Meat Company, Arcadia Retirement Residence, Ocean Seafoods and three Waikiki hotels in the Sheraton chain.

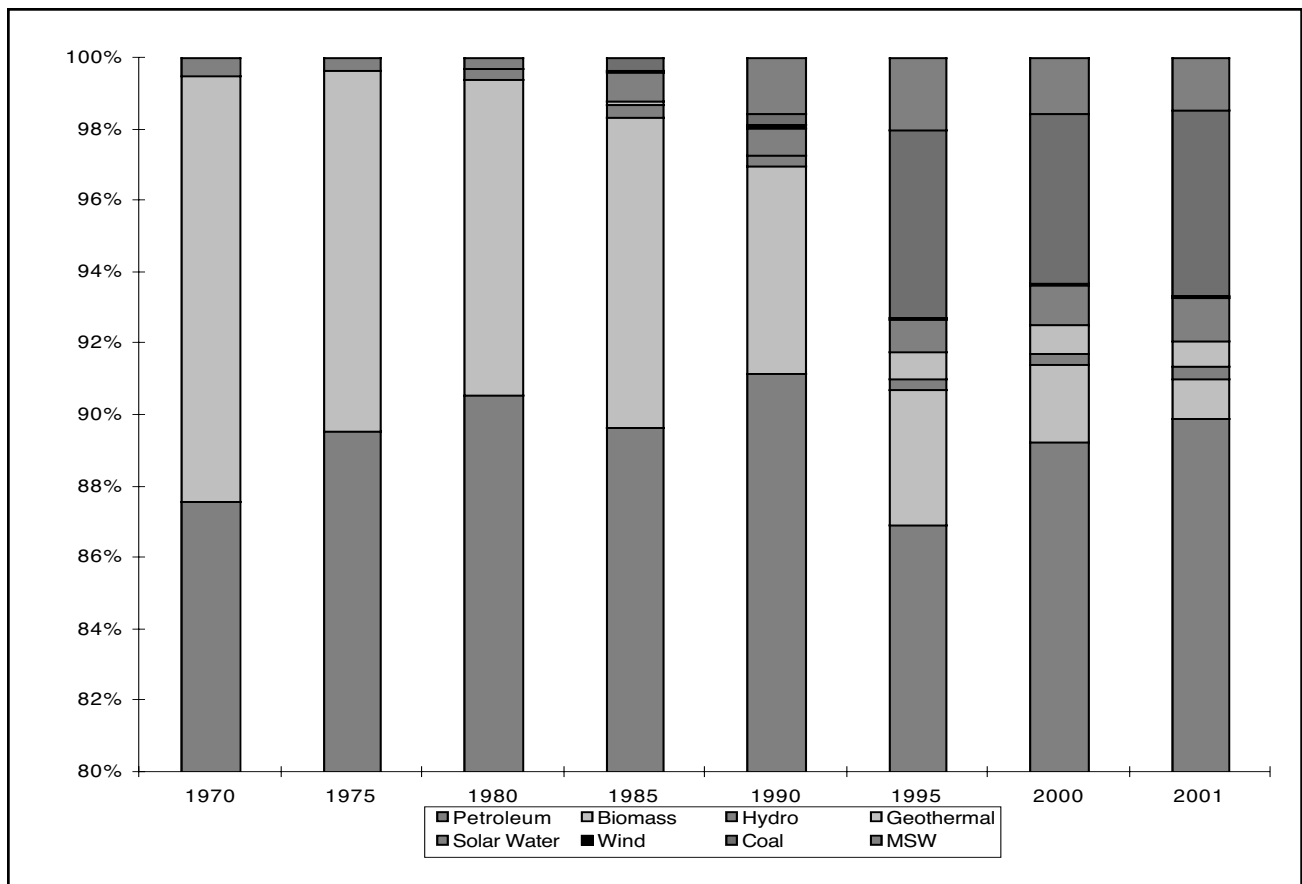


Figure 5. Hawaii's Primary Energy Demand, by Type

Renewables Pursued to Reduce Oil Dependence

Renewable energy resources are an important part of Hawaii's energy mix (see Fig. 5).

During 2002, progress was made toward expansion of wind power when HELCO and Hawi Renewable Development submitted a proposed 15-year power purchase agreement to the PUC for approval. The 3-megawatt wind facility, to be built near Upolu Point, would be the third largest wind farm on the island.

On April 8, the Hawaii Wind Working Group held its inaugural meeting in Honolulu. Updates on programs and incentives were provided, and regulatory and policy issues were discussed.

The largest renewable energy power plant in the state, Puna Geothermal Venture, curtailed its output from 30 megawatts to five megawatts in April due to a clogged production well. A new production well is expected to be completed by early 2003. The plant has displaced more than 1,000 barrels of oil daily since beginning operation in 1993.

An assessment of the state's wave power potential was completed for the Hawaii State Legislature in early 2002; the report appears on ERTD's website. It summarizes available cost data and analyzes case studies for Kauai and Oahu, representing the highest

and lowest electricity rates. The report concluded that wave power is not economical today in Hawaii, except possibly for small direct use applications.

During 2002, the Mauna Lani Bay Hotel and Bungalows retained its status as the leading user of photovoltaics in Hawaii's resort industry by dedicating a 250 kilowatt solar tracking system on January 23. The installation, covering three acres, will pump water for two 18-hole golf courses.

Mauna Lani also added its second component of 60 solar-powered golf carts. The resort's total solar power capacity is about 440 kilowatts.

Distributed Energy Offers Security, Efficiency Potential

Distributed energy technologies, which are built and operated at the site of electricity consumption, are gaining attention due to their potential to reduce transmission line losses, minimize generation inefficiencies, and provide added security by decentralizing the electric power system. Distributed energy systems are typically owned by utility customers.

These technologies can include fuel cells, generators fired by diesel or propane, and renewable technologies including wind and photovoltaics.

In July 2002, DBEDT sponsored a series of five public forums statewide to solicit public comment on distributed energy resources. The goal was to develop strategies which encourage new energy projects and explore ways to mitigate or eliminate barriers.

Among the largest distributed energy facilities in the state are “combined heat and power” plants at more than half a dozen sites, including residential facilities for senior citizens and major resorts.

A Distributed Energy Resources Center, currently under development, will be located at the Natural Energy Laboratory of Hawaii Authority (NELHA) Gateway Project. Groundbreaking was August 28; completion is anticipated in late 2003.

When completed, the \$3.5 million, federally-funded facility will include more than 7,000 square feet of laboratory and of-

fice space, education and outreach facilities, and a retail outlet.

NELHA is also the location of a major photovoltaic power system, approved by its board of directors in June. The \$8 million project, to be funded by a consortium of private investors, will provide over half of NELHA’s power and is expected to provide \$3.5 million in savings over the next 25 years.

A total capacity of 1.1 megawatts will make this the largest photovoltaic installation in the state. It will include 50 kilowatts of roof tiles on a laboratory building, two “power shade” parking lot covers capable of 30 and 120 kilowatts, and three separate Power Tracker stations, covering seven acres, which will provide 900 kilowatts of water pumping power.

The equipment will be provided by PowerLight Corporation. NELHA will continue to buy electricity from HELCO at night.

Sea Water Provides Cooling Alternative

Using cold, deep-ocean water for air conditioning in dense urban areas could achieve significant energy savings, because sea water air conditioning needs only 10% of the electrical power consumed by a conventional cooling system.

Preliminary evaluations have been completed for 10 areas statewide, with sensitivity analyses focusing on Waikiki, Kakaako and the Honolulu Waterfront. If these three areas were converted to sea

Solar Heating is Popular Statewide

Solar water heaters continue to proliferate across the state, totaling an estimated 85,000 systems, each saving approximately four barrels of oil annually. The State Energy Conservation Income Tax Credit and electric utility rebates provide significant incentives for solar installations.

Of the 85,000 systems, approximately 19,000 are counted as part of the Million Solar Roofs Initiative—representing 95% of the solar water heaters installed under this national program since its inception in June 1997.

Among the notable solar water heating projects during 2002 were the Hoolimalima affordable housing subdivision in Kapolei and the Helemano Military Reservation, where solar was installed on 650 homes.

A Renewable Energy Award was presented by the U.S. Army to the 25th Infantry Division (Light) Hawaii for the Helemano project.

water air conditioning, over 226,000 MWh and 420,000 barrels of imported oil could be saved each year. The analyses show that sea water air conditioning can be very cost effective, up to 58% less expensive than conventional a/c.

A follow-up investigation of integrating energy storage with seawater air conditioning has been initiated, with a workshop on Innovative Energy Systems planned for Spring 2003.

Energy Publications Available Online

The following reports are among the information newly posted on ERTD's website, www.hawaii.gov/dbedt/ert/:

✓ Nurturing a Clean Energy Future in Hawaii—Large-Scale Utilization of Hydrogen and Fuel Cells (Jan. '02)

✓ Feasibility of Developing Wave Power as a Renewable Energy Resource for Hawaii (Jan. '02)

✓ Final Report, Energy Efficiency Policy Task Force (Jan. '02)

✓ Energy-Efficiency Policies to Promote Sustainable Economic Growth in Hawaii: Responses to Technological Change and Globalization (Mar. '02)

✓ Hawaii Wind Working Group meeting handouts (April '02)

✓ Environmental Purchasing Conference (July '02)

✓ Buy Recycled in Hawaii (Sept. '02)

✓ Sea Water District Cooling Feasibility Analysis for the State of Hawaii (Oct. '02)

✓ Proceedings of the Fuel Ethanol Workshop (Nov. '02)

✓ Solar Water Heaters on the Big Island: Analysis of Sizing, Costs and Customer Satisfaction (Nov. '02)

✓ Hawaii Homeowners' Guide to Energy, Comfort and Value (Dec. '02)

These publications join a wide variety of factsheets, newsletters, data tables, and basic information on energy technologies posted on ERTD's website.



Figure 6. Science Bowl champs from Maui High School celebrate.

Science Students Embrace Opportunities to Excel

Each year, ERTD is an active sponsor of the Hawaii Science Bowl and the Hawaii Science and Engineering Fair. Both events are competitions designed to heighten students' knowledge and to encourage them to pursue careers in science.

The 2002 Hawaii Science Bowl was held on January 19. The winning team, from Maui High School (see Fig. 6), traveled to Washington, D.C., for national competition. They were recognized by the Hawaii State House of Representatives.

The Hawaii Science and Engineering Fair was held April 1-4. Cash awards were presented to 17 students for their excellent work on projects featuring energy efficiency, renewable energy resources, and recycling.

Another competitive event was the seventh annual Hawaiian Electric Electron Marathon. Twenty four student teams constructed electric go-carts and vied for honors in the categories of documentation, oral presentation, construction, safety, and vehicle performance.

Kohala High School was deemed Best of Show for having the highest cumulative score in the meet. Sacred Hearts Academy's brilliant pink vehicle took second place, and the West Hawaii Exploration Academy, which achieved the greatest number of laps in the event—a total of 50—received third place honors.

ERTD staff also facilitated a forum for school and facility decision makers in order to apply national Best Practices for High Performance Schools guidelines to Hawaii schools. Utilizing a grant from the National Association of State Energy Officials, the forum was held for high-level managers with several State departments on October 30.

Transportation Options: Electric Vehicles and Alternative Fuels

The transportation sector uses almost two-thirds of the oil imported into Hawaii. Although aviation fuel is the largest component (see Fig. 7), Hawaii policy makers and businesses can only significantly influence ground transportation.

To prepare for the expected availability of ethanol fuels, ERTD sponsored a series of practical evening workshops for automotive service technicians during November. "Fuel Ethanol: Coming Soon to a Car Near You" was offered statewide at no cost.

An additional all-day workshop for policy makers, regulators, fuel producers and the general public was offered in Honolulu, featuring guest speakers from the mainland. Sessions addressed na-

tional energy and fuels policies, distribution issues, production methods and other topics.

In May 2002, Pacific BioDiesel dedicated its new Oahu facility near Sand Island. The company also opened a drive-up biodiesel fuel pump which is available to the public.

Biodiesel, made from vegetable oils, can be used without engine modification. Maui County has eliminated the highway fuel tax on biodiesel. At the state level, alternative fuels for on-highway use are taxed at one half the effective state tax rate.

Biofuels got a further boost at a Bio-Energy Conference held on Kauai in May. The 1.5-day conference attracted 125 people.

An assessment of bioenergy

resources and potential statewide is underway with funding from the USDOE Pacific Regional Bioenergy Program. At least five significant biomass feedstocks and biomass-derived materials will be analyzed by the U.H. Hawaii Natural Energy Institute (HNEI).

The largest all-electric passenger vehicle in the state was deployed when the Hawaii Electric Vehicle Development Program delivered an all-electric shuttle to Hickam Air Force Base in 2002. The shuttle, with a capacity of 30 passengers, can be recharged at Hickam or any one of 13 Rapid Charge Stations on Oahu.

Meanwhile, ten new electric trams have been ordered to replace the diesel Wikiwiki shuttles at the Honolulu International Airport.

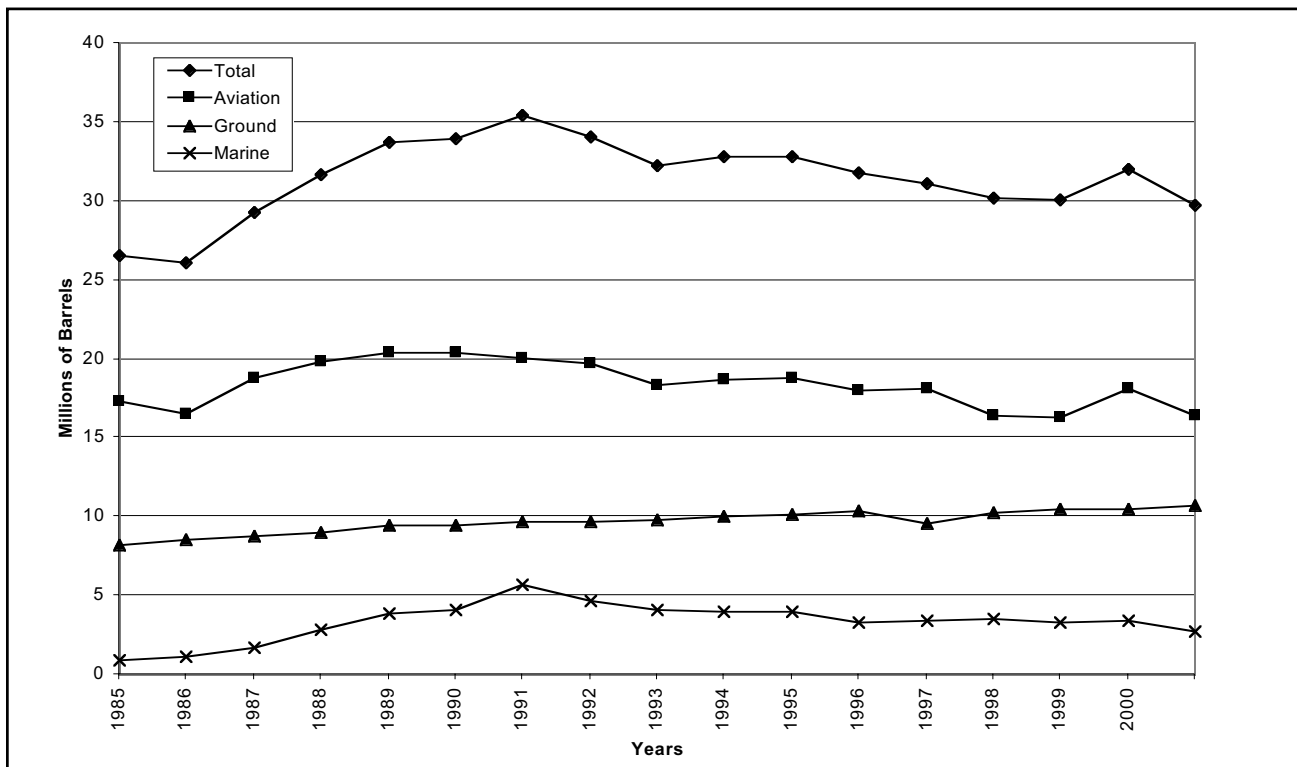


Figure 7. Annual Transportation Fuel Use, All Sectors