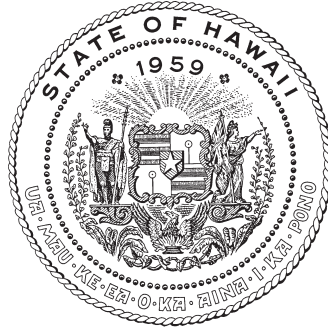
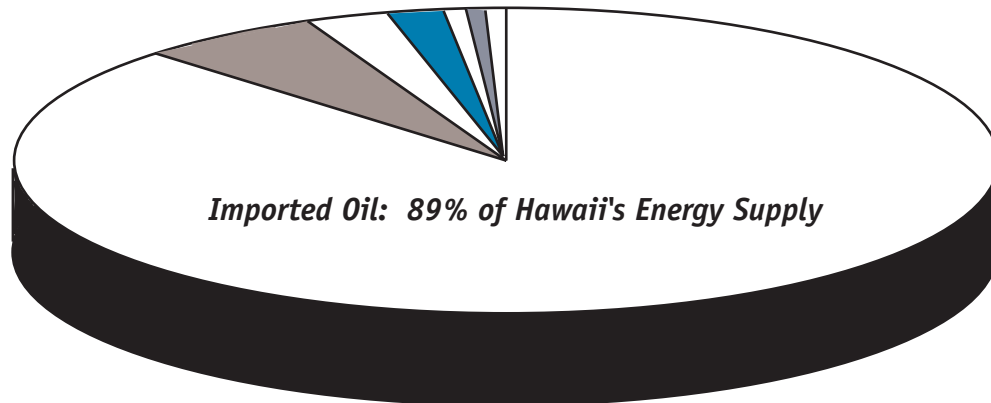


# State of Hawaii Energy Resources Coordinator



## Annual Report 2004



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This report is also available at: <http://www.hawaii.gov/dbedt/ert/erc/erc04.html>

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# Energy is Fundamental to Economic Health

Energy—its supply and use—is the foundation of Hawaii’s economy.

How much fuel is imported and how efficiently it is used impacts each resident’s personal life and business activities. A stable energy supply is essential to continued prosperity.

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

The Energy Resources Coordinator, whose staff works to enhance energy security, improve the state’s economy, and reduce dependence on imports, faces a number of challenges, including:

- ✓ Hawaii, the most oil-depend-

ent of the 50 states, relies on imported petroleum for nearly 89% of its primary energy. Most of this oil is from foreign nations.

- ✓ The islands’ electricity grids are not interconnected.

- ✓ Hawaii residents pay among the nation’s highest costs for electricity and gasoline.

The Legislature created the position of Energy Resources Coordinator in 1974 to address economic, environmental and energy security issues. It is held by the Director of the Department of Business, Economic Development, and Tourism (DBEDT).

By law, the State’s energy program considers these objectives:

- ✧ dependable, efficient, and

economical statewide energy systems capable of meeting the needs of the people;

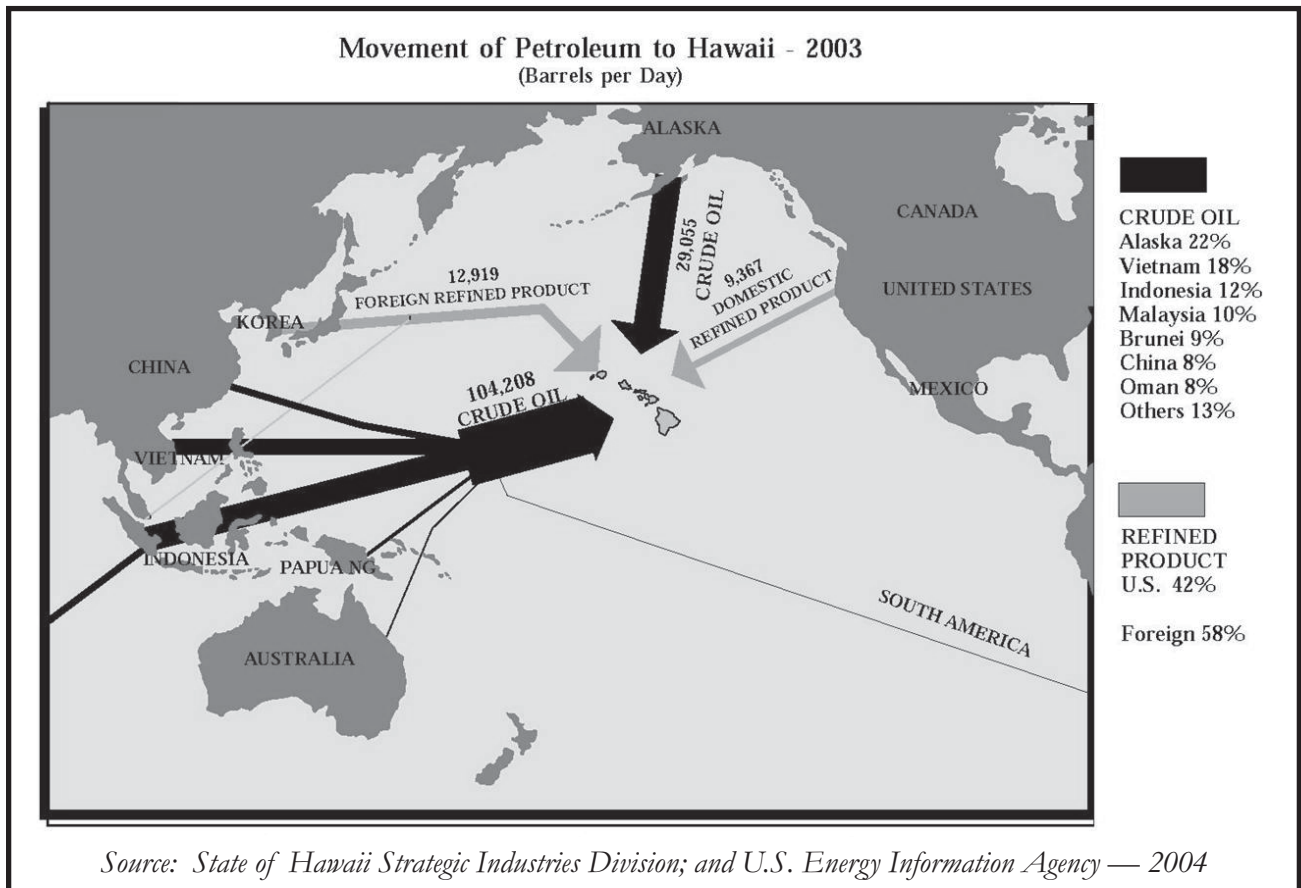
- ✧ increased energy self-sufficiency;

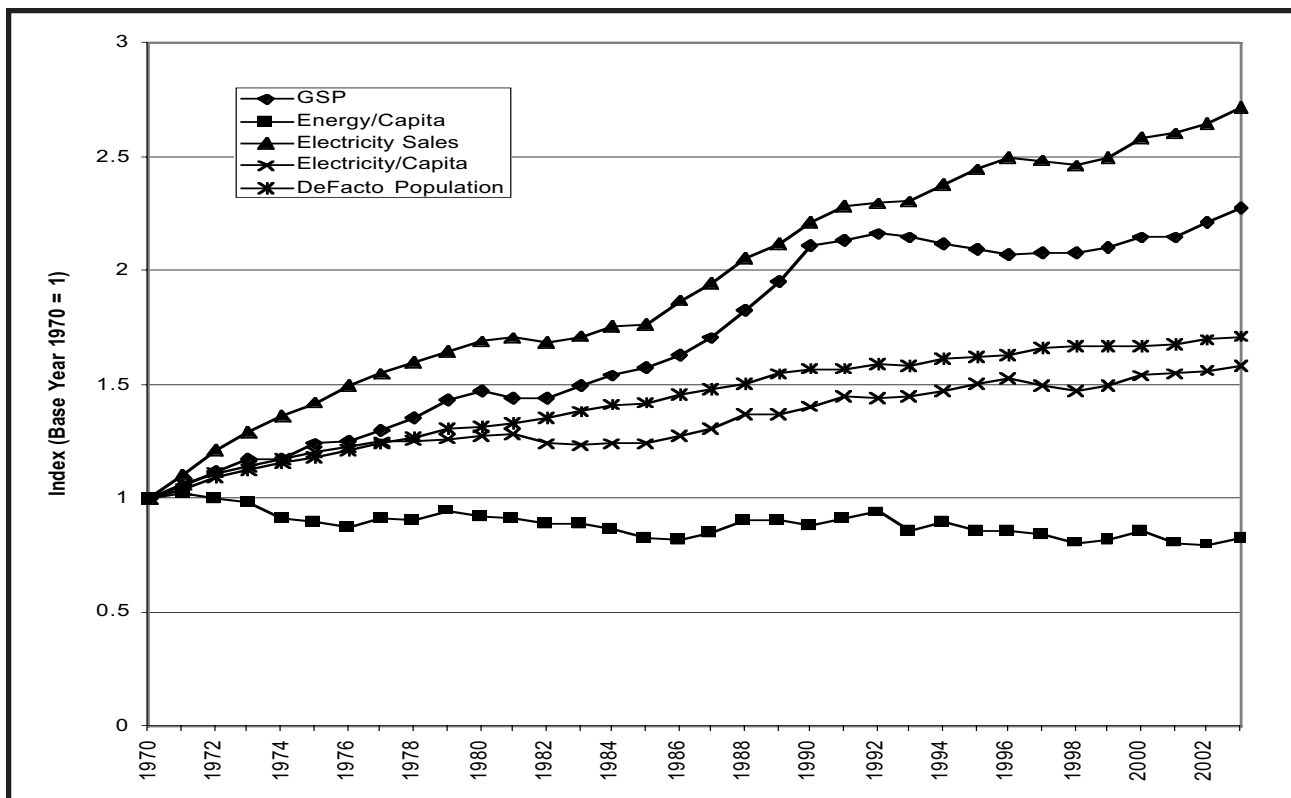
- ✧ greater energy security; and

- ✧ reduction, avoidance, or sequestration of greenhouse gas emissions.

The State’s energy policy also requires that the total costs and benefits of all energy resource options—including efficiency—be compared. Alternative transportation fuels and efficient transportation must also be promoted.

The Strategic Industries Division (SID) implements programs to meet these goals. This report details achievements in 2004.





*Key Energy and Economic Indicators in Hawaii, 1970-2003*

## Energy Consumption, Expenditures Rising

In 2003, Hawaii's energy use and expenditures for energy grew.

Hawaii's primary energy consumption was 320 trillion Btu, up 4.6% over 2002.

Petroleum use increased 4.2%, reversing a slight downward trend during 2001 and 2002 from a high point in 2000, when 290 trillion Btu of oil were consumed. Petroleum consumption in 2003 was roughly equivalent to that of 1990, slightly more than 284 trillion Btu.

Coal use was up 6.3%, continuing a trend begun in 1985. Together, coal and oil represent 94% of Hawaii's energy consumption.

Renewable energy production increased by 9.7% during 2003. Much of the renewable energy

increase resulted from Puna Geothermal Venture resuming full operation, plus additional solar water heating and photovoltaics.

Renewable energy use was only two-thirds that of 1990, primarily due to the loss of biomass-generated electricity provided by now-closed sugar factories. In 1990, biomass provided more energy than all renewable sources in 2003 combined.

Energy consumers spent \$3.69 billion for energy in 2003, or 19% more than in 2002, principally due to high oil prices. This was about 7.6% of Hawaii's \$48.2 billion Gross State Product (GSP).

Despite the increases in 2003 energy use, Hawaii's economy is significantly more energy efficient

than it was in 1970. Hawaii residents use 17% less energy per capita (based on de facto population) than 30 years ago, although overall energy use per capita increased 3.81% in 2003 compared to the previous year.

Consumers' increasing use of electrotechnologies has resulted in electricity sales continuing to rise faster than the de facto population and GSP.

In 2003, electricity sales per capita were 159% more than 1970, while de facto population grew 71% and real GSP increased 127%.

2003 electricity sales increased 2.5% over 2002. This also resulted in a modest 1.6% increase in electricity sales per capita.

## Over \$1 Million Received

# Federal Funds Support State Energy Initiatives

More than \$1.2 million in Federal and State funds were dedicated to a wide variety of energy initiatives during the fiscal year ended June 30, 2004.

Of this, \$1,095,654 was from Federal sources, nearly \$9 for every \$1 of State funds budgeted.

Federal funds included a significant amount obtained through competitive nationwide solicitations offered by the U.S. Department of Energy (USDOE). SID's track record of securing and successfully completing Federal contracts remains stellar.

The State's energy program is extended by a network of partners at the County, State and Federal government levels as well as in the private sector. Many of SID's projects involve matching funds and in-kind services from other partners, meaning that the level of commitment within the State and the economic impact of these programs is far beyond what can be characterized by SID's budget alone.

The Buildings sector received the most money, a total of \$658,890. These funds supported a wide variety of projects, including implementing the Model Energy Code, identifying efficiency retrofits for State buildings, and developing building design guidelines for sustainability.

Initiatives undertaken by the Rebuild Hawaii Consortium and technical assistance to the City and County of Honolulu were also included in the Buildings sector activities.

Utilities projects received \$347,814 in federal funds plus \$116,750 in State general funds. These projects encompassed emergency preparedness planning, administrative rulemaking, various policy activities, updated assessments of renewable energy potential, and support for the export of Hawaii private sector expertise in energy and the environment.

Alternative fuels, notably hydrogen, biodiesel and ethanol, were promoted with \$50,000 in federal funding. A variety of public information activities preceded Governor Linda Lingle's adoption of administrative rules requiring the use of gasoline/ethanol blends by April, 2006.

Industrial programs in resource efficiency received \$31,000 in support, primarily focused on reducing the use of electricity and water in Hawaii's resort industry.

Student excellence in science education—specifically, participation in the State Science Bowl and the State Science & Engineering Fair—received \$7,950.

Description	State Funds	Federal Grants	Total
Education	\$ 0	\$ 7,950	\$ 7,950
Transportation	0	50,000	50,000
Buildings	0	658,890	658,890
Industrial	0	31,000	31,000
Utilities	116,750	347,814	464,564
<b>Totals</b>	<b>\$116,750</b>	<b>\$1,095,654</b>	<b>\$1,212,404</b>

*SID Energy Program Budget for the Fiscal Year Ended 6/30/04*

## Addressing the Bottom Line

# Saving Energy in Public Facilities

Taking an aggressive approach to reducing energy costs and improving efficiency in State buildings, SID continues working with other State agencies to implement energy-saving strategies.

Pursuing the recommendations of the 2003 report, *State Energy Facility Upgrade Analysis and Performance Contracting Potential*, SID has selected a contractor to analyze performance contracting potential at specific State facilities on Oahu. The analysis is expected to be completed in 2005.

Meanwhile, performance contracting continues. According to an update prepared for the Environmental Council of the United States, Hawaii state and local government contracts avoid a total of 26,587 MWh of electricity and 26,065 metric tons of carbon dioxide annually. These projects have created a total of \$27 million in new investment, an estimated 390 jobs, and \$14.8 million in direct and indirect income to the economy.

SID worked with the Judiciary, which is focusing on replacing inefficient lighting. The Judiciary has completed an analysis of the impact of lighting retrofits at two of its buildings under an existing performance contract, and determined that an 11% electricity savings was achieved. Future data will cover all six buildings in the project.

The Judiciary has received rebates totalling \$48,095 from the

Hawaiian Electric Co. (HECO) for its completed energy retrofits at three Oahu courthouses.

Appliances and equipment bearing the "Energy Star" label are among the most efficient available nationwide. Hawaii has been actively promoting the use of Energy Star products through training, technical assistance and procurement programs.

In September 2004, SID received a new award of \$12,500 from USDOE to further promote the use of efficient Energy Star products. Facts on local success stories will be disseminated in press releases, websites, and through networks such as Rebuild Hawaii and the Hawaii BuiltGreen partnerships.

Recognizing that its facilities are among the top energy consumers in the state, the University of

Hawaii (UH) has initiated an ambitious program to conserve energy and water. Following an assessment of energy use in nearly 50 buildings on its Manoa campus, the UH completed detailed energy profiles for specific buildings during 2004.

For new construction and retrofits, high performance building standards are being established by the UH. Assessments of solar radiation potential as well as gas technology opportunities are underway. Energy Star products will be demonstrated in UH-Manoa dormitories.

The SeaGrant Center for Smart Building and Community Design has begun strategic design and planning at several UH facilities, including the Marine Laboratory on Coconut Island and Kapiolani Community College.

## Best National Partnership Award

A Hawaii partnership led by SID received the USDOE's award for best national partnership in 2004, recognizing achievements in Hawaii's High Performance Schools project. It was one of only four national recognition awards designated this year.

SID accepted the Energy Smart America 2004 National Award for Renewable and En-

ergy Efficiency Partnerships on behalf of the Rebuild Hawaii team that launched statewide high-performance design standards and retrofits for public schools.

Members of the team include DBEDT, Dept. of Education, Dept. of Accounting and General Services, UH School of Architecture, HECO, the USDOE, and national groups.

# Diverse Strategies for Transportation

Concern over Hawaii's near-total dependence on imported oil for transportation spurred a number of initiatives in 2004 to address ground transportation issues, including new rules relating to ethanol fuel and a revised gasoline price cap law.

## Ethanol Mandate

In September, Governor Lingle signed new administrative rules implementing a 10-year-old law mandating that ethanol be added to gasoline sold in Hawaii.

The new regulations call for at least 85% of Hawaii's gasoline to contain 10% ethanol, beginning in April 2006. An exemption is allowed if competitively priced ethanol is not available, or in the case of undue hardship.

The rules reflect a long process that involved representatives from all segments of the energy sector, agriculture community, and environmental groups, and which culminated in a formal public hearing in August.

It is estimated that at least 40 million gallons of ethanol per year will be required to meet the mandate. Studies have pegged Hawaii's ethanol production potential at 90 million gallons per year in the short term, and over 400 million gallons per year as a mature industry.

Ethanol-blended fuels are widely used in the United States and are approved for use by all automakers. For more information, view the State's ethanol web



*The first vehicle powered by a hydrogen fuel cell in Hawaii, this bus was deployed for a one-year demonstration at Hickam Air Force Base during 2004.*

page at [www.hawaii.gov/dbedt/ert/ethanol.html](http://www.hawaii.gov/dbedt/ert/ethanol.html).

SID will continue its ethanol informational programs, assisting the High Technology Development Corporation with a \$75,000 biofuels marketing grant from the U.S. Department of Commerce.

## Gas Cap Revised

The 2004 session of the Hawaii State Legislature passed a gasoline price cap bill which repealed the provisions of the gas cap bill passed in 2003, replacing it with controls on the wholesale prices of all grades of gasoline. The bill became law without the Governor's signature.

The 2004 law revises the formula for calculating gasoline price caps, and extends these controls to all grades of gasoline. The caps will be set at different amounts according to eight different zones statewide, and will go into effect on Sept. 1, 2005.

Until that date, the State Public Utilities Commission will evaluate the law and determine how to

implement or revise this more complicated formula.

Governor Lingle indicated that she allowed enactment of the bill to give the Administration time to work with the Legislature to repeal the law and develop workable alternatives to address high gasoline prices.

## Taxes Reduced

Another law passed in 2004 reduces total state fuel taxes by 50% for ethanol, methanol, biodiesel and other alternative fuels, excepting liquefied petroleum gas, starting in calendar year 2004.

The State fuel tax for biodiesel is now 4 cents per gallon, versus 16 cents for regular diesel. The State fuel tax for ethanol is now 2.3 cents per gallon, compared to 16 cents for regular gasoline.

Kauai County passed an ordinance providing a 100% County fuel tax exemption for alternate fuels. While all Counties provide alternative fuel tax incentives, only Maui and Kauai provide 100% exemptions for biodiesel.

# Many, Varied Training Opportunities

Training state agency staff, which enables them to implement energy efficiency, conservation, and renewable strategies in government facilities, was a major thrust of SID's activities.

Representatives from county and federal government, and the private sector, were also invited.

In addition, a wide variety of public awareness events increased understanding of and demand for energy efficiency and renewables.

The 2004 seminars and workshops for which DBEDT was a sponsor included:

- ✓ Geothermal Review for Government, Jan. 7
- ✓ Daylighting & Daylighting Controls, Jan. 29
- ✓ Annual Home Building Show, Feb. 5-8
- ✓ Leadership in Energy and Environmental Design (LEED) Overview, Feb. 25
- ✓ ARUP Sustainability Seminar, Feb. 25
- ✓ LEED Training, Feb. 26
- ✓ Indoor Air Quality: Mitigation Through Design, Mar. 18
- ✓ Alternative Fuel Vehicle Day Odyssey, Apr. 2
- ✓ Energy-Efficient and Load-Responsive Lighting, Apr. 8
- ✓ Daylighting, Apr. 21
- ✓ PacRim/Build and Buy Green Conference, Apr. 21-25
- ✓ Water Conservation, May 11-14
- ✓ LEDs—The Solid State Revolution, May 12
- ✓ Energy Design and Modeling Tools, May 20
- ✓ Remodel it Right, May 20



*Dean Masai (seated), an SID energy analyst, provides information on residential energy efficiency at one of many outreach events offered in partnership with the Building Industry Association during 2004.*

- ✓ Energy Efficiency Workshop, May 21
- ✓ Ethanol Workshops, May 20-25
- ✓ Decision-Maker Workshop, May 24
- ✓ Securing Energy Savings Workshop, May 25-26
- ✓ Green Hotel Forum, May 26
- ✓ Ewaste Seminar, May 27
- ✓ Managing Your Industrial Energy Costs, May 28
- ✓ Implementing Energy Efficiency Projects, June 1
- ✓ Light and Health, June 16
- ✓ Pacific Exposition Home & Garden Show, June 17-20
- ✓ Green Hotel Forum, June 25
- ✓ Ewaste Seminar, June 25
- ✓ Application of Energy Management Systems & Direct Digital Control Systems, July 8
- ✓ Distributed Energy Resources and Combined Heat & Power Workshop, Aug. 24
- ✓ Panel at Hawaii Congress of Planning Officials, Sept. 10
- ✓ Remodel it Right, Sept. 11
- ✓ Green Hotel Forum, Oct. 1
- ✓ New Lighting Trends, Oct. 13
- ✓ Energy Awareness Month Expo, Oct. 16
- ✓ LEED Workshop on Maui, Oct. 20
- ✓ Energy Star training, Oct. 26 & 29
- ✓ Building Integrated Photovoltaics, Oct. 26
- ✓ Efficient Electro-Technology Exposition and Conference, Oct. 27-28
- ✓ American Institute of Architects/Construction Specifications Institute Expo, Nov. 3
- ✓ Green Hotel Forum, Nov. 16
- ✓ Asia-Pacific Homeland Security Summit, Nov. 14-17



# New Goal: 20% Renewables by 2020

On June 2, 2004, with the signing of Act 95, Session Laws of Hawaii 2004, Hawaii's original renewable portfolio standard (RPS) goal was replaced with an enforceable standard.

Under the new standard, 20% of Hawaii's electricity is to be generated from renewable resources by the end of 2020.

Each electric utility is required to achieve the following percentages of net electricity sales from renewables:

- ◆ 7% by Dec. 31, 2003;
- ◆ 8% by Dec. 31, 2005;
- ◆ 10% by Dec. 31, 2010;
- ◆ 15% by Dec. 31, 2015; and
- ◆ 20% by Dec. 31, 2020.

Existing renewables, about 8.2% of electricity generation statewide in 2003, can be counted in the total. HECO and its sub-

sidiaries Maui Electric Co. (MECO) and Hawaii Electric Light Co. (HELCO) can aggregate their renewable generation to meet the standards.

"Renewable energy" encompasses electricity produced by wind, solar, hydropower, municipal wastes, geothermal, ocean thermal, wave energy, biomass, and fuels (such as hydrogen, alcohol or biodiesel) derived from renewable sources, including when such renewable fuels are used in fuel cells.

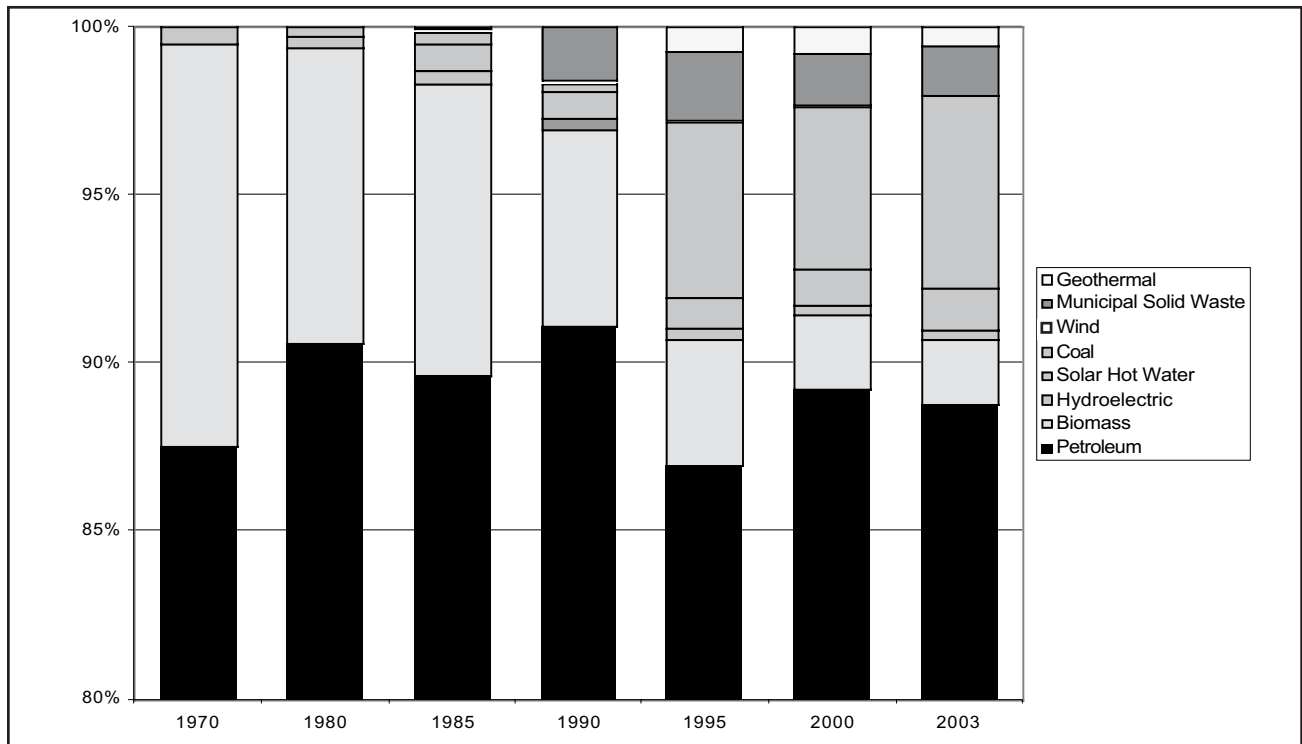
The new law also includes energy savings in its definition of "renewable energy," which means that solar water heating, seawater district cooling, quantifiable energy conservation measures, use of rejected heat in small combined heat and power systems,

heat pumps, ice storage and other technologies will also qualify.

The Law also conforms with Federal law by requiring the Public Utilities Commission (PUC) to approve rates paid to a renewable energy generator that do not exceed the utility's avoided cost of generating the same amount of electricity using its existing system.

The PUC will adopt rules and implement a rate structure by the end of 2006, and provide incentives. If the PUC determines that a utility cannot meet the standard in a cost-effective manner, it can issue a temporary waiver.

Beginning in 2009, the UH Hawaii Natural Energy Institute will report every five years to the PUC on whether the RPS should be revised to a higher or lower target five and ten years into the future.



*Hawaii's Primary Energy Sources*

# Promoting Sustainable “Green” Buildings

SID continued its complementary initiatives to save energy in residences, hotels and commercial buildings with a variety of forums, workshops, and displays.

## Hawaii BuiltGreen™

Among the largest events was the Home Building and Remodeling Show in February, which attracted more than 21,000 people. SID staffed an interactive exhibit resembling a home in various stages of construction. It featured a solar water heater, radiant barrier, roof and wall insulation, a solar-powered attic fan, recycled rubber roofing material and efficient appliances. SID distributed 4,000 publications describing the BuiltGreen™ program.

SID also cosponsored the Build and Buy Green Conference & Expo and PacRim Conference in April, which combined programs relating to sustainable construction and steel framing in a single event. Over 300 people attended, including some from Pacific Rim nations.

Both events were cosponsored by the Building Industry Association (BIA), USDOE, and other public and private organizations.

A host of other events also promoted the BuiltGreen™ program, including a series of “Remodel It Right” seminars with the BIA, which reached an estimated 800 homeowners, a meeting with the Waihee (Maui) Community Planning Committee, the Pacific Exposition Home & Garden



*Participants in the Green Hotel Forum held on June 25, 2004 at the Grand Wailea Resort Hotel & Spa are saving water, energy and money.*

Show, the Energy Awareness Month Exposition at Ala Moana Center, and the American Institute of Architects & Construction Specifications Institute Expo in November.

## Green Hotels

Four Hawaii Green Business Forums were held at resort locations across the state during 2004. Cosponsored by SID, the Chamber of Commerce of Hawaii, the State Department of Health, the Hawaii Hotel and Lodging Association and other partners, the forums gave participants an opportunity to discuss environmental best management practices and opportunities.

The current focus of the Green Business program is reducing energy and resource use at Hawaii’s resorts and hotels. To date, 77 hotels have ordered more than 50,000 water conservation cards, which offer guests the option of reusing towels and linen to save energy and water. Potential savings may amount to 100 million gallons of water, 250 tons of de-

tergent, and enough energy to run more than 1,500 homes each year.

## Green Design

To encourage environmentally responsible building design for new buildings, SID continued to promote the Leadership in Energy and Environmental Design (LEED) initiative.

Workshops such as Creating High Performance Green Buildings, offered in February and October, prepared attendees for the LEED-accredited professional exam.

Other training opportunities included a series of four Sustainable Design Tools workshops offered by HECO. Topics included daylighting and lighting controls, mitigating indoor air quality problems, building energy simulation, and energy management controls.

Sustainable design information was also provided during HECO’s Efficient Electro-Technologies Expo and Conference in October. SID staffed an informative booth and cosponsored seminars held as part of the Expo.

## Innovative & Efficient Lighting

Lighting is a major electricity user for government and commercial facilities. SID supported training to improve lighting design and introduce new technologies.

Training opportunities included seven workshops, such as a seminar on Light and Health held in June in cooperation with the Illuminating Engineers Society (IES).

Two organizations received recognition for excellence in lighting design from SID and the IES in 2004: Kaneohe Marine Corps Base, which retrofit lighting in five hangars, saving 27% of their electricity and improving lighting conditions for sensitive repair work; and 1132 Bishop Street, a downtown Honolulu office tower, which changed the lighting in its parking garage, thereby reducing heat, improving visual acuity, re-

ducing the number of lighting fixtures and cutting energy use by 48%.



*A dozen "Mooncell" lamps at Hanauma Bay are powered by the sun and the wind. Funded by user fees, they replace tiki torches, illuminating the parking lot when the education center is open during the evenings.*

## Maui County Adopts Energy Code

Maui County's new energy efficient Building Code will take effect in early 2005, joining the other three Counties which have already adopted versions of the Model Energy Code developed and promulgated by DBEDT and other partners.

The Maui Code is based on the City and County of Honolulu's.

New residential buildings will need to have roof insulation of R-19, or an equivalent. Five different options for compliance are specified; the least expensive costs less than \$500.

Commercial buildings will be required to install efficient water heating, ventilating and air conditioning equipment. Limits are also placed on certain outdoor lighting.

## Rebuild Hawaii Partnership Achieves Savings

DBEDT's Rebuild Hawaii program is affiliated with over 500 community organizations nationwide under USDOE's Rebuild America initiative. The partnerships save money by reducing energy use in buildings. There are 15 other Rebuild America partnerships in Hawaii.

The Rebuild Hawaii program began in 1997 and has obtained over \$1 million from seven competitive grant awards as well as other USDOE funds. The program has won five national awards, saved \$8.4 million statewide, and invested \$64 million in energy efficiency projects.

In 2004, DBEDT was awarded \$128,899 by USDOE to assist Hawaii Rebuild America partnerships, analyze economic, environmental, and occupant costs and benefits of sustainable design for State facilities and public schools, and implement sustainable technologies in new homes.

Among this year's key accomplishments was an amended law increasing the allowable term for energy performance contracts from 15 to 20 years, broadening financing options, and expanding energy conservation definitions.

Hawaii County achieved energy savings of \$170,314 in the second

year of their performance contract at public safety buildings, exceeding the guaranteed savings.

In 2004, Maui Community College completed its investigation of six measures, which are expected to be implemented with assistance from MECO. The initiatives include improvements to chillers, lighting, and vending machine controllers, as well as installing combined heat and power equipment.

The newest Rebuild America partner is Malama Learning Center at Kapolei High School, which will provide learning opportunities for conservation.

# Hawaii Prepares for Energy Emergencies

Hawaii was recognized as the nation's first "Center of Excellence (COE) for Energy Assurance" by the USDOE and the National Association of State Energy Officials (NASEO). The COE designation went to a dual-agency partnership of SID and State Civil Defense (SCD) for leadership in energy emergency preparedness and critical infrastructure protection programs and plans.

SID is the lead State entity which plans for and responds to energy emergencies, including those caused by oil market disruptions, as well as both natural and human-induced disasters.

SID supports SCD by coordinating industry's energy emergency responses and performing critical energy infrastructure planning for Homeland Security. The State Energy Council, composed of Hawaii's major energy companies, as well as representatives of

all levels of government, facilitates the flow of information with quarterly and special meetings.

Hawaii SCD and the Hawaii Emergency Preparedness Executive Committee recognized the Energy Council with Governor Lingle's presentation of a 2004 award for outstanding support of Hawaii's emergency preparedness and Homeland Security.

The 9/11/01 terrorist attacks increased physical security needs of critical energy facilities, as well as for Homeland Security initiatives. The Council continues to ensure that measures are being taken to guard against the terrorist threat, protect critical energy facilities, provide situational analysis and consequence management, and facilitate recovery efforts.

The Council began a comprehensive update of the State's Energy Emergency Preparedness plan, incorporating evolving Fed-

eral and State emergency management policies.

In November, SID and other Council members played major roles in the second Asia-Pacific Homeland Security Summit in Honolulu, including organizing a panel of experts on critical infrastructure protection.

The annual Statewide Hurricane Exercise, Makani Pahili 2004, focused on preparation, response, and recovery phases of disaster management as they related to statewide energy systems.

SID staff participated in a national energy emergency preparedness and critical energy infrastructure protection exercise, "Dark Sun." The event was organized by the USDOE Office of Energy Assurance, the U.S. Department of Homeland Security, NASEO, National Conference of State Legislators, and other state and federal organizations.

## Developing International Export Opportunities

DBEDT facilitates exports of clean energy, environmental, and resource-based technologies and services to high-growth Asia-Pacific markets.

SID helps Hawaii firms leverage limited resources, take advantage of industry partnerships, and participate in export development initiatives.

DBEDT's Platinum Key Service Partnership with the U.S. Commercial Service at the U.S. Embassy in Beijing and U.S. Consulate in Shanghai provided information and business development

assistance to Hawaii energy, engineering, environmental and planning firms targeting Chinese infrastructure projects.

As a result, two Hawaii companies are working on a \$1-2 million cultural and environmental resource management plan for Wuyishan Reserve Area, a U.N. Cultural and Natural Heritage Site. The plan could lead to valuable opportunities for Hawaii firms.

Three Hawaii solar companies were awarded federal grants (of only eight firms nationwide) and joined a National Renewable En-

ergy Laboratory energy export mission to China.

In April, a cooperative agreement for business partnership in clean energy and environmental technologies was signed by DBEDT and the Shanghai Environmental Protection Bureau.

A September export business mission to Shanghai, Beijing and Tianjin allowed Hawaii companies and researchers to develop business leads, negotiate agreements, and participate in the International Environmental Conference on EXPO 2010 in Shanghai.

# Recycling Efforts Gain Results

SID's coordination of an unusual waste-to-energy project—reclaiming derelict fishing nets and incinerating them in Honolulu's HPOWER municipal waste power plant—garnered national awards for innovation and effectiveness.

The Council of State Governments selected "From Pollution to Power: Transforming Marine Debris to Energy" as one of ten regional finalists for the 2004 Innovations Awards.

SID also coordinated a discussion on the problem of electronic

waste at a forum sponsored by the State Department of Health in May. Many of these materials, including computers, batteries, and cell phones, contain hazardous substances.

SID supports recycling activities on the Neighbor Islands, including a presentation on electronic waste on Maui and the expansion of activities by the Kauai Resource Center which will encourage composting, recycling computers and batteries, and remanufacturing glass.



*Hawaii Metal Recycling off-loads 130 tons of derelict fishing nets salvaged from the N.W. Hawaiian Islands. The nets, which pose a hazard to wildlife, will be burned for energy on Oahu.*

# Cleaning up "Brownfields"

In 2004, \$800,000 in new Environmental Protection Agency (EPA) funds were received to clean up and develop "brownfields" sites in an environmentally responsible manner. "Brownfields" are underutilized, idled and contaminated sites.

SID assisted three other agencies in the preparation of these successful proposals.

A \$400,000 award was received by the State Office of Planning

for site assessments. Kauai's Office of Economic Development was granted \$200,000, and the Anahola Homesteaders Council received \$196,334 in cleanup funding, continuing an effort initiated by SID with EPA funding in 2002.

SID is also coordinating the Hawaii Brownfields Task Group to share information and focus cooperative efforts among agencies.

# New DBEDT Energy Publications Online

The fastest and easiest way to obtain a copy of new State of Hawaii publications on energy efficiency and renewable energy is to surf to SID's website, [www.hawaii.gov/dbedt/sid](http://www.hawaii.gov/dbedt/sid).

New publications, including workshop presentations, are highlighted, and reports from previous years are also available. Most are available in both pdf and text formats.

Documents posted in 2004 include:

- ◆ Alternative Commercial Approaches to Distributed Energy Resources and Combined Heat and Power in Hawaii
- ◆ Energy Resources Coordinator's Annual Report
- ◆ Energy-Smart Schools
- ◆ Evaluating Bulk Energy Storage to Relieve Transmission Congestion on the Island of Hawaii
- ◆ Hawaii's K-12 Portable Classrooms: Bioclimatic Monitoring, Assessment & Design Recommendations
- ◆ Managing High Saturations of Distributed Energy Resources as a Microgrid on the Big Island of Hawaii
- ◆ Presentations on Gasoline Ethanol Blends
- ◆ Select Hawaii Renewable Energy Project Cost and Performance Estimates, 2004
- ◆ Tax Credits for Energy
- ◆ Wind Maps
- ◆ Workshop on Distributed Energy Resources and Combined Heat and Power

# Seeking Sustainable Power Solutions

Supporting an evolution toward sustainable energy solutions, SID continued its analyses of renewables and distributed energy resources (DER) during 2004.

## Distributed Energy

SID partnered with HELCO to win two competitively awarded USDOE grants that examined ways to increase the use of distributed energy resources on the Big Island system.

One project evaluated the ability of energy storage to alleviate electricity transmission and reliability issues on the Big Island of Hawaii, which are expected to increase due to the projected growth in the use of DER and renewable energy. It is postulated that bulk energy storage located at strategically placed nodes on the transmission network could result in a more robust electrical system that is inherently more flexible, especially for non-dispatchable renewable generation.

The analysis, however, determined that changes to cross-island transmission lines would be less expensive than energy storage in solving transmission problems.

## Net Metering Law Expanded

Hawaii's net energy metering law was revised in 2004, increasing the maximum allowable generating capacity from 10 kilowatts to 50 kilowatts for companies and individuals who generate their own power and sell excess power to the local utility.

In addition, the new law allows government entities to participate in net metering.

While energy storage could facilitate additional renewable energy use, it could cost more.

The second effort evaluated different DER "microgrid" combinations in an effort to produce the lowest electricity costs, highest reliability and power quality, optimized operations, and reduced emissions levels on the Big Island.

In August, a workshop covering Distributed Energy Resources and Combined Heat and Power attracted 150 participants in Honolulu.

Final reports are posted on SID's website.

## Hydrogen Fuel Cells

Another main thrust of research and demonstration is hydrogen fuel cells.

In 2004, the hydrogen infrastructure to fuel a 5-kW PEM fuel cell was installed and tested. Design and permitting is underway for the Hydrogen Power Park in Kapolei. A strong public/private partnership has been instrumental in this project's success thus far.

Hydrogen fuel cells, and the potential for hydrogen to be made from renewable sources, is a focus of the new Hawaii Gateway Energy Center at the Natural Energy Laboratory of Hawaii (NELHA). The innovatively designed building incorporates photovoltaics, seawater cooling, and natural lighting, and is a candidate for LEED platinum certification.

## Renewables Assessed

A consultant to DBEDT updated an assessment of selected renewable energy resources, including detailed cost and performance information. The study suggests that a number of projects are possible at below avoided cost on all utility systems.

Another partnership with HELCO for an assessment of the potential for hydroelectricity on the island of Hawaii is scheduled for completion by the end of 2004. The study evaluated the potential for additional on-line and new pumped storage hydroelectric systems.



*The Hawaii Gateway Energy Center at NELHA, a nexus for fuel cell research and public awareness, was dedicated in October 2004.*

## Counties Aided in BioFuels

Technical assistance to the Counties may lead to increased production of liquid and gaseous fuels from wastes.

Hawaii County is studying the market for biodiesel produced from fats, oils and grease. A cooking oil diversion program will be suggested to keep such oils out of the landfills and create incentives for their conversion to biodiesel.

An analysis of landfill gas quality at the Kekaha landfill, Phase 2, is underway on Kauai. Potential customers for the methane include the U.S. Navy and the Kauai Island Utility Cooperative.

On Oahu, the City and County of Honolulu will conduct a technical feasibility assessment of the gas quality, volume, and pressure at its Kapaa landfill with the intention of resuming the collection of landfill gas. Before the Kapaa landfill gas recovery system was shut down in 2002 due to difficulties with its combustion turbine, it was used to generate over 3 MW of electricity.

In support of these activities, the UH-Manoa continues its analysis of chemical, physical, and fuel properties of selected biomass resources.

## Milestones for Solar

The Island of Maui Million Solar Roofs Initiative Partnership received the 2004 National Best Progress Award from USDOE.

Maui's partnership has installed more than 5,100 of its target of 6,300 solar systems. Some of Maui's home builders are installing solar water heaters as standard equipment in new homes.

SID assisted MECO with the first phase of its Solar for Molokai program, installing some 35 solar water heaters by year's end.

Solar technologies will be encouraged on Oahu due to the \$7.85 million Honolulu Solar Bond passed in 2004. The bond will fund a variety of clean energy projects on municipal buildings.

Hawaii's first "green tag" solar system is at Island Dodge, an automobile dealership in Kahului, which expanded its photovoltaic

system from 32 to 52.2 kW. Another dealership, King Auto Center of Lihue, installed 25 kW of photovoltaics. Cycle City in Honolulu became the small business with the largest photovoltaic array in Hawaii: 93 kW. These three systems were privately funded.

HELCO installed two approximately 20-kW arrays at the Gateway Energy Center at NELHA.

## Wind Projects & Assessments Advance

Maps of Hawaii's wind resources were completed in 2004, with validated wind maps for each island available online at <http://www.hawaii.gov/dbedt/ert/winddata/>. Data are also available in Geographic Information System (GIS) format.

The planned wind energy project at Kaheawa Pastures on Maui has been modified from its

## Non-Electric Uses of Geothermal Heat to be Examined

With two separate grants awarded during 2004, DBEDT and Hawaii County will initiate an examination of potential non-electric uses of geothermal heat in the Puna District.

The funds, totalling \$110,000, will be used to establish a community working group, provide information on geothermal "direct use" projects elsewhere, and conduct a feasibility study of enterprises likely to be successful on the Big Island.

These actions were endorsed by attendees at a January 2004 workshop for government leaders and staff, sponsored by DBEDT and USDOE to review historical, policy and technical issues related to Hawaii's geothermal resources.

Also during 2004, Hawaii's only geothermal power plant changed hands. The new owner, Ormat Nevada, Inc. expects to increase the output of the 30-MW Puna Geothermal Venture (PGV) plant by 6.5 MW by 2006.

original size of 20 MW to a proposed 30 MW.

HECO began a yearlong survey to study the wind energy potential of the ridges above its Kahe Power Plant in leeward Oahu.

All necessary approvals have been obtained for the 10.56-MW Hawi Renewable Development windfarm in North Kohala, near Upolu Point.