Energetically Celebrating Learning!

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Report Focuses on Energy Initiatives

The 1992 Energy Resources Coordinator's Annual Report (ERC) is now available and being distributed through the Dept. of Business, Economic Development & Tourism (DBEDT) Energy Division and the county Energy Extension Service (EES) offices. The ERC Report is free of charge and an excellent energy resource for students and the public.

The report outlines the progress of various energy initiatives and programs undertaken in the State of Hawaii during calendar year 1992. Areas of focus include energy planning, alternate energy development, energy conservation, transportation, communication and education, and energy emergency preparedness. There is also a detailed appendix section featuring international, national, and local energy resource data.

"Energy conservation is perhaps the most cost-effective and readily available energy alternative for Hawaii," notes DBEDT Director and Energy Resources Coordinator Muifi Hannemann.

"The development of our indigenous sources of electric power depends upon increased commercialization and economic competitiveness of renewable resources. The Hawaii Energy Strategy program will pave the way for development of important recommendations and new initiatives designed to ensure that Hawaii's people will be served by dependable, efficient and economical energy systems to increase energy self-sufficiency and security."

For a copy of the 1992 ERC Report, contact any of the following offices:

- DBEDT Energy Division: 587-3800
- Hawaii EES Office: 920-4558
- Maui EES Office: 243-7735
- Kauai EES Office: 241-6390

Solar Thermal Energy: Too Costly?

Although there are suitable solar thermal electric generating plant sites on the leeward sides of major Hawaiian islands, high costs and low performance make it unlikely that such facilities will be viable.

Those are the major conclusions of a recently-concluded assessment conducted by the State of Hawaii by Luz Development & Finance Corporation. The $100,000 study was nearly complete when Luz filed for bankruptcy.(see Transitions #3); the final work was done by Kearney & Associates, consultants who had been previously associated with Luz and played major roles in the earlier phases of the assessment.

The results are a disappointment for State solar enthusiasts who had acclaimed Luz's successes in the Mojave Desert. Luz had designed, installed and operated solar power plants totaling 356 megawatts in California, making the company the world's premier producer of solar electricity. Its solar electric generating systems, dubbed SEGS, consist of acres of parabolic trough concentrators which heat a synthetic oil to a temperature high enough to generate steam in a power plant. Natural gas was used as an auxiliary fuel source.

Thinking that Luz's commercial success could be translated to Hawaii, DBEDT asked Luz to evaluate the economic and technological potential of utility-scale SEGS on the islands, focusing on the issues of siting, design, utility requirements, operating characteristics, performance, and cost.

The assessment was carried out by first examining the utility needs on the major islands. Next, capital costs were estimated for Hawaii conditions, and electrical generation performance projections were made, based on a careful evaluation of potential solar resources. Preferred sites were identified. Lastly, a preliminary economic analysis of levelized electricity costs was completed to compare SEGS in Hawaii with conventional electric generation options.

Kearney found SEGS would have to be built in Hawaii only as a California—no more than 30 megawatts on most islands, or BOM on Oahu—and that capital costs would be significantly higher due to the physical characteristics of the best sites, shipping, taxes and labor. Although the picture was improved by including dedicated incentives for renewable energy, such as tax credits, property tax exemptions, and payments for environmental benefits, the study concluded that the plants would still not be cost-effective.

Also, the solar resource applicable to SEGS projects in about 25-30% lower in Hawaii than in the Mojave, which could cause the plants' performance to drop by one-half. SEGS, and other concentrating solar technologies, rely on "direct" solar radiation; if the sunlight is scattered by clouds, humidity, dust or volcanic haze, it cannot be focused by the reflective parabolic surfaces and therefore cannot be used.

Kearney comments that the results of the assessment are applicable only to SEGS such as those developed by Luz, and may not reflect on the viability of other solar electric technologies, such as photovoltaics, or even other solar thermal systems which have different cost and performance characteristics.

Transitions
Securing Hawaii's Future Through Energy Diversity

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Want to talk to someone in the government? Most Honolulu phone numbers, including those of legislators and the staff of DBEDT's Energy Division, can be reached toll-free from the Neighbor Islands.

Just dial 1-800-688-4644.

If you have a touchtone phone, you can then enter the last five digits of the number you wish to reach, and you'll be connected directly. Citizens using rotary phones will receive assistance placing their calls.
TRANSMONDS, May 1993

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NEWS BRIEFS

O‘ahu Wind Farm Sold

Hawaiian Electric Industries, Inc. (HEI) has sold its non-regulated wind farm subsidiary to New World Power Corporation, a Connecticut-based company active in the international electric utility industry. Last year, HEI shut down its Hawaiian Electric Renewable Systems (HERS) subsidiary because of "chronic mechanical problems and financial performance." The new owner expects to fix and upgrade the equipment and, in time, expand operations. The purchase of HERS included the contract to sell power to Hawaiian Electric, a mutual utility subsidiary. The two wind farms, located at Kahuku on O‘ahu, consist of a 3.2-MW Boeing MACS-B wind turbine (the world’s largest) and 15 600-kW Westinghouse turbines. Last year, the two installations sold 5.1 million kilowatt-hours of electricity.

New World is the only publicly-held wind company in the country. It also owns wind farms and resource areas in California, wind resources in Montana, and companies that manufacture and service renewable energy equipment. (IE 1/93, PBN 3/19/93, HS 5/18/93)

Coal Contribution Clarified

The article, "Coal Offers Hawai‘i Energy Diversification," in the Feb. 1993 issue of Transmissions, stated that the AES/Barbers Point coal power plant provides about 11% of O‘ahu's electrical generating capacity.

While this is true, since the coal plant is a baseload plant, it provides about 18% of the island's electricity, thus making a greater contribution to the reduction in the use of oil.

Seawater Projects in Japan

Construction reportedly began in Dec. 1992 on what will be the world's first pumped-storage hydroelectric project this spring. A 30-megawatt facility will use the ocean as its lower reservoir. Located on Okinawa’s main island, the project is scheduled to be completed in 1995. A special tender will be used in the upper reservoir to keep seawater from seeping into the ground, and equipment will be treated to prevent corrosion. (IE 2/93)

In a separate project, seawater is used to heat and cool a section of a Fukuoka City. The district, Seaside Monochi, includes businesses, housing, sports facilities and medical facilities. It is one of the world's largest seawater heating and cooling projects. The system also includes a heat storage tank and a gas absorption chiller. Pipes carrying hot and cold seawater from the district heating facility are laid out beneath roads. District Heating and cooling systems are not uncommon in Japan, but this is the first to be funded under a government program specifically tailored to the use of "unusual energy." Service was expected to begin in April 1993. (NPD vol. 9, no. 2)

Bikes Are Better!

The Worldwatch Institute notes that bicycle ownership worldwide totals some 600 million, much of it intended for basic (not recreational) transportation, compared with just 3.5 million automobiles. Being a bicycle user means saving 1.860 kilocalories per mile, a bicycle uses only 35 calories. (re 12/92)

Rating Home Energy Use

A new House Energy Rating Scheme is being piloted in Geelong, a city in Victoria, Australia, amid calls for a national rating system. The scheme uses a scale of 0 to 5 stars, with five stars being the most energy-efficient. An average new home meeting the Victorian minimum insulation regulations rates around three stars, while many older homes rate only one star. Ratings are based on a point system measuring the energy required to heat or cool a house. A variety of factors are reflected, including insulation, types and locations of windows, ventilation, and zoning.

What is This ‘Integrated Planning’ Stuff, Anyway?

It’s not just a buzzword, it’s a way of planning future energy use that’s sweeping the nation. In the past, most utilities looked at how fast their customer base was expanding, and decided to build enough power plants to provide for this growth. We call this the "Supply-Side Planning," since building power plants is the only way to meet additional load. A new idea means creating a supply of energy for customers to use. With "Integrated Resource Planning," the supply side is not only the thing addressed. Utilities look at how customers use energy, not just how much they use. It’s necessary to not only build a new power plant if customers would use a little less. Or, perhaps energy use can be shifted to a different time of day—say, the wee hours of the morning—when most utilities have excess capacity. These strategies are known as "Demand-Side Management" since they entail modifying customers’ demand for electricity or gas. These DSM strategies can be cheaper, and can help keep prices lower.

The Hawai‘i Public Utilities Commission has directed all of the State’s gas and electric utilities to submit DSM plans this year.
RAYCING FROM KAUA'I—Danny Miyasato, a sophomore in electronic technology at Kaua‘i Community College, shows off KCC’s nearly-completed entry in the solar bowl, which won award for electric car. The vehicles will travel from Arlington, Texas, to Minneapolis, Minnesota, a distance of 1,800 miles. In June, KCC’s car, Ka‘La O Kaua‘i, features a carbon fiber body, titanium wheel bins, and 800 PV cells. DBEDT supported the development of the car with $46,200 in funds and equipment. Additional funding came from Kaua‘i County, businesses and individuals.

SOLAR, continued from page 1

with solar dealers or your plumber.) Once it's gone, if a leak develops in the tank, the entire tank must be replaced—and that's the single most expensive component of the solar system.

Knowing this, we monitor our tank temperature closely. We have three thermocouples installed: one at the top of the tank (reading the highest temperature), one on the side taking water out from the bottom of the tank up to the collector, and one on the pipe bringing hot water from the collector back down to the tank.

If our tank gets up to 150°F, we use more hot water. It's a singular luxury to take a shower knowing that your moral duty to have a hot, hot one.

I also charge my laundry habits: some loads are done in cold, warm or hot water depending on the weather. Or, I might use cold water for washing clothes, and warm water for a day or two, hoping that the sky clears soon.

Choosing a new dishwasher, as did many in Oklahoma, can be an important choice. Unlike the solar water heater, which needs warm water to heat up the storage tank, the dishwasher heating element is off when water temperature is too low, or when the tank temperature is too high. Curt finds this to be a big limitation.

I love my dishwasher, as noted above, but it is a singular luxury.

CONTINUED on page 6

How New Policy, Taxes May Hit Hawai‘i

By Steven Alger

Two recent Federal actions will have impacts on parking and free transit passes in Hawai‘i.

The first, the National Policy Act of 1992 (EPACT), was signed into law by President Bush on Oct. 24, 1992. The second is the Clinton Administration’s tax proposal, often called the “Blu Tax” because it is supposed to raise the average gas tax.

What do these actions mean to Hawai‘i?

National Energy Policy Act

In more than 200 pages, the EPACT covers every aspect of energy, from renewable resources to electric vehicles, fossil fuels and nuclear power. It is expected to reduce U.S. oil imports by 4.7 million barrels per day by 2010, keeping almost $80 billion (1990 dollars) from going to foreign oil producers in that year.

Let’s look at some of the provisions which apply to typical choices.

The Act seeks to improve energy efficiency in homes and businesses. States are encouraged to update energy portions of building codes, on an effort already underway in Hawai‘i (see Transitions #3). Energy efficiency standards and labeling for a host of lighting, plumbing, and heating and cooling equipment will also help businesses and consumers make energy-efficient choices.

Voluntary building codes, an effort in our case, we set our back-up with the tank temperature is too high. Curt finds this to be a big limitation. Although conventional wisdom says dishwashers should be run at 140°F, 1

Hawaii drivers could pay 7.5 cents more per gallon of gasoline, or $34.30 a year, per vehicle, on average.

Business vehicle users could pay an additional $4.08 a year, or $22.59 per year, at a nominal increase of 0.6 cents per kilowatthour.

Residential gas utility users could pay about $6.94 per year per person.

These estimates are for direct, out-of-pocket costs, but when all use of fuel are considered, Hawaii residents would pay an additional $150 million per year, a 1995 promise, or about $150 per person, compared to about $80 in 1990.

The Act would provide annual savings, but in my case, the taxes on jet fuel are approximately proportionally the same as the higher ticket prices, which could impact the visitor industry.

The Blu Tax

The second Federal action, the Clinton Administration’s proposed Blu Tax, is the subject of intensive national debate. The proposal includes a basic tax on energy supplies of 25.7 cents per million BTU, with an additional 34.2 cents per million BTU slapped on oil. Non-fuel uses of fossil fuels, such as fossil fuels, and non-conventional fuels such as coal, geothermal, biomass (including bagasse), and wind will be exempt.

Since most of us don’t buy fuel by the millions of BTU, what could the Blu tax be on real people? The following are estimates, based on current proposals and assuming proportional application of the tax to various products.

The Blu Tax will contribute an estimated $22 billion annually to deficit reduction, and encourage energy efficiency. Hawai‘i is already one of the most energy-efficient states, but due to overdependence on oil will be costly if the tax is enacted. While the tax is being debated in state government and the Hawaii’i Congressional delegation are working on alternatives to the tax, theʻi driver will be affected by efforts to sell. The following are estimates, based on current proposals and assuming proportional application of the tax to various products.

Vehicles and Commuters

Drivers will be affected by efforts to introduce alternative vehicle technologies into service, including Federal, State, and energy-producing fleets. Incentives will be offered to encourage purchase of alternatively-fueled vehicles.

Some Chula commuters may find their employers reluctant to continue offering parking and transit pass benefits. EPACT sets limits on the exclusion of an employer’s gross Federal income tax for free employee parking and free transit passes in Hawai‘i.

The Act seeks to further extend the use of alternative energy for power generation, which may contribute to increased use of fossil fuels and nuclear power.

The Spark M. Matson Renewable Energy and Ocean Technology Center is established by the Act as a National Point of Hawai‘i, to conduct renewable energy research.

Less directly related to energy, the Act also provides support programs for low-income and first-generation college students.

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I also charge my laundry habits: some loads are done in cold, warm or hot water depending on the weather. Or, I might sit in the sun if the weather's warm enough to do that. But even though the sun can be hot, it's not nearly as hot as a typical 120°F to 150°F water heater.

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The Worldwatch Institute notes that bicycle ownership worldwide totals some 600 million, much of it intended for basic (not just recreational) transportation, compared with about 20 million cars owned by Japanese. More than 1 million bicycles are sold on the mainland each year, providing an annual income of $2 billion. Bike sales have surged in recent years, particularly in the last decade, as a growing number of people have realized the benefits of cycling. These benefits include improved health, reduced pollution, and lower costs for transportation. As a result, many people are opting to ride bikes as a means of getting around, and the number of bike riders continues to grow. It's important to note that while bikes are a popular mode of transportation, they are not a replacement for cars. However, they can be used as an alternative to cars in certain situations, such as when traveling short distances or when conditions are favorable for cycling. Overall, cycling is a sustainable and healthy way to get around, and it's something we should all consider incorporating into our daily lives. Aloha and Welcome, New Readers! With this issue of Transitions, we're happy to greet several thousand new readers! Be sure to find your newsletter informative and interesting! Our column "This Integrated Planning Stuff, Anyway?" has been published for just over a decade, and readership has grown steadily. Recently, however, we've merged mailing lists from other programs at DBEDT's Energy Division (notably the Hawaii Energy Strategy data base), with the result that we now reach some 5,000 people. Our readers live around the world, from Poland to the Pacific Basin, although the majority are in Hawaii.

We tried our hardest to persuade the postal unions and eliminate obvious duplications, but we know we're not perfect. If you find that you're receiving two copies of Transitions, we apologize, and we'd appreciate letting us know which address we should use.

It's possible that some of you will receive a copy at your home address and another at a place of business. Or, we may have been using your current address, and then added an out-of-date one from an older data base. If you're like us to correct our mailing list, please let us know soon--you can send back the form on the back of your mailing. We promise: to list the problem promptly.

Meanwhile, we hope that you enjoy our newsletter and that it helps us in our interest in your future.
**Report Focuses on Energy Initiatives**

The 1992 Energy Resources Coordinator’s Annual Report (ERC) is now available and being distributed through the Dept. of Business, Economic Development & Tourism’s (DBEDT) Energy Division and the county Energy Extension Service (EES) offices. The ERC Report is free of charge and an excellent energy resource complement for students and the public.

The report outlines the progress of various energy initiatives and programs undertaken in the State of Hawai’i during calendar year 1992. Areas of focus include energy planning, alternate energy development, energy conservation, transportation, communication, and education and energy emergency preparedness. There is also a detailed appendix section featuring international, national, and local energy resource data.

"Energy conservation is perhaps the most cost-effective and readily available energy alternative for Hawai’i," notes DBEDT Director and Energy Resources Coordinator Muli Hennemann.

The development of our indigenous sources of electric power depends upon increased commercialization and economic competitiveness of renewable resources. The Hawai’i Energy Strategy program will pave the way for development of important recommendations and new initiatives designed to ensure that Hawai’i’s people will be served by dependable, efficient and economical energy systems to increase energy self-sufficiency and security.

For a copy of the 1992 ERC Report, contact any of the following officers:

- **DBEDT Energy Division:** 587-3800 Hawai’i EES Office: 920-4558 Maui EES Office: 243-7735 Kauai EES Office: 241-6390

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**Solar Thermal Energy: Too Costly?**

Although there are suitable solar thermal electric generating plant sites on the leeward sides of major Hawaiian Islands, high costs and low performance make it unlikely that such facilities will be viable, notes Energy Program Administrator Maurice H. Kaya.

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The assessment was carried out by first examining the utility needs on the major islands. Next, capital costs were estimated for Hawai’i conditions, and electrical generation performance projections were made, based on a careful evaluation of potential solar resources. Preferred sites were identified. Lastly, a preliminary economic analysis of feasible electric costs was completed to compare SEGS in Hawai’i with conventional electric generation options.

Kauai’s SEGS would have to be smaller in Hawai’i than in California—no more than 30 megawatts on most islands, or O’ahu at 40. Most of the capital costs would be significantly higher due to the physical characteristics of the best sites, shipping, taxes and labor. Although the picture was improved by including government discussed incentives for renewable energy, such as tax credits, property tax exemptions, and payments for environmental benefits, the study concluded that the plants would still not be cost-effective.

Also, the solar resource applicable to SEGS plants is about 25-30% lower in Hawai’i than in the Mojave, which could cause the plants’ performance to drop by one-half. SEGS, and other concentrating solar technologies, rely on "direct" solar radiation; if the sunlight is scattered by clouds, humidity, dust or volcanic haze, it cannot be focused by the reflective parabolic surfaces and therefore cannot be used.

Kaya remarks that the results of the assessment are applicable only to SEGS such as those developed by Luz, and may not reflect on the viability of other solar electric technologies, such as photovoltaics, or even other solar thermal systems which have different cost and performance characteristics.
Energetically Celebrating Learning!

Whether it's brewing a time capsule, baking apple crisp in a solar oven, or discovering how renewable energy resources can generate electricity, teachers and students on the Big Island have been busy energizing their classrooms. (Left) Teacher Holly Curt, flanked by colleagues Nancy Manuwau and Nancy Hunter, check the temperature of a cardboard solar oven (it reached 200°F). At a one-credit class, "Fun with the Sun," held in Kealakekua in January, the teachers learned how to introduce solar concepts to their own students.

After building working solar ovens from shoeboxes, foam mattress loops, and old group pictures, advantage of a brilliantly sunny Saturday to experiment. In addition to ovens, large and small food dryers, water heaters, and photovoltaic devices provided data on electrical and thermal applications of sunshine.

The students, who are members of the National Junior Honor Society's NEED Committee, persuaded Mayor Stephen Yamashita to issue the official proclamation and attend the time capsule ceremony. The team also established an energy resource center in their school library, broadcast energy tips on radio, produced a play, and prepared a school energy newsletter. Science teacher Mike Swangel is the faculty sponsor. (Right) Irene Kozohara and Gayle Hatada, teachers at Kealakehe Elementary in Hilo, discover how a muscle-powered flashlight works at a January in-service workshop, "Energy in Action!" The session included a briefing on energy use in Hawaii, the potential of renewable resources, and hands-on experience with simple turbines and energy toys.

To request a similar workshop, Big Island teachers should contact DBEDT's Hawaii Energy Extension Service, 933-4586. The energy extension is also the island's contact for the NEED program, and has many of NEED's activities and educational games, along with other curriculum aids, in its reference library. Credit courses such as "Fun with the Sun" are offered periodically by the energy extension service, in cooperation with the University of Hawaii at Hilo.

Hawaii's wet reputation has earned it recognition as the state with the most rain days per person every day. Adding that up, we estimated that our family required between 91 and 111 gallons of hot water daily. Call it 100 gallons. Since Hawaii's cloudy area, we followed the State DBEDT Energy Division guidelines to size the collectors: 344 square feet of collector for every gallon of hot water we wanted. That would be 75 sq. ft. It was nearly perfect. (In sunny areas, you'd only need 1 sq. ft. per gallon.)

The second sizing question was, how big a storage tank to get? The State suggests a range of 1.4 to 2.2 times the amount of hot water we wanted. A 120-gallon tank is on the small side, but it's the biggest available. It is possible to have a two-tank system, but they take more space than we had.

Understanding the tank is dangerous: hot water is corrosive, and can cause leaks. Every tank has a protective anode rod inside, which corrodes first, safeguarding itself to safeguard your tank. Once the anode is gone, though, the tank is the prime target. If the water in your tank stays below 140°F, your anode should last at least as long as the tank warranty (usually five years). Between 140° and 150°, the corrosion rate doubles, and it keeps doubling every 10 degrees, according to local solar professionals.

It was a cloudy day in May, the anode could be eaten away in two years. It can be replaced; check your state guidelines for a similar workshop, Big Island teachers should contact DBEDT's Hawaii Energy Extension Service, 933-4586. The energy extension is also the island's contact for the NEED program, and has many of NEED's activities and educational games, along with other curriculum aids, in its reference library. Credit courses such as "Fun with the Sun" are offered periodically by the energy extension service, in cooperation with the University of Hawaii at Hilo.