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LEAFLET December 2007

Front Page

Imua! (Move Forward!)

Photo: Sue Henning, Reef Teacher, presents a lei to Natalie Ai Kamauu, who captured the hearts of Bay Concert-goers with her enchanting voice.

"Through a concert with music and humor, you brought many elements of our community together to celebrate that which is good about our Island home. Kahaluu is in good hands because the Village who has kuleana (responsibility) for it grows daily." - Bob Lindsey, Kohala Center Board member

"Mahalo nui loa to all of our exceptional volunteers who helped with the Bay Concert. It was a magical evening filled with beautiful music, beautiful people, and beautiful songs. Mahalo to all of our wonderful Reef Teachers and volunteers who believe in taking care of our Bay, to our Kahaluu Bay Project sponsors who understand the importance of this project, and to the sponsors of our Bay Concert who believe in us and our work. A ohe hana nui ka alu ia (No task is too great when done together)." – Cindi Punihaole, The Kohala Center's Public Outreach and Volunteer Coordinator

Although the Bay Concert started off as a fundraiser (And raise funds it did! The concert cleared $40,000 to support the work at Kahaluu Bay!), it became apparent to all who were there that something more important happened. Businesses, individuals, schools, and clubs were all given the opportunity to celebrate their work with one another to enhance our natural environments and to ensure that our Island society continues to thrive. With CEOs of major corporations mingling with students, teachers, volunteers, musicians, scientists, artists, moms, dads, and kids, the Bay Concert was truly a celebration of community, bringing a sense of awareness and recognition to all the good that can happen when people share their very best with one another and the *aina* (land). MaryLou Foley of Outrigger Hotels and Resorts, Sara Peck of UH Sea Grant College Program, and Rosanne Shank of Kahakai Elementary School and the leader of Hawaii Girl Scouts Troop 425 were especially recognized for launching the effort to Save Kahaluu Bay. These three extraordinary women from different walks of life, who share a love of the ocean and our Island, have shown us what a small group of individuals can do to make a very positive difference in all of our lives.

Photo: MaryLou Foley **(left)**, Rosanne Shank **(right center)**, and Sara Peck **(right)** received special recognition from Matt Hamabata **(left center)** of The Kohala Center for their work to save Kahaluu Bay.

The Bay Concert, the recent Food Summit which brought 500 people together in October, and the community input sessions that led to the final draft of the Island's comprehensive energy plan are visible indicators that we care about our Island's and our planet's future, that we are engaged, and that we know how to bring a "can do" sense of optimism to shaping our own future. We *will* move toward energy and food self-reliance. We will develop a vibrant, resilient local economy that enhances the quality of our natural environments, that supports the development of the very best in educational opportunities for Island youth, and that deepens our sense of appreciation and respect for our Island's root culture. And we will have fun along the way!

The future is, indeed, bright. *Imua!*

A Strategic Vision for the Next 20 Years

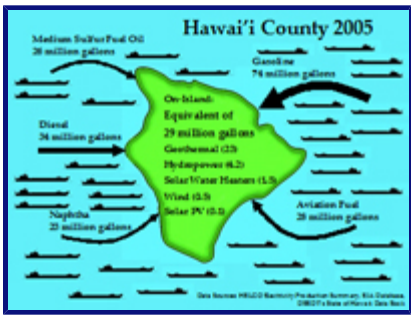

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Image: In 2005 Hawaii Island imported roughly 185 million gallons of oil. Renewable energy production on the Island offset a mere 29 million gallons of imported oil. Graph from the Hawaii County Energy Sustainability Plan.

"If you ask me what the public can expect in the future, my answer is higher energy prices." – Bob Arrigoni, Hawaii County Energy Coordinator

Two years ago, when Bob Arrigoni assumed his position as Energy Coordinator for the County of Hawaii, there was no plan in place which established energy policy for the Island. Since that time, the County of Hawaii, The Kohala Center, and Yale University have collaborated to create the Hawaii County Energy Sustainability Plan, completed in October 2007. Arrigoni is proud of the new plan, and he reports that County and State policy makers are also impressed with the scope and professionalism of the document. The Energy Plan compiles energy statistics, institutional knowledge, and information gleaned from numerous documents into a comprehensive policy framework for the County. The Plan outlines concrete recommendations for moving the County toward greater energy independence, which, taken together, provide a strategic vision for the Island's energy future. The Plan focuses on implementation, with clear steps to transition from inefficient to efficient technologies in public and private sector businesses and in our own residences. In the long-term, the Plan makes recommendations intended to shift the energy balance on the Island away from dependence on imported oil toward greater local production of energy.

"The most important project I've worked on this past year is the Hawaii County Energy Sustainability Plan. All efforts going forward should now be directed towards implementation. There is no need to keep the Plan updated on an ongoing basis. Its recommendations will be pertinent for the next twenty years," says Arrigoni.

Read more about our Hawaii County Energy Coordinator and his efforts to implement the new Energy Plan.

Change Your Life: Apply for a Scholarship

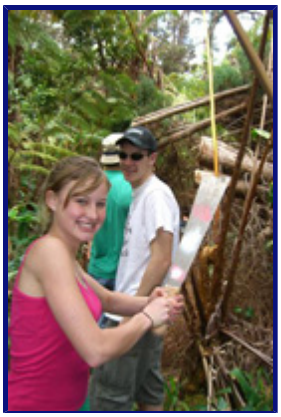

Photo: BELL 2007 students attack invasive species with a macheté in the native rainforest at Volcano, Hawaii. Photo by Vanessa Parker-Geisman.

Island high school students are once again invited to participate in the Brown Environmental Leadership Lab (BELL). The BELL Program will return to Hawaii Island in April 2008, and The Kohala Center and Brown University are offering generous, need-based scholarship assistance to offset tuition costs. Students choose between two sessions: April 11-18 or April 20-27, 2008.

BELL Hawaii is a week-long residential program packed with cultural, scientific, social, and personal learning experiences. Students rise with the sun at the edge of Halemaumau, where they are introduced to traditional Hawaiian protocols for entering this sacred space. They kayak across Kealakekua Bay from their campground on the south shore of the Bay, they plant native trees in Kaupulehu Dry Forest, they hike across the volcanic landscapes of Hawaiian Volcanoes National Park, and they help to eradicate invasive species from a tract of native rainforest in Volcano.

"I would recommend this program to my friends because it was a life changing experience for me," remarked one 2007 BELL graduate at the close of last year's program. Students are introduced to systems thinking and the concept that everything on this Island is connected. An outstanding team of instructors help the students to think through how challenges to the Island's natural and cultural resources can be extrapolated to a global environmental context. This year's team includes environmental and cultural leaders from around the island, as well as Brown University staff. Last, but not least, BELL participants make friends with their peers from across the country and around the globe. "Coming into this program I honestly did not believe that a group of people could bond so quickly," is a comment echoed by many BELL graduates.

Photo: Planting native trees in the dry forests of Kaupulehu. Photo by Vanessa Parker-Geisman.

The deadline to submit BELL program and scholarship applications to The Kohala Center is January 15, 2008. Download the application forms or call The Kohala Center at 887-6411 to request application materials.

Read reflections from Kamalani Pahukoa, one of last year's scholarship recipients.

Renaissance Learning at Kohala School

Photos: As part of the *Hidden Jewels* program, each student creates large fold-out books which reinforce the science concepts covered in class. At the end of the year, the students take their books home. A page from a 1st grade book - the forest **(left)** and one from a 3rd grade book - the ocean **(right)**.

"Showing students that science can be fun and meaningful to them is a primary goal of this team. The support and enthusiasm of the teachers and staff at the school, and generous funding from friends of The Kohala Center have helped this program grow into a model for science education in the State. Once our science building is ready to go, the students will have a

first-rate facility in which to learn. Our goal is not to meet the State standards, but to exceed them." – Susan Lehner, author and instructor of the Hidden Jewels science program

The Hidden Jewels program celebrates its fourth year at Kohala Elementary School this fall. The program has added a new grade level each year, expanding from a single second grade class in 2004 to 12 classes in grades two through five in the current school year. Each grade level focuses on a unique island ecosystem: second graders learn about the Hawaiian forest, third graders study the ocean surrounding Hawaii, fourth graders explore the Hawaiian sky and Polynesian voyaging, and for the first time this year, fifth graders are studying the Earth and the formation of the Hawaiian Islands. The innovative science program was written by Susan Lehner, who also teaches the weekly classes. Science learning is reinforced in art classes designed and taught by Kohala artist Peter Kowalke. Under Kowalke's tutelage, former students have created chess sets, tile murals, and colorful paintings, all depicting the "hidden jewels" of Hawaii in the form of its plants and animals.

Photo: This ocean-inspired mural created by students in the Hidden Jewels program was recently installed at the Kamehameha Pool in Kohala, where it can be enjoyed by pool patrons, young and old. Serendipitous resources arrived on the scene to help with the installation, in the form of two Ultimate Frisbee teams (shown here) who hoisted the 600-pound mural into place on the wall.

The Kohala Center is pleased to announce a very exciting development this year. Kohala Elementary School Principal Eleanor Laszlo has obtained a building that is being retrofitted into a science center to house the Hidden Jewels program. The new science building is being equipped with all the tools necessary to help young scientists learn and explore. There may even be a Kamehameha butterfly garden adjacent to the science center in a separate structure.

Read more about the future of science education at Kohala Elementary School.

Good Old-Fashioned Kid's Stuff

Photos: 2006 Waimea Nature Campers mugging for the camera. Photo by Melora Purell.

Wondering how your kids will spend the last week of their long winter break from school? Waimea Nature Camp might be just what your child has in mind. Nature Camp provides kids with the opportunity to connect with the natural world through games, trips, crafts, and play. The winter session runs from 9 am to 3 pm, Monday through Friday, from January 7-11, 2008, at the Waimea Nature Park. The week-long program costs $50 per student, which includes transportation for field trips, snacks, craft supplies, and a t-shirt. The winter camp is open to students in grades 2-6.

"Waimea Nature Camp is for kids who like to learn about nature, climb trees, wade in streams, sing silly songs, create crafts, and collect tadpoles. The focus of camp this winter is watersheds: the connections between the sky, the land, and the sea," says Camp Director Melora Purell. Three days per week campers will travel to the streams and forests of Kohala Mountain. Each environment will offer physical challenges, new places to explore, and living things to learn about.

Melora is the Coordinator for the Kohala Watershed Partnership and is a former camp counselor, riding instructor, and science teacher. Melora will be assisted by Steve Coffee, a Field Science Specialist with The Kohala Center. Steve currently trains ReefTeach volunteers in coral reef ecology and reef etiquette, and works with Hawaii Island teachers to develop the Hawaii Island School Gardens Network.

Learn more about what to expect at camp. Register your child by contacting Samantha Birch at The

Kohala Center at 887-6411 or sbirch@kohalacenter.org.

Voices of Wisdom

Photos: A synthetic image of the Moon as seen from the Earth on December 3, 2007, from the U.S. Naval Observatory website.

The public is invited to a series of free lectures in the New Year, celebrating what it means to be Hawaiian. Speakers share their perspectives on a variety of topics, ranging from the Hawaiian lunar calendar to the ecology of the Northwest Hawaiian Islands. All lectures are offered twice: once in West Hawaii and once in East Hawaii, affording Island residents two opportunities to attend. The schedule for January through April 2008 is as follows:

Speaker: KALEI TSUHA
Topic: Kulana Mahina, The Hawaiian Lunar Calendar
KONA: Outrigger Keauhou Beach Hotel, Kahaluu Ballroom
Date/Time: January 25, 2008, 5:00 - 6:30 pm
HILO: UH Hilo, Room to be determined (TBD)
Date/Time: January 28, 2008, 12:00 - 1:30 pm

Speaker: SCOTT KEKUEWA KIKILOI
Topic: Northwest Hawaiian Islands
KONA: Outrigger Keauhou Beach Hotel, Kahaluu Ballroom
Date/Time: February 15, 2008, 5:00 - 6:30 pm
HILO: UH Hilo, Room to be determined (TBD)
Date/Time: February 19, 2008, 12:00 - 1:30 pm

Speaker: RUBELLITE KAWENA JOHNSON
Topic: Hawaiian Perspective of the Environment & Kumulipo
KONA: Outrigger Keauhou Beach Hotel Royal Garden
Date/Time: March 1, 2008, 10:00 – 11:30 am
HILO: UH Hilo, Room to be determined (TBD)
Date/Time: March 3, 2008, 12:00 - 1:30 pm

Speaker: JONATHAN OSORIO
Topic: Kauikeaoüli, Kamehameha III
KONA: Outrigger Keauhou Beach Hotel, Kahaluu Ballroom
Date/Time: March 14, 2008, 5:00 - 6:30 pm
HILO: UH Hilo, Room to be determined (TBD)
Date/Time: March 17, 2008, 12:00 - 1:30 pm

Speaker: KEPA MALY
Topic: Historical Maps, Documents & Images
KONA: Outrigger Keauhou Beach Hotel, Kahaluu Ballroom
Date/Time: April 18, 2008, 5:00 - 6:30 pm
HILO: UH Hilo, Room to be determined (TBD)
Date/Time: April 21, 2008, 12:00 - 1:30 pm

These lectures are part of the *Puana Ka ʻIke* (Imparting Knowledge) Lecture Series sponsored by Bishop Holdings Corporation/Kamehameha Investment Corporation, The Kohala Center, Outrigger Keauhou Beach Resort, Hawaii Tourism Authority, the University of Hawaii at Hilo Kipuka Hawaiian Student Center, the National Oceanic and Atmospheric Administration, and The University of Hawaii Sea Grant College Program. For more information, visit http://learning.kohalacenter.org/?page=Puanaka or contact Joy Cunefare at 322-0088, ext. 106.

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The Job Ahead

Perspective by Bob Arrigoni
Based on an interview with Linda Copman

Photo: The first hydroelectric installation on the County Department of Water Supply's system at Hina Lani Street, above Costco. From left to right are Mike Maloney, developer of the technology; Bettina Arrigoni, Energy Management Analyst, Department of Water Supply; and Bob Arrigoni, Energy Coordinator, County of Hawaii.

I have two titles at the County: Economic Development Specialist III and Energy Coordinator. The first title is for Civil Service purposes, and the other is to let people know what I do.

I was hired by the County Department of Research and Development (R & D) and the State Department of Business, Economic Development, and Tourism (DBEDT). I have a unique position in that my County job is funded by a federal program and administered by the State. The County matches the federal monies by paying for my benefits and my office. In effect I have two bosses: Maurice Kaya at DBEDT and Jane Testa, Director of County R & D.

Regarding what I do, my duties can be divided into three categories: energy policy, energy projects, and energy emergency planning.

From the policy perspective, I represent the County at State, County, utility, and public energy policy planning forums. This includes participating in the State legislative process by attending Hawaii Energy Policy Forum meetings, representing the Mayor on the Natural Energy Laboratory Authority of Hawaii (NELHA) Board of Directors, participating in Community Development Planning working group meetings, representing the County at HELCO Integrated Resource Planning (IRP) meetings, and most recently, introducing the public and local energy stakeholders to the Hawaii County Energy Sustainability Plan.

I also oversee County energy projects. My job is to ensure that existing energy performance contracts are operating as designed, and to initiate new contracts for both energy efficiency and renewable energy installations at County facilities. Over the past ten years, approximately 30 County buildings have been energy retrofitted. For example, the County has five years remaining on a ten-year performance contract with Honeywell, Inc., for an energy retrofit of the Kona Police Department and the Hilo Public Safety Building. Another ten-year performance contract for an energy retrofit for the County Building in Hilo was recently concluded. The County is in the process of remodeling the County Building due to age deterioration, and, as part of the remodel, the building's climate control equipment and lighting will be upgraded to today's energy efficient standards.

Photo: The Hawaii County Building in Hilo is currently undergoing a major renovation, to include energy efficiency improvements.

The County's first large solar installation will be on the new West Hawaii Civic Center. It is anticipated that approximately a 100 kW system will be installed at the Civic Center, either on the roof of the main building, on a shaded parking structure, or utilizing a combination thereof.

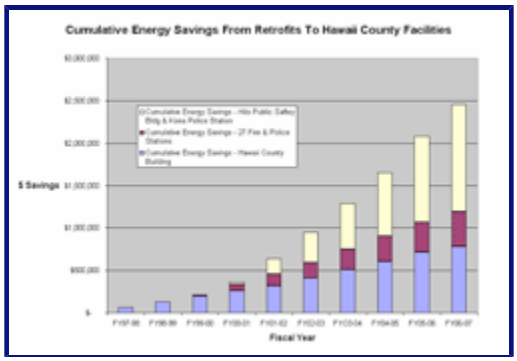

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Image: A chart of cumulative energy savings from County retrofits, courtesy of Bob Arrigoni and County R & D.

My role in energy emergency preparedness involves updating the County Energy Emergency Preparedness Plan every two years and ensuring that the County Plan works in concert with the State energy emergency plan. The Emergency Preparedness Plan was created to outline duties, authority, and the chain of command in the event of an energy supply disruption due to a natural disaster or human event. It provides guidelines for the County to follow in the event of a declared fuel supply shortage and communication guidelines for government agencies, energy industry stakeholders, and the public. I also assist the County Civil Defense Agency during any event that may affect energy infrastructure, such as a natural disaster. I belong to two State energy emergency preparedness committees that meet regularly to coordinate statewide preparedness and training.

The Island spends approximately $750,000,000 on energy each year, and about 90% of that amount goes directly off the Island to pay for fossil fuel. High petroleum prices are a main factor driving up Hawai'i County's electricity price, which was more than three times the national average in 2006. Gasoline prices here are among the highest in the nation. Due to this reliance on imported petroleum-based fuels, the County is vulnerable to the volatility of global oil markets. Fossil fuel use poses environmental problems that include oil spills, air pollution, and the release of greenhouse gases that cause global climate change.

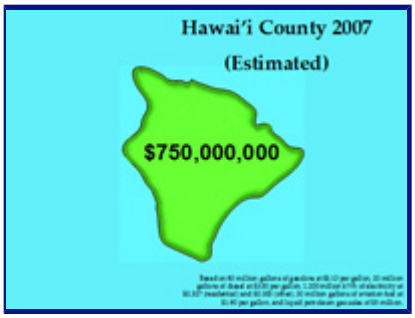

Image: Energy expenditures make up 16% of the Gross County Product, while average energy expenditures across the country are closer to 8%. The typical household with two cars in Hawaii County spends approximately $2,500 per year for gasoline and $2,300 for residential electricity. Data courtesy of Jeremiah Johnson, PhD, of the Yale School of Forestry and Environmental Studies.

The goal of the Hawaii County Energy Sustainability Plan is to provide a roadmap to transition transportation energy and electric generation from fossil fuel dependency to greater efficiency and renewable energy. The County seeks to minimize energy use to the greatest extent possible and to meet remaining demand with energy generated from locally generated renewable resources. The plan identifies measures to improve the energy efficiency of buildings, transportation, and water use on the island. Renewable generation options include the use of biofuels in transportation, distributed generation solar technologies, and large-scale electricity production options for HELCO such as geothermal power, wind farms, and pumped storage hydro.

One main theme in the Plan is that the County should "lead by example." The assumption is that if the County embraces energy efficiency and renewable energy practices, the rest of the community will follow in adopting these technologies and practices.

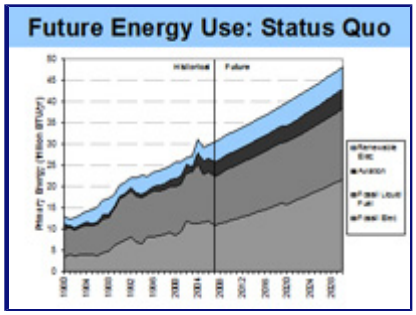

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Image: The demand for energy in the County has increased steadily over the past several years, and without concerted action, energy use is projected to continue to increase. Graph from the Hawaii County Energy Sustainability Plan.

Implementation of the Energy Plan at the County level will begin with discussions with each County Department regarding those Plan items that fall within that department's responsibilities. For example, Public Works will be impacted by recommended revisions to the Building Code, transitioning to a more efficient vehicle fleet, and solar installations on County facilities. Mass Transit will be involved in expanding the public bus system, and the Department of Environmental Management will oversee maximizing pump efficiency and managing landfill gas. Each department will be consulted, in order to come up with a resource list which outlines estimated funding requirements to assist that department to meet the County's energy goals.

A good example of an energy efficiency project to be implemented in the near term is to transition the County fleet to utilize more efficient vehicles. This will involve working with the Department of Public Works to determine the scope for a pilot program and the resources needed to service the new vehicles.

On the renewable energy front, the County has recently implemented two micro-hydroelectric generation installations on the transmission system of the Department of Water Supply (DWS). Prior to being hired as the Energy Coordinator for the County, I worked on a one-year contract as an energy analyst for DWS. During that time I applied for and received federal funding to install the first hydroelectric system in West Hawaii, right above Costco on Hina Lani Street. After my contract with DWS ended, my wife, Bettina Arrigoni, assumed a full-time energy analyst position at DWS, and she has continued working on this project. Both the Costco turbine and a second turbine on King Kamehameha III Highway will be completed by the end of this year. These turbines create approximately 40 kW of power, or about the equivalent of the demand generated by roughly 20 houses. Once DWS personnel have mastered the techniques for operating these facilities, plans call for installing similar turbines at DWS facilities around the Island.

Photo: The new micro-hydroelectric turbine(s) at the DWS facilities at Hina Lani Street.

In the long term, the County should install solar energy systems at all its facilities, including those at the Department of Water Supply. This should be achieved using a third-party power purchase agreement model, in which a third-party designs, builds, owns, operates, and maintains the solar systems and sells back solar-generated electricity to the County. This model removes the burden of significant upfront costs from the County. It also allows the solar contractor, with significantly greater expertise than the County, to assume the responsibility for system installation and maintenance. This model significantly lowers the cost of the systems, because unlike the County, which is a public agency, the private third-party can take advantage of tax credits and accelerated depreciation for the solar systems. These financial incentives help to drive down the cost of the systems, as well as the subsequent electricity price charged to the County.

The Plan recommends that the County hire additional staff dedicated to energy policy and projects. Additional staff would allow for faster implementation of the Plan by providing the required resources to support research, development, and implementation of pilot programs and long-term initiatives with key County agencies, as well as outreach into the private sector and Island communities.

Specifically, the Plan recommends hiring an energy project specialist to assist the County Department of Public Works in implementing energy efficiency and renewable energy projects at County facilities and in updating and interpreting the Model Energy Code section of the County Building Code. The Plan also recommends hiring an energy policy specialist to represent the County at the State legislature, the

Public Utilities Commission (PUC), NELHA, and utility IRPs. Finally, the Plan recommends establishing a cabinet-level energy position to facilitate the flow of information among departments and to act as a single point of contact for all County energy issues. Of these three new positions, the cabinet-level post is by far the most important. I recently attended a few seminars which showcased local government success stories in energy management. Many successful programs positioned the municipal energy manager on par with the chief executive - in order to break down barriers among departments and maintain energy as a priority in the government leadership.

One factor that struck all of us who worked on the Hawaii County Energy Sustainability Plan was the power that State agencies have over the individual counties in regards to determining energy policy. The fact is that future electricity planning and pricing is ultimately determined by the Public Utilities Commission (PUC). The PUC also controls the type of energy efficiency programs that can be adopted by an Island utility and the level of funding for such programs. Decisions made by the PUC have profound ramifications on the type of primary energy used to produce electricity, for example petroleum versus renewable energy. These decisions determine how much we pay for electricity and how we can purchase electricity.

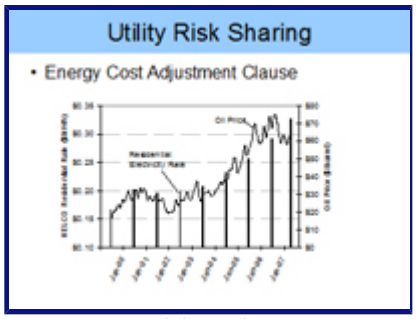

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Image: The Energy Cost Adjustment Charge (ECAC) is a rate adjustment mechanism that passes changes in fuel cost to electricity ratepayers. This effectively insulates the utility from the dramatic fluctuations in oil prices and places all of the risk on the ratepayers. With 77% of HELCO's generation relying on petroleum-based fuels in 2006, the ratepayers are vulnerable to oil price spikes at both the gas pump and the electrical outlet. Data courtesy of Jeremiah Johnson, PhD, of the Yale School of Forestry and Environmental Studies.

For example, current PUC regulations forbid the County from installing a solar energy system at its soon-to-be-built West Hawaii Civic Center and using some of the excess produced electricity at another County facility. The County cannot use the electricity at another separately metered County facility, even if the facility is located right next door to the new Civic Center. Until the regulatory playing field between the County, HELCO, and the PUC is "leveled," the County is not in real control of its destiny when it comes to planning for future electrical generation and distribution.

One example of "leveling the playing field" is called intra-governmental wheeling. Currently before the PUC is a docket that would allow government institutions the ability to move power across the electric utility's system, to be used at a government facility for a to-be-determined tolling rate. What this means is if the County has a large solar system producing electricity on the west side of the Island, the County could then utilize that power on the east side – simply by paying HELCO a transmission and distribution charge, but no energy charges. Hypothetically, the County could also purchase excess power from a facility like Puna Geothermal Venture and use this power at any other County facility, again paying HELCO only the tolling rate. The Intra-governmental Wheeling Docket has just opened, and its outcome is uncertain.

Another roadblock which deters the public sector from using more renewable distributed energy and from transitioning to energy efficient vehicles, buildings, and appliances (including computers) is our current procurement laws. The public sector (both the County and the State) needs to change its procurement requirements from a low bid for **initial** cost basis, to a low bid for **lifecycle** cost basis. When considering the lifecycle cost of a car, building, or appliance, any upfront premium paid is recouped quickly through energy savings over the lifetime of the purchase.

Regarding procurement of renewable energy, the public sector is struggling to create contracts that allow third-party ownership and maintenance of energy systems located on or at government facilities. Again, third-party ownership is preferable to the government buying and maintaining these systems because of the financing and expertise third-parties bring to the table, not to mention the tax credits and accelerated depreciation which are available to the private sector and not to the public sector.

On the bright side, there are several things that every Island resident can do NOW to contribute to a more sustainable energy future for the Island.

click to enlarge

Image: Compact fluorescent light bulbs pay for themselves through energy savings in as little as two months and can save households up to $250 per year. Solar water heaters can be paid for in 2-3 years and continue saving the household up to $700 or 800 per year in energy costs. It costs as little as $30 more to purchase an Energy Star efficient central air system, which can save households up to $150 per year in energy costs. Data courtesy of Jeremiah Johnson, PhD, of the Yale School of Forestry and Environmental Studies.

Homeowners should replace their water heater with a solar hot water system. This retrofit is the number one energy saver for existing residential homeowners. With rebates and tax credits, these systems pay for themselves in three years for a typical household of four or more people. If you're buying or building a home, insist that the home have a solar hot water system installed during its construction. HELCO is now in the process of implementing a new solar hot water pilot program, in which a homeowner can have a system installed with no upfront costs. Instead, the customer pays for the system on a monthly basis as a line item on his or her electric bill. This pilot program will include a maximum of 50 solar hot water heating systems through June 2008.

Another efficiency measure residents can implement very easily is to change all their light bulbs to compact fluorescent bulbs (CFLs). CFLs use a fraction of the energy of standard incandescent bulbs and last many times longer. Though CFLs are initially more expensive than standard bulbs, they pay for themselves through energy savings in less than a year.

A third thing to consider is purchasing efficient appliances. When you see an Energy Star Label that says you will save $50 per year because of the energy efficiency of a particular appliance, the reality is that you will save on the order of $150 per year - because Energy Star bases its savings estimates on mainland electric rates. In fact, Hawaii Island rates are at least three times higher than average mainland rates. Take this threefold savings into consideration if the energy efficient washer, dryer, air conditioner, or refrigerator is more expensive than the standard model. When buying the more efficient appliance, you will make up the added cost quickly in energy savings and likely realize a fivefold savings over the life of the appliance.

Photo: The potential costs that volatile oil prices have on our pocketbooks. Image courtesy of Kyle Datta, U.S. Biodiesel Group.

One last recommendation is to buy the most efficient vehicle in your vehicle class. Notice I didn't say buy a hybrid. I understand that some people need a truck for work, a minivan for family, an SUV for unpaved roads, etc. What I ask the car buyer to consider is buying the most fuel efficient model in the vehicle class. In other words, buy the most efficient truck, minivan, SUV, etc. according to the use of the vehicle. Every vehicle class has efficient alternatives and every class has gas-guzzlers. Choose the most efficient alternative.

Each of these recommendations requires no reduction in comfort or change in lifestyle. There is a subtle marketing message we often hear that suggests that reducing energy in this country and on this Island will require "sacrifices." Nothing could be further from the truth. The only thing that changes when we make the transition to a less energy intensive lifestyle is that LESS money disappears from our wallets.

One more thing that we as a community should be doing is educating our children about energy. If kids understand their relation to energy and energy consumption and the limitations of our Island resources, they will become the ambassadors to their parents and help lead the transition to a less energy intensive lifestyle on the Island.

A New View of Home

By Kamalani Pahukoa

Photo: 2007 BELL Hawaii students pose with Rob McGovern **(kneeling second from left)** after hand clearing invasive ginger from the Niaulani Campus of the Volcano Art Center.

Editor's Note: *Kamalani Pahukoa, then a freshman at Kanu o ka Aina New Century Public Charter School (now a sophomore at Kamehameha High School in Keaau), was the recipient of a scholarship to the 2007 BELL Hawaii Program.*

Like a typical teenager, I was at first a bit reluctant to meet so many new kids my age from other places. I didn't know that I was going to be the only local girl, and, at first I thought the task was too tall. I was surprised at how quickly I made friends.

It was fun to revisit Island spots I knew and help interpret the importance of these places to newcomers. Many of the cultural lessons were things I knew well, but watching my new friends learn about the island gave me a new view.

I thought it was interesting that other people wanted to learn about our islands, culture, and history when it wasn't part of their own genealogy. So many times it is our *kuleana* (responsibility) to know places and practices as a Hawaiian. It was intriguing to find that others can take this responsibility as seriously as I do.

Photo: Kamalani shares a hula with the group in the pavilion at their Keei campground.

I now realize that I did pretty good job of sharing the things I knew. It was different to be the *kumu* (teacher). I think I developed some tour guide skills I didn't realize I had.

I especially liked the fact that the BELL program offered so many water activities. I feel I belong in the water. With many of the students coming from places where there is no ocean, spending so much time surrounded by the ocean made for a great time – for them and for me.

Photo: Kamalani (right) adds cinders to a new stairway that BELL students constructed as part of their service learning component.

I especially like the fact that I was able to joke around and teach my new friends the funny aspects of talking pidgin. In Hawaii we pay little heed to racial barriers - as we are the melting pot of all cultures.

I still keep in touch with the friends I made during the BELL program, and I only wish that the program would have lasted longer.

Read an excerpt from Kamalani Pahukoa's BELL application essay.

New Views of Science and Art

Perspective by Susan Lehner and Peter Kowalke
Based on an Interview with Linda Copman
Photos by Peter Kowalke

Photo: Kohala Elementary School students immersed in creating the *Hidden Jewels* ocean mural.

What's so novel about the *Hidden Jewels* program? Quite a lot. It was implemented four years ago – which is three years before the DOE began to assess student progress on statewide science standards at the elementary school level. Now that the DOE is formally measuring achievement in science among elementary-age children, *Hidden Jewels* provides a successful model for integrating science (and art) into the existing elementary school curriculum.

While master teachers Lehner and Kowalke present their lessons, the regular classroom teachers remain in the room, absorbing the concepts along with their students. All science classes are carefully aligned with State DOE standards and provide hands-on learning opportunities. Games like "Astronomy Jeopardy," "The Vertebrate Grab Game," and "Whose Worm Is That?" make the program fun and very popular with the kids. For example, "Whose Worm Is That?" is a game that teaches students about diversity in Hawaiian honeycreepers. Students use imitation beaks, consisting of chopsticks, pliers, tongs, etc., to remove worms, rice grains, ants, pollen, and other foodstuffs from different containers that simulate the natural environments for these food sources. This exercise helps kids to understand which kind of beak is best adapted to eat which kind of food, thus helping the students to understand selective adaptations in the beaks of the various species of birds.

Photo: Students experiment "eating" Styrofoam "floating plants" with a shallow spoon-shaped "beak."

"Please tell me we'll have these classes in middle school," requested one fifth grade participant after a recent class. Lehner also shared these other memorable quotes from former students:

SUSAN: "GIVE ME AN EXAMPLE OF A NATIVE ANIMAL."
STUDENT: "EDDIE AIKAU."
SUSAN: "WHAT KINDS OF FISH DON'T LAY EGGS?"
STUDENT: "BOY FISH."
SUSAN: "ALL BIRDS HAVE FEATHERS."
STUDENT: "UNLESS YOU ROAST THEM."

In anticipation of the expansion of the *Hidden Jewels* program into its new building in 2008, Kohala Elementary School teacher Calin Duke has been added as Curriculum Specialist and Community Liaison. Calin has worked for the past four years as a much-loved second-grade teacher. Calin is now working to integrate language arts and math into the *Hidden Jewels* science curriculum for students in grades two through five. The idea is that next year, classroom teachers will reserve a block of time in the new science room. Within that time frame, they will be able to teach science, math, and language arts in an integrated manner, in a prepared environment - with the appropriate materials and equipment right at their fingertips.

The goal of the *Hidden Jewels* program is to make meaningful connections for the students, so that they can begin to make sense of complex systems which surround them in real life. Artist Peter Kowalke is proud of the success of the program, in which science, art, math, and language arts are being integrated into a more holistic approach to teaching and learning. Kowalke shares the pedagogic thinking behind this experimental program:

"An aspect of the program I would like to address is the integration of art and science in order to emphasize the overlapping skills and premises upon which each discipline is based - observation /experimentation / communication. Thus we de-emphasize the stereotypical views of art and science.

The premise is that there is art in science and science in art, and that there is beauty in science and science in beauty. We find it all based in nature. We use our limited human perceptual devices and the

devices we create to observe nature, then come up with systems to categorize and systematize. What we are striving for is the feeling of awe, respect, and wonder while observing nature which can be documented in many ways - through art and science.

Photo: A second grade student crafts a forest tile with a wood spider.

Ultimately, we are striving for that awe which induces respect and humble stewardship of the natural world. We are also building young well-rounded 'perceptionists' capable of using many modalities of inquiry: mathematical, musical, kinetic, artistic, scientific, etc. They engage in many of the same skills in both the art and science parts of the program: comparison, classification, and observation skills - using language which we consciously overlap in both programs: scale, proportion, dimensions, texture, shape, line, color, and form. Concepts such as adaptation, evolution, competition, and harmony within natural systems are mutually reinforced through the art and science activities.

Photo: The finished tiles assembled into a mosaic mural on the wall at Kohala Elementary School.

Let's look at one example within our lesson plan: that of the 'spiral radiation' or the adaptation of the many Hawaiian birds from one species of finch over millions of years. The concept is introduced in the science curriculum. Susan explains the concept of adaptation to available ecological niches. She introduces genetic mutation and natural selection on an age-appropriate level. The students do experiments with different tools which mimic beak shapes paired with the appropriate foods for each tool: seeds for finches, tubes for honeycreepers, etc. She makes a game of this ('Whose Worm Is That?'), and the students record their findings in their journals. These same concepts are then used to sculpt and paint the birds. They learn the artistic concepts and skills needed to sculpt each type of beak and the terminology to go along with those skills: for example, 3-dimensional shapes such as cones, cubes, and cylinders.

Next the idea of ecological niches is reinforced by painting a forest environment on beautiful canvas and creating the creatures of the forest separately in cut out canvas. The students then use deductive reasoning, the culmination of the many lesson plans and their new vernacular, to place the creatures with Velcro within the appropriate ecosystems using clues like symbiotic plant species and food supplies. Opportunistic lessons are often inserted, such as the history of Velcro, which was discovered by analysis of plant burrs which hitch-hike on animals. Another opportunity here is to discuss endemic plants and how they got here. And another opportunity is to take the students to the pottery wheel, where students order 'parts' to build their native birds in 3-d using the highly descriptive language they have learned. He or she might say, 'I need a long conical shaped beak for my honey creeper, an oval body, a short cylinder for its neck, and an open conical shape for the lobeliad flower it will be drinking from.'

Photo: Kowalke shapes a special order beak for one student's native bird sculpture.

While working on the pottery wheel, another series of opportunities presents itself: the wheel turns which brings up centrifugal force, which leads to discussion of the Earth's rotation, then gravity, and so forth. Once the birds are complete, the students hand paint them and a whole new series of opportunities arise for dramatic play, including recreating sounds of the forest, music making, chanting, hula, and exploring creation myths.

Photo: Hand painting, a good example of opportunistic learning.

This is all leading to the idea of the individual, our institutions, and our ecosystems being perceived as inter-dependent. This kind of education fosters a sense of wonder and the certainty that we are connected to nature and to each other in a myriad of ways. When this sense of connectedness is instilled in the students, we are helping to create communities and a future that reflects the delicate, powerful, and beautiful world we have been given to explore. We also realize the urgent need to protect the delicate balances revealed through scientific and artistic observation."

Boat Races in the Waikoloa Stream

Story and Photos by Melora Purell

Photo: The Waimea Nature Camp *ohana* (family) at home in their woodland house at *Ulu Laau*, the Waimea Nature Park.

At Waimea Nature Camp in summer 2006, we had the blessing of a full and flowing Waikoloa Stream meandering through Ulu Laau Nature Park.

We had fun throwing sticks into the stream and watching them float along. From this simple beginning, the kids got the idea that we could construct boats and have boat races. So we did! The limitations to the boat building process were that we had only natural materials at our disposal - sticks, grass, rocks, and roots. Once the race was announced, the kids split up and started constructing their boats. Some kids teamed up and others went solo. Some designed intricate boats that required tying together a raft of bamboo. Others created woven grass mats that could float. A few decided to try sails. One little girl made a few huge wads of grass that she could just heave into the stream. The engineers in the group tested their designs over and over to see what worked best. The artists wanted boats that looked good!

The race start time was announced, the starters took their positions, the boats were adjusted one last time, and then they were off. We watched the sails flip over, the wads of grass sink, and the bigger sticks get stuck in the overhanging branches. The rafts were carried along by the winds and water currents. We raced around the corner to see if any boats made it through the maze of rocks and trees. The losing boats were readjusted, new ideas were incorporated, and we raced again. And again… and again.

Photo: Campers cavorting with the toads in Pololu Stream.

What did we learn from this? We learned about hydrodynamics and the forces of water and wind. We learned about the properties of natural materials. Did you know that ginger roots are extremely rubbery and strong? They made wonderful cords to tie things together. We learned to work together. We took responsibility for our positions in the race crew. We were good sports when our boats capsized or got caught on branches. We created something new from simple natural materials.

Photo: Campers all revved up and ready to go hiking on the windward Kohala Coast.

These are the kinds of activities that happen at Nature Camp. My belief is that we cannot plan too much, or we lose the chance to synthesize these organic moments. I make the effort to put myself and the kids into situations where these sorts of experiences can happen.

Waimea Nature Camp is rooted in values of respect for the Earth and environment, service to the community, striving to understand nature and find peace, and equality between people. And, as always, a big part of nature camp is simply being kids, getting dirty, and playing together!

Register for the Winter Camp by contacting Samantha Birch at The Kohala Center at 887-6411 or sbirch@kohalacenter.org.

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