



KA HEI

Newsletter

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Educators come together for Common Core Standards aligned Professional Development workshop

The Hawai'i Department of Education's (DOE) Ka Hei Program is a five-year endeavor launched in 2014.

IT WILL INTEGRATE INNOVATIVE energy technology with meaningful learning experiences, while reducing energy costs. As a comprehensive energy and sustainability program, Ka Hei will transform the learning environment, reduce operational expenses and provide engaging educational opportunities for our students and community.

► **Ka Hei Logo Design Contest** To embrace the inclusion of art in STEM curriculum, we have launched the Ka Hei Logo Design Competition open to all DOE students. The overall winning design will be digitally reproduced and featured in Ka Hei communications and materials. Contestants will submit their original artwork accompanied by an essay explaining the inspiration for their piece. Winning designs will be awarded at the elementary, middle and high school levels. **Entries due March 13, 2015, with winners selected on April 8, 2015.**

LOGO CONTEST

We've launched the Ka Hei Logo Design contest! Rules and resources available at <http://opterraenergy.com/ka-hei-logo/>



Kaua'i educators Crystal Parry, Ashley Swart and Claire Yamada compete to design the quickest solar thermal power pump



Jeffrey Garvey spins his handmade pinwheel to simulate wind energy

Professional Development

Three Workshops, Two Islands

THE ISLAND ENERGY INQUIRY™ Lessons are designed to support the implementation of a comprehensive STEM energy curricula through standards-correlated, inquiry-based, hands-on lesson units. Island Energy Inquiry™ is an expanded curriculum for teachers and schools of Hawai'i offered at an exciting time in the state's evolution in energy production and use. This program, developed by the Maui Economic Development Board, not only is useful in engaging students in rigorous explorations of real energy issues in our islands, but is also a wonderful supplement to interdisciplinary STEM efforts taking place in schools throughout the islands. The two-day Ka Hei professional development workshops were held on O'ahu in October and November, and on Kaua'i in December.

“Critical thinking is huge for the new curriculum that we're developing... it was the [energy audit] activity where the kids really became mindful of [energy consumption].”

—Maggie Ballard, Kaimuki MS

Education BY THE NUMBERS

12
SCHOOLS

in the pilot education program

- Jarrett MS
- Kahuku HS
- Kailua ES
- Kaimukī HS
- Kaimukī MS
- Kōloa ES
- Mōkapu ES
- Pāloa ES
- Waikīkī ES
- Waipahu HS
- Wilcox ES
- Wilson ES

39

Educators trained (surpassing goal of 31 educators in 2015)

476

Students to date who have experienced Ka Hei lessons spanning PV Inquiry, PV House Design, Pinwheel, Energy Audit, and/or Solar Hot Water curriculum.

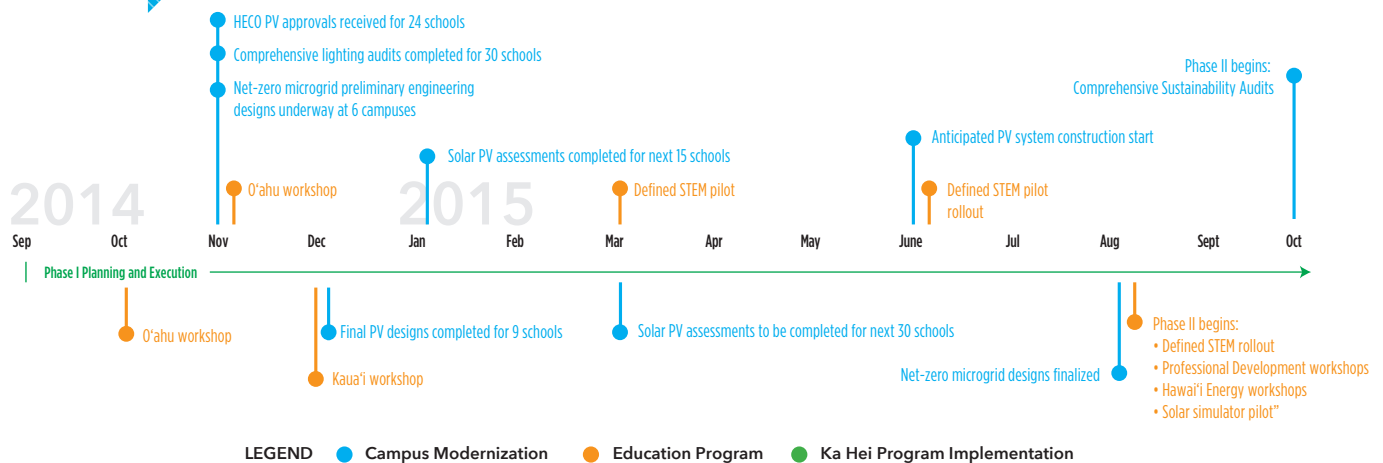
The success of Ka Hei would not be possible without our community partners to make our program have long-term impact. For your support, contributions and dedication to furthering education and sustainability on our islands, thank you to:

»
PROJECT
PROGRESS

» **ISLAND ENERGY INQUIRY**
for leading all of our first three professional development workshops centered around inquiry-based STEM education

» **KAUAI ECONOMIC DEVELOPMENT BOARD**
for making the two-day Kauai professional development workshops a possibility by funding all venue costs at

Kauai Community College, providing lunch, snacks and drinks, as well as covering substitute teacher costs.



Clean Power *at 24 schools*

CURRENTLY, the DOE spends more than \$62 million a year on electricity, gas, water and sewage fees – a 50 percent increase over the past 10 years. The more we spend on utility costs, the fewer funds there are to direct toward accomplishing our core mission of fostering student success.

Our first step is to install solar photovoltaic systems at the following school campuses.

These sites were selected based on the capability of O'ahu's open circuits to handle PV installations, and are targeted for completion by the end of this year. Hawaiian Electric Net Energy Metering applications have been approved at these locations:

- Castle HS
- Farrington HS
- Honowai ES
- 'Iliahi ES
- Ka'ala ES
- Kahalu'u ES
- Kaimuki MS
- Kalihi ES

- Kalihi Kai ES
- Kapalama ES
- Kipapa ES
- Lanakila ES
- Lehua ES
- Leilehua HS
- Makakilo ES
- McKinley CS
- McKinley HS
- Mililani Uka ES
- Kauluwela ES
- Pearl City ES
- Royal ES
- Shafer ES
- Waipahu HS
- Wilson ES

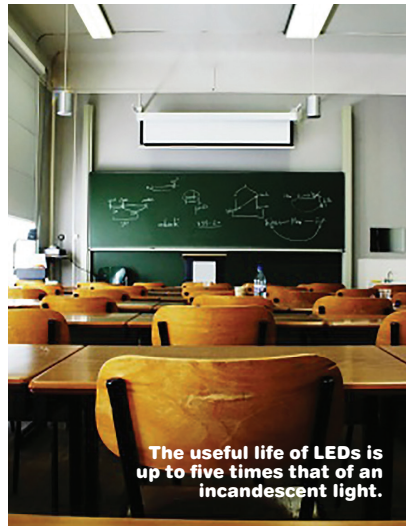
2015 KA HEI GOALS

- **2 MW** of renewable energy installed
- **5 MWH** of energy reduction through efficiency measures
- **\$1 million** energy savings realized 12 months after completion
- **50% reduction** of electricity purchased at Phase 1 schools
- **31 teachers** receiving Professional Development training
- **800 students** participating in the program
- **35 lesson plans** implemented
- **40 schools** participating in Phase 1 (facility upgrades or education)
- **450 tons** of reduced GHG emissions
- **\$7.5 million** increase in local spending

PROJECT PROGRESS

An Illuminated Learning Environment

IMMEDIATELY AFTER OPTERRA RECEIVED a signed contract in September 2014, **a comprehensive room-by-room lighting assessment was conducted across the 30 O'ahu schools included in Phase 1.** Specifically focused on efficiency measures, the project team pinpointed that school lighting was on average responsible for more electricity than all other loads combined. Implementing high-efficiency retrofits and intelligent lighting design, including systems that offer enhanced controllability for teachers and facilitators **could yield both significant savings and improved learning environments.**



Lighting BY THE NUMBERS

30

number of elementary, middle, high and community schools that received a lighting audit as a part of Phase 1

48%

percentage of electricity used only for lighting at the Phase 1 schools

nearly

9.4M

number of kilowatt hours (kWh) of energy consumed for lighting at the Phase 1 schools in a year. By comparison, the average Hawai'i household's annual consumption is about 7,400 kWh.

5x

magnitude of time that LED lighting systems last compared to existing technologies

NET-ZERO ENERGY MICROGRID CAMPUS—DRIVING INNOVATION

AS THE DOE CONTINUES TO STRIVE toward achieving energy self-sufficiency, Ka Hei is looking to harness each campus' ability to become a net-zero energy facility. **A net-zero energy campus, or "microgrid", would have the ability to generate all of its energy requirements on-site and to operate as an independent power-grid during utility interruptions.** Six

initial candidate sites were identified in July of 2014 and preliminary engineering began this past December to identify energy savings from viable efficiency measures such as LED lighting, natural ventilation, high-efficiency heating, ventilation and air-conditioning (HVAC) retrofits and automated controls. Photovoltaic (PV) systems are being

designed to generate each campus' remaining energy needs, including the strategic use of battery energy-storage systems that allow each campus to store excess PV energy for use during evening hours. **Importantly, net-zero energy microgrids would provide the DOE decision-makers and students alike with a technically feasible and cost-effective**

model of achieving a sustainable and self-sufficient energy footprint.

The six candidate sites selected for evaluation in the net-zero microgrid pilot program are:

1. Kahakai ES (Kona)
2. Waiakea HS (Hilo)
3. Kamali'i ES (Kihei)
4. Pōmaika'i ES (Kahului)
5. Maui HS (Kahului)
6. Kaimuki MS (Kaimuki)

Ka Hei's success would not be possible without partners pioneering its vision. The following teachers have taken leadership roles in ensuring that Ka Hei resources are available through the Island Energy Inquiry™ Lending Library:

- Greg Kent, *Kailua ES*
- Elizabeth Mahi, *Kaimuki HS*
- Uila Vendiola, *Kahuku HS*
- Kelly Perez, *Mōkapu ES*
- Naomi Kamauoha, *Pālolo ES*
- Stephanie Sweeney, *Waikiki ES*
- Jamie Hatfield, *Waipahu HS*
- Lauren Hew, *Wilson ES*



Energy costs are very high, and renewable energy in the form of PV solar is an excellent solution for the DOE to embrace at this time. The savings on energy can allow us to focus more resources on improving quality of instruction and student achievement in our schools [to bring] opportunities for real world, rigorous learning [to] our students."

—Alvin Shima, Complex Area Superintendent, Baldwin-Kekaulike-Maui

KA HEI PIONEERS