



Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability

Legislative Informational Briefing
Senate Education and Energy and Environment
House Education and Energy & Environmental Protection
March 10, 2014

Ka Hei is a specific type of snare made with ropes, and is what the Hawaiian god Maui used to capture the sun in the Hawaiian tradition.

Another meaning is “to absorb as knowledge or skill.”



Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability



Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability



Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability

Projected Timeline

2014

2015

2016

2017

2018

Phase 1: Initiating

- Key Stakeholder Engagement (HECO, Hawaii Energy, Kokua Foundation)
- Fast-Track Solar PV installations on “Open” HECO circuits (appx. 30 schools)
- 3 microgrid installations
- Living Labs Educational Curriculum Program
- Campus of the Future

Phase 2: Planning

- Master planning studies across all DOE facilities
- Continued design and installation of fast-track measures
- Continued expansion of Living Labs Educational Programs
- Continued stakeholder engagement and community outreach

Phase 3: Execution

- Design and installation of master plan recommendations
- Continued expansion of Living Labs Educational Programs
- Continued stakeholder engagement and community outreach

Phase 4: Monitoring

- Implementation of monitoring, tracking, and reporting of program results

Phase 5: Close-Out

- Ongoing O&M
- Anticipated formal program close-out



Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability

Guiding Objectives For Phase 1



Maximize Immediate Savings

- Offset increasing utility costs



Create Positive Momentum

- Demonstrate success
- Leverage excitement in schools and classrooms
- Provide hands-on learning opportunities for students



Drive Innovation

- Implement new technologies to improve the learning environment
- Demonstrate emerging technologies to enhance the electric grid

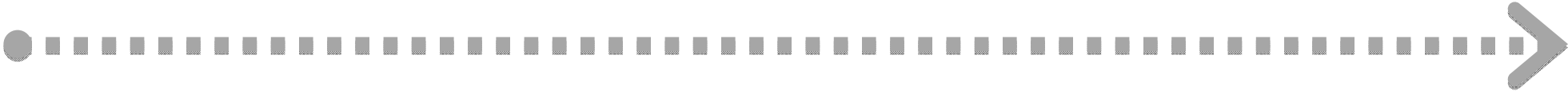
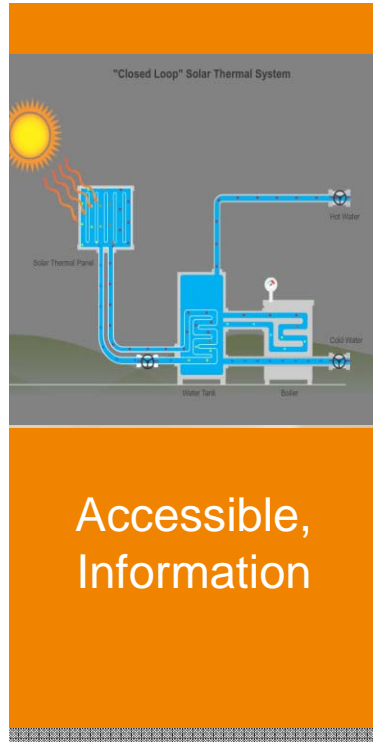


Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability

“Living Lab” Educational Curriculum



Hawaii State
Department
of Education

Ka Hei

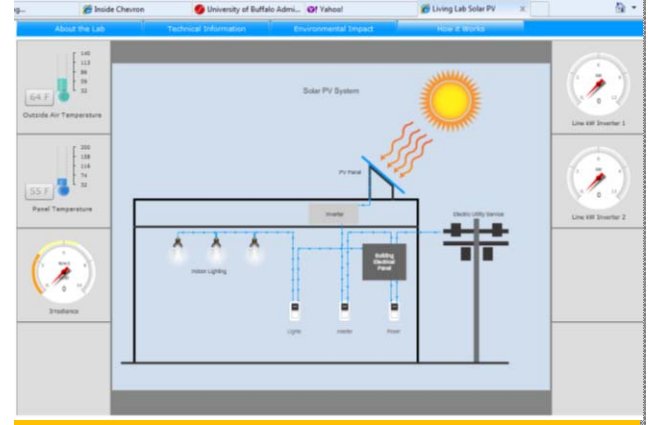
A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability



Behavioral



Hands On Learning



Living Laboratories



STEM Career Exposure



Staff Training



Professional Development



Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability



Ka Hei Press Conference, March 5, 2014



Hawaii State
Department
of Education

Ka Hei

A program to build clean, renewable energy, improve the energy efficiency of facilities, and educate students about sustainability

Informational Briefing for

Senate Committee on Education
House Committee on Education
Senate Committee on Energy and Environment
House Committee on Energy and Environmental Protection

March 10, 2014



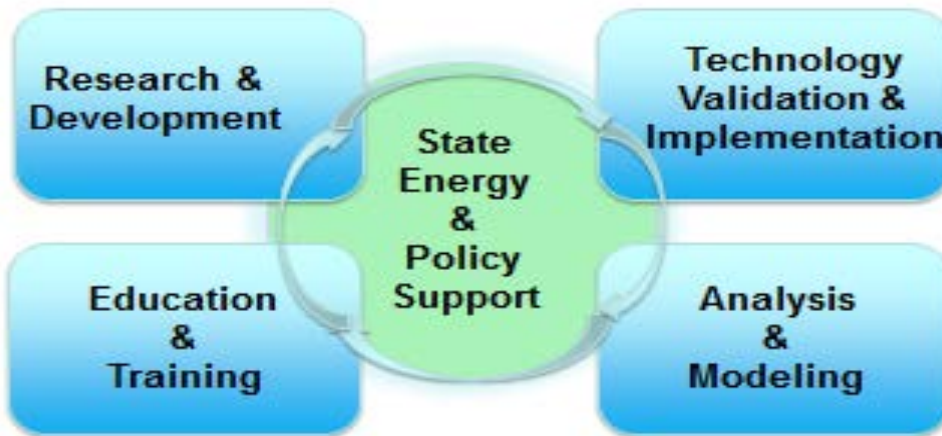
HNEI

Hawai'i Natural Energy Institute

School of Ocean and Earth Science and Technology
University of Hawai'i at Mānoa

Hawaii Natural Energy Institute

- Organized Research Unit in the School of Ocean and Earth Science and Technology
- Established by the Legislature in 2007
- Since 2007, funded by:
 - \$7M Barrel Tax (2010-2013)
 - \$100M+ Federal awards



- Alternate fuels
- Renewable generation
- Fuel cells & batteries
- Energy efficiency
- Grid management & enabling technologies

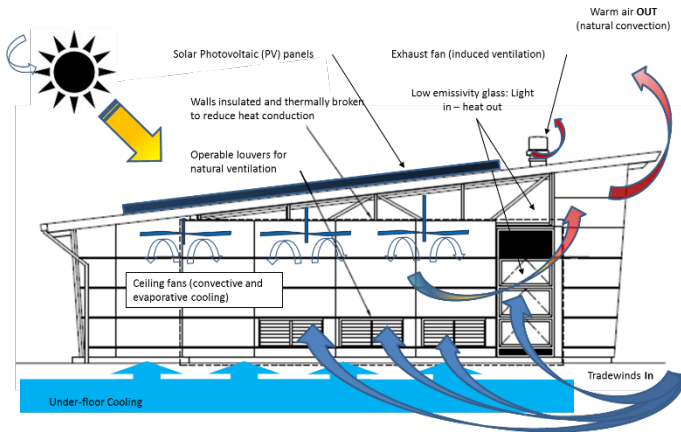
Select Projects and Programs

- Hawaii Clean Energy Programmatic EIS (\$1.7M) - statewide
 - To help streamline project specific permitting and environmental reviews
- Wave Energy Test Site (\$12M) – MCBH Oahu
 - Partnering with Navy and USDOE for a plug-and-play testing facility
- Battery Energy Storage Systems (>\$6M) – Big Island, Molokai, Oahu
 - Support grid resiliency, PV and wind management, distribution stability
- Grid Integration (>\$30M)
 - Maui Smart Grid project
 - Smart Inverter project - Maui
 - Grid analysis studies (GE) – statewide
 - Molokai microgrid
- PV Test Sites (\$2M) – Kauai, Big Island, Maui, Oahu
 - Evaluate performance and lifetime of PV technologies in various environments
- Energy Efficiency in Buildings – Kauai, Oahu

HNEI Energy Efficiency Research

Net Zero Energy buildings installed

- One at Ilima Intermediate, (Ewa)
- Two at Kawaikini Charter, (Kauai)



Designed to optimize human performance using:

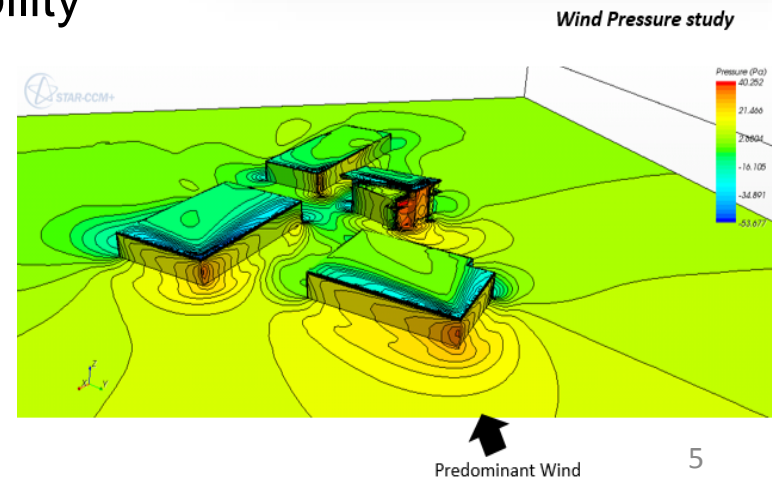
- Efficient lighting and daylighting
- Natural cooling and ventilation
- Advanced energy controls
- Rooftop photovoltaics

- Comparing performance of net-zero structures to other conventional DoE classrooms in Ewa.
- Developing simulation and design tools to inform the design of comfortable, efficient classrooms in different environments
- Monitoring several classrooms in DoE Campbell complex to evaluate comfort/energy/environment

Dept of Education: Facilities Assessment

Objective: To develop a facility assessment protocol to guide design of comfortable learning environments with reduced energy consumption.

- Partnership of HNEI, UH School of Architecture, and MKThink
- Using DoE Campbell complex as test site.
- Comparing performance of different classroom types using measured energy and environmental data
- Comparing Campbell and select other sites to validate models/protocols for applicability to other facilities.
- Develop design guidelines applicable to DoE facilities statewide in future.



About Hawaii Natural Energy Institute

An organized research unit of the University of Hawai`i at Manoa's School of Ocean and Earth Science and Technology (SOEST); HNEI is a nationally acknowledged leader in energy research with active programs in alternative fuels, energy efficiency, systems integration/energy security, renewable energy generation, and electrochemical power systems. HNEI has undertaken a pivotal role within the State, working closely with DBEDT, the HPUC, and the utilities to reduce the state's dependence on fossil fuels. HNEI is leading several major public/private partnerships to deploy and demonstrate grid-scale energy systems to address the technical issues associated with high penetration of renewable energy technologies onto the grid. For more information, please visit www.hnei.hawaii.edu/.