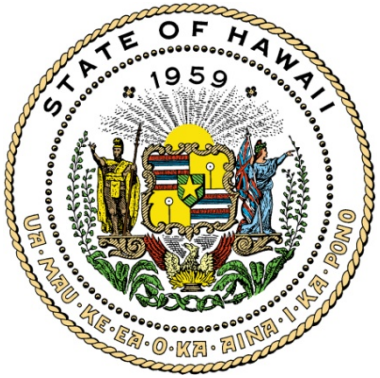



# Mark Glick, Administrator

## Hawaii State Energy Office

## Wednesday, August 15, 2012

## "Inside the Test Bed"

2012 Asia-Pacific Clean Energy Summit & Expo

# Hawaii: “It’s Happening Here”

**Hawaii is one of the world’s leading clean energy test beds**

# “Clean Energy Can Transform Island Economies”

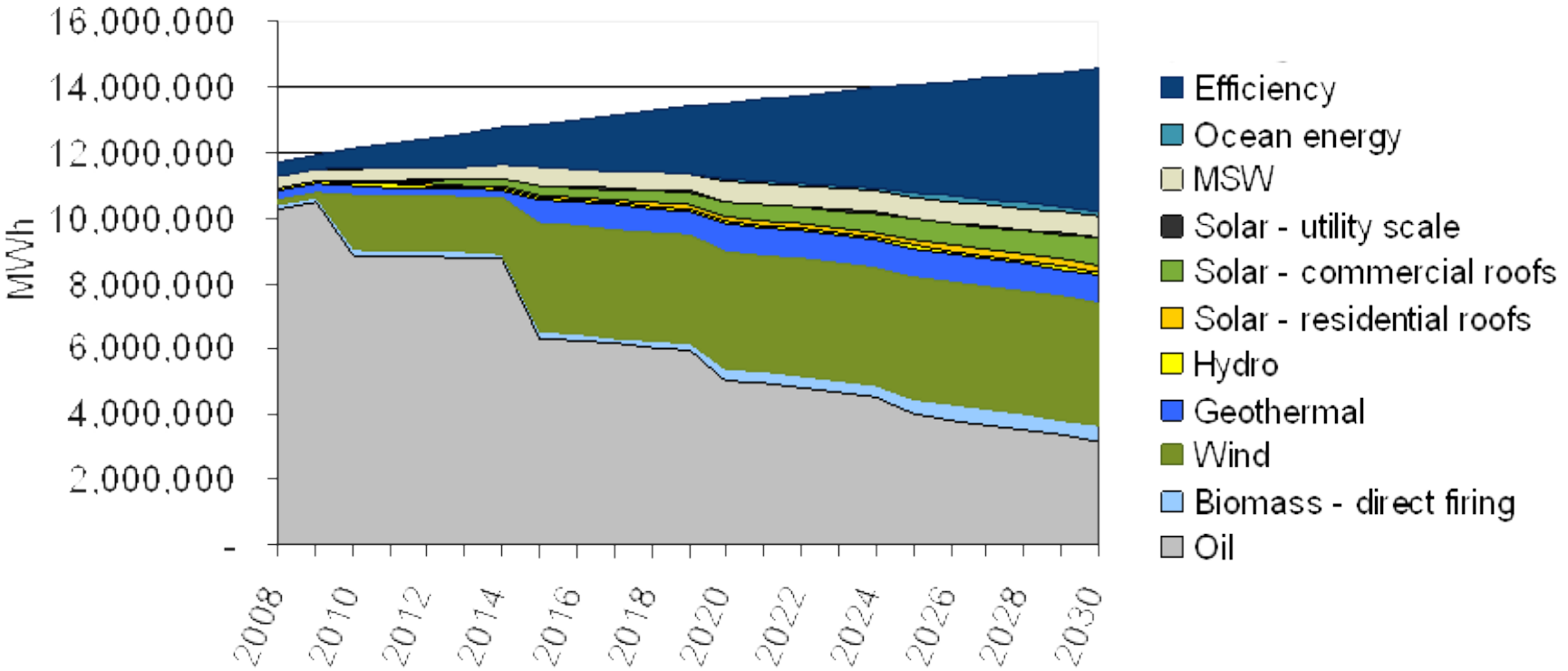
- Island Economies must maximize clean energy potential for economic development.
- Sharing experience with other islands: Virgin Islands, Caribbean nations, Indonesia, Korean islands.

# The Hawaii Clean Energy Initiative: A Proven Path for Economic Growth

- Assess RE & EE potential
- Set goals, codify with public policy
- Develop scenarios to reach goals
- Keep public informed and engaged
- Build consistent, supportive regulatory & permitting climate
- Deploy infrastructure

# "We Need It"
# Hawaii Clean Energy Scenario Analysis

*We believe our 70 percent clean energy goal for electricity sector is achievable through aggressive energy-efficiency goals, high deployment of wind and solar resources, and an interisland cable connection*



# "We Can Afford It"

## Scenario Installation & Capital Requirements

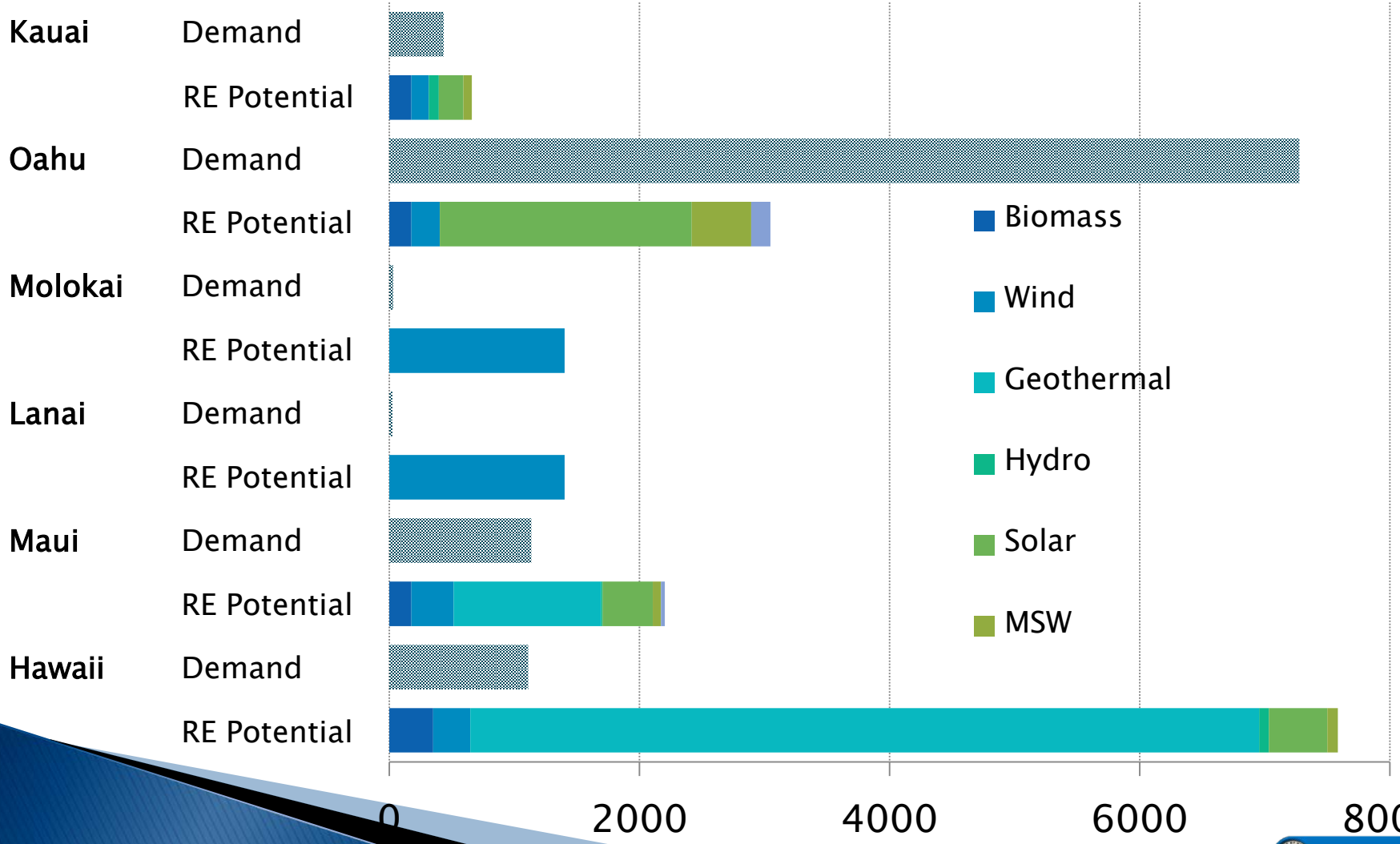
*Assumes $16 billion of NPV for capital investment and a "break-even" value of this investment when the long-term average cost of oil is $65 to $85 per barrel (bbl).*

| Renewable Energy Sources ($ / kWh) | Scenario 8 | Capital Cost Range |
|---|---|---|
| Solid Biomass | 83 MW | $2,000 – $6,000 |
| Wind | 1,060 MW | $2,400 – $2,800 |
| Geothermal | 102 MW | $3,000 – $5,000 |
| Small Hydro | 24 MW | $2,500 – $4,000 |
| Solar – Residential Roofs | 179 MW | $8,125 – $9,375 |
| Solar PV (large roof/utility scale) | 651 MW | $6,500 – $7,500 |
| MSW/Landfill Gas | 77 MW | $2,100 – $3,500 |
| Ocean Energy (wave) | 53 MW | $2,000 – $7,600 |
| Energy Efficiency | 495 MW | $70 – $100 |

# “We Have the Resources”

## Hawaii Renewable Energy Potential (GWh)

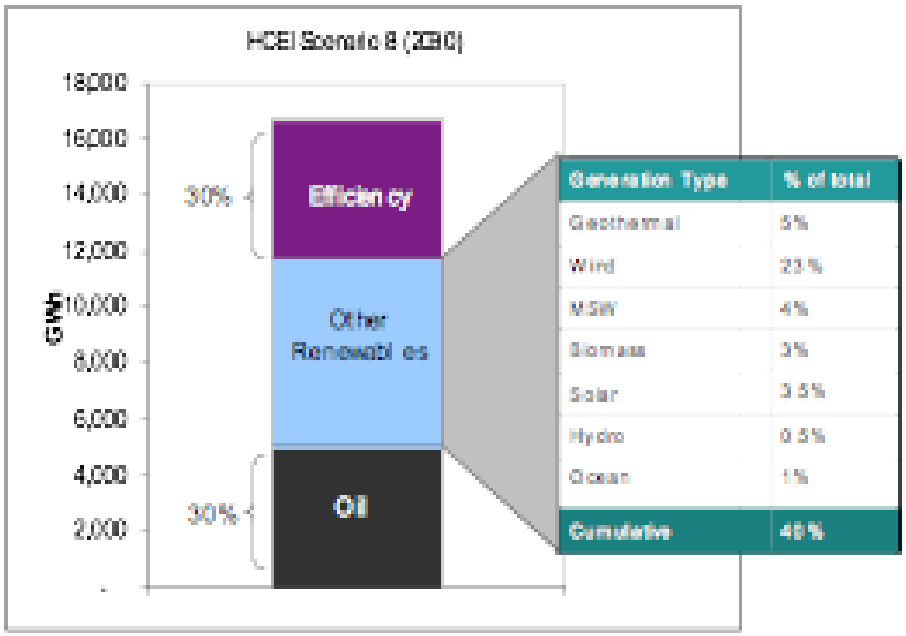
*Oahu has the most energy demand, but most renewable energy sources are on the neighbor islands*



# “We’re Stressing Diversity”

## Resource Analysis

Hawaii has enough renewable resources to meet the 40% RPS without biofuels according to the HCEI scenario analysis




...Including biofuels in the renewable portion (up to a cap of 30%) may result in an energy mix that looks like this

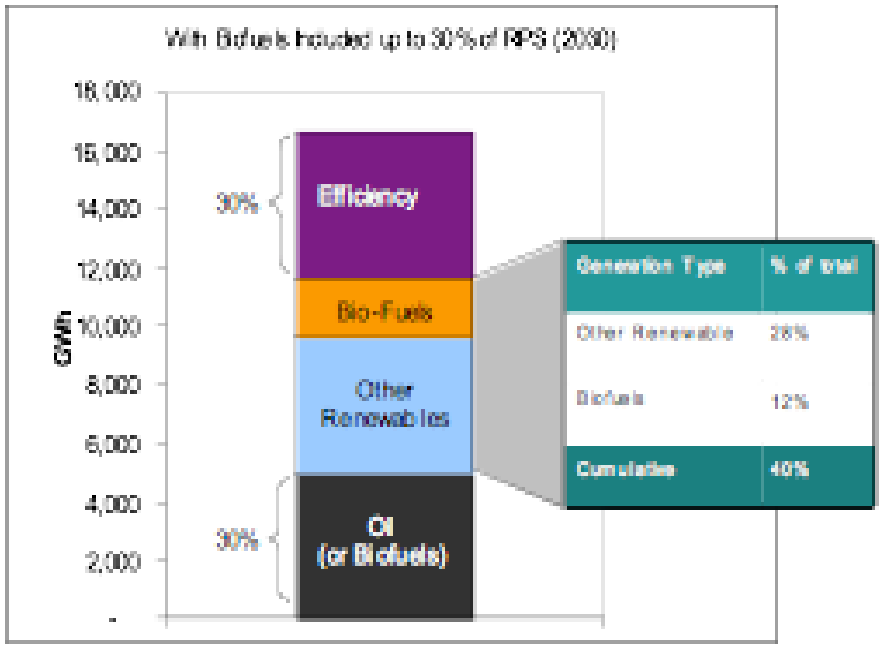



Figure 2. Resources available to meet the RPS

Courtesy of: NREL Clean Energy Policy Analysis: Impact Analysis of Potential Clean Energy Options for the Hawaii Clean Energy Initiative, Technical Report NREL/TP-7A2-47891 April 2010

# "We Must Create Motivation"
## Carrots & Sticks

### Laws & Regulations

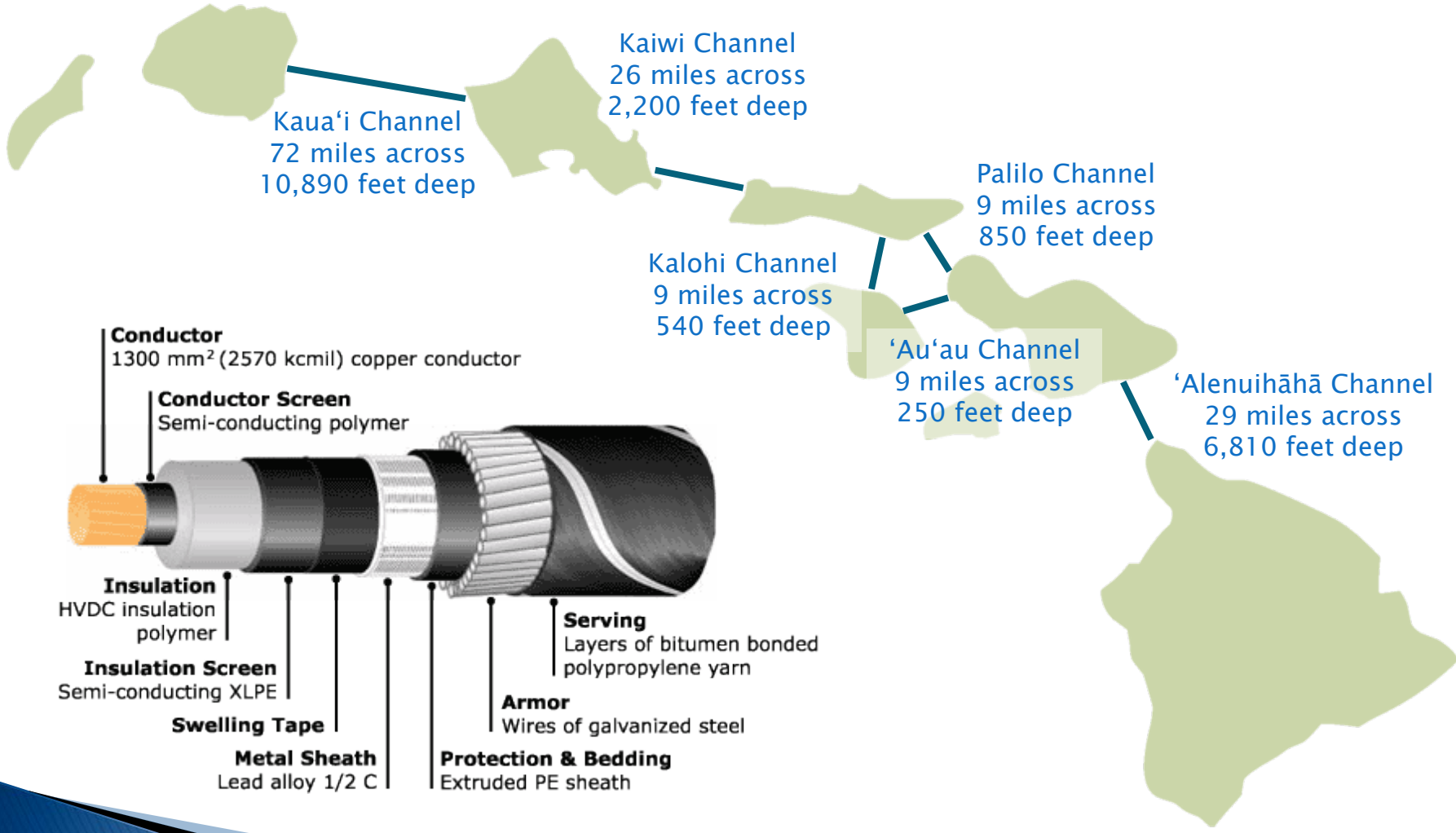
- RPS & EEPS Goals codified as law
- FIT, Net Metering, Decoupling, RSWG
- Transportation Goals

### Incentives & Technical Assistance

- Tax Credits
- Public Benefits Fee Administrator
- US Dept. of Energy – formula grants, ARRA, technical assistance

# “The Key will be the Cable”

*The interisland cable is essential to Hawaii’s clean energy future*



# We're Improving our Tool Kit

Our Developer/Investor Center

- providing developers and investors the resources for starting a clean energy venture in Hawaii.

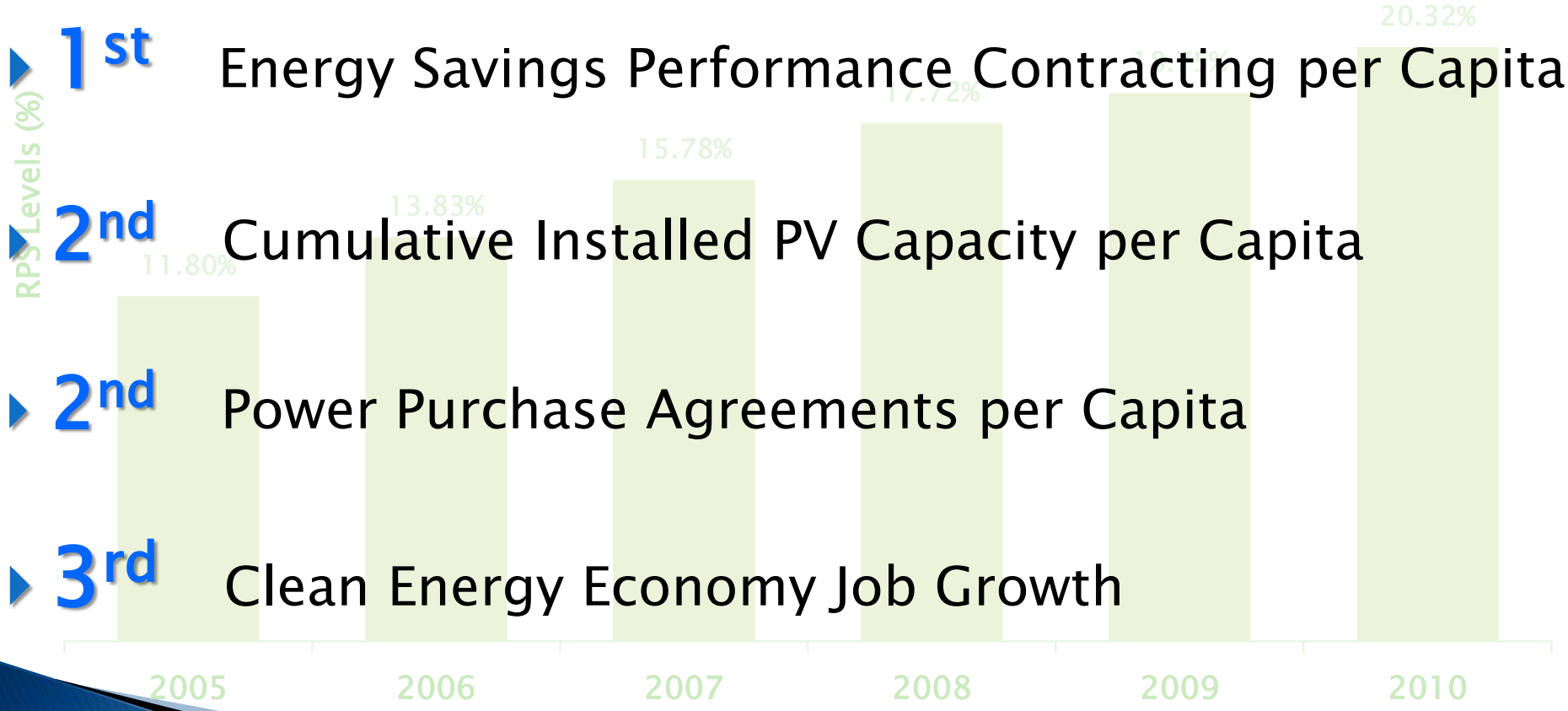
  - Business Registration Resources
  - Financing and Incentives for RE Projects
  - Land Resources for Renewable Energy Projects
  - Project Permitting Assistance and Resources
  - Utilities Resources

http://energy.hawaii.gov/developer-investor

# “We’re Making Progress”

## Compared to Other US States

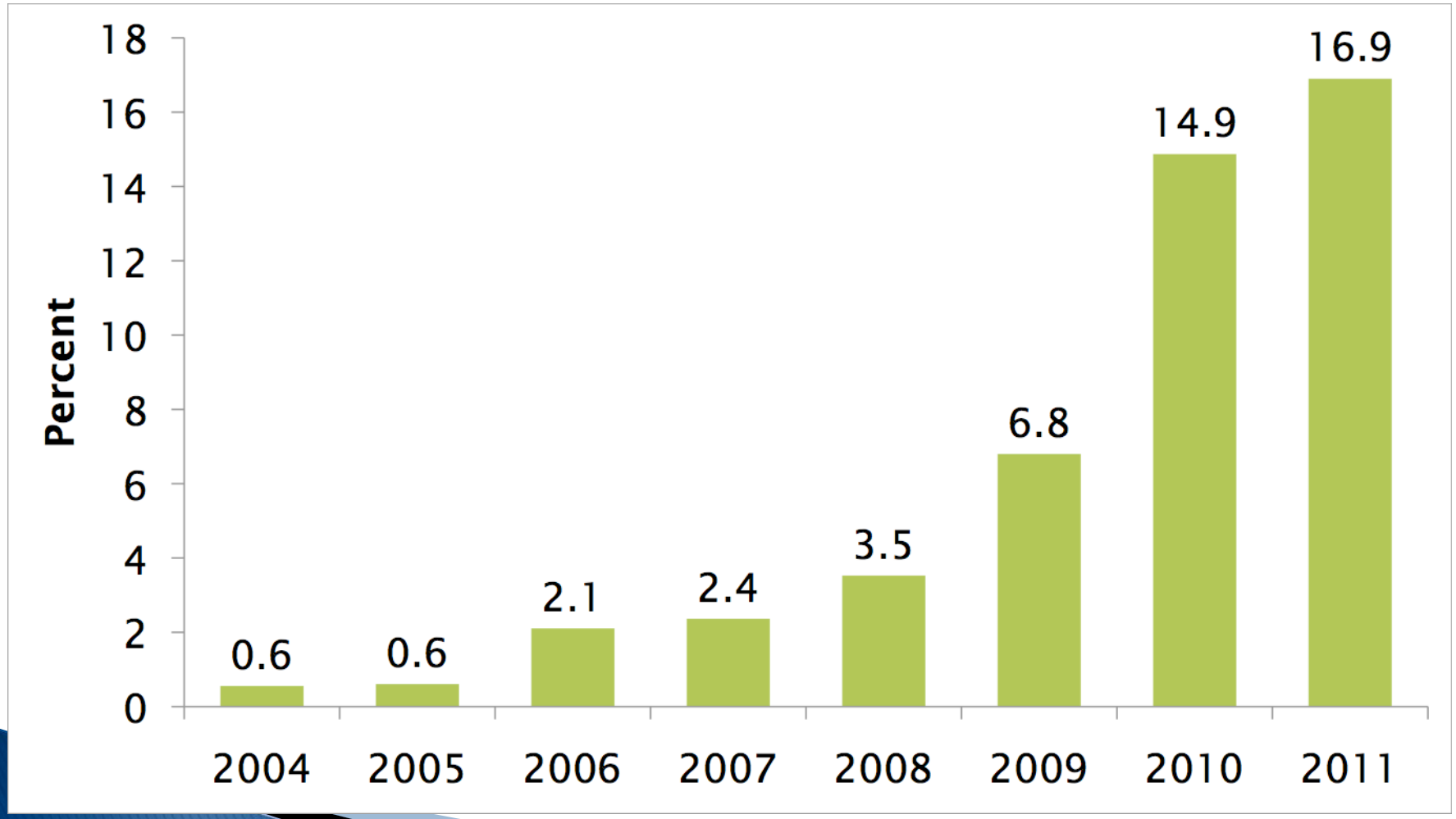
- 1st Solar Water Heaters per Capita
- 1st Energy Savings Performance Contracting per Capita
- 2nd Cumulative Installed PV Capacity per Capita
- 2nd Power Purchase Agreements per Capita
- 3rd Clean Energy Economy Job Growth



# “The Private Sector is Responding”

## Solar-Related Construction Expenditures

*Solar-related construction expenditures reached 17% in 2011*



# "The Private Sector is Responding"

## First in Nation
## Energy Savings Performance Contracting Per Capita

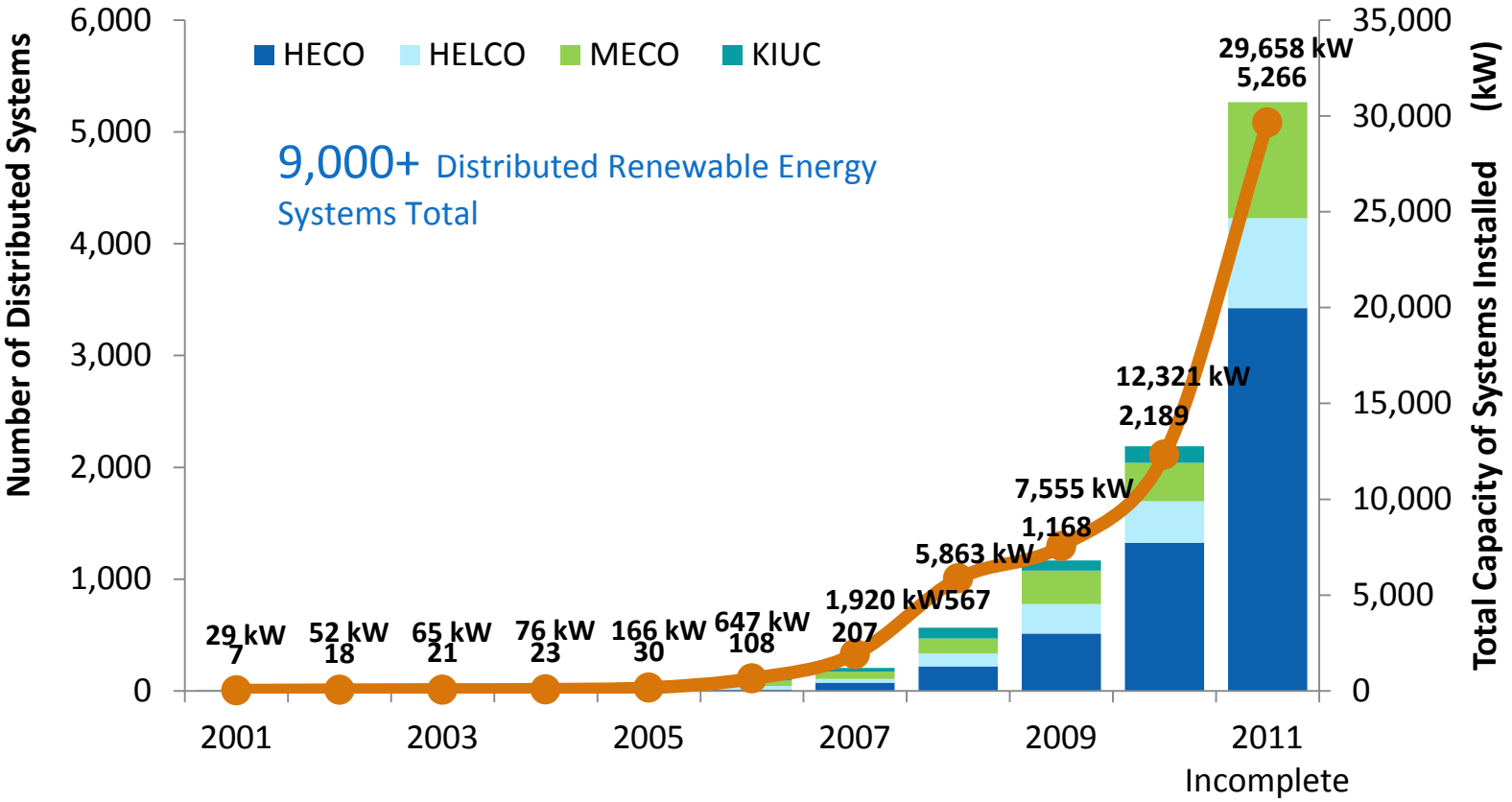
| State | Dollars per Capita ($) | Total Performance Contracting ($) | Jobs Created (Job Year) |
|---|---|---|---|
| **1. Hawaii** | **$117.09** | **$159,278,011** | **1,731** |
| 2. Kansas | $90.81 | $259,094,503 | 2,816 |
| 3. Idaho | $90.27 | $129,000,000 | 1,402 |
| 4. Massachusetts | $71.53 | $457,696,106 | 4,975 |
| 5. Utah | $66.89 | $165,195,000 | 1,796 |
| National Average | $31.46 | $130,846,670 | 1,379 |

Source: *Performance Contracting Impacts - State Comparison*, December 2011 (Energy Services Coalition)

# “The Private Sector is Responding”

**Distributed Renewable Energy Systems**

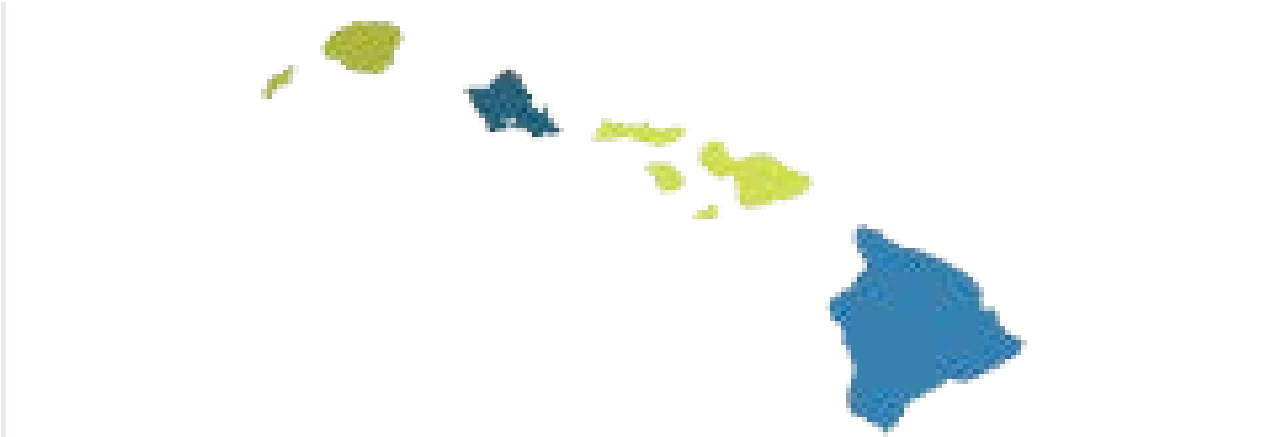
*As of 2011, over 9,000 distributed renewable energy systems have been installed statewide, totaling over 58 MW in capacity.*




(Public Utilities Commission)

# “We’re Seeing Economic Benefits”

*Hawaii is expected to have over 14,000 green jobs by 2012*



| COUNTY | PRIVATE SECTOR GREEN JOBS | % OF COUNTY JOBS | ADDITIONAL GREEN JOBS BY 2012 |
|---|---|---|---|
| Hawaii | 1,222 | 2.5 | 510 |
| Honolulu | 6,866 | 2.0 | 1,885 |
| Kauai | 460 | 1.9 | 71 |
| Maui | 2,597 | 4.6 | 437 |
| State Total | 11,145 | 2.4 | 2,903 |

Department of Business, Economic Development & Tourism

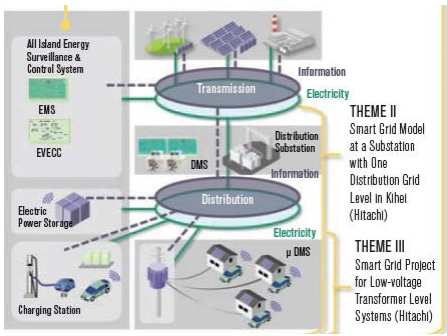
# "We're Getting Results"

**Second in the Nation**
**Cumulative Installed Photovoltaic Capacity per Capita**

| State | Cumulative Through 2010 ($W_{DC}$/person) | 2010 Installations ($W_{DC}$/person) |
|---|---|---|
| 1. Nevada | 38.8 | 25.3 |
| **2. Hawaii** | **32.9** | **13.6** |
| 3. New Jersey | 29.6 | 15.1 |
| 4. California | 27.4 | 6.8 |
| 5. Colorado | 24.1 | 12.3 |
| National Average | 7.0 | 2.9 |

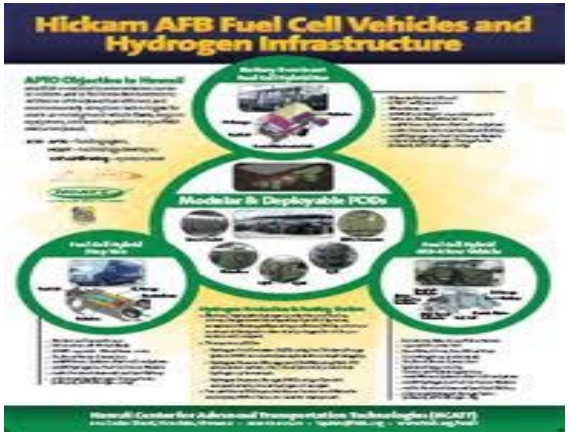
Source: *2010 U.S. Solar Market Trends*, July 2011 (IREC)

# "We're a Center for *Test Bed Projects*"



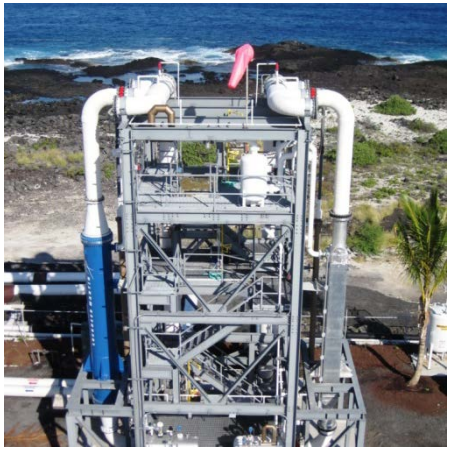

| Diverse Projects | Kona Algae Demonstration Facility | Maui Smart Grid (NEDO) | Ocean Power Technologies Demonstration |
|---|---|---|---|
| **Island:** | Hawaii | Maui | Oahu |
| **Technology:** | Biofuels | Smart Grid | Wave |
| **Potential Generation:** | Demonstration | Demonstration | Demonstration |
| **Project Status:** | Active/Ongoing | Development | Completed |

# "HCATT Test Bed Projects"


| Hawaii Center for Advanced Transport-ation Technologies | Hawaii Hydrogen Power Park | Hickham Air Force Base Fuel Cell Test |
|---|---|---|
| **Island:** | Hawaii & Oahu | Oahu |
| **Technology:** | Hydrogen Vehicles & Fueling Facilities | Hydrogen Fuel Cells |
| **Project Status:** | Development | Active |

# "OTEC Test Bed Projects"

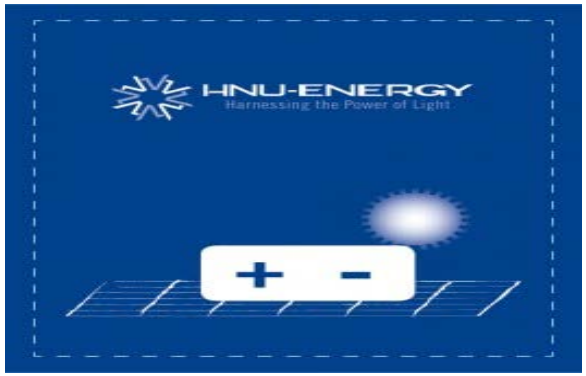


| OTEC Projects | OTEC Heat Exchanger Test Tower | 1MW OTEC Demo | At-Sea OTEC Demonstrations |
|---|---|---|---|
| **Island:** | Hawaii | Hawaii | Oahu (Proposed) |
| **Technology:** | OTEC | OTEC | OTEC |
| **Potential Generation:** | Research | 1 MW Demonstration | 5-100 MW Pilot |
| **Project Status:** | Active/Ongoing | Development | Proposed (several) |

# "Pioneering Test Bed Projects"


| 1st of Kind Projects in Hawaii | Puna Geothermal Venture (Ormat) | UOP (Honeywell) Integrated Bio-Refinery | La Ola Solar Farm & NREL |
|---|---|---|---|
| **Island:** | Hawaii | Oahu (Campbell Industrial) | Lanai |
| **Technology:** | Geothermal | Biofuel | PV & Battery Storage |
| **Potential Generation:** | 30 MW + 8 MW expansion | Demonstration (~3 barrels/day) | 1.2 MW |
| **Project Status:** | Operational | Near Completion | Operational |

# "HREDV Test Bed Projects"




| Hawaii Renewable Energy Dev. Venture Projects | HREDV – HNU Energy Megawatt-Class Storage | Micro Concentrated Solar Power Air Conditioning |
|---|---|---|
| **Island:** | Maui | Maui |
| **Technology:** | Lithium Battery for RE Grid Integration | PV and CSP |
| **Impact** | 1 MW | Energy Savings of 26,568 kWh Annually |
| **Project Status:** | HREDV Grant Awarded | Under Construction |

# "Next Level Test Bed - Energy Accelerator"

**Hawaii's first clean energy accelerator program.**

**HREDV will award $600,000 ($20,000 – $100,000 per company) to 3-8 companies with clean energy technologies that advance Hawaii's energy needs and can scale for global impact**

Starting Fall 2012

To support and grow Hawaii"s energy technology community.

A five-month program to provide entrepreneurs and companies tools and networks to develop their businesses.

Energy Excelerator

# “Let’s Work Together”

**Hawaii State Energy Office**
energyoffice@dbedt.hawaii.gov
http://energy.hawaii.gov
808-587-3807

# Mahalo

**Hawaii State Department of Business Economic Development & Tourism**