



# The Future is **Bright**

Building a clean energy economy for Hawaii





Hawaii is the most fossil fuel dependent state in the nation. The finite nature of fossil fuels and the fact that Hawaii is extremely vulnerable to fluctuations in oil prices and availability, have, in turn, inspired us to create one of the nation's most aggressive clean energy goals. When we achieve our target of 70% clean energy by 2030, we will have established an enviable global standard.

The world has already discovered that Hawaii is the ideal laboratory for the development of environmentally friendly technologies. Moving forward, it should be a priority for businesses and developers to expand their efforts to explore our islands for clean energy investment opportunities. All of us at the Hawaii State Energy Office hope this brochure inspires you to do just that and we also invite you to visit [energy.hawaii.gov](http://energy.hawaii.gov) for a more comprehensive look at Hawaii's clean energy future.

Aloha,

Richard C. Lim, Director

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

# We're Off to a Good Start

Hawaii has already taken important steps to build energy efficiency, increase photovoltaic capacity, and create green jobs. In these and other clean energy-related categories, we consistently place among America's top five states.



## SECOND IN NATION

### Energy Savings Performance Contracting Per Capita

STATE	DOLLARS PER CAPITA (\$)	TOTAL PERFORMANCE CONTRACTING (\$)	JOBS CREATED (JOB YEAR)
1. Idaho	\$90.27	\$129,000,000	1,402
2. Hawaii	\$77.76	\$99,161,315	1,078
3. Massachusetts	\$71.53	\$457,696,106	4,975
4. Utah	\$66.89	\$165,195,000	1,796
5. Kansas	\$63.69	\$174,796,442	1,900
National Average	\$29.38	\$126,333,708	1,332

Source: Performance Contracting Impacts - State Comparison, September 2010 (Energy Services Coalition)

## SECOND IN THE NATION

### Cumulative Installed Photovoltaic Capacity per Capita

STATE	CUMULATIVE THROUGH 2010 (W <sub>DC</sub> /PERSON)	2010 INSTALLATIONS (W <sub>DC</sub> /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)

## THIRD IN NATION

### Clean Economy Job Growth 2003-2010

STATE	JOB GROWTH 2003-2010 (%)
1. Alaska	10.23
2. North Dakota	6.71
3. Hawaii	6.52
4. Wyoming	6.31
5. New Mexico	5.96
National Average	3.45

Source: Sizing the Clean Economy, August 2011 (Brookings Institute)

# Planning Ahead



Clean, year-round, renewable energy will empower Hawaii's economy because the land, the sea, the wind, and the sun are rich, world-class resources capable of providing Hawaii with limitless amounts of indigenous fuel.

The Hawaii State Energy Office's overall strategy for energy independence is to focus on the Hawaii Clean Energy Initiative's (HCEI) community-based efforts to create high-impact, clean energy solutions that encourage innovative, economic development. This will be accomplished, in part, by leveraging resources and partnerships with business, government, and the public at large. Visit [energy.hawaii.gov](http://energy.hawaii.gov) for more information.

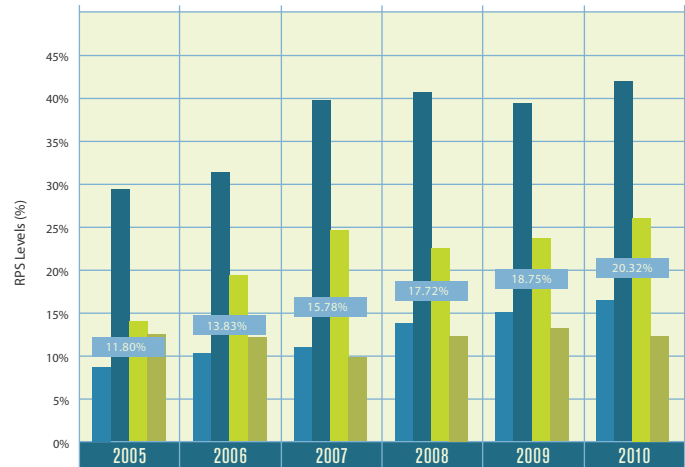
# Securing the Renewable Future



To achieve 70% clean energy by 2030, 40% of Hawaii's energy must be generated from renewable resources including solar, wind, geothermal, hydropower, and bio-fuels. Thus far, the state has made great strides in increasing the amount of locally produced renewable energy.

Hawaii has already made great progress in aligning regulatory policies with clean energy goals; encouraging development of next generation, clean energy technologies; and deploying renewable generation and grid infrastructure. Needless to say, it is our mission to do more in each of these areas and beyond.

## Hawaii Renewable Portfolio Standard (RPS) Levels 2005-2010



Source: Renewable Portfolio Standards Status Reports, 2005-2010  
(Hawaii Public Utilities Commission)

■ Hawaiian Electric Company  
■ Hawaii Electric Light Company  
■ Maui Electric Company  
■ Kauai Island Utility Cooperative  
■ State Total

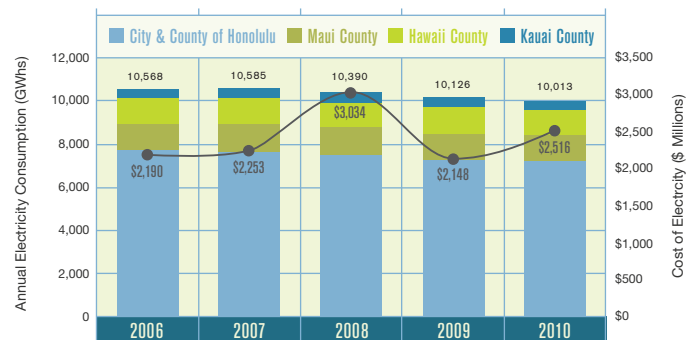
# Achieving Efficiency



Energy efficiency measures will account for 30% of Hawaii's 70% clean energy objective. To reach this goal, the state supports retrofitting residential and commercial buildings, strengthening new construction policies and building codes, and identifying non-building-related energy efficiency measures.

To inspire Hawaii residents and local businesses to embrace energy efficiency and conservation, the state employs the Lead By Example (LBE) initiative, designed to make government buildings, fleets, and personnel practices models of environmental responsibility. State agencies and other organizations have allocated federal funds to underwrite rebate programs and financial incentives such as the Loan Loss Reserve program and tax credits. Visit [energy.hawaii.gov](http://energy.hawaii.gov) for more information.

## Hawaii Electricity Consumption & Average Cost 2006-2010



Source: Monthly Energy Trends, 2006-2010 (Department of Business, Economic Development and Tourism)



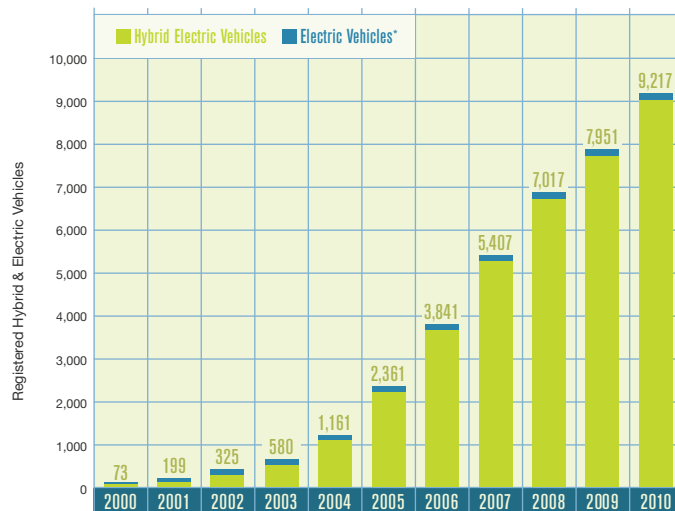
# Transportation on the Move



Reducing the use of petroleum fuel for ground transportation plays an important role in achieving Hawaii's clean energy goals. The state's transportation strategies rely heavily on influencing consumer behavior and include accelerating the deployment of electric vehicles and supporting infrastructure.

On March 18, 2011 the state awarded \$2.6 million in federal stimulus funds to six organizations that will accelerate Hawaii's adoption of electric vehicles and related charging equipment. Grants will contribute to the state's energy goals by reducing consumption of imported petroleum fuels for ground transportation.

## Hawaii Cumulative Hybrid & Electric Vehicles Registered 2000-2010



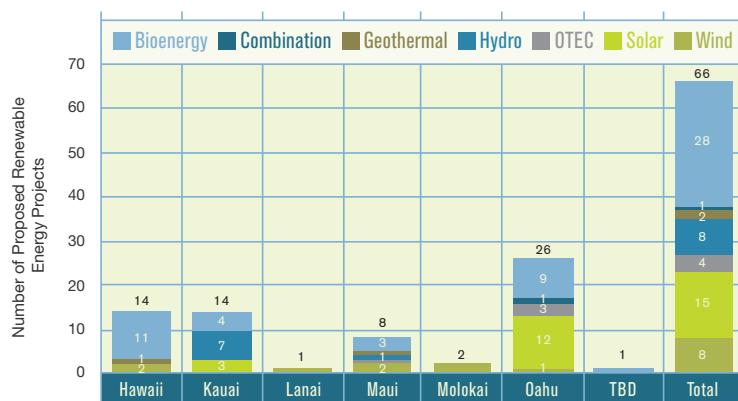
\*Includes Neighborhood Electric Vehicles

Source: National Renewable Energy Laboratory, August 2011

# Powering the Economy

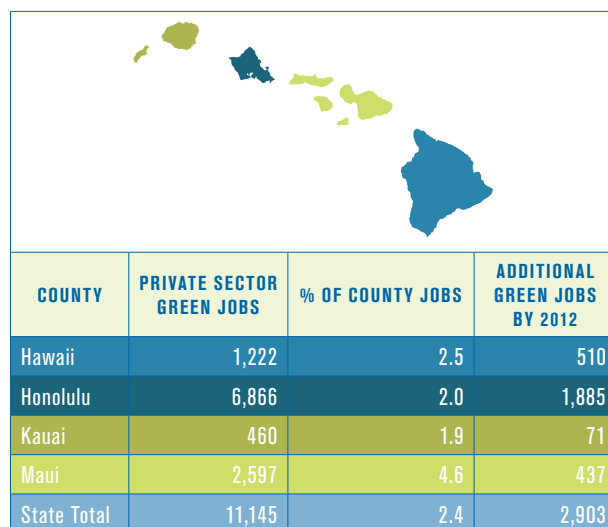
Clean energy will do more than simply improve the environment. It will also supercharge Hawaii's economy by attracting green business and creating a workforce for the future. It will further serve to highlight Hawaii's gift for innovation and allow the state to serve as a clean energy model for the U.S. and for the world. As the graph below indicates, 66 renewable energy projects are currently in progress and more are in development.

## Currently Proposed Renewable Energy Projects in Hawaii



Source: Department of Business, Economic Development and Tourism, August 2011

## Department of Labor and Industrial Relations Green Jobs



Source: Hawaii's Green Workforce: A Baseline Assessment, December 2010 (Department of Labor and Industrial Relations)

# Renewable Energy Projects



Photo courtesy of First Wind Energy.

## KAHUKU WIND

March 23, 2011 marked the first day of commercial operations of the Kahuku Wind project on Oahu's North Shore. The 30-megawatt wind project includes twelve 2.5-megawatt wind turbines and an innovative battery storage system with the capacity to generate enough renewable energy to power up to 7,700 Oahu homes.

The Kahuku Wind project will harness this local energy source while preserving the environment for future generations.



Upper Waiahi Station. Photo courtesy of Shelley Paik, KIUC.

## KAUAI HYDROPOWER PROJECTS

Hydropower has been a part of Kauai's electricity sources for more than 100 years. Today, the Kauai Island Utility Cooperative (KIUC) draws power from eight hydro facilities across the island. KIUC considers creating new hydroelectric power a legacy project and while new hydro is capital intensive, it is the lowest cost of power – 25% cheaper than solar/PV and about 30% cheaper than the cost of fossil fuel generated today.



Photo courtesy of Castle & Cooke Hawaii.

## LA OLA – LANAI'S SOLAR FARM

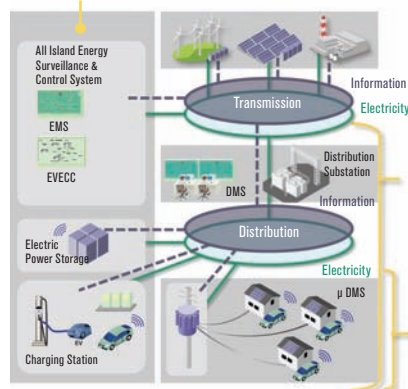
Covering 10+ acres and consisting of 7,400 solar panels, La Ola provides 1.2-megawatts (AC) of clean energy, which equates to 30% of Lanai's daily peak electricity demand and 10% of Lanai's annual electricity needs.

In 2010, La Ola incorporated a customized utility-grade energy storage system to ensure the seamless delivery of electricity.

La Ola is the result of a commitment to Lanai by Castle & Cooke to move towards energy independence.

#### THEME I

EV-based Remote Island Smart Grid Model on Maui (Hitachi, Sharp, and JFE Engineering)



#### THEME IV

Comprehensive Research

- 1) Analysis and evaluation of results from smart grid demonstration (6 companies)
- 2) Evaluation of cyber security (Hitachi, HP Japan, and Cyber Defense Institute)
- 3) Evaluation of the economic viability of the system (Mizuho Corporate Bank)
- 4) Creation and verification of a cutting-edge low-carbon social infrastructure system business model on a remote island (Hitachi, Mizuho Corporate Bank)

#### THEME II

Smart Grid Model at a Substation with One Distribution Grid Level in Kihei (Hitachi)

#### THEME III

Smart Grid Project for Low-voltage Transformer Level Systems (Hitachi)

Illustration courtesy of Hawaiian Electric Company, Inc. and Hitachi, Ltd.

## MAUI SMART GRID PROJECT

Energy partners from Japan and the U.S. are collaborating on a Smart Grid Demonstration Project on the island of Maui. The project is designed to showcase the integration of renewable energy resources, such as solar and wind power, with the electric system in preparation for the adoption of electric vehicles. The relatively small size and high renewable energy integration of the Maui system make it an ideal site to demonstrate smart grid technologies.



Photo courtesy of Pacific Biodiesel.

## PACIFIC BIODIESEL

In 1996 at the Central Maui Landfill, Pacific Biodiesel opened its first refinery, the longest, continuously operated commercial biodiesel production plant in America. The community-based production model, pioneered by Pacific Biodiesel, utilizes locally available feedstock and produces and distributes the fuel within the community. Pacific Biodiesel has designed and built 12 biodiesel plants in the U.S. and Japan and continues to advance its technology for super-efficient, multi-feedstock, zero-waste biofuel processing.



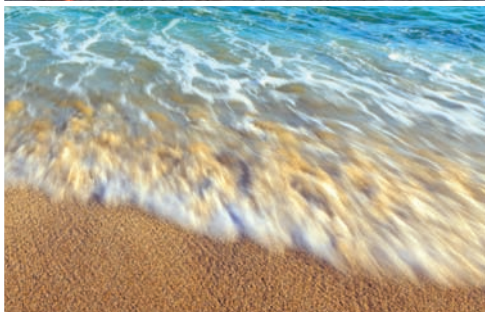
Photo courtesy of Ormat Technologies, Inc.

## PUNA GEOTHERMAL VENTURE

Puna Geothermal Venture, an Ormat Technologies, Inc. company, is Hawaii's only commercial, base-load, indigenous power source and is the state's only producer of geothermal energy. Geothermal energy has the potential to replace fossil fuel-powered plants because, unlike solar and wind power, geothermal is a "firm" resource—it's always there. The 30-megawatt power plant has been operating for 18 years and generates nearly 20% of the electricity used on Hawaii's Big Island.

For more information on renewable energy projects, visit [energy.hawaii.gov](http://energy.hawaii.gov).





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