

PRESENTATION

# Clean Energy for Hawaii

September, 2008



# Overview

- ▶ Hawaii Clean Energy Initiative
- ▶ What's happening around the State
- ▶ What about Kauai?



# Hawaii presents unique opportunities, both immediate and long-term, for energy sector transformation

- ▶ The state has abundant **local renewable resources**, including sun, wind, geothermal, etc.
- ▶ Hawaii pays the **highest electricity costs** in the nation and among the highest transportation fuel costs
- ▶ Hawaii has large, relatively **unexploited opportunities for efficiency**
- ▶ Oil provides approximately 92% of the state's energy, leaving Hawaii vulnerable to supply disruptions and **energy insecurity**
- ▶ Each island is an **isolated micro-grid** providing an opportunity to focus on **integrated systems**

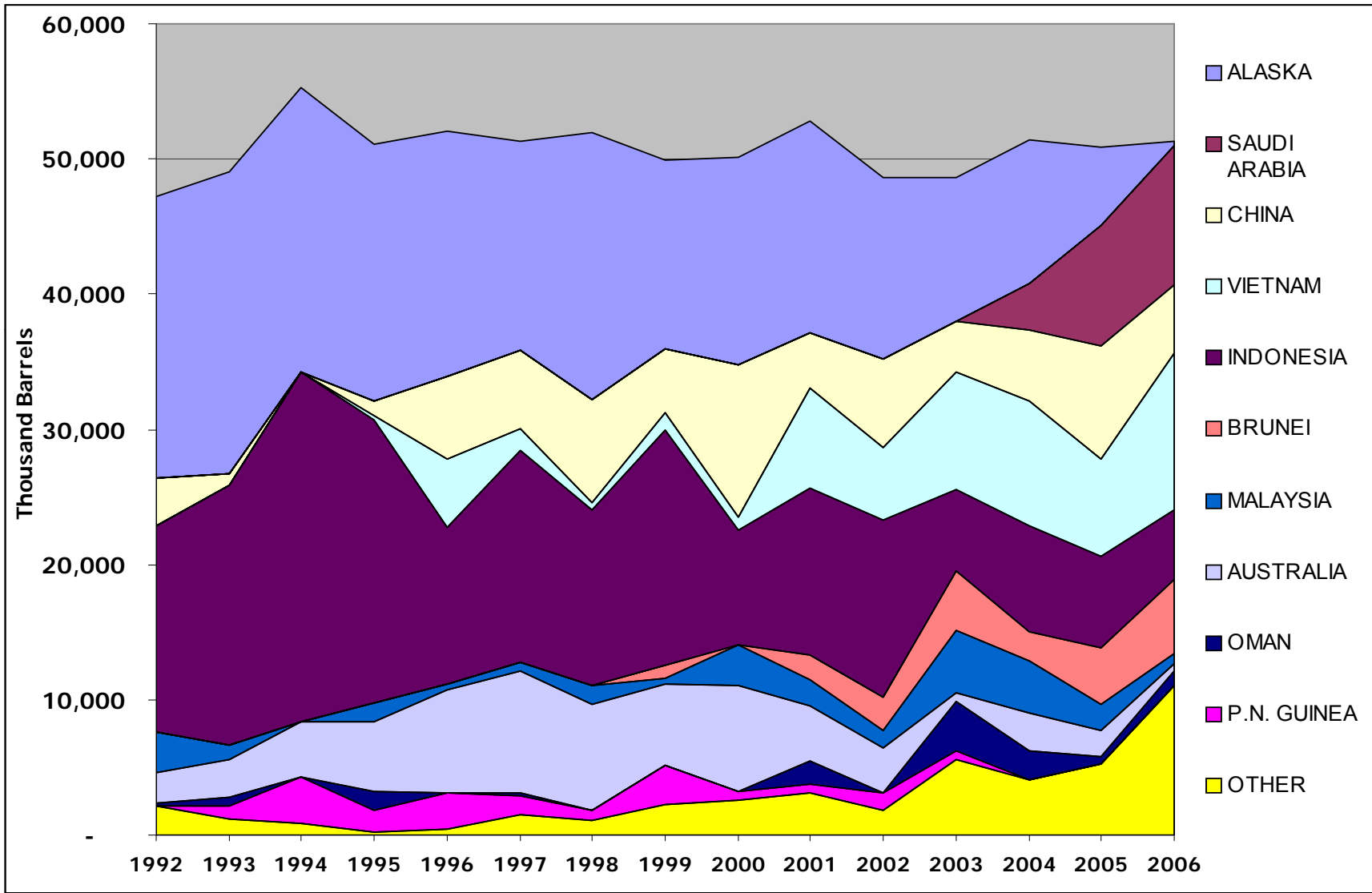
## Vision for Hawaii Clean Energy Initiative

*To partner with Hawaii and serve as a global model for creating a sustainable, flexible, and economically vibrant path to a carbon-free energy future*



# Trends in Hawaii Crude Oil Import Sources

1992-2006

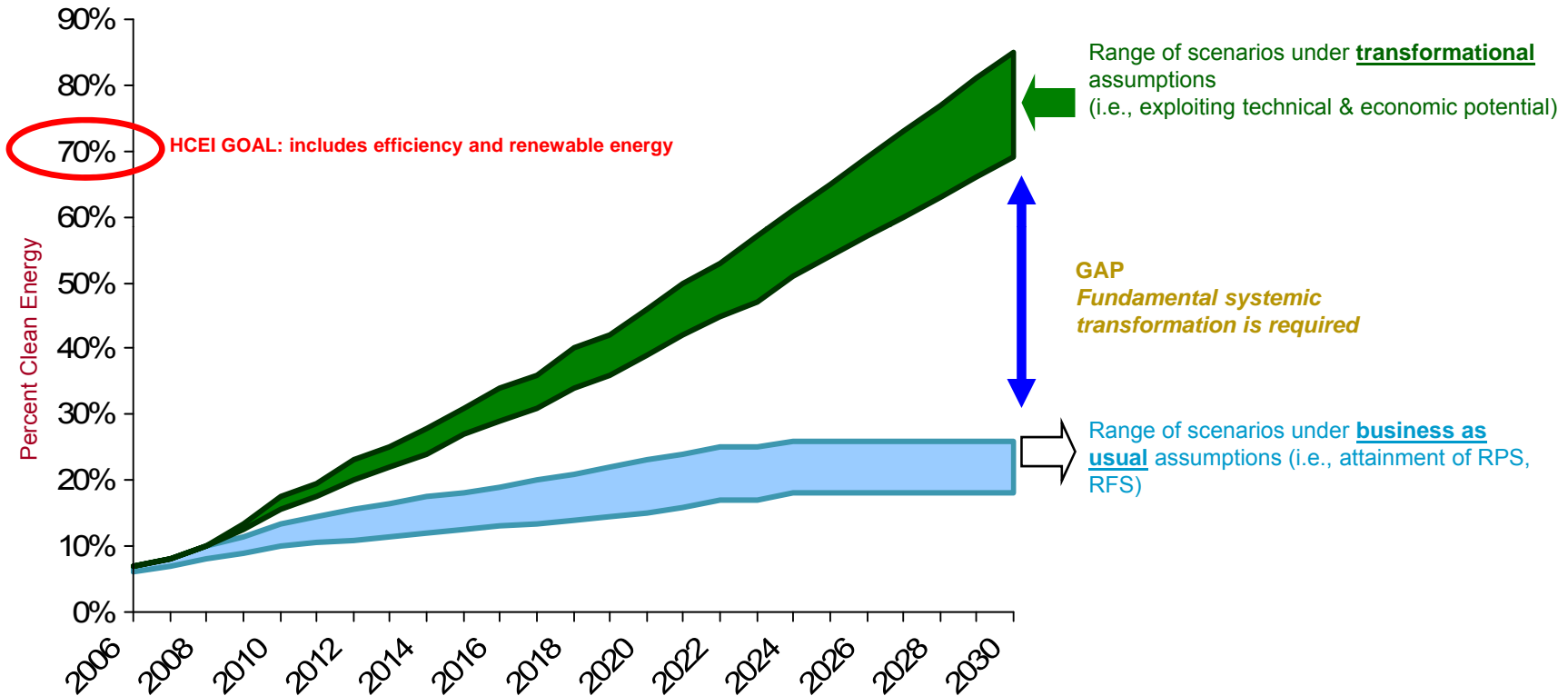


Sources: State of Hawaii – DBEDT, 2007; and U.S. Energy Information Administration (USEIA), 2007.



# HCEI: Hawaii needs to transition from an economy powered by oil to one based on clean energy...

In 2007 Hawaii's energy portfolio included 8% renewable energy, a proportion which is set to increase to approximately 20% under current plans



...but doing so will require a substantive transformation of regulatory, financial, and institutional systems



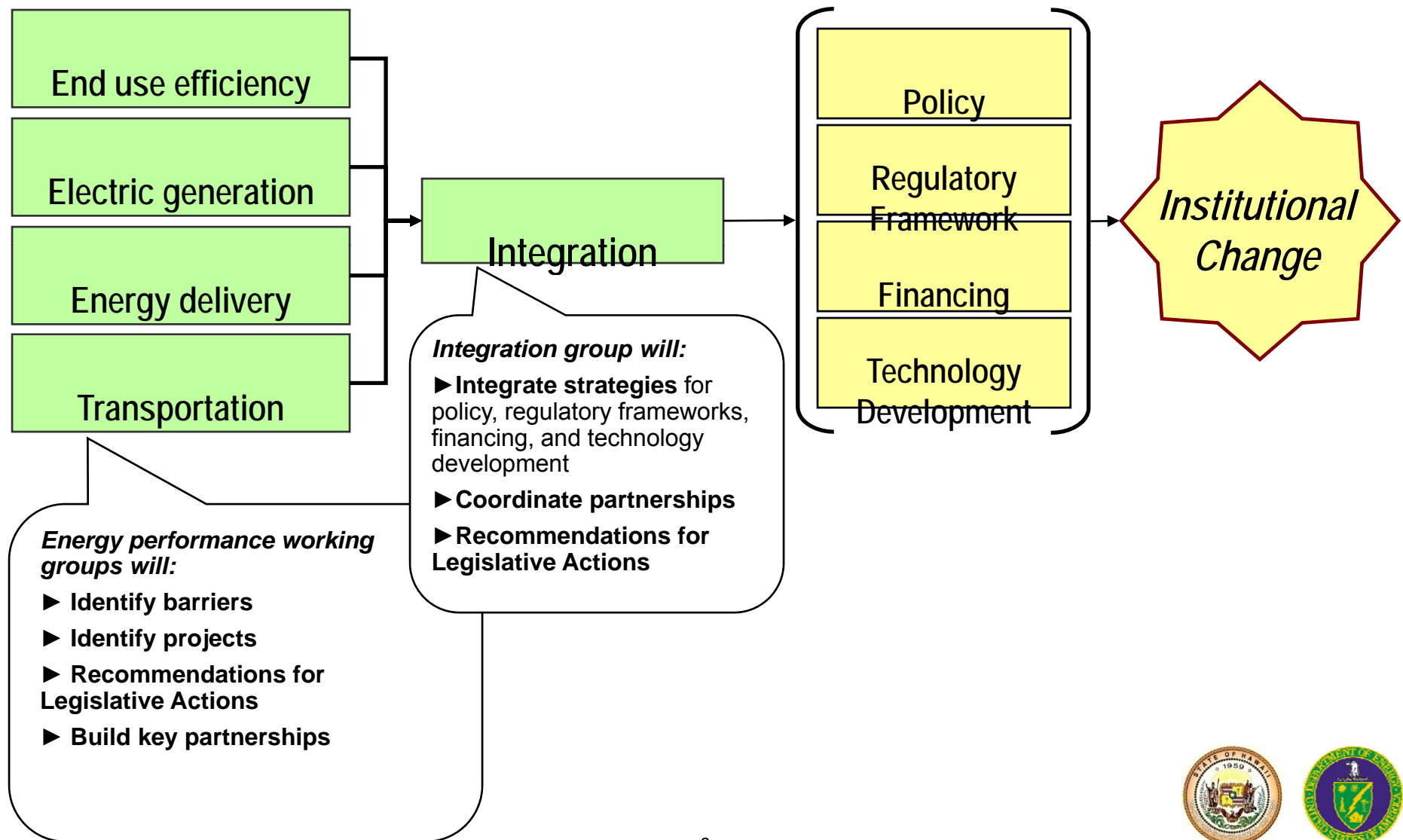
# To accelerate this transformative process, Hawaii and U.S. DOE have joined forces to form the Hawaii Clean Energy Initiative

The goals of the initiative are as follows:

- ▶ *Achieve a 70% clean energy basis for Hawaii within a generation*
- ▶ *Serve as a “open source” learning opportunity:* Make Hawaii a replicable model for achievement of a clean energy-based economy for the world
- ▶ *Increase the security of Hawaii:* Diversify Hawaii’s energy supply and increase the security of its energy delivery and defense capabilities
- ▶ *Create economic opportunity at all levels of society:* Develop and diversify Hawaii’s economy through innovative, market-based mechanisms that allow every sector to benefit from the transition to clean energy
- ▶ *Foster and demonstrate innovation:* in the technology, financial, organizational and policy models used to achieve a clean energy future
- ▶ *Build the workforce of the future:* help Hawaii create educational and employment opportunities necessary to sustain a clean energy economy



# The HCEI will outline strategic changes needed in Hawaii's policy, regulatory, financial, & technology structures



## Some partners and participants

- ▶ Governor Lingle
- ▶ US Congressional Delegation and staff
- ▶ Hawaii Legislature and staff
- ▶ County Mayors
- ▶ Selected County Council members
- ▶ Department of Business, Economic Development and Tourism
- ▶ DOE representatives
- ▶ Hawaii DOD Representatives
- ▶ USDA Hawaii
- ▶ Public Utilities Commission representatives
- ▶ Consumer Advocate

- ▶ Hawaiian Electric Industries, HECO, MECO, HELCO
- ▶ Kauai Island Utility Cooperative
- ▶ Hawaii Energy Policy Forum representatives
- ▶ County Economic Development Boards
- ▶ Environmental organizations
- ▶ Native Hawaiian community
- ▶ Kohala Center
- ▶ Hawaii Natural Energy Institute representatives
- ▶ University and community college representatives
- ▶ Private industry, e.g. General Electric, First Wind, Castle and Cooke, Hawaiian Commercial & Sugar, Gay & Robinson, Pacific Biodiesel, etc
- ▶ Others



# Activities

- ▶ MOU signed January 28, 2008
- ▶ Working Groups established, DBEDT and DOE co-chairs
  - Third meeting in September
- ▶ Studies and Project Starts
- ▶ PUC Regulatory Training/Discussions
- ▶ Evaluations to Date
  - Scenario Analysis
  - GHG Analysis
  - First cuts at Economics
  - Regulatory Framework



# Studies/Evaluations

- ▶ Inter-island cable
- ▶ Bio-energy Master Plan
- ▶ Electric Vehicles
- ▶ County Interactions



# Projects: Building on existing work through public-private partnerships

- ▶ 100% Renewable Lanai
- ▶ Forest City Highly Efficient Communities
- ▶ Grid Modeling on all islands
- ▶ Maui Grid Integration Project
- ▶ Support for Bioenergy



# Scenarios

- ▶ First cut at order of magnitude requirements and impacts
- ▶ Evaluated sensitivity to several factors
- ▶ No absolutes defined in this evaluation
- ▶ Most work on Electricity, some on transportation, little on jet fuel
- ▶ **Based on commercially viable technologies; potential game changers like OTEC and algae energy plays are not considered**
- ▶ **All scenarios are presented without imported biofuels, all scenarios can hit the goals with imported biofuels**
- ▶ Follow-up economic impacts, refinement of Scenario 8 in progress.



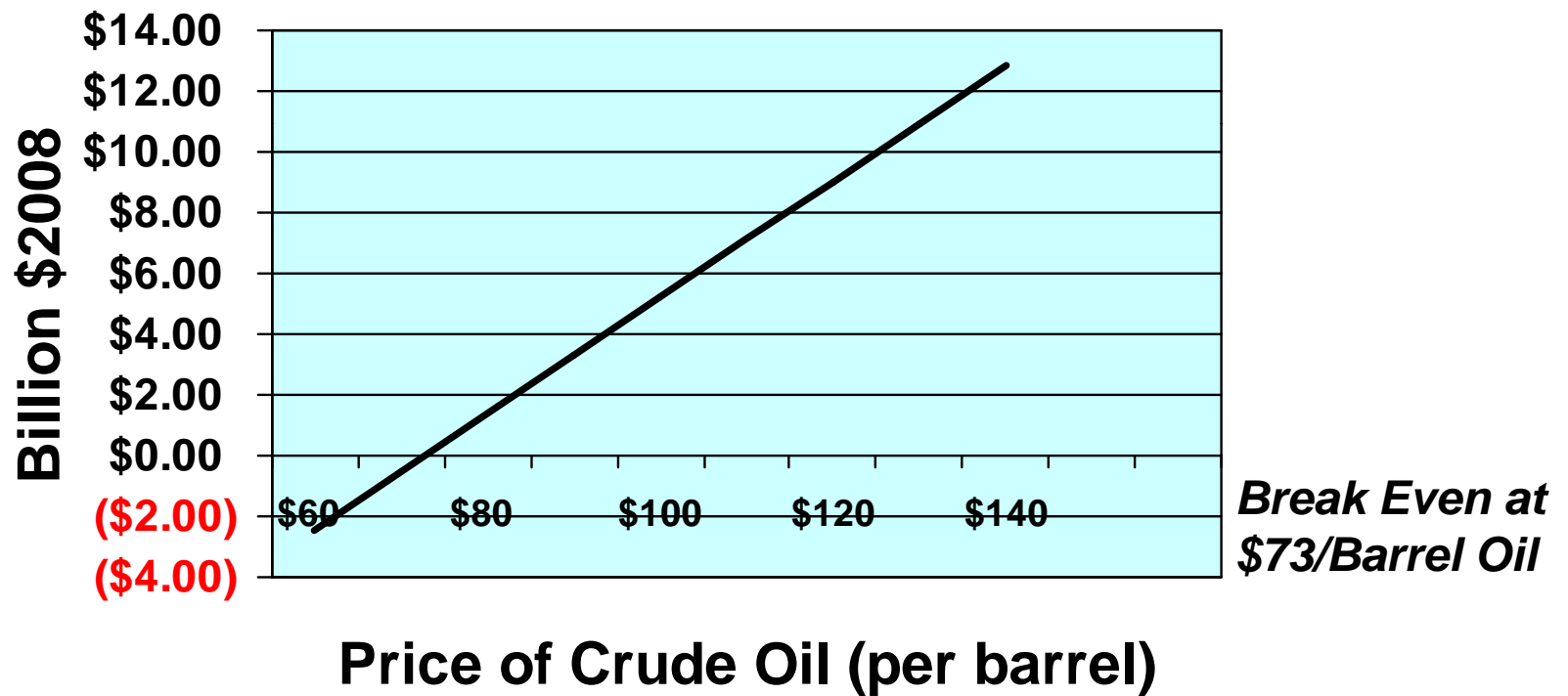
## Scenario 8: Investments and Projected Savings (2008 through 2030)

Avg. Crude Oil Price (2008-2030) per Barrel	Investment Cost	PV of Investment Cost	Savings from Oil Displaced	PV of Savings from Oil Displaced
\$40	\$ 16.0	\$ 7.7	\$ 18.5	\$ 7.6
\$50	\$ 16.0	\$ 7.7	\$ 23.1	\$ 9.6
\$60	\$ 16.0	\$ 7.7	\$ 27.7	\$ 11.5
\$70	\$ 16.0	\$ 7.7	\$ 32.3	\$ 13.4
\$80	\$ 16.0	\$ 7.7	\$ 36.9	\$ 15.3
\$90	\$ 16.0	\$ 7.7	\$ 41.5	\$ 17.2
<b>\$100</b>	<b>\$ 16.0</b>	<b>\$ 7.7</b>	<b>\$ 46.1</b>	<b>\$ 19.1</b>
\$110	\$ 16.0	\$ 7.7	\$ 50.1	\$ 21.0
\$120	\$ 16.0	\$ 7.7	\$ 55.4	\$ 23.0
\$130	\$ 16.0	\$ 7.7	\$ 60.0	\$ 24.9
\$140	\$ 16.0	\$ 7.7	\$ 64.6	\$ 26.8

*Figures in Billion 2008 dollars (except per barrel cost).  
PV figures based on discount rate of 7%*



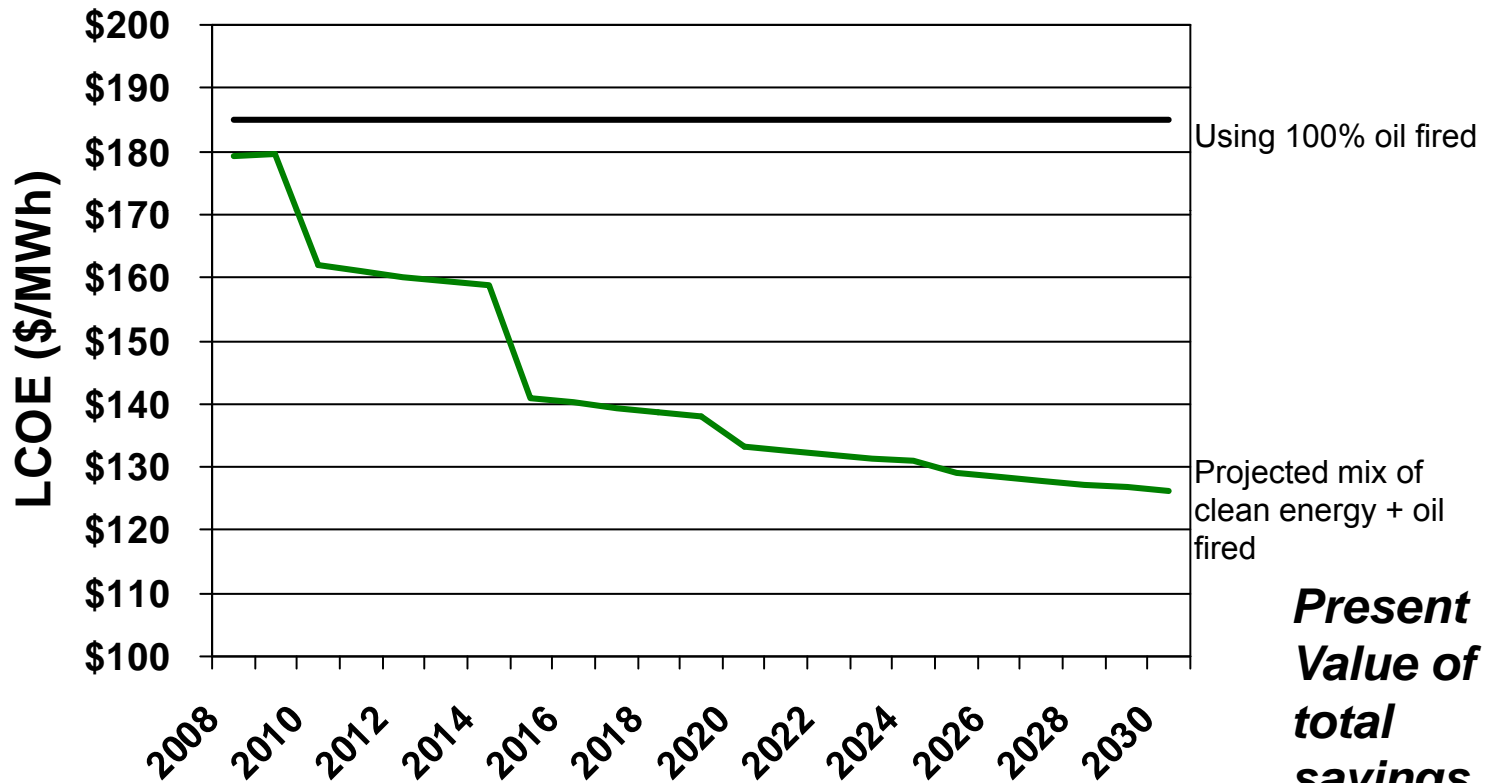
## Scenario 8: Net Present Value of Projected Savings Less Total of Levelized Costs for 2008 - 2030



*Figures in Billion 2008 dollars (except per barrel cost).  
PV figures based on discount rate of 7%*



# Scenario 8: LCOE (Electricity) and Savings Over Time \$100/Barrel Oil



**Present Value of total savings is \$5.9 billion**

*Figures in 2008 dollars  
PV figures based on discount rate of 7%*



# New Regulatory Framework

- ▶ De-Coupling
- ▶ Increased Renewable Portfolio Standard
- ▶ Feed-in Tariffs
- ▶ Energy Efficiency, Demand Response, Distributed Generation
- ▶ TOU rates, Automatic meters, no cap to net metering
- ▶ Creating an Energy Scenario Planning process that replaces the current IRP.
- ▶ Green energy tariff and/or Renewable Energy Credits
- ▶ Revising transmission planning processes to include identification of Renewable Energy Zones with preferred renewable generation development sites, with expedited transmission planning, siting, permitting and interconnection for new renewables.
- ▶ Creating a Clean Energy Infrastructure Surcharge



# What next?

- ▶ Specific recommendations for a new regulatory framework
- ▶ Recommendations for an Omnibus Energy Bill
- ▶ County interactions through Energy conferences and coordination
- ▶ Outreach and communications on energy issues
- ▶ Bio-energy meetings and master plan
- ▶ Completion of studies and analysis over the next year
- ▶ Govt FY09 Funding Requirements
- ▶ Siting/Permitting Actions



# What kind of things I would like from the State in the next 12 months?

- ▶ IMPLEMENTATION!!!!!!! Sense of urgency
- ▶ Big efficiency push
- ▶ Initial transportation actions
- ▶ Electricity regulatory and statutory actions
  - New regulatory framework
  - Certainty of Market rules to bring in private investment
- ▶ T and D system improvements started
- ▶ More renewable projects in the pipeline
- ▶ Reasonable balance between healthy utility systems, consumer protection and a working market for energy developers



# Maui

- Working Groups for 2020 Net Zero Energy goal
- Major Wind build-out
- Wave Energy project
- Grid Integration Project
- HR Bio-petroleum
- Pumped Hydro storage combined with renewables



# Hawaii

- Energy Sustainability Plan
- Hydrogen system demonstration Volcano National Park
- Small Wind
- NELHA projects
  - Solar testing



# Honolulu

- Sustainability Plan
- Wave Energy Project-DOD
- Zero Net Energy Homes-DOD
- Sustainable Communities
- Sea Water Air Conditioning
- OTEC demonstration



# Other Counties-Actions Needed

- ▶ Comprehensive Specific Targets within an integrated system
- ▶ Building codes and standards
- ▶ Transportation
- ▶ Efficiency Mandates



# Kauai

- ▶ It's beautiful
- ▶ It's isolated – no cable solution
- ▶ It's unique –KIUC, PMRF
- ▶ It's vulnerable- fuel, food



# Electricity

- ▶ Assume you are on your own,
  - Decide your own energy fate or live with the consequences
  - You control

How much efficiency/building codes

How much renewable energy

How much bioenergy/biofuels

How much small scale generation

Integration of those systems

- ▶ Then any help you get can augment what you do



# Kauai Renewable Build-out Limitations

- ▶ MW scale Wind-Shearwater interactions
- ▶ Solar-Still high costs
- ▶ Bioenergy- cost effective?
- ▶ OTEC/Wave- not commercial
- ▶ Geothermal-low temp unexplored
- ▶ Small systems- high costs today
- ▶ Investment needed for smart grid
- ▶ Land/water access/acceptability



# Kauai Grid Study

- ▶ Joint KIUC-HCEI effort,
  - Model the electricity system
  - Run scenarios to see what is rational
    - High Solar build-out
  - System Integration



# Transportation

- ▶ For transportation, your control is limited, but you can act
  - Local Electric Vehicle credits
  - Fuel Flexible Vehicle's
  - Biofuels support



# Kauai Coordination

- ▶ County Sustainability Plan
- ▶ KIUC planning
- ▶ KEDB Energy Conference
- ▶ HCEI and State Support



# Summary

- ▶ What does Kauai want to do about energy dependency?
- ▶ When?
- ▶ How?
- ▶ A concerted effort is needed
- ▶ It's up to you

Hopefully we can help

