

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**

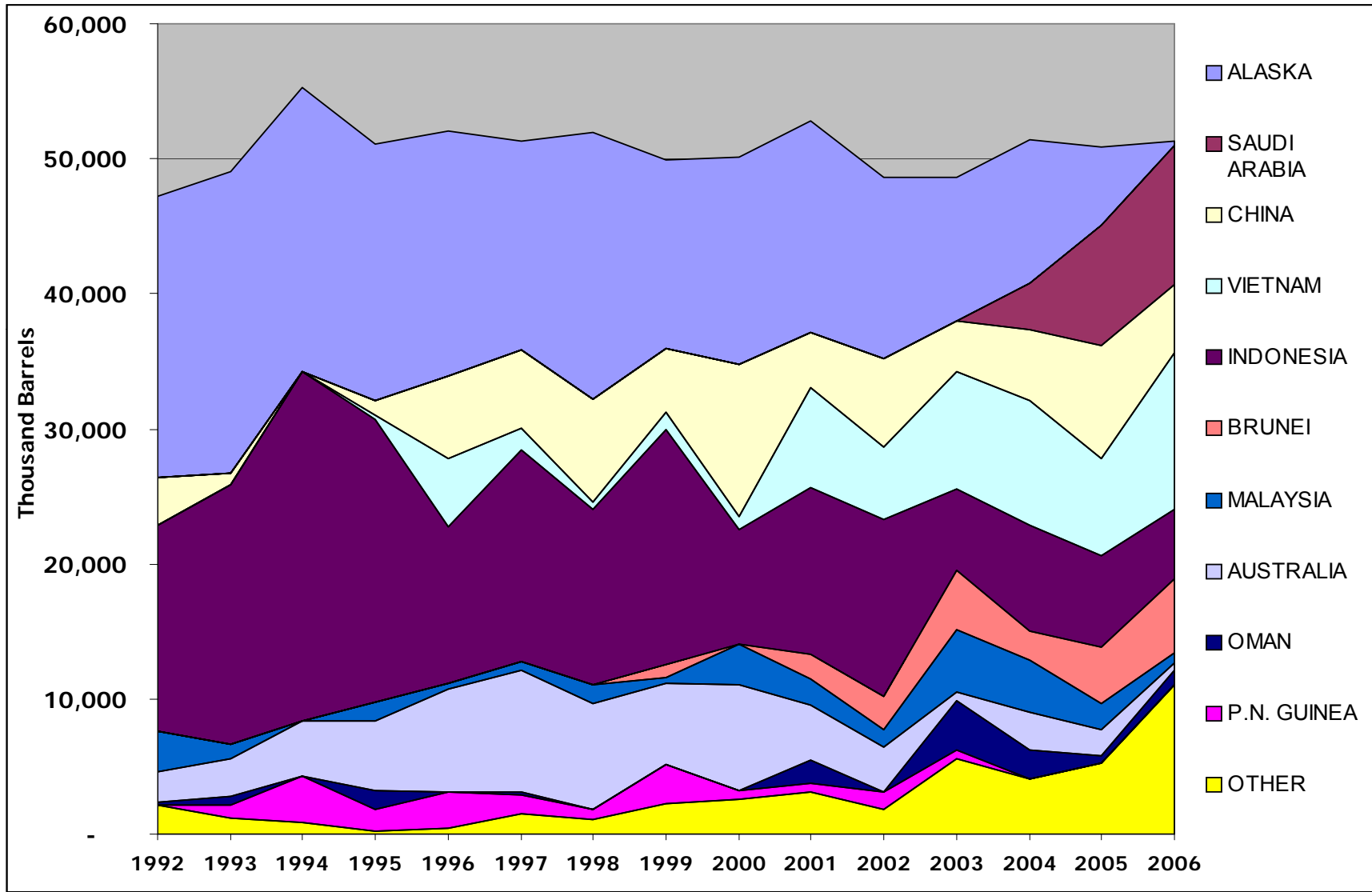
Vision for Hawaii Clean Energy Initiative

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

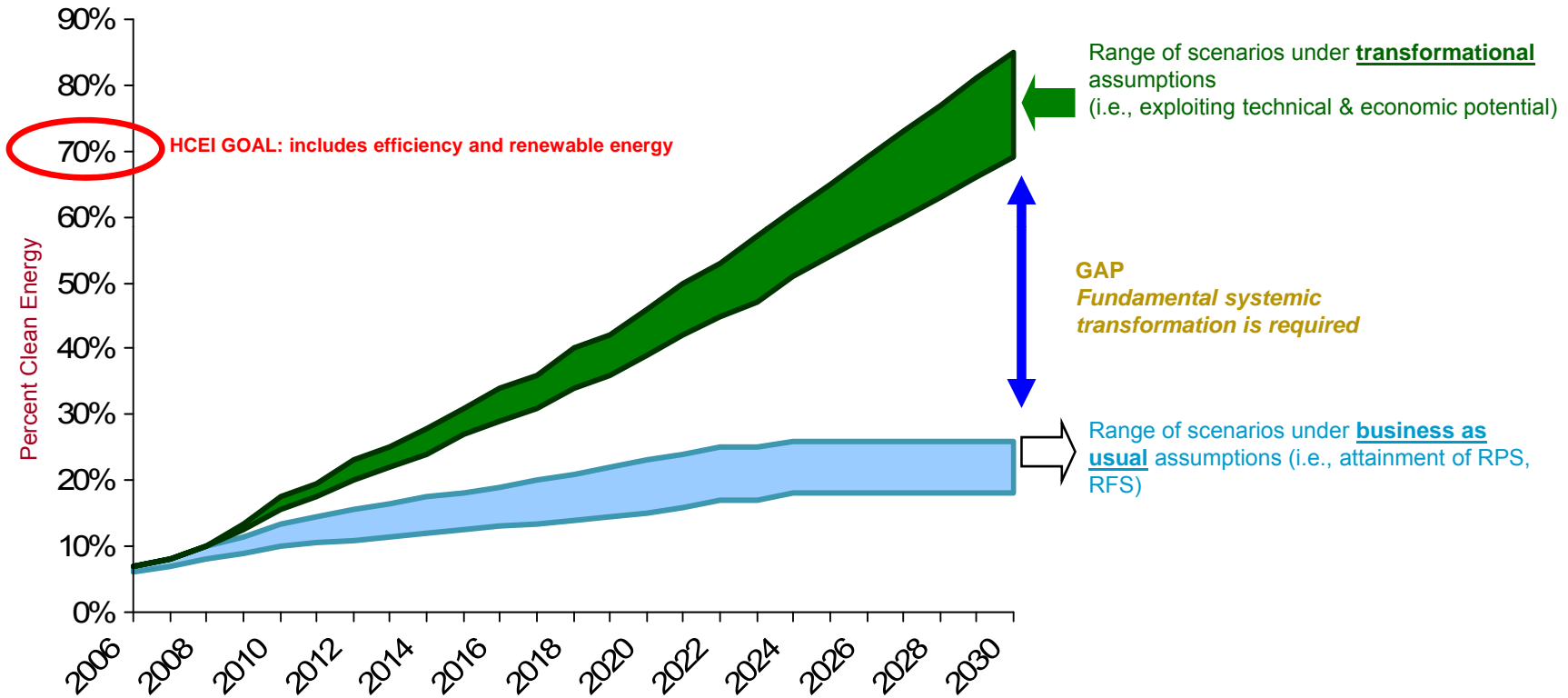


Sources: State of Hawaii – DBEDT, 2007; and U.S. Energy Information Administration (USEIA), 2007.



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



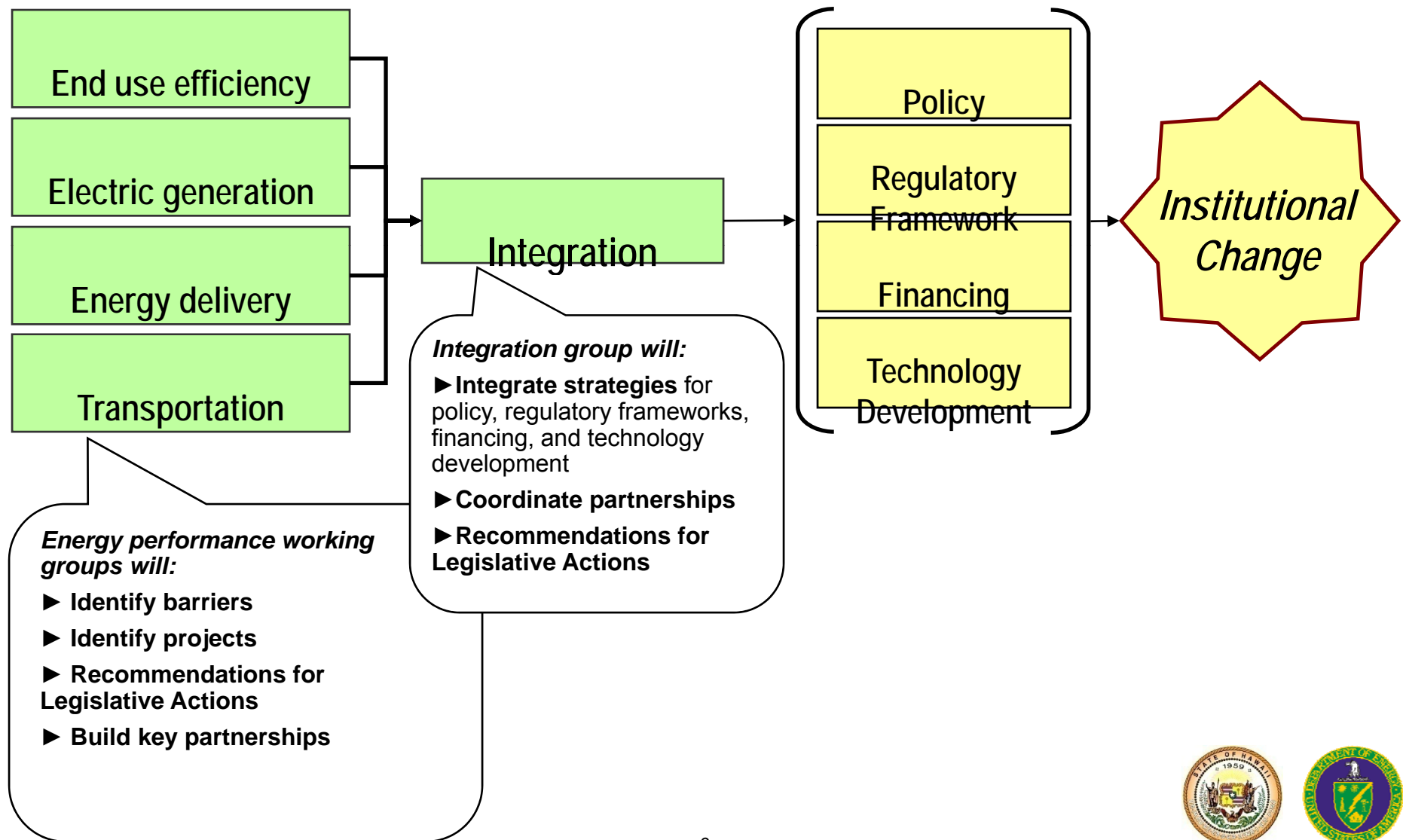
To accelerate this transformative process, Hawaii and U.S. DOE have joined forces to form the Hawaii Clean Energy Initiative

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.



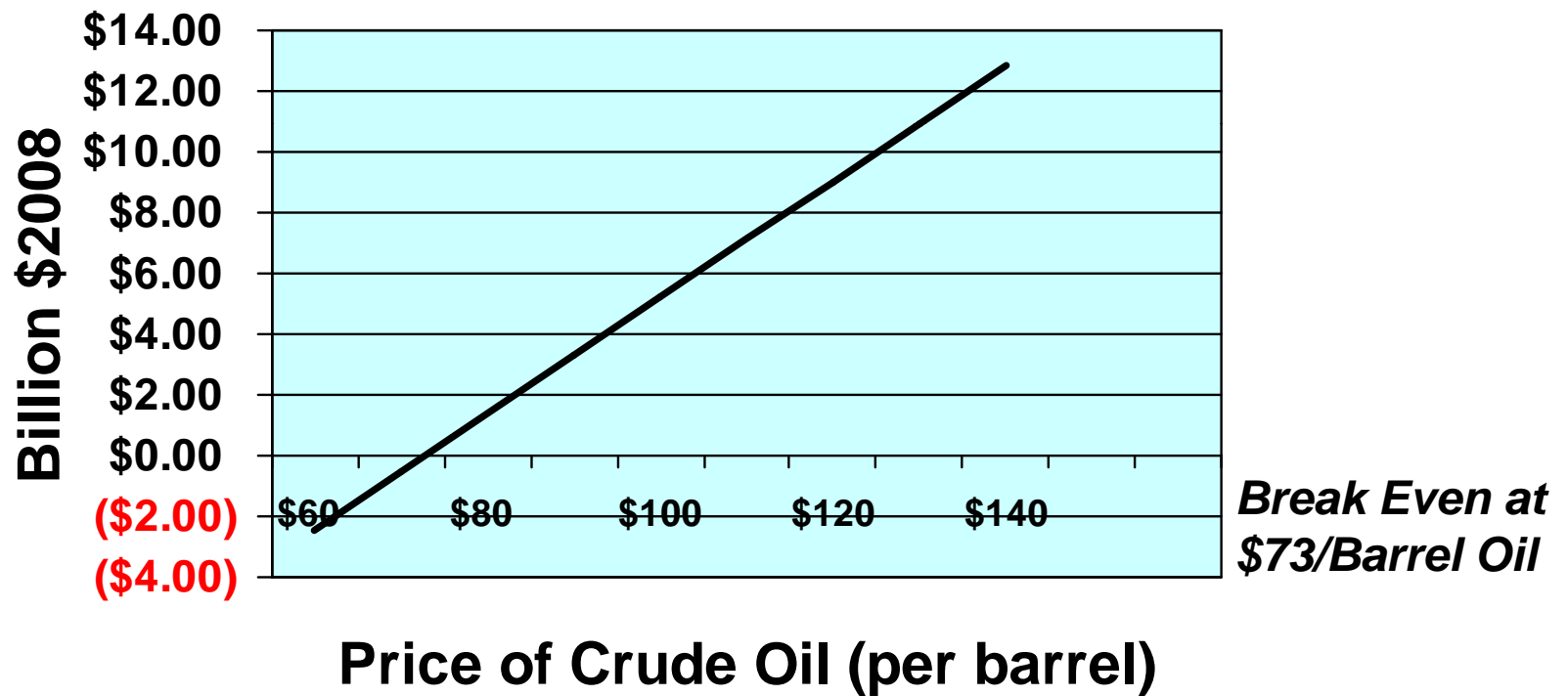
Scenario 8: Investments and Projected Savings (2008 through 2030)

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
\$100	\$ 16.0	\$ 7.7	\$ 46.1	\$ 19.1
\$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%*



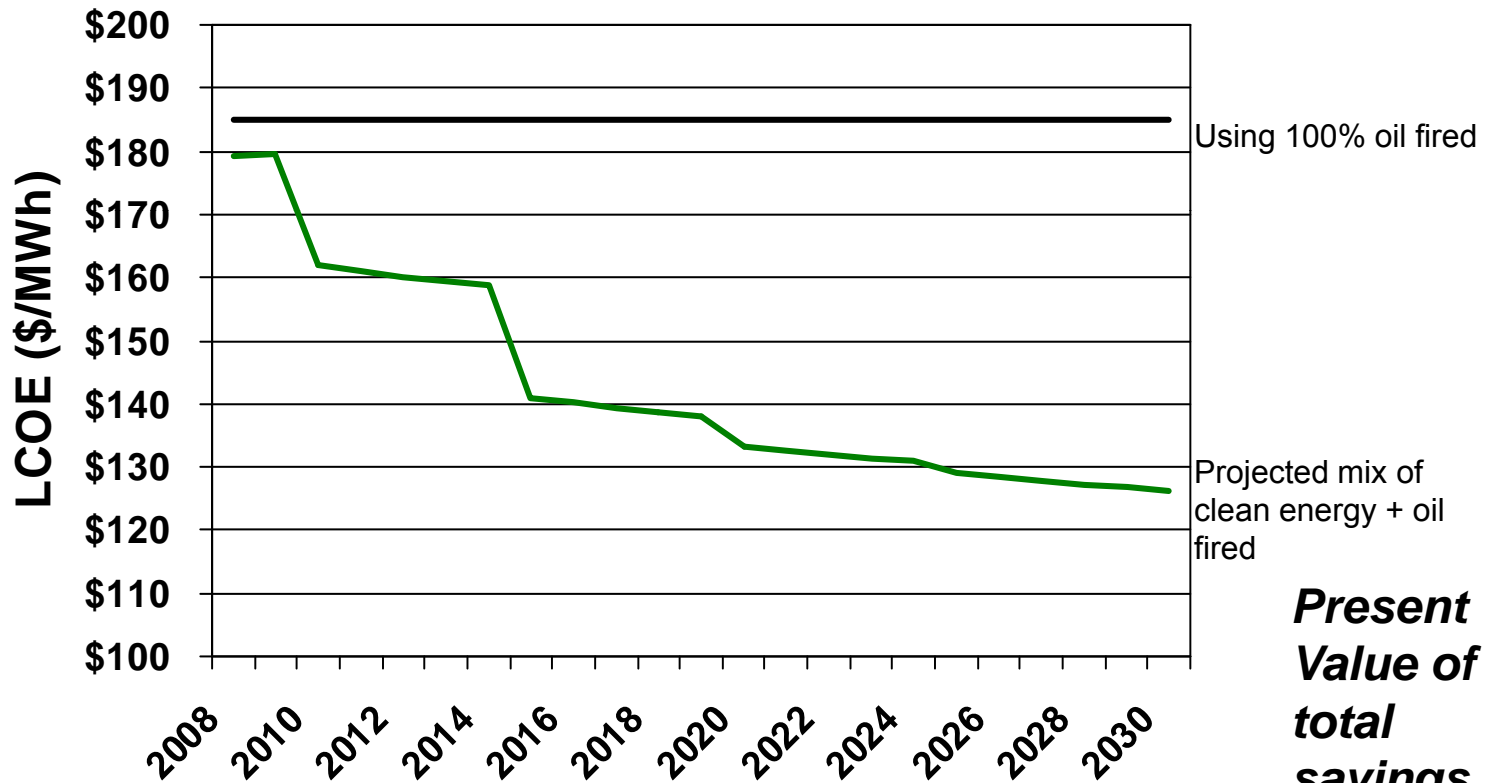
Scenario 8: Net Present Value of Projected Savings Less Total of Levelized Costs for 2008 - 2030



*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

