

Kauai: Island in Transition, Creating the New Prosperity for the Garden Island

Presented at
**The Future of Renewable Energy on
Kauai**

Kauai Economic Development Board

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A Needed Sense of Urgency

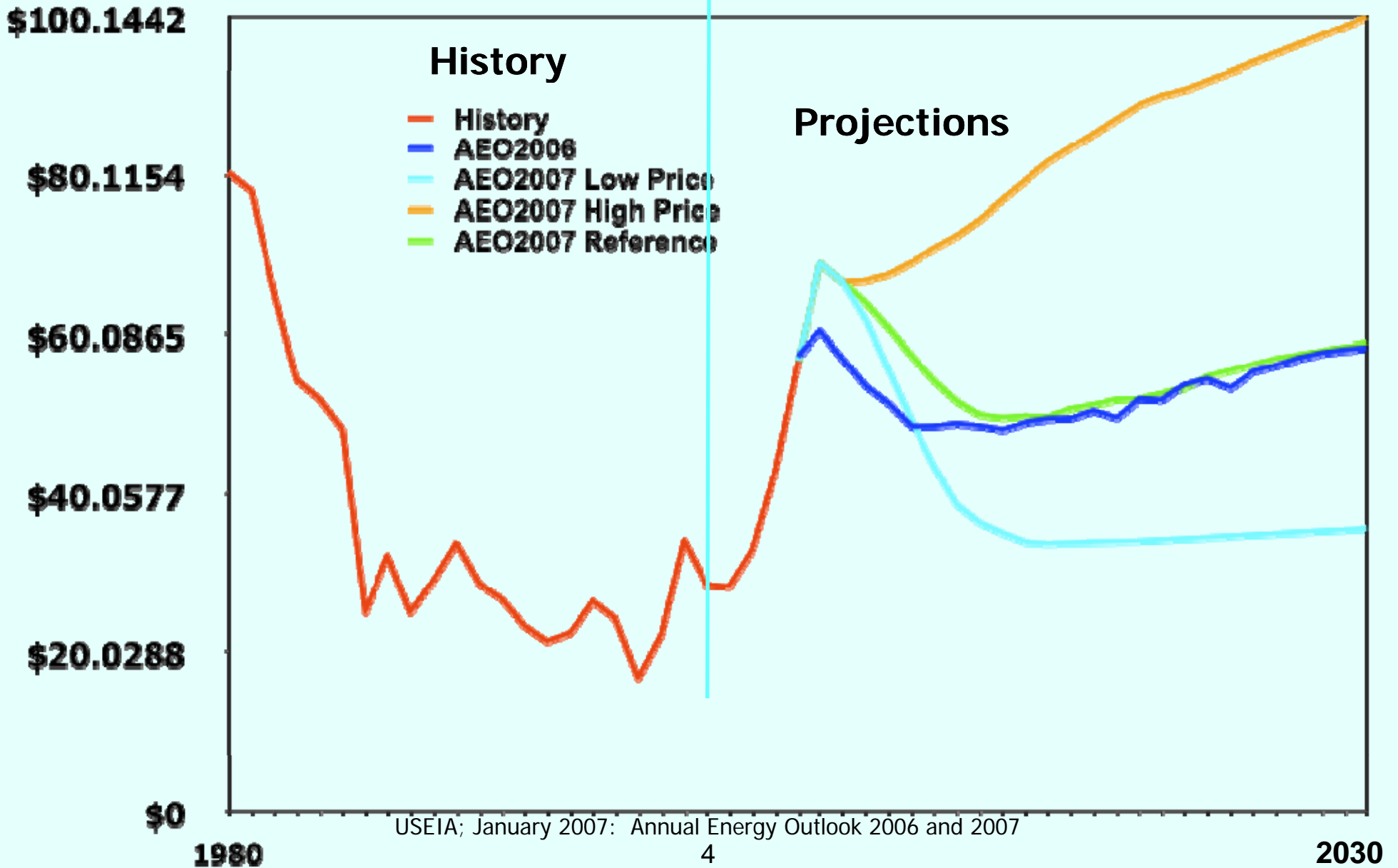
- A Long and Serious Problem
- Why Should You Care?
- The Policy Fundamentals Are There
- Key Strategies:
 - Energy Efficiency
 - Electricity
 - Transportation
- A Vision for the Future

World Oil Price, 1980-2030

(2005 dollars per barrel)



In 2008, \$120/bbl

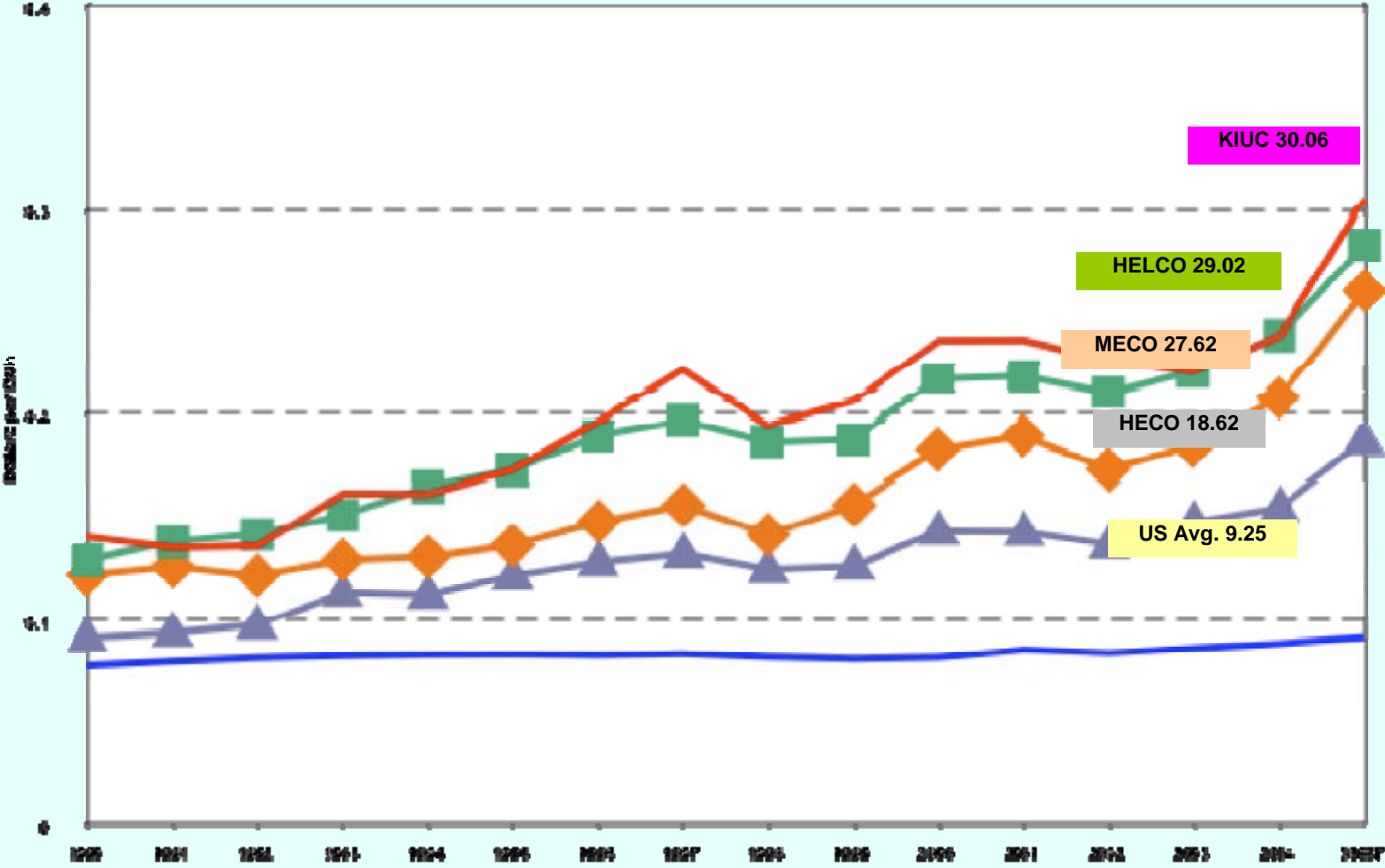


Avoid Complacency

- Industry, government, and research analysts agree: “A New Era”
- Oil prices at new plateau, not simple high point in market cycle
- BUT, all the expert forecasts have been wrong!
- Historic price trends of cheap oil not expected to return
- AVOID COMPLACENCY during price downswings
- Previous net oil exporters, like China, have become huge net importers
- Oil production will increasingly concentrate in the Middle East
- Oil imports will be strong with steady increase around the world, Asia-Pacific in particular
- Hawaii, besides being so dependent on oil, requires the most expensive type of oil
- First Aloha Airlines, ATA, NCL, who’s next?

Hawaii's Energy Costs Are the Nation's Highest –Electricity, 1990-2005

Comparison of Hawaii and US Residential Electric Utility Rates 1990-2005



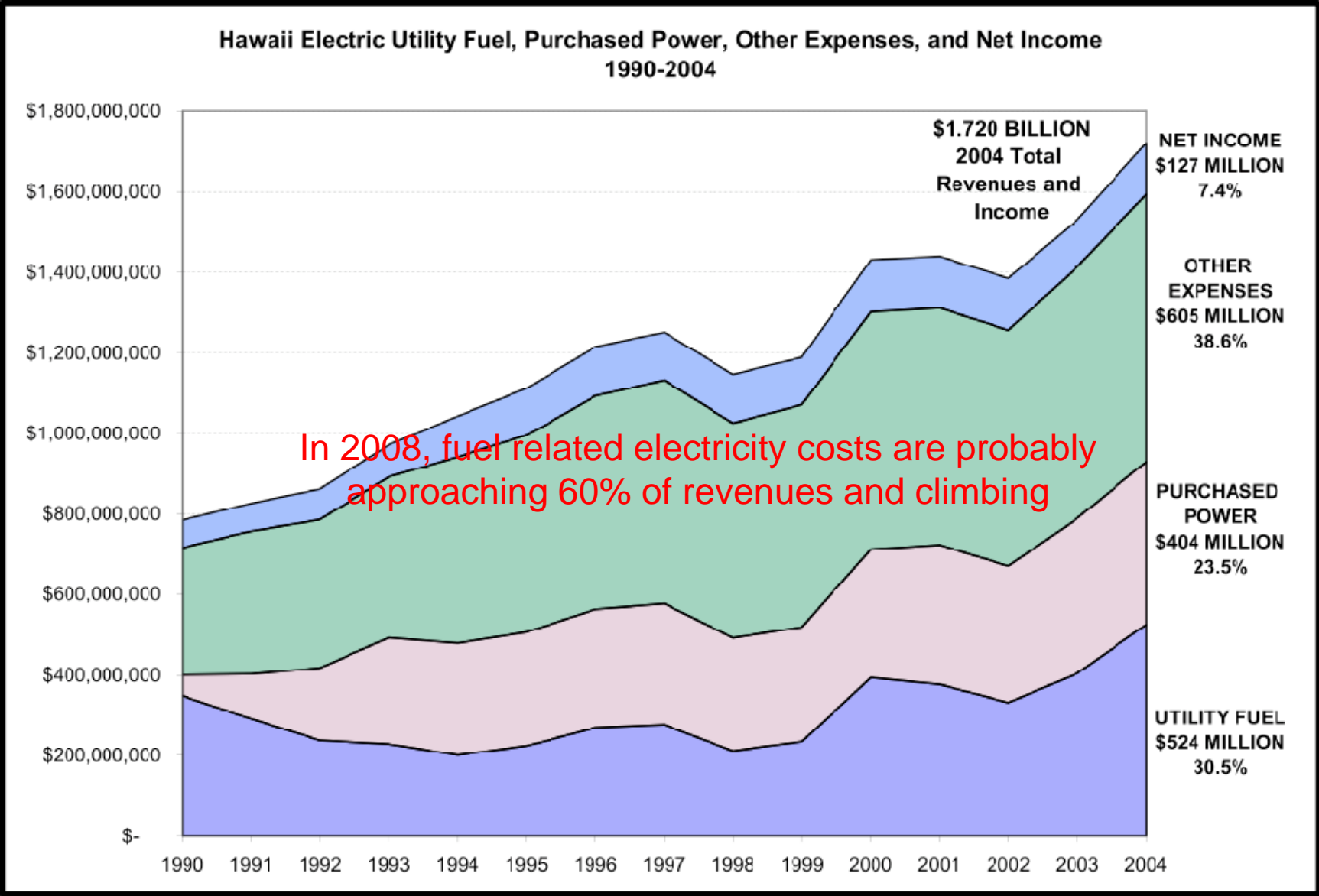
Sources: State of Hawaii – DBEDT, 2006; and USEIA 2006.

Electricity Prices, 2005-2008

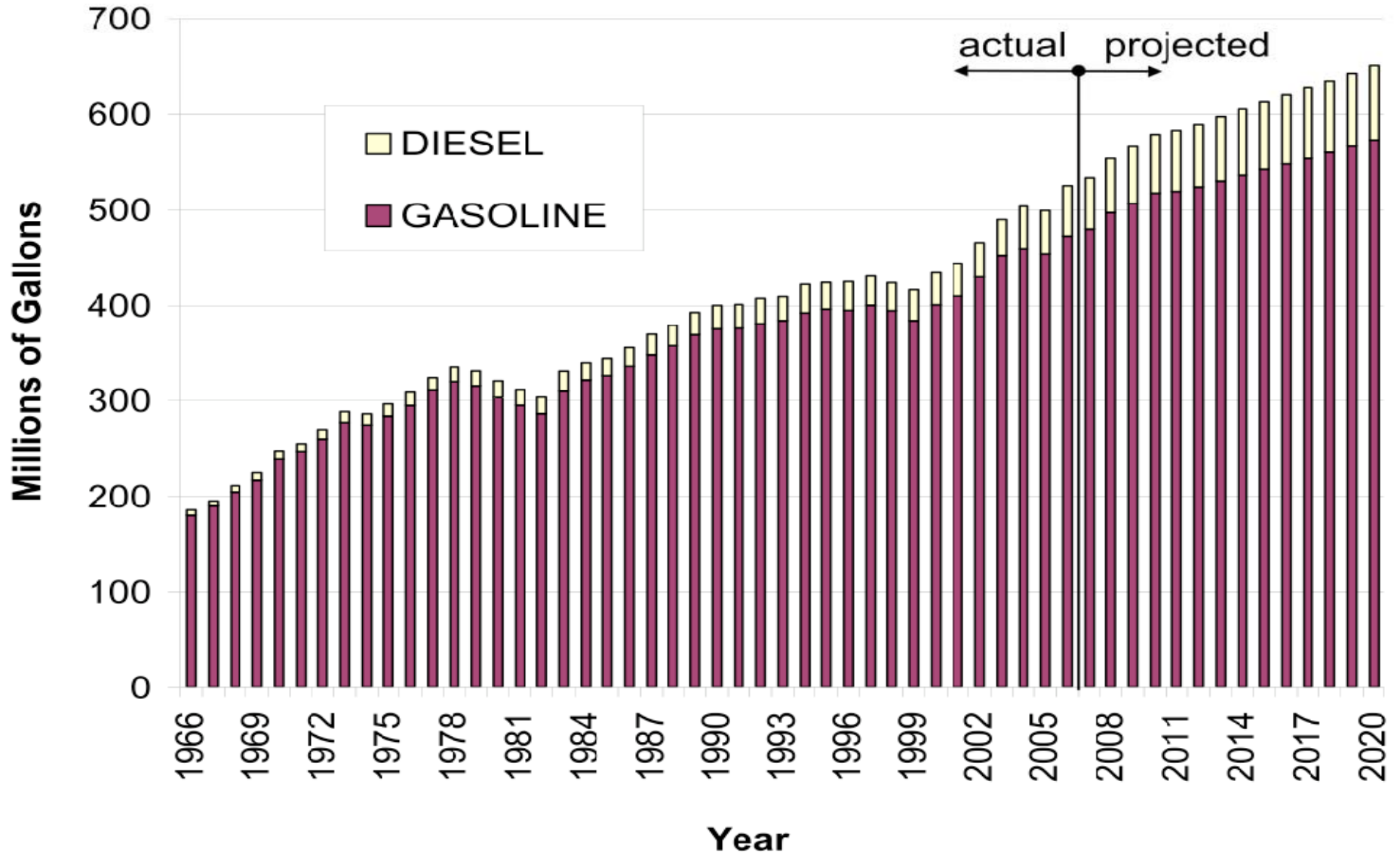
	2005 cents/KWH	2008 cents/KWH	% Oil Cost
HECO	18.6	25.7	45
HELCO	29.0	36.4	41
MECO	27.6	32.6	54
KIUC	30.1	41.3	57
US Avg	9.3	10.0	<5

Note: 2008 Figures from DBEDT as of April 01; % oil cost calculated as ECAC contribution to total cost

Oil Dominates Hawaii Electricity



Hawaii's Highway Fuel Demand



Hawaii's Energy Economy

- Highest gasoline and electricity prices in the US
- Import ~90% of energy in the form of crude oil
- Economy directly impacted by the price of oil
- Rich in renewable resources (for specific islands) including solar, ocean, geothermal, wind, and biomass
- 8% of Hawaii GDP (2005) consumed by energy costs
- In 2008 oil costs more than doubled, so the “hit” on the state economy rises in proportion

How is Kauai Positioned?

- in 2006, 90% of Kauai's electricity was produced from oil
- In 2006, the remainder came from biomass, hydroelectric, and PV
- In 2007, residential comprised 35% of KIUC electricity sales
- KIUC customers used less kwh on average than other major island users

Source: State of Hawaii DBEDT Data Book, 2008

Why Should You Care?

- Hawaii's Oil Dependence Will Drag Down Our Economy
- Energy Usage is a BIG Part of the Economy
- Electricity Consumption is a BIG Part of the Energy Usage
- There are Things We Can Do
- The Status Quo Carries Too Much Risk
- We Must Attack the Problem on All Fronts
- There is no time to waste--it's urgent

Hawaii Has a Sound Policy Foundation

Comprehensive Energy Legislation of 2006

- Savings Through Efficiency
- Independence Through Renewable Energy
- Fuels Through Farming
- Security Through Technology
- Empowering Hawaii's Consumers

The Hawaii Clean Energy Initiative

- Strategic Partnership between Hawaii and USDOE
- Provide 70% of energy from efficiency and renewable energy within a generation
- Major transformation of markets
- Regulatory reform
- New Business Models to Emerge

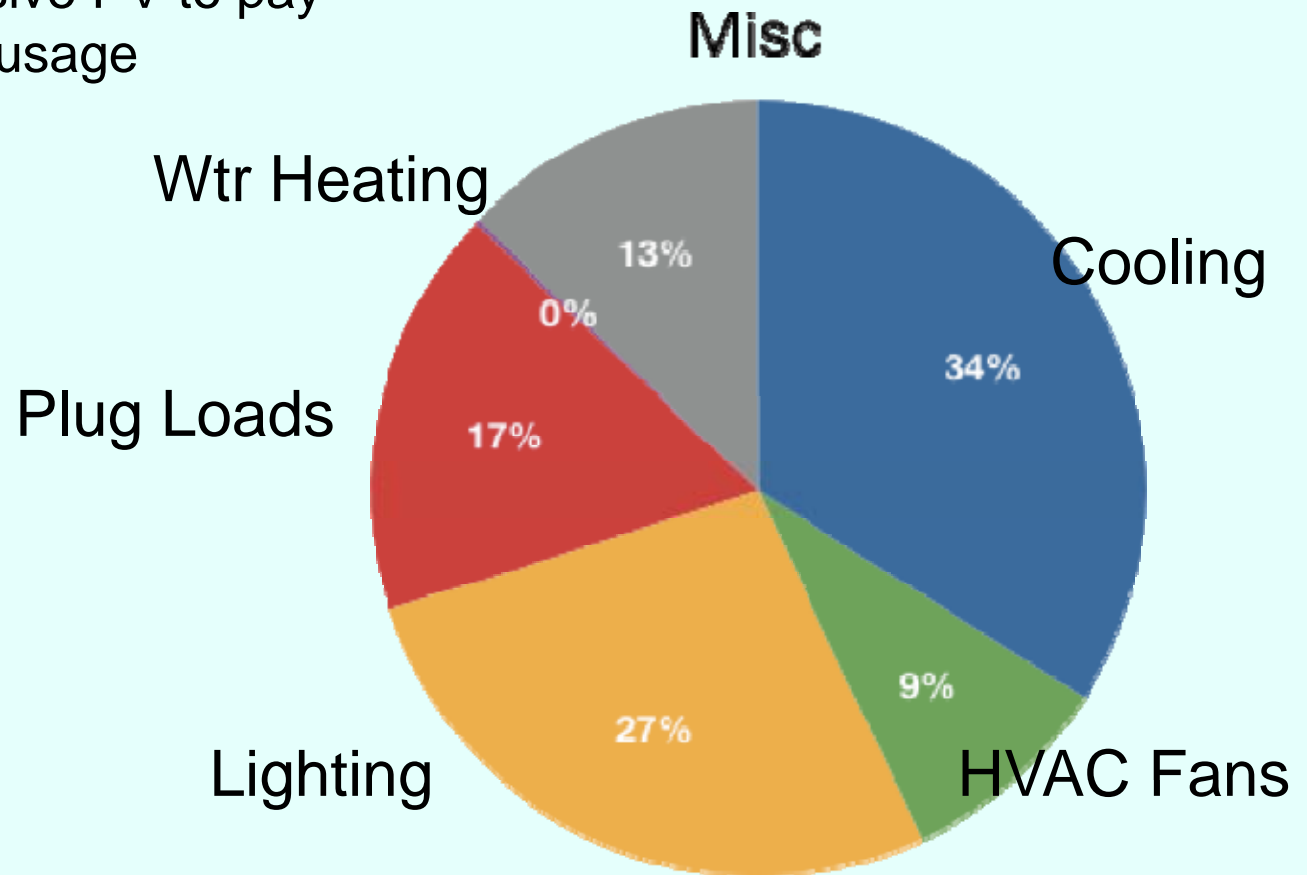
Future Prospects for State-Federal Collaboration

- Address problems with high renewable energy penetration in island electricity grids
- Develop tropical feedstocks for biofuels
 - Crop trials for palm, jatropha, others
 - High lipid content microalgae strains
- Transportation/grid integration—PHEV
- Develop sustainable communities
 - Residential integrated solar, ZEH
 - Showcase development in military housing or selected sustainable community (HUD, Hawaiian Homes, etc.)
- Ocean energy opportunities—no organized federal program

The First Strategy: Efficiency

Efficiency: The Logical First Investment

- *Typical Energy Reductions: 30=%
- *Typical Building Paybacks: <5 yrs
 - *Lighting Paybacks: < 2 yrs
- *Do not install expensive PV to pay for inefficient usage



Set Examples for Building Enhancements



- Strive for Energy Star™ for Buildings
- USEPA Program Recognizes Top 25% of Buildings
- Achievements in illumination, indoor air quality, adequate ventilation, thermal comfort
- Enhances occupant productivity, leasability

New Construction: No Lost Opportunities

- Demand That New Construction Meet Aggressive Energy Performance Standards
- Energy Efficient Codes and Standards at the County Level are a Key
- Demand Exemplary Performance from Government Buildings--Build to LEED Certification (Silver)
- Levelize, then start reducing overall electricity consumption on island

Opportunities for Major Energy Efficiency Investments in Kauai's Public Facilities

- Water and Wastewater Systems
- Schools and Hospitals
- Kauai Community College
- State and County Administration Buildings
- Judiciary complexes

The Second Strategy: Electricity

Electricity: Island Energy Systems

(Opportunity out of Challenges)

- Small isolated grid
 - Challenges unique to Kauai island
 - Significant potential for renewable energy
 - Remote possibility for inter-island connection
 - KIUC Challenge: 50% or greater renewable energy
- High average energy cost (>\$0.40/kWh, \$4.50/gal gasoline, \$5.50/gal diesel)
 - Customers already motivated—distributed gen., solar water heating, PV
- Existing sugar plantation is significant asset
- High capacity factor; transmission challenges
- Intermittent renewable sources challenge to maintain reliability and power quality
- Opportunity to deploy and early adopt smart grids, controls, storage
- Unique transportation characteristics
 - Limited driving distances, perfect for demo of new vehicle technology (electrics)

What About KIUC?

- Healthy Utility=Healthy Economy
- Opportunity for Leadership (Rapid ramp-up to 50% or greater RE)
- Align Utility Interests with County and State Needs (Co-op offers unique advantages)?
- Inter-island cable solutions not likely
- Develop the Right Business Model?
- What Is the Cost of Inaction?
- How Do We Generate Consensus? You need to be part of the discussion.

A Vision for the Model Utility

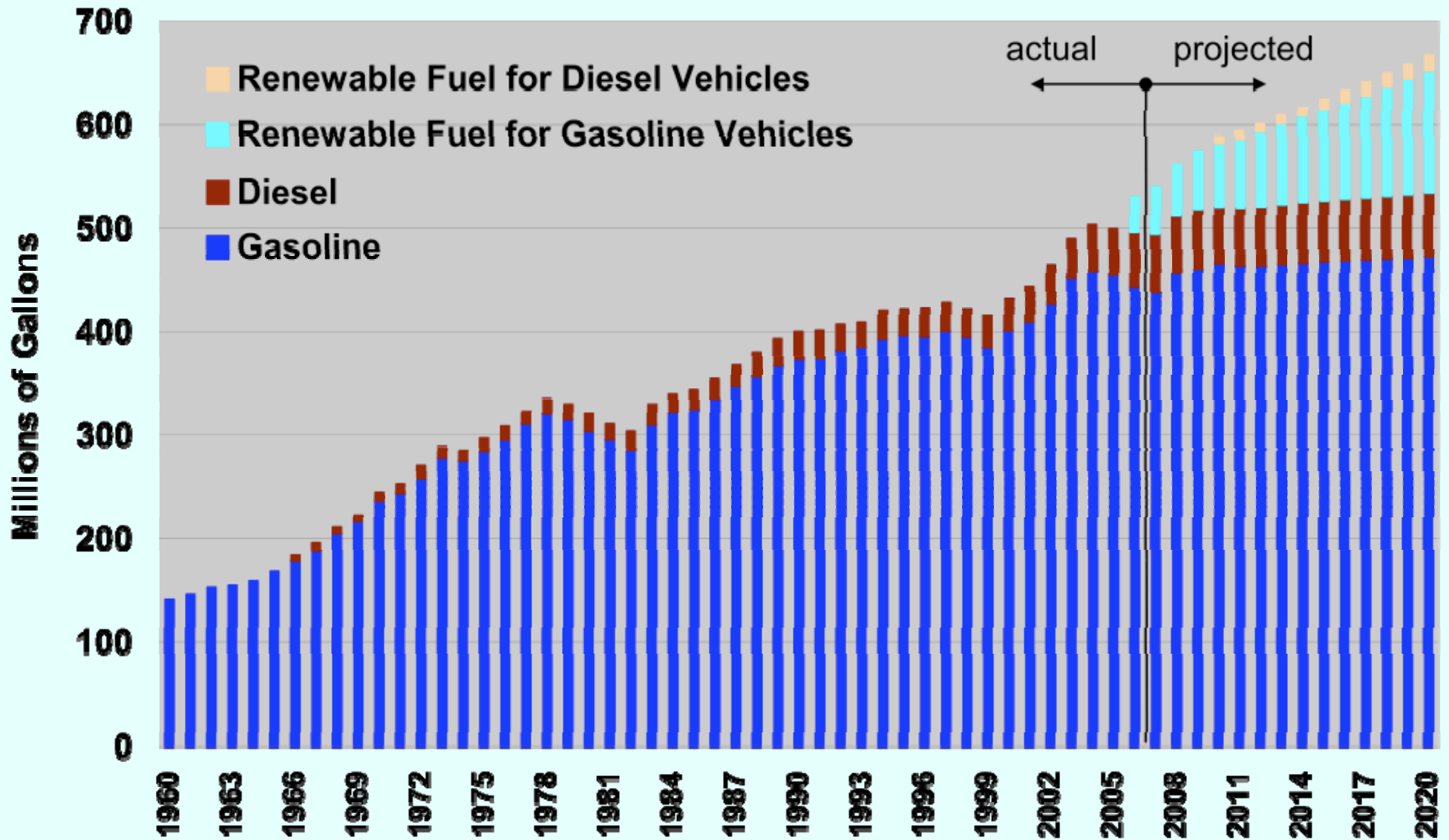
- Zero Dependence on Imported Oil
- Incorporate RE strategies at the customer level (all classes, e.g. PV)
- Significant market driver for EE/RE investments
- Integrate transportation systems as long-range strategy (biofuels, PHEV)
- Look at System-wide Advantages (intelligent grids, load as a resource, rate structure design)
- Consider the County and Co-op Shareholders as Utility Partners
- Deliver Value to Customers by Employing Small Business networks
- Create and Exploit Value out of GHG Regulations
- Deliver Reasonable, Predictable Electricity Cost to Customers
- Leverage advantages of the Co-op structure

The Third Strategy: Transportation Fuels

BIOFUELS: Support State Goals

- **Energy:** reduce oil dependence, lower costs to consumers, and increase energy security through production of indigenous fuels;
- **Agriculture:** preserve important agricultural lands, revitalize the rural economy, and avoid tradeoffs between fuel and food/diversified agriculture;
- **Environment:** protect the environment, foster sustainable agricultural production, and integrate biofuels and their byproducts into the agricultural sector;
- **Economy:** diversify the economic base and expand economic growth.

Statewide Ground Transportation Fuels Demand 1966-2006 Actual; 2007-2020 Projected, with RFS



Kauai's Assets

- Rich endowment in lands suitable for RE production—bioenergy, wind, solar
- Gay and Robinson's lands in sugar
- Green Energy Hawai'i
- Grove Farm/Hawai'i Bioenergy
- A and B Properties

Hawaii's Advantage: Integration Opportunities in Electricity and Transportation

- Island Energy Systems are Highly Integrated
- Material Flows and Inherent Synergies Become Obvious
- Plug-In Hybrid Electric Vehicles: A Potentially Disruptive Technology
- Opportunity to Maximize Development of Renewable Energy on the Island
- Battery technology will permit charging off-peak
- Limited island driving distances and high energy costs enhance early adoption

Intuitively We Feel That These Actions are Insufficient

- Things are Not Happening Fast Enough
- We Feel Powerless Against the Grip of Oil
- Businesses are Failing
- Consumers are Complaining not only about energy prices, but food as well
- Confidence in Government to Act Quickly and Responsibly is Low

ACTION PLAN: Set a High Bar!

Agree on a Statewide Transition Strategy

- Phase 1--Declare war on inefficiency
 - Achieve 30% reduction in energy use by 2015: solar water penetration to 75%, 30% more efficient buildings, aggressive energy codes
- Phase 2--Transform electricity generation to renewables
 - Attain 70% reliance on RE: max out wind, biomass, customer sited PV and other solar, hydroelectric
- Phase 3--Transform ground transportation to non-fossil fuel
 - 50 % shift to non-oil fuels by 2020 through electric and flex fuel vehicles
- Phase 4--Incorporate “game changing” technologies
 - 70 % overall shift to non-fossil energy by 2030: OTEC and wave, cellulose-based biofuels, fuel cells and hydrogen

Present



2030?

So What's Preventing Us from Making This Transition?

- Ignorance
- Complacency
- Dependency on “others” to do it
- Incumbent institutions have not been compelled to action (government and private sector)

What's Needed--A New Call to Action

- Traditional sources of leadership have failed us in this challenge: Political system, business, the Post-War generation (Yes, you and me!)
- Unleash Previously Untapped Sources of Commitment and Leadership
- Learn from our Kupuna and Native Culture
- Employ Youth as agents of Change
- Develop Coalitions to Effect and Sustain Change

Can We Afford Not to Act?

- Continued oil dependence weakens Hawaii's economy (It ain't getting any better!)
- Bold actions needed now; THE CRISIS IS HERE
- Join efforts to agree on an Efficiency and Renewable Energy Transition Strategy
- Electricity Reliability and Affordability Too Important to Ignore
- Be Proactive, Evolve Your Business Before It is Too Late
- Demand clean energy at predictable cost from your supplier
- Enable change agents who truly "get it;" get out of the way!

Possibilities for Kauai

- Energy Efficiency: 50% more efficient buildings by 2020, aggressive County building energy code
- Leadership in Solar: Solar WH saturation program, customer sited-PV systems and other distributed generation in consort with KIUC
- Integrated Energy Platform at G and R
 - Biomass co-generation
 - Ethanol
 - Advanced fuels (cellulosic ethanol, algae to bio-distillates)
- Establish renewable energy development zones
- Electric/PHEV Integrated with electric grid
- Develop Pre-permitted Ocean Energy zone at Kekaha

Pathway to Prosperity For the Garden Island

- Maximize Your Opportunity with Efficiency to reduce costs
- Insist that Renewable Energy Assets be Developed to Full Potential (KIUC, PUC transformation)
- Insist that Consumer Benefits are Derived from the Shift to Renewable Energy
- Develop Kauai Island Energy Independence Roadmap to Guide the Policy and Investment Environment
- Work to Gain Support from consumer, environmental, and youth constituencies
- Insist that policymakers take this seriously, hold them accountable

**Transition: The Act
of positioning
yourself for success
and prosperity in the
future.**

Mahalo