



Hawaii Clean Energy Initiative

Transforming
Hawaii's Energy
System

October 12, 2010

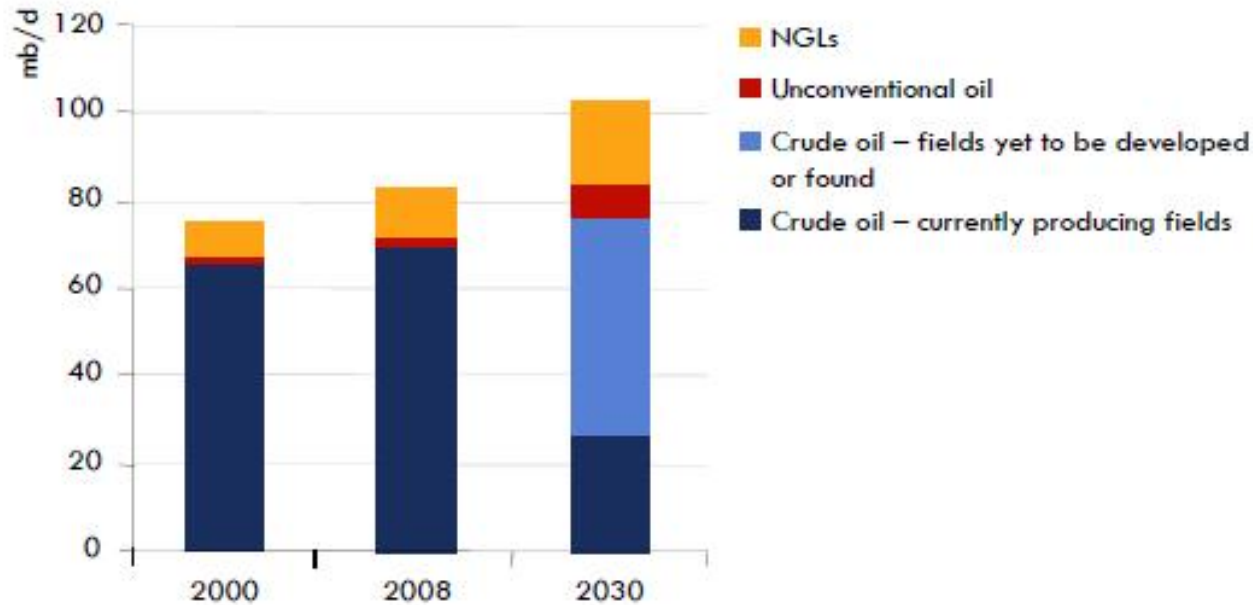
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▶ Hawaii's Energy Picture

- ▶ Hawaii 2050 Sustainability Plan Definitions And Priorities
- ▶ HCEI: Structure, Strategy, and Successes
- ▶ Efficiency
- ▶ Renewables
- ▶ Mapping the Transformation – Roadmap 3.0
- ▶ ARRA Energy Spending Plan
- ▶ Four Energy Barriers
- ▶ Key Takeaways

Oil production in the Reference Scenario

Source: International Energy Agency



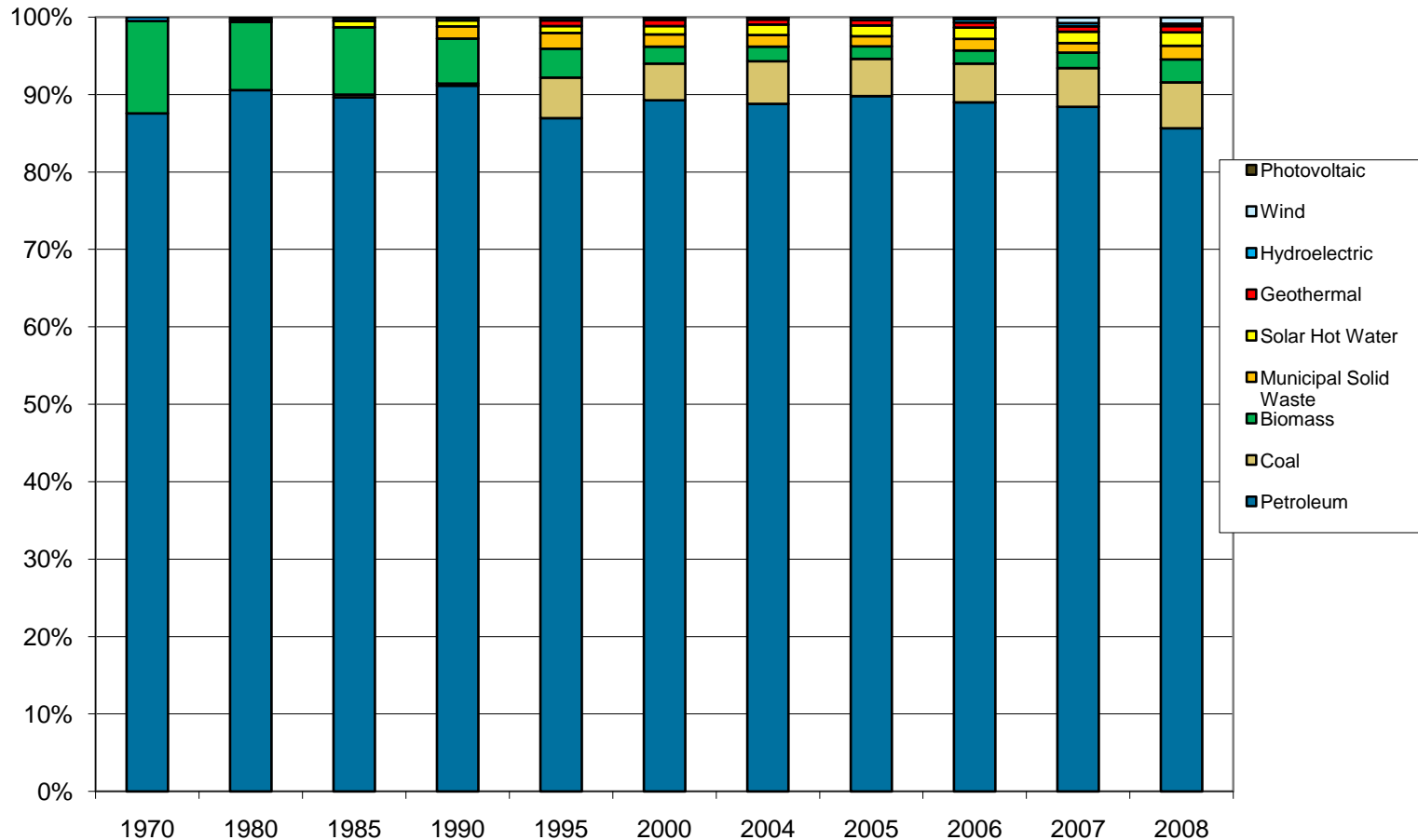
Sustained investment is needed mainly to combat the decline in output at existing fields, which will drop by almost two-thirds by 2030

© OECD/IEA - 2009

Hawaii's future based on petroleum not yet found?

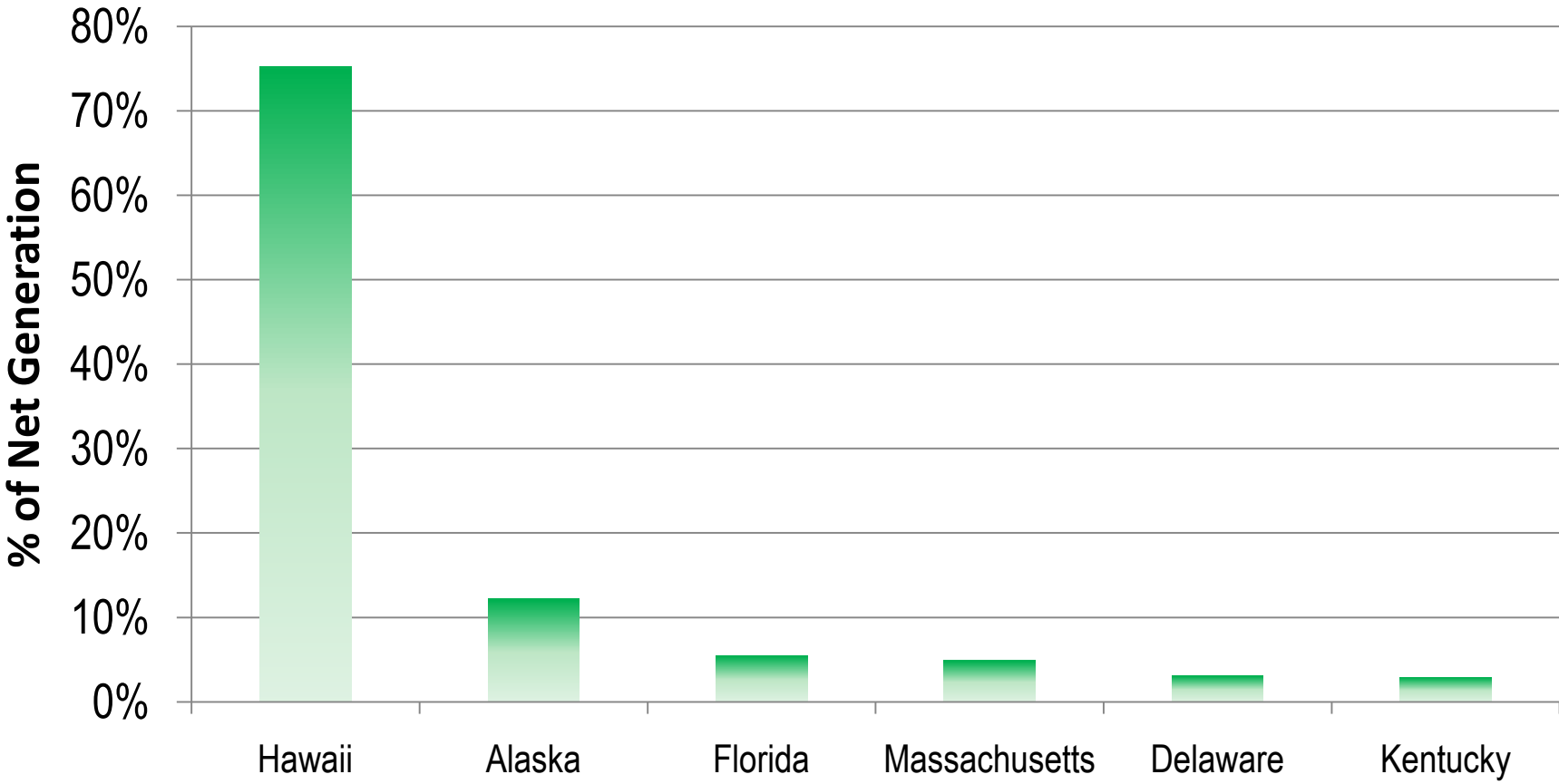
Hawaii's Historic Dependence on Fossil Fuels

Primary Energy Sources in Hawaii, 1970-2008



Over 36 years, petroleum consumption remains above 85%

Hawaii is the most petroleum-dependent state in the U.S.



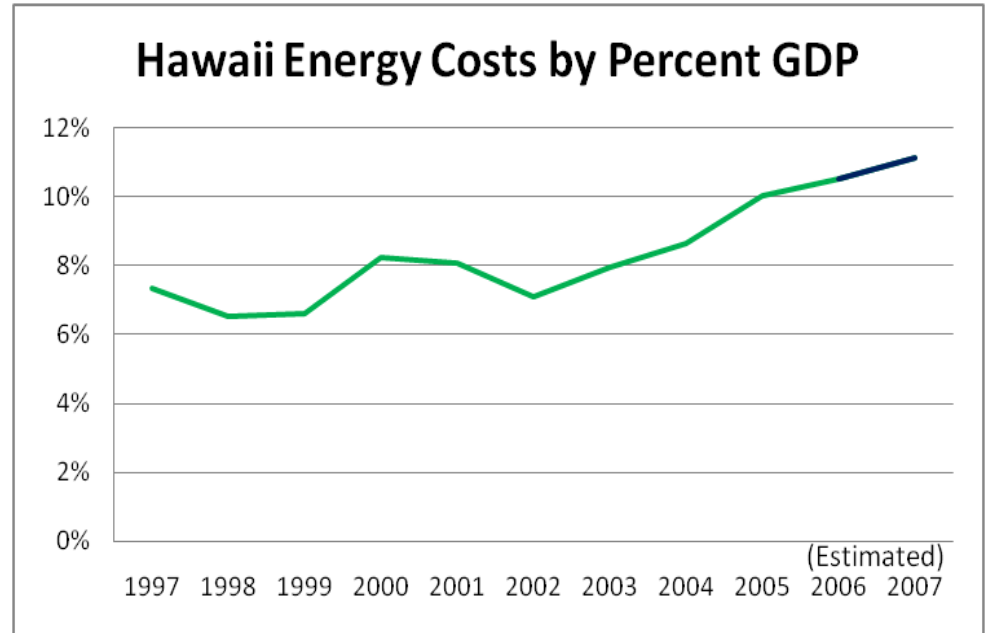
Source : EIA-923 and EIA-860, December 2008

Petroleum dependence for electricity
Top six states



Economic Impact of Dependence on Expensive Energy

- On US mainland, energy costs are 4% of a state's Gross Domestic Product.
- In Hawaii, it is over 10%, **almost 3 times as much.**
- Drain of dollars from the economy.



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HAWAII 2050 SUSTAINABILITY PLAN

- Sustainability defined as:
 - Respecting our island communities;
 - Striking a balance among economic, social and community, and environmental priorities; and
 - Meeting the needs of the present without compromising future generations.
- In working on goals:
 - Residents wanted a sense of urgency to be evident.
 - People desired tangible targets and benchmarks.

HAWAII 2050 SUSTAINABILITY PLAN

Priority Actions Identified for Year 2020 include:

- Reducing reliance on fossil (carbon-based) fuels.
 - **Benchmark – Renewable Portfolio Standard requirement of 20% electricity generation from renewable resources; and**
- Increasing production/consumption of local foods/products, particularly agriculture.
 - **Benchmark – CTAHR estimates that it is reasonable to: locally grow 30% of foods consumed and 85% of fruits and vegetables consumed.**

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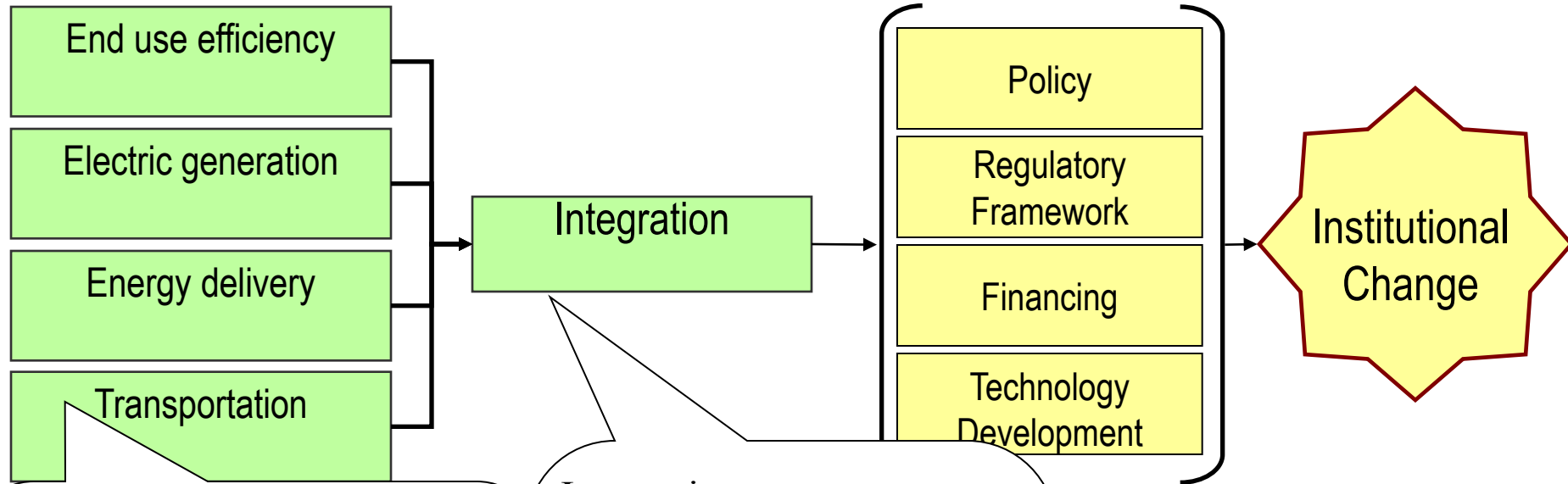
Hawaii Clean Energy Initiative

State-Federal Partnership to Accelerate System Transformation

The goals are:

- Achieve a **70% clean energy economy** for Hawaii by 2030; that is, within one generation
- Increase Hawaii's **security**
- Capture **economic benefits** of clean energy for all levels of society
- Foster and demonstrate **innovation**
- Build the **workforce** of the future
- Serve as a **model** for the U.S. and the world

HCEI's initial structure designed to access the best thinking needed to change Hawaii's policy, regulatory and financial framework



Technical Working Groups:

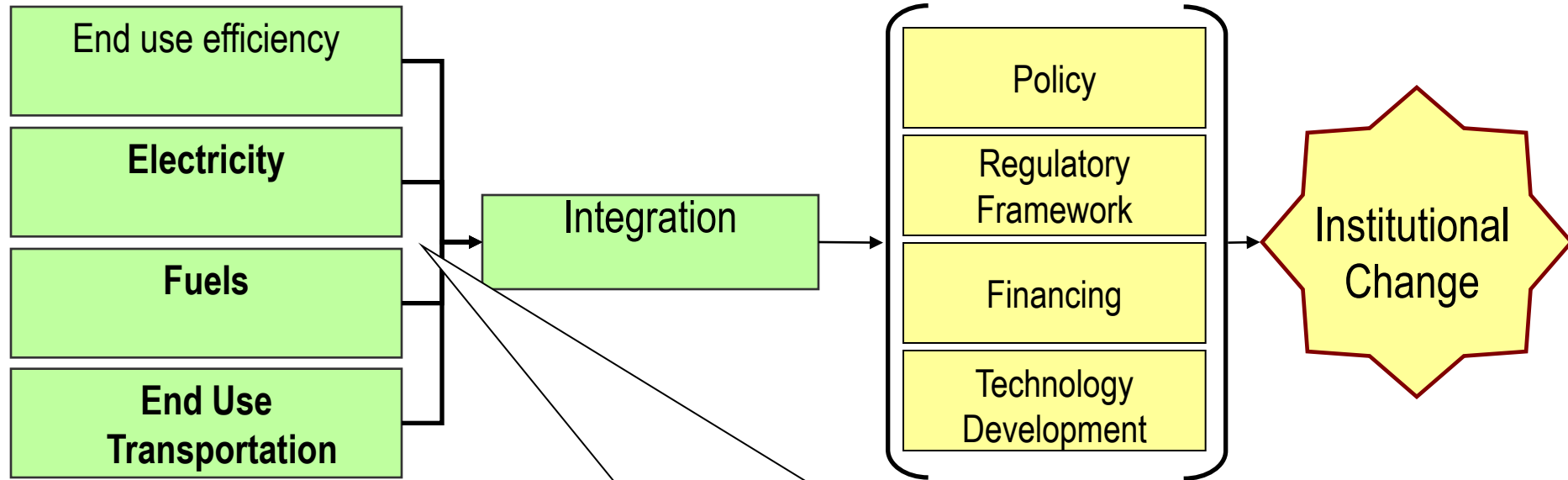
- ▶ Identify barriers
- ▶ Identify projects
- ▶ Recommend regulatory & legislative actions
- ▶ Build key partnerships

Integration group:

- ▶ Integrate strategies for policy & regulatory framework, financing, and technology development
- ▶ Lead partnerships
- ▶ Integrate regulatory & legislative recommendations
- ▶ Communicate

HCEI's structure is intended to be flexible and to adapt over time

End-2008

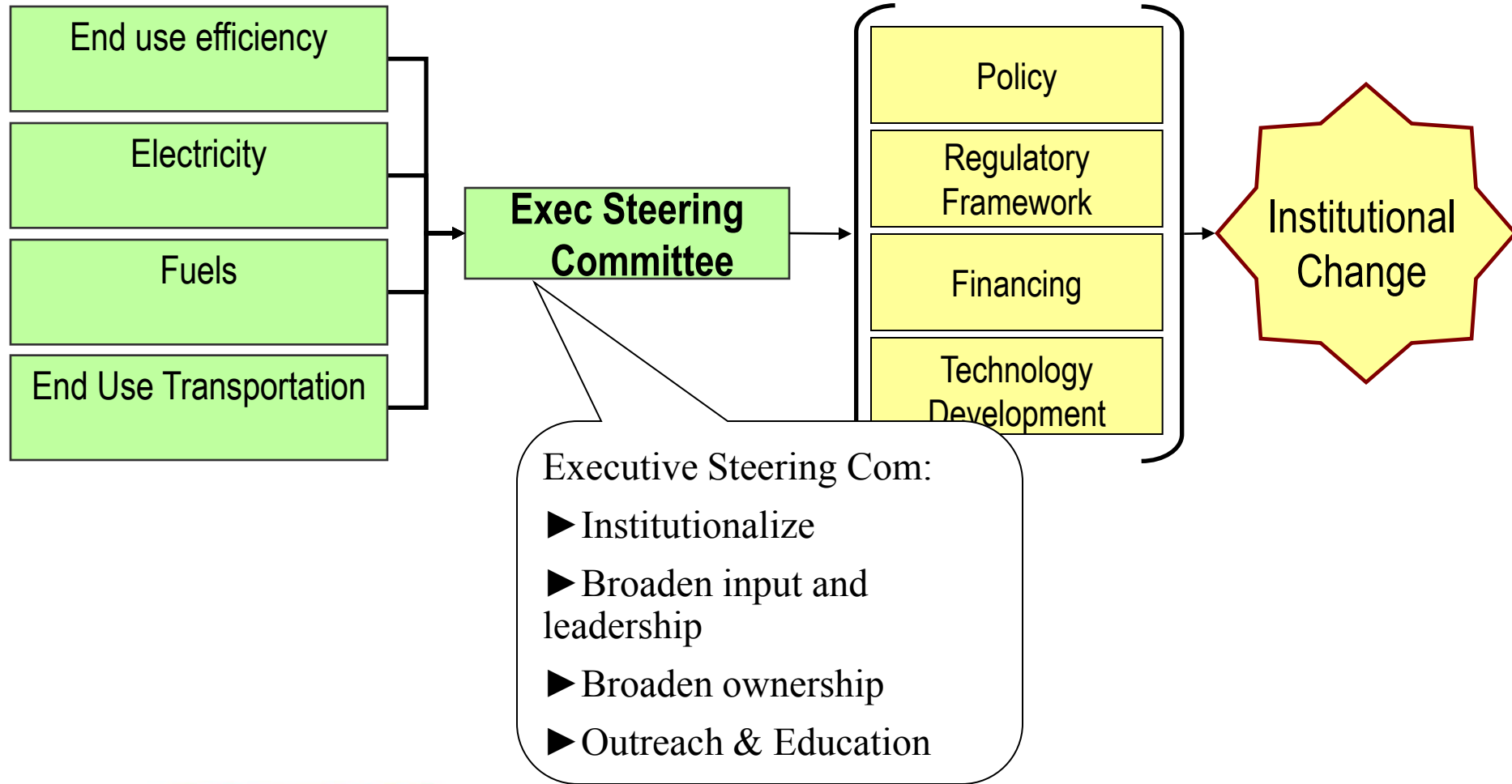


Technical Working Groups:

- ▶ Combined Electricity Generation and Delivery into one WG
- ▶ Took Fuels from a component of Transportation into a focused WG
- ▶ Refocused the Transportation WG to vehicles and infrastructure

HCEI's structure is intended to be flexible and adapt over time

February, 2010



Some Partners and Participants

Public Sector Representatives

- ▶ Governor Linda Lingle
- ▶ Federal Congressional Delegation and staff
- ▶ Hawaii Legislature and staff
- ▶ County Mayor and Council leadership
- ▶ State Cabinet-level agencies, led by State Energy Office
- ▶ County energy coordinators
- ▶ U.S. Department of Energy
- ▶ National Laboratories (NREL, Sandia, Oak Ridge, Idaho, PNNL)
- ▶ U.S. Department of Defense and Pacific Command
- ▶ US Department of Agriculture (USDA) Hawaii
- ▶ Public Utilities Commission (PUC)
- ▶ Hawaii Consumer Advocate
- ▶ International Partners – Energy Development in Island Nations (EDIN), Asia-Pacific

Industry, NGO, and Other Representatives

- ▶ Hawaiian Electric Industries group: HECO, MECO, HELCO
- ▶ Kauai Island Utility Cooperative
- ▶ The Gas Company
- ▶ Refineries
- ▶ Hawaii Energy Policy Forum and other public policy advocates
- ▶ County Economic Development Boards
- ▶ Energy NGOs
- ▶ Environmental NGO
- ▶ Native Hawaiian groups
- ▶ University of Hawaii
- ▶ Private industry, e.g. General Electric, First Wind, Castle and Cooke, Hawaiian Commercial & Sugar, Gay & Robinson, Pacific Biodiesel
- ▶ At-risk developers
- ▶ Banks, financial institutions and private investors

2008 Key Progress & Milestones

- State of Hawaii – U.S. Dept of Energy MOU signed January 28, 2008
- Working Groups & Integration Group established and active early 2nd Qtr
- NREL, Sandia, Oak Ridge national labs' participation → **credibility**
- Analytical assessment of 70% clean energy target → **confidence**
- Regulatory framework discussions 2nd Qtr
 - PUC regulatory training with DOE's Regulatory Assistance Project
 - Proposed “straw man” regulatory framework
- Partnership projects, including grid modeling and wind storage, launched
- Stakeholder meeting at National Renewable Energy Laboratory, July 2008
 - “Historic” participation – 60 participants across all sectors
- Voluntary Energy Agreement among State, Consumer Advocate, and HECO utilities, October 20, 2008
 - 1100 MW of renewables in next 7 years
- Begin focus on transportation: electric vehicles, plug-in hybrids, flex-fuel

2009 Key Progress & Milestones

- Passed foundational HCEI legislation
 - 40% RPS, 30% EEPS by 2030
 - Incentives, such as 35% refundable credit for renewable energy
- Over 30 PUC dockets – Feed-in Tariff, De-coupling, others
- Counties adopt IEEC building codes; strategic energy plans
- Pacific Command establishes the Pacific Energy Partnership Strategic Council
 - Pursuing actions for all services to meet or exceed HCEI objectives
- State agencies “leading by example:
 - Department of Hawaiian Homelands strategic plan based on HCEI
 - Performance Contracting – highest in nation per capita
 - State lands and facilities installing PV, solar and small wind
- Public Benefit Fund Administrator – July 1, 2009
- Bio-Fuels Master Plan
- > 100 private renewable energy generation projects under discussion/development

HCEI Initial Achievements

- **1st in nation in solar water heater installed capacity**
 - 25% single family homes
 - Total energy from SWH approaching 2%
 - Mandated for new construction Jan 2010
- **Photovoltaic solar energy**
 - Third in the nation in per-capita generation
 - Doubled capacity in 2009 – new tax benefit
- **Bioenergy Master Plan fulfilling purpose of kick-starting industry**
- **Storage Projects being developed on all islands**
- **1st in nation in energy performance contracts per capita**
- **Clean Energy Standards among highest in the nation**
- **Clear and maturing plan to reach objectives – transformation is real and within reach**
- **Broad set of partnerships – Federal, State, County, NGO, Industry**

GHG Emissions Changes Under HCEI

Target: 13,660 kt CO₂e

2007: 15,487 kt CO₂e

Work Plan or case	Description	Emissions in 2020 (CO ₂ e)	Amount Below 1990 Target CO ₂ e	% Below 1990 Target Level
Work Plan 1	HCEI & added proposed policies are met on time	8,377 kt	5,280 kt	38.7%
Work Plan 2	State Carbon Tax used w/ Work Plan 1	8,327 kt	5,330 kt	39.0%
Work Plan 3	Federal Cap & Trade system used with Work Plan 1	8,324 kt	5,340 kt	39.1%
Reference Case	Existing laws & policies met on time	13,122 kt	538 kt	4.0%

HCEI can reduce Hawaii Greenhouse Gases by 50% by 2020



HCEI National News Coverage



≡ greentechmedia:

The CHRISTIAN SCIENCE
MONITOR

Detroit Free Press
www.freep.com



BusinessWeek



RENEWABLE
ENERGY
WORLD.COM

GOVERNMENT TECHNOLOGY
SOLUTIONS FOR STATE AND LOCAL GOVERNMENT

the Atlantic

The New York Times



Newsweek



THE HUFFINGTON POST
THE INTERNET NEWSPAPER: NEWS BLOGS VIDEO COMMUNITY

Los Angeles Times

Nikkei BP



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#1: Vast Reserves of Efficiency



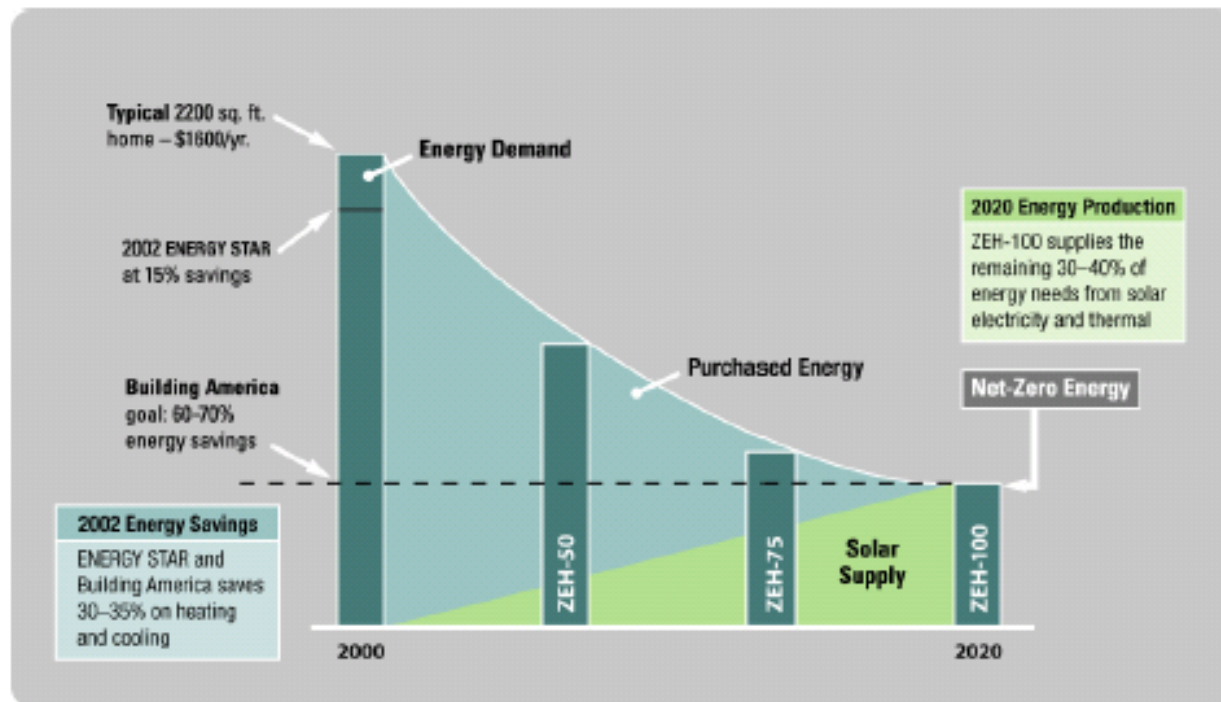
Office buildings, homes, schools, retail, infrastructure, etc.

Efficiency: “Nega” watts

- Efficiency in the US is increasing at a rate of 2.5-3.5% per year
- The U.S. Department of Energy estimates that increasing energy efficiency throughout the economy could cut national energy use by 10% or more in 2010 and about 20% in 2020
- Hawaii law requires 4,300 GWh saved per year by 2030
- Peak load in 2008: 10,422 GWH
- Buildings account for 72% of the nation’s electricity consumption

Existing buildings are a critical component of the state’s drive to energy efficiency

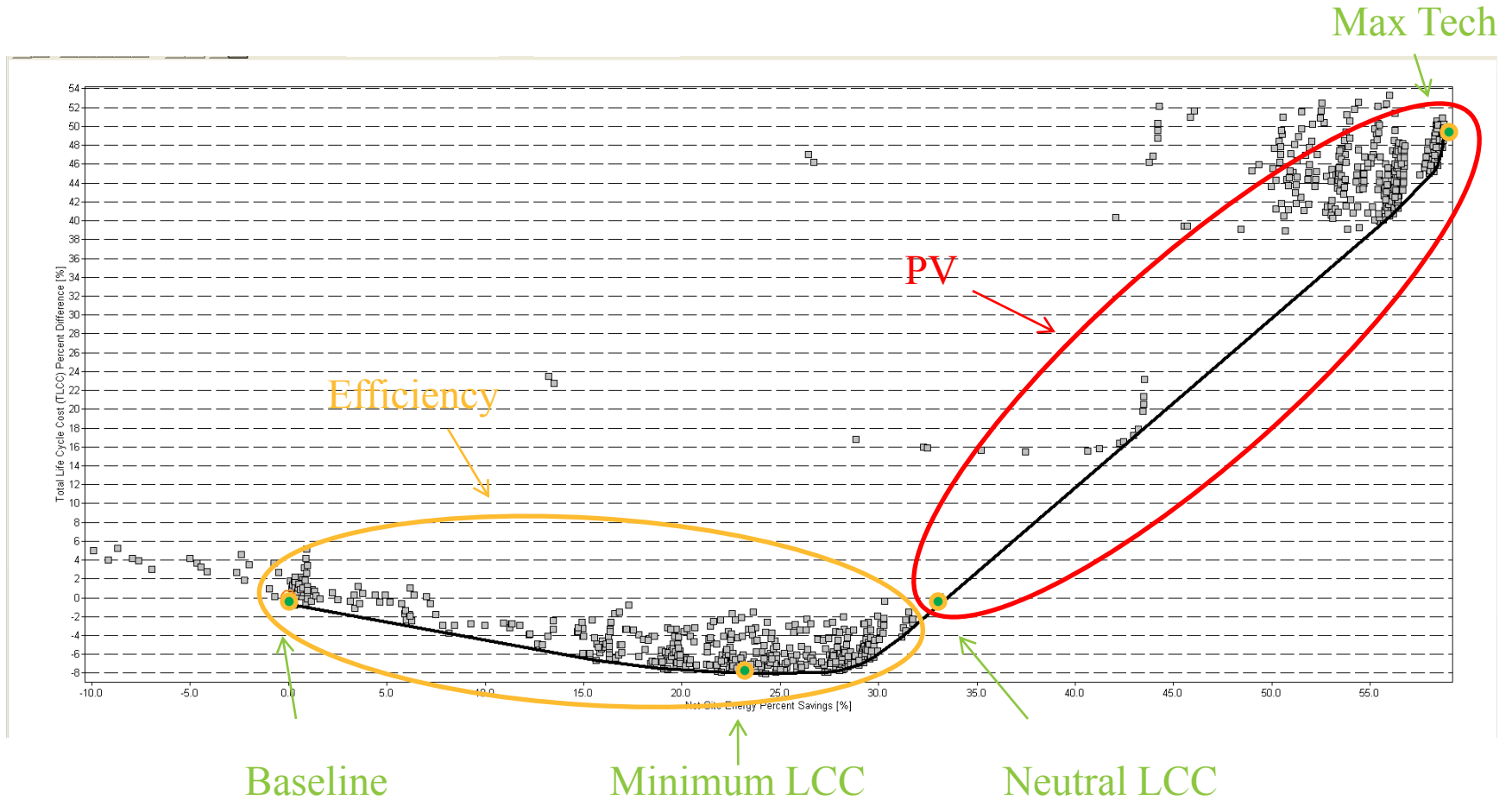
Residential Integration: The Building America program is marching toward zero-energy homes (ZEH) for all Americans.



Ultimate goal is a zero-energy home using cost-effective tools, techniques, and integrated technologies, systems, and designs for buildings that generate and use energy so efficiently that buildings are capable of generating as much energy as they consume on an annual basis at neutral cash flow.

Analysis Examples: Commercial Building Code Analysis

Preliminary analysis results – Medium Office



Energy Performance Contracts

NEW State of Hawaii EPCs

DAGS

Announced on October 6
1.3 Million ft² of space
\$33.9 million 20-year contract
6.3 GWh savings/year

Buildings include:

- The State Capitol
 - Kalanimoku
 - Ke'elikolani
- Kekauluohi (State Archives),
 - Kekuanaoa
- Keoni Ana (Capitol Center)
 - Kinau Hale
 - Queen Lili'uokalani,
- No.1 Capitol District (Hemmeter)
- Leiopapa-A-Kamehameha (State Office Tower)

HPHA

Facilities on all islands
\$29.9 million 20-year contract
5 GWh savings/year

Additional EPCs being planned

Dept of Transportation

UH System

Dept of Education

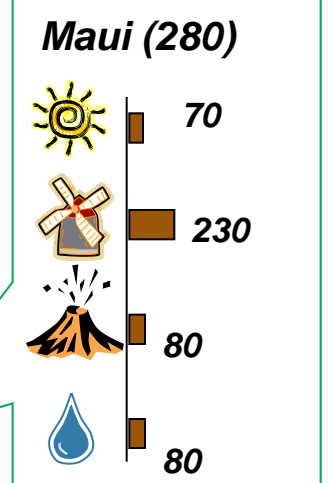
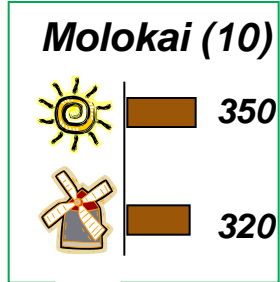
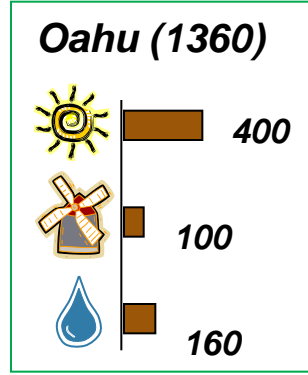
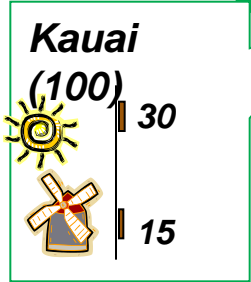
=> these compose 75% of state gov't
electricity consumption

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Hawaii's Abundant Renewable Resources ...

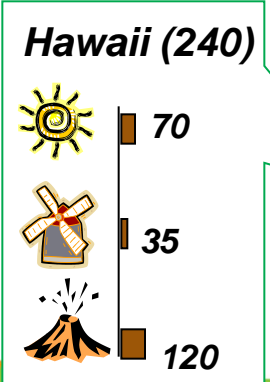
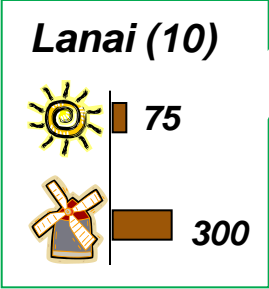
Total installed capacity of selected renewables, 2030
Megawatts



Cable
1 GW
45 km

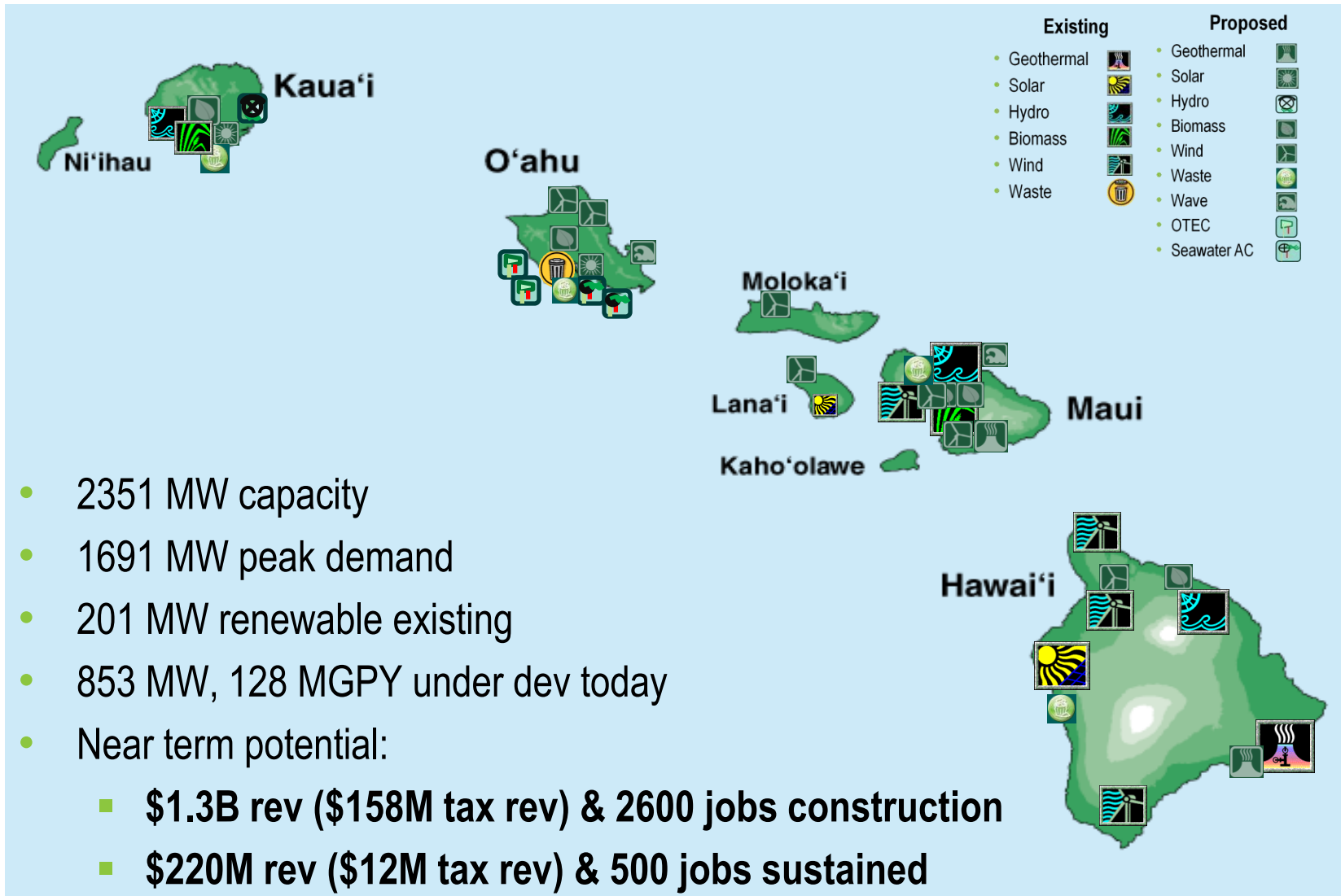
Cable
1 GW
25 km

Cable
1 GW
15 km

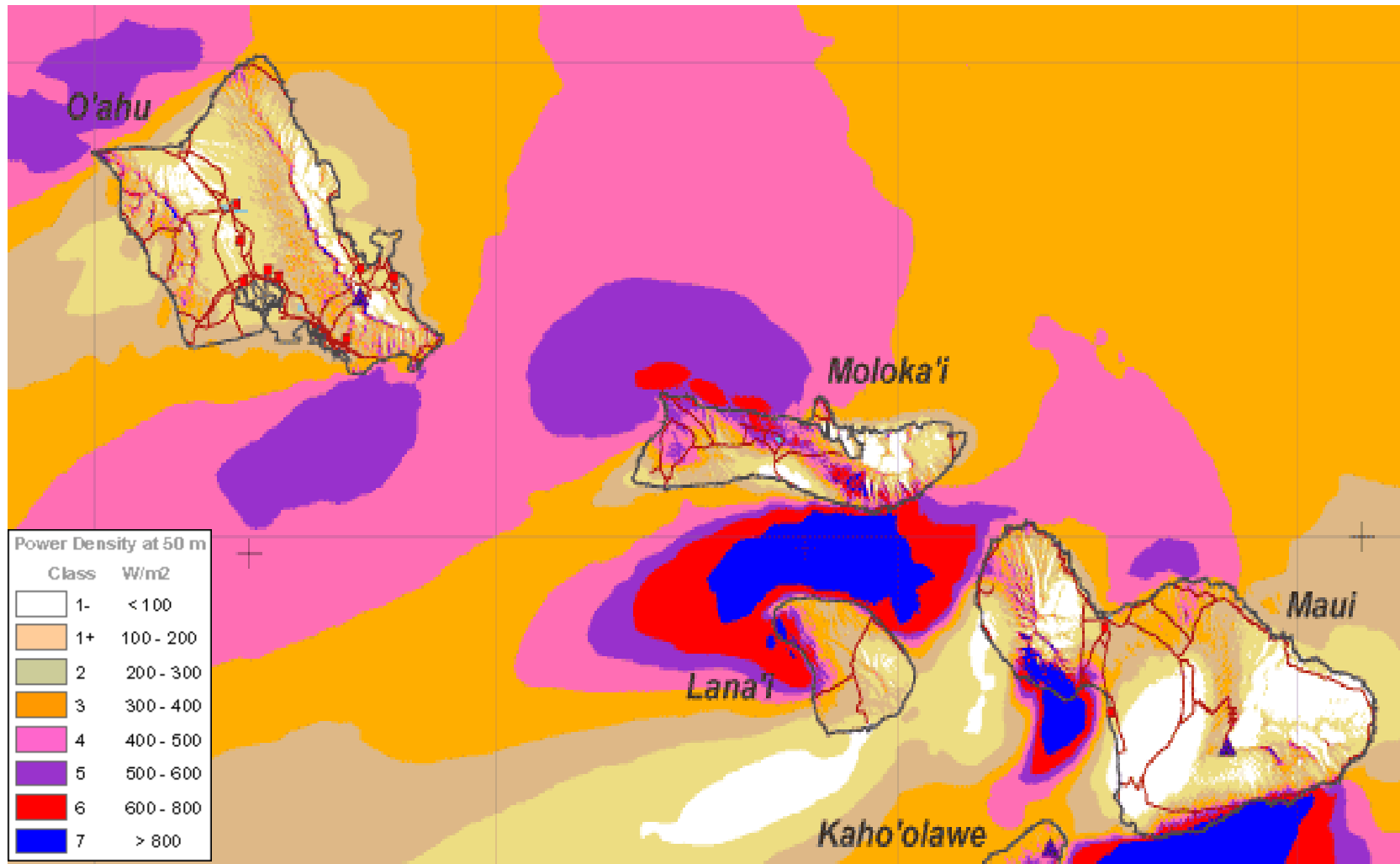


(Peak 2030 demand in MW for each island is in parentheses)

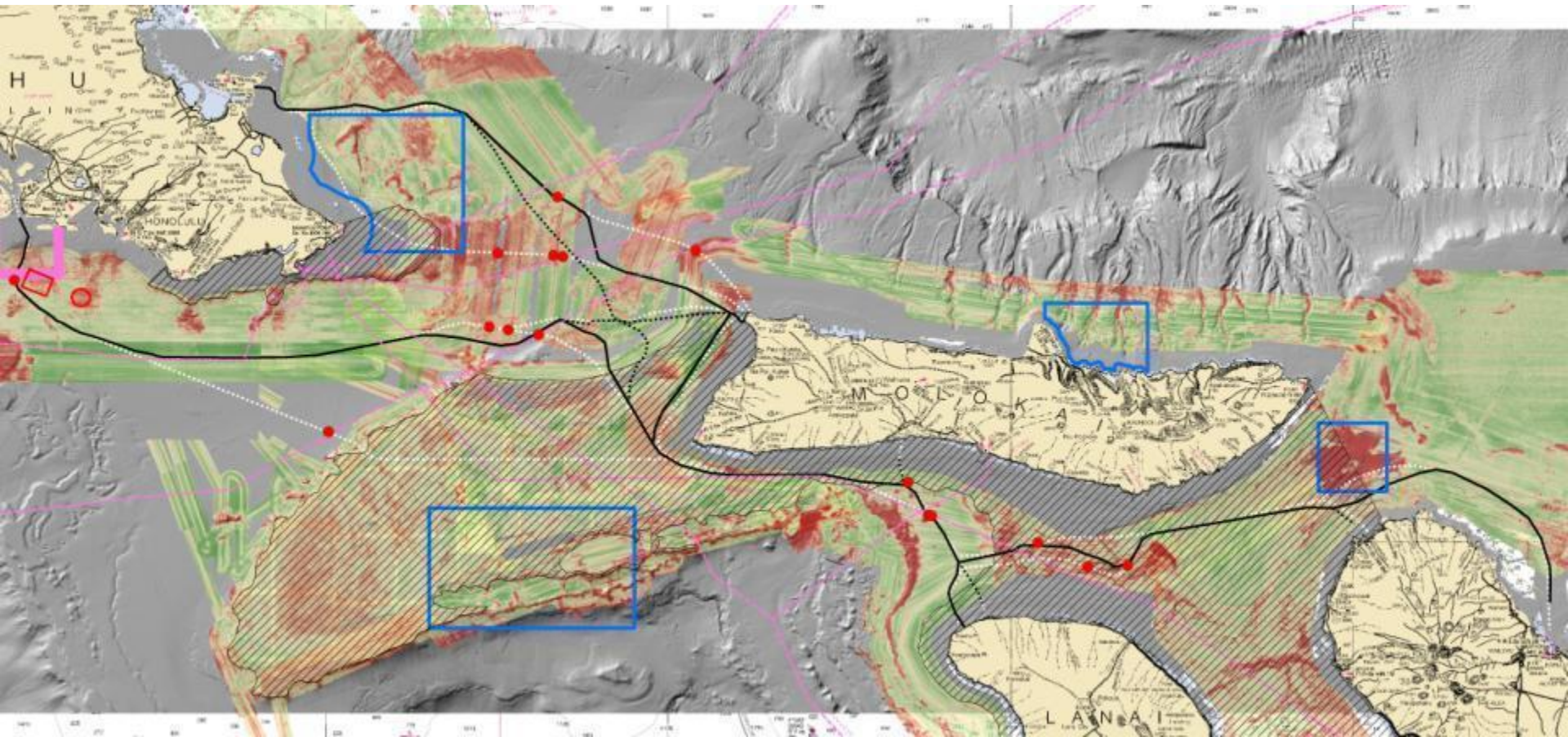
... HCEI Beginning Change



Wind on Molokai and Lanai



Potential Undersea Cable Routes



- Sea floor imagery – red = strong, green = weak
- Red dot – cable crossing; Blue box = Bottom Fish area; Hatch = whale sanctuary; Pink = Existing cable

The Road to

Locally Produced Food & Fuel

Processing Facilities

- Small, distributed local facilities convert sugars, oils, and/or fiber to fuels (ethanol, biodiesel); co-products (feeds, fertilizers, electricity, etc.); and/or bio-oil (for refinement at central facility).
- Centralized Hawaii facility converts bio-oil to refined fuels – biomass-based diesel, jet fuel, gasoline.

Fuel Distributors

- Blend biomass-based fuels with petroleum-based fuels.
- Ensure that fuels meet all Federal, State, industry, and manufacturer specifications.
- Communicate that fungible biomass-based fuels have the same properties and handling as their petroleum-based counterparts, and can be blended, transported, stored, and used in the same equipment.

Fuel Users

- Land and Marine: Use biomass based fuels alone or in blends with petroleum based fuels.
- Utility: Use biodiesels, bio-oil, and other biomass-based fuels as dispatchable power in support of other renewable energy sources; capture or provide CO₂ to algae producers.
- Aviation: Complete testing, demonstration, and certification for use in civilian and military aircraft.

Small Farms

- Identify opportunities to increase revenues or reduce costs via electricity, feed, fertilizer, by-products, or bioenergy / bio-oil feedstock production and application.
- Participate in crop trials and co-product testing when appropriate.

Large Farms

- Evaluate long-term business plans that include production of food, feed, energy, fuels, and co-products.
- Determine cost-effective scale(s) of production.
- Monitor changes in petroleum supplies and prices, fuel production technologies, crop yields, production and harvesting costs; and market(s) for product(s).
- When feasible, obtain financing; develop project(s); modify as necessary to capture new opportunities.

Seed Farmers / Ranchers / Other Producers

- Work with potential feed producers to evaluate and test suitability of co-products for local livestock and aquatic use.
- Identify opportunities to increase land utilization through co-production or intercropping.

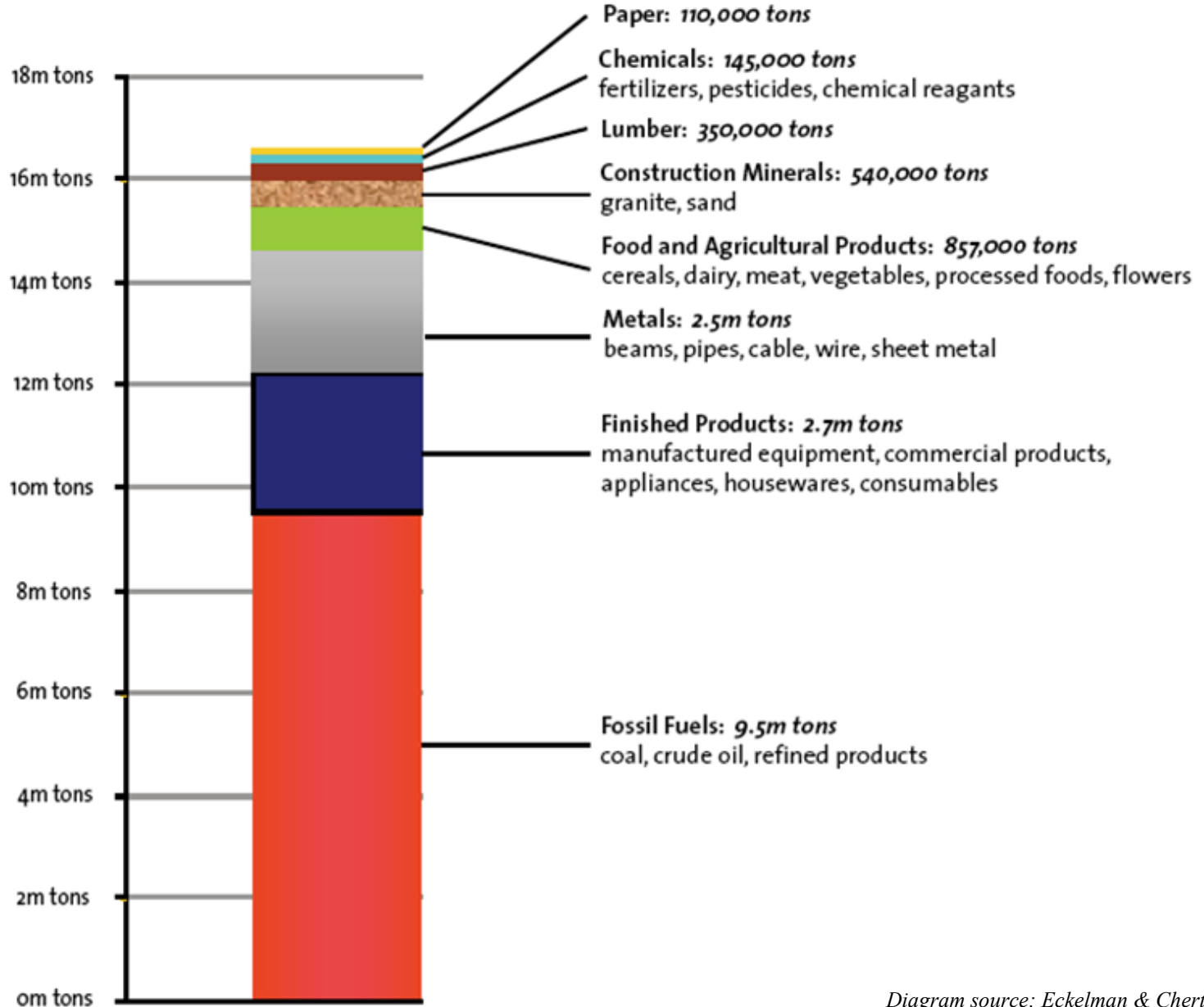
Conduct Research & Demonstrations; Provide Information & Support

- Crops: Conduct crop trials to determine Hawaii yields; hybrids suited to various Hawaii conditions, i.e. grasses (cane, sorghum); oilseeds; tree nuts; algae; trees (eucalyptus; seedless leucaena; timber); other crops, especially those with food or feed potential
- Water: Research & demonstrate use of non-potable sources; demonstrate low-loss irrigation techniques; provide information to farmers.
- Land: Provide soil type, slope, rainfall, solar insolation, temperature, and other relevant information in GIS format and downloadable maps; research potential use of lava lands.
- Harvesting: Develop and demonstrate technologies appropriate for Hawaii.
- Processing and Fuel Production: Reduce technical risk through private- and government-funded research; develop co-product utilization technologies and markets.
- Information: Establish Hawaii bioenergy website; provide information on projects, funding, incentives.
- Coordination: Facilitate introductions and discussions between investors, project developers, landowners, funding agencies, researchers, consultants, technical experts, and public and private organizations; provide capability for public input and community outreach.
- Sustainability: Provide scientific data on crop, processing, and resource utilization and best practices.
- Analysis: Develop agricultural/bioenergy decision model, with current agricultural entities and various processing facility, biorefinery, and by-product scenarios included.
- Policy: support existing Hawaii biofuel and agricultural operations.

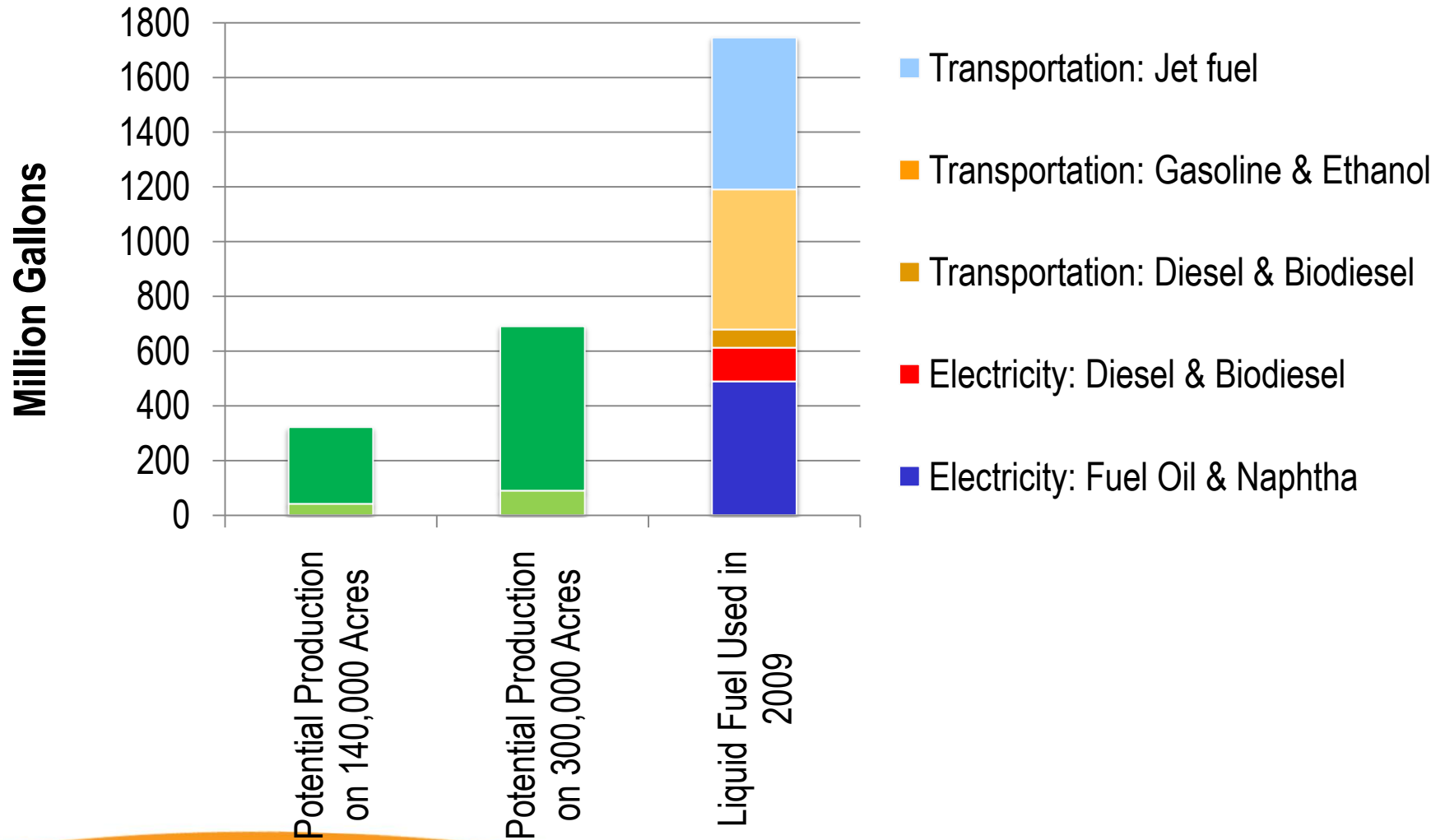
Support Agricultural Sector

- Land: Protect good agricultural land and provide long term leases and reasonable lease rents for farmers.
- Water: Maintain aging irrigation systems and plan and develop new systems. Ensure access to reliable, consistent and affordable water for agriculture.
- Energy: Address rising transportation, fertilizer, fuel, electricity, feed and other input costs through use of local resources.
- Labor: Develop programs to ensure agricultural labor availability and agricultural worker housing.
- Revenue and financing: Increase revenue (electricity sales; value from co-products); develop long term contracts to offset market volatility concerns.

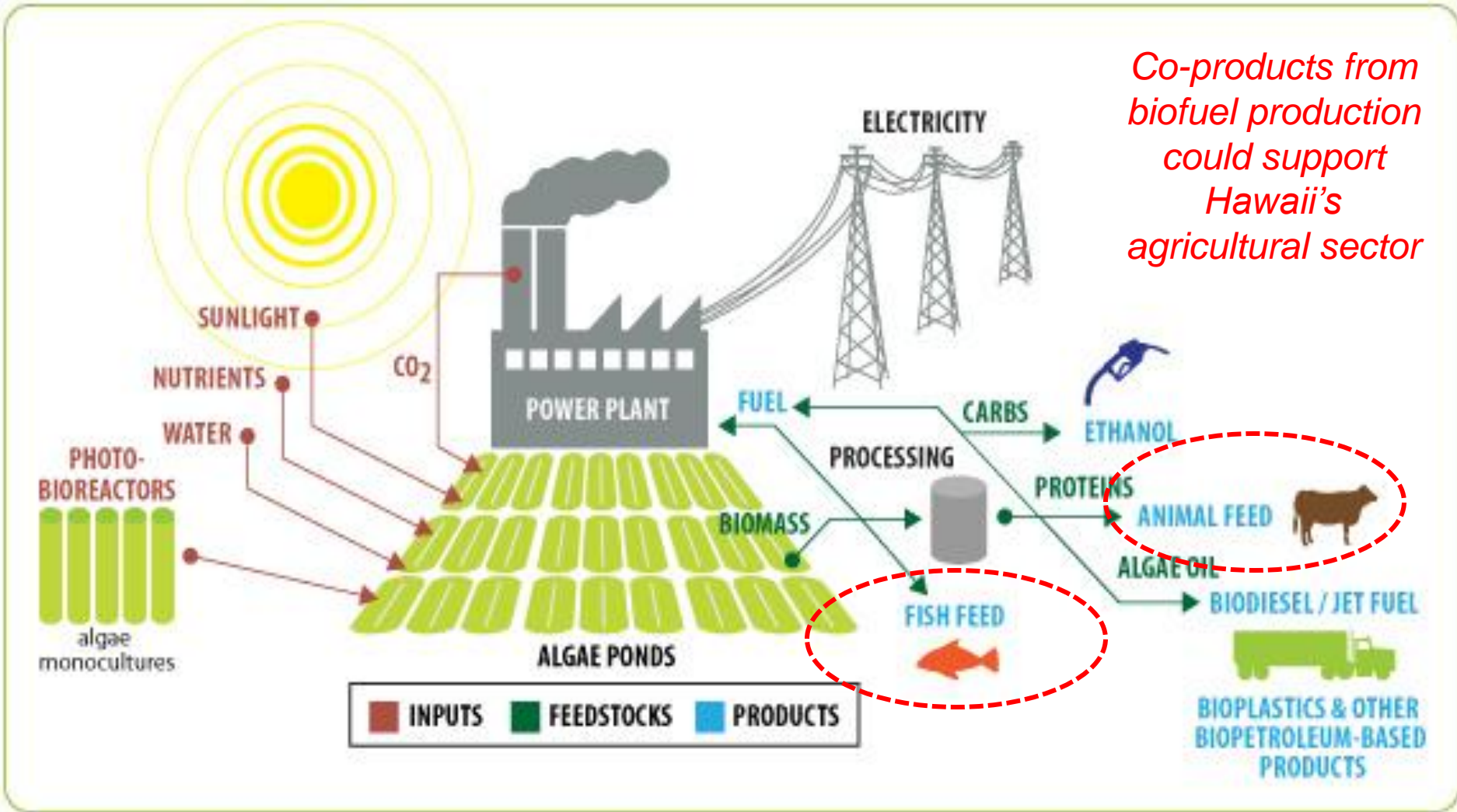
Materials Imported to Oahu – Million Tons, Annually



Liquid Fuel Use and Potential Production in Hawaii



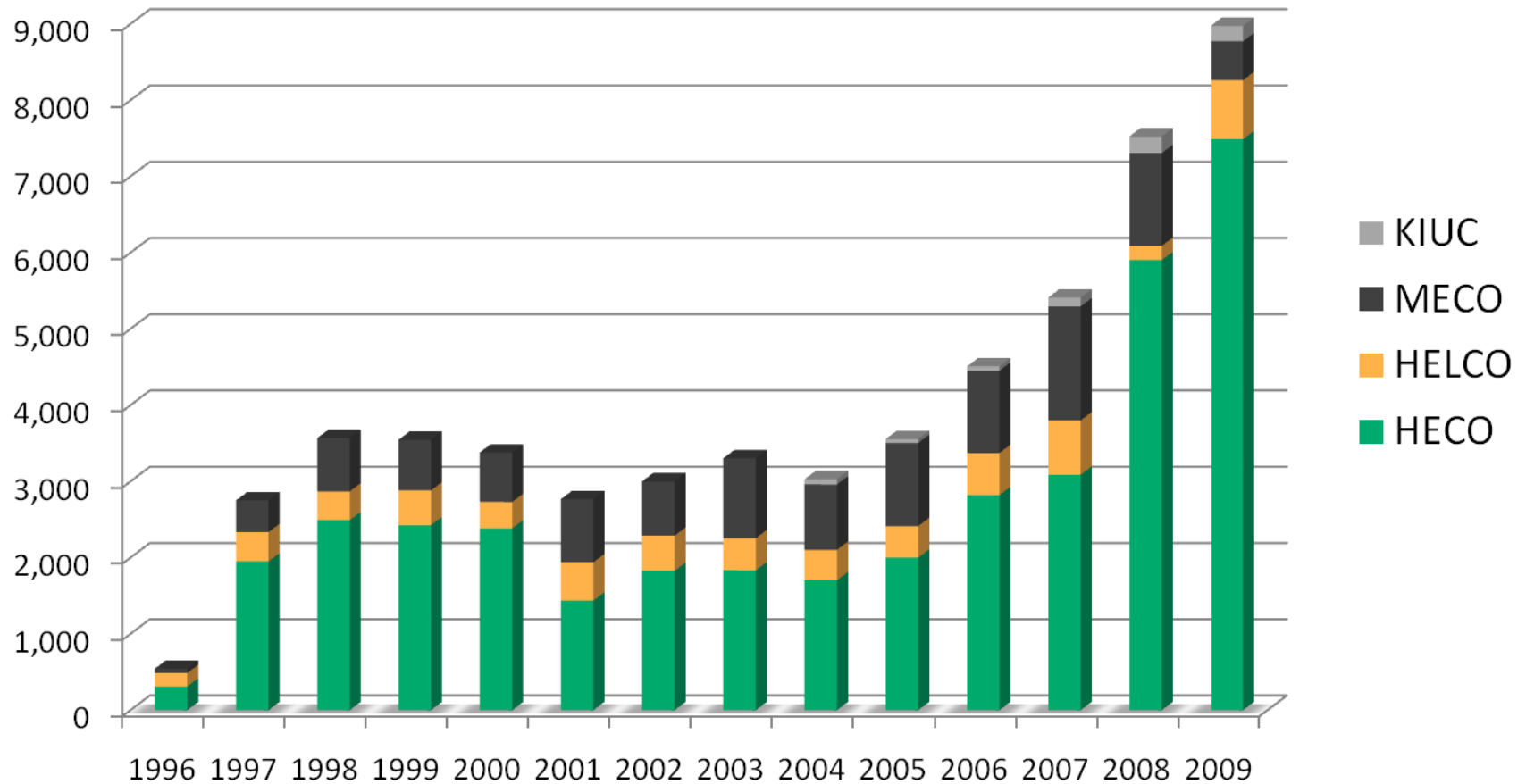
Example of Product Sets



Co-products from biofuel production could support Hawaii's agricultural sector

*Some processes give multiple products: 40% jet / 30% diesel / 20% gasoline

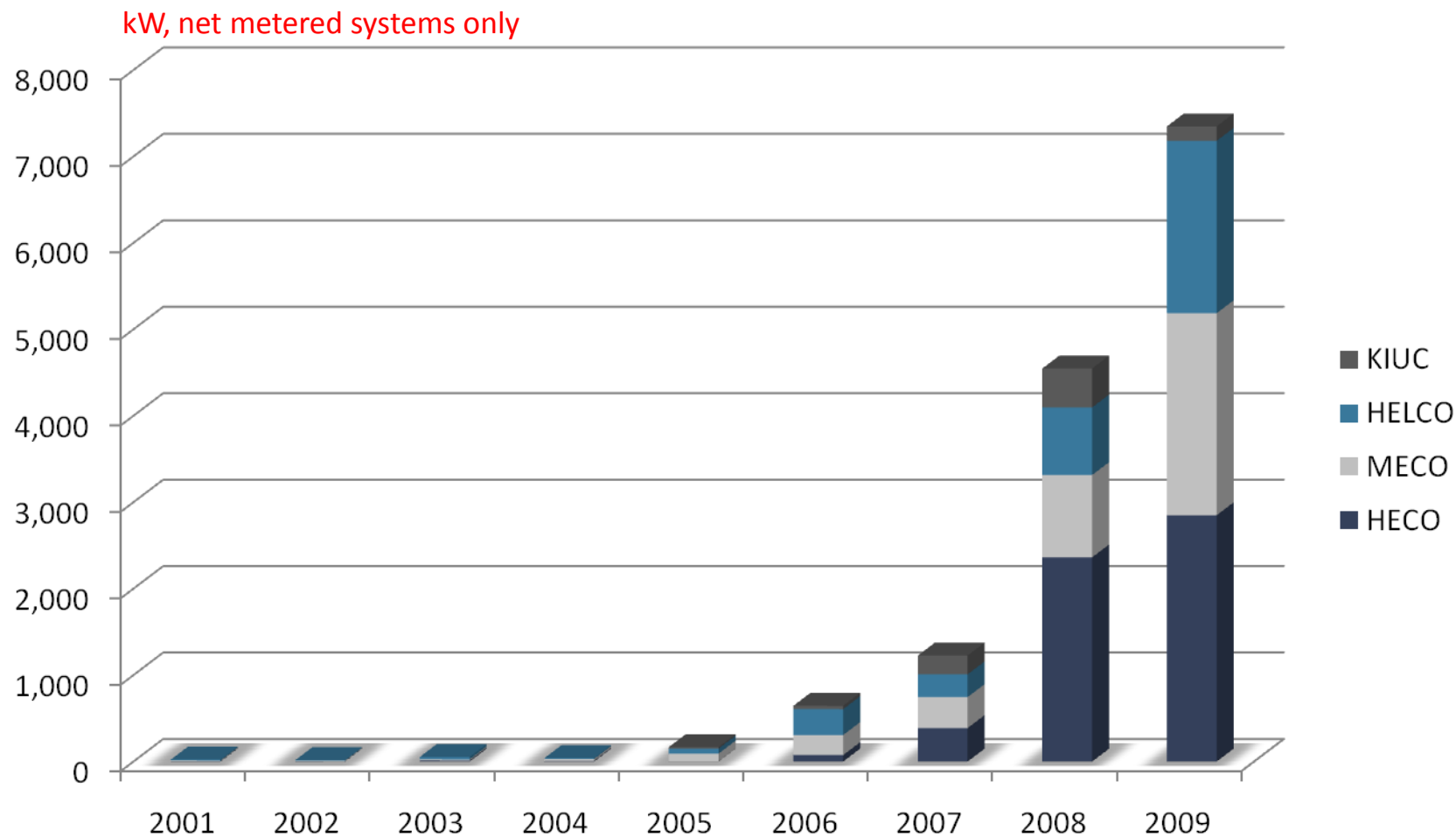
Hawaii SWH Installs, Annual



Note: KIUC excluded 1996-2003. Chart underestimates the market by not capturing non-program installs on any islands.

Source: Honeywell Utility Solutions; Hawaii Energy Efficiency Program; KIUC.

PV Market is Growing



Note: Net metered installs are only a portion of the total. In 2009 total installs were 14 MW indicating about only half of installs were NEM.

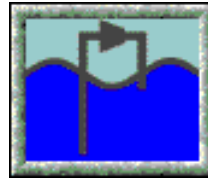
Source: HECO Companies Net Energy Metering Annual Status Report 2009 for HECO/MECO/HELCO, personal communication with KIUC staff for KIUC. KIUC had 93.1 kW installed prior to 2005.

Key Barriers/Market Flaws (HSEA issues)

- Grid access (NEM program/system limits; proposed new 14H/FIT limits; interconnection rules; lack of true reliability standards; etc.)
- Utility incentive structure
- Cost of storage
- Grid quality/smart grid status
- Financing for middle/lower-middle class owners for residential PV

#2 – Other Renewable Energy Sources

Ocean Energy



Hydropower



Geothermal

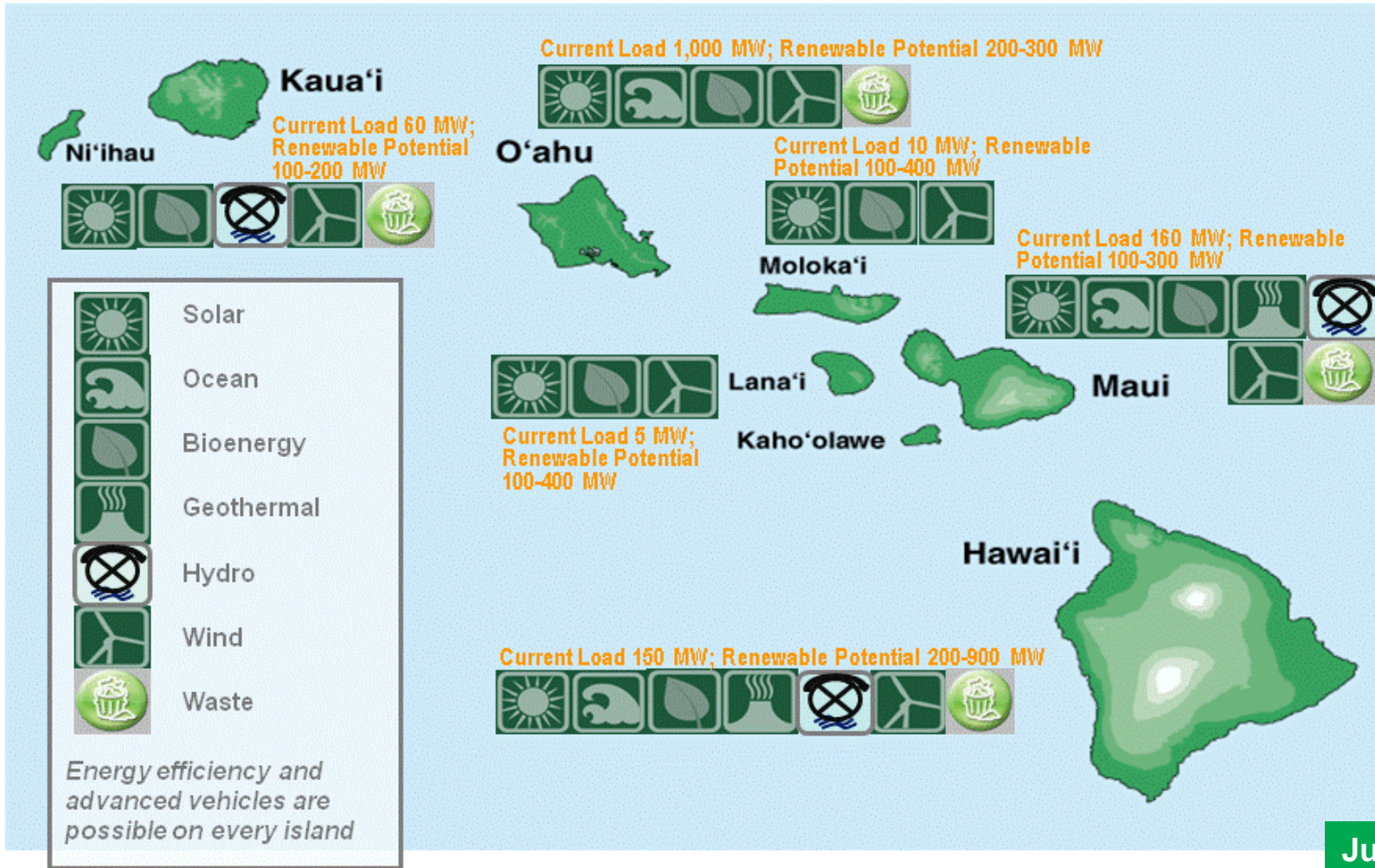
Pending actions

- US Corps Of Engineers report
- Geothermal Task Force

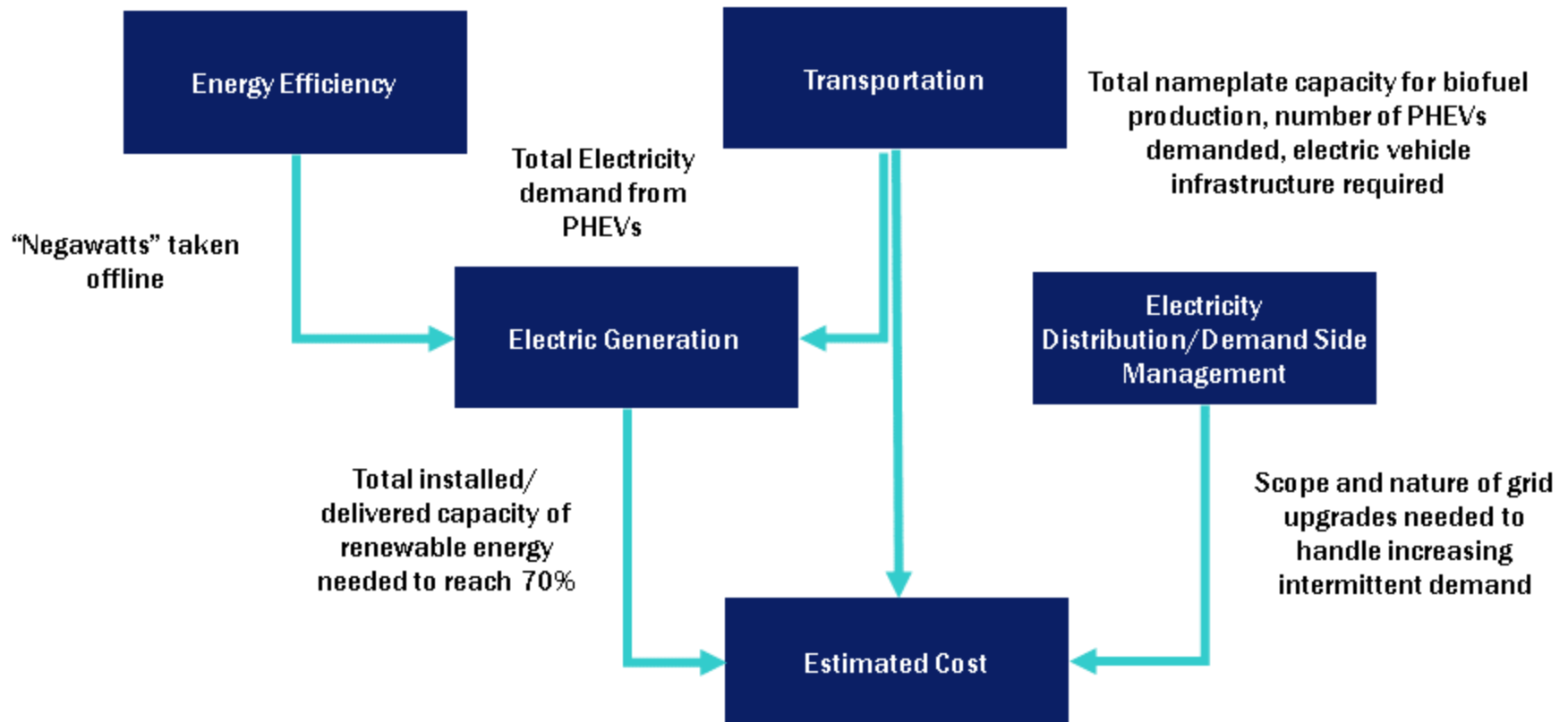
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Analysis Step 1 – Evaluate the resource potential for each island



Analysis Step 2 – Design inter-dependent models to understand complexity and project future scenarios



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Analysis Step 3 – Define scenarios that distinguish the impacts among *available policy levers*

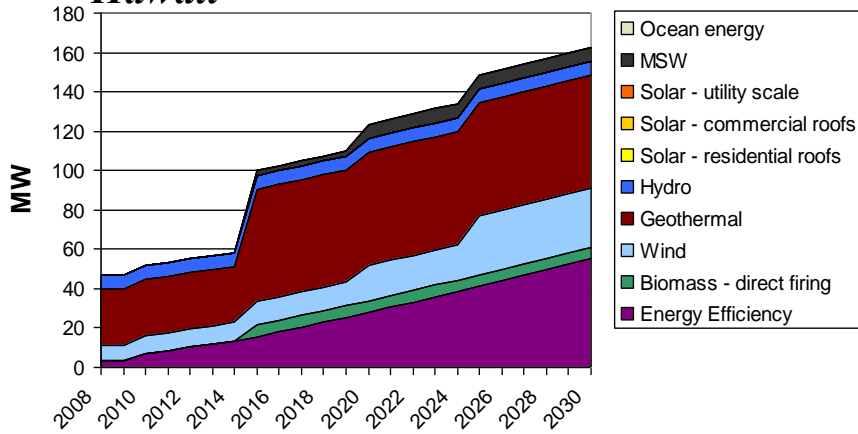
	Transportation: Maximize ethanol production and use all biofuels for transportation; low PHEV penetration	Transportation: Maximize biodiesel production and use biodiesel for electricity needs on Oahu; high PHEV penetration
Moderate Efficiency ("Maximum Achievable Potential" from utility IRPs)	1 Kauai loaded by economics (limit CSP to 14 MW) Hawaii loaded by economics (limit geo to 60 MW) Maui loaded by economics (limit geo to 42 MW, deploy 3 MW ocean) Oahu resources loaded by economics - no cable Biofuels for transportation (only ethanol) Low PHEV	3 Kauai loaded by economics (limit CSP to 14 MW) Hawaii loaded by economics (limit geo to 60 MW) Maui loaded by economics (limit geo to 42 MW, deploy 3 MW ocean) Oahu resources loaded by economics - no cable Biofuels fill in Oahu electricity to 70% (only biodiesel) High PHEV
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Note: Grey boxes have an inter-island cable

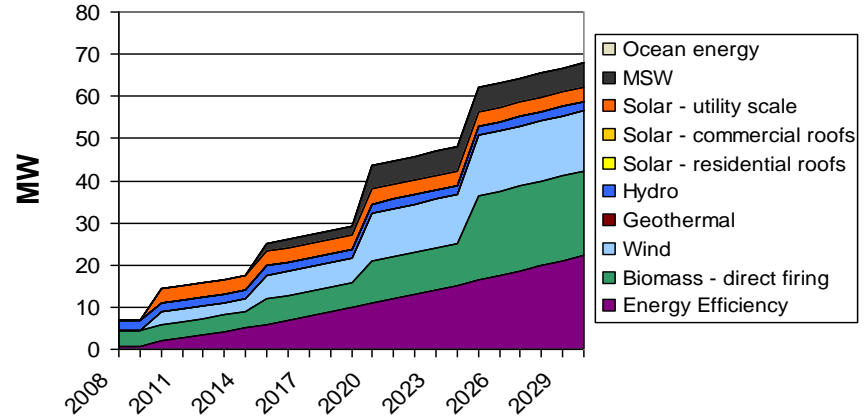
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Analysis Step 4 – Predict future deployment of economically viable renewable energy on each island

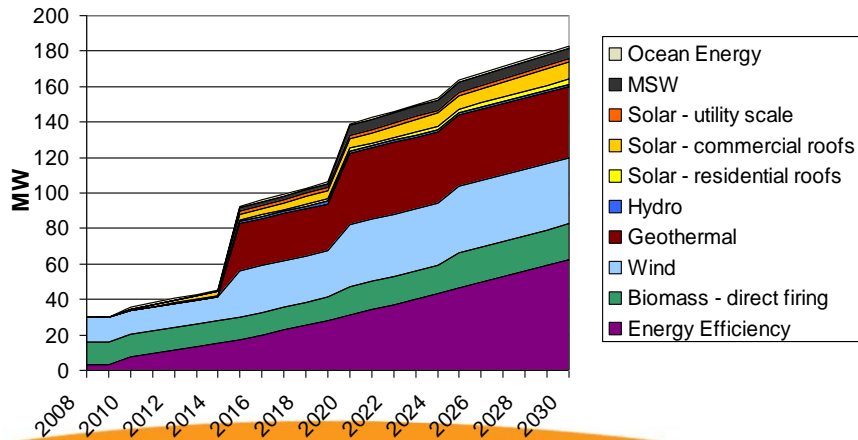
Hawaii



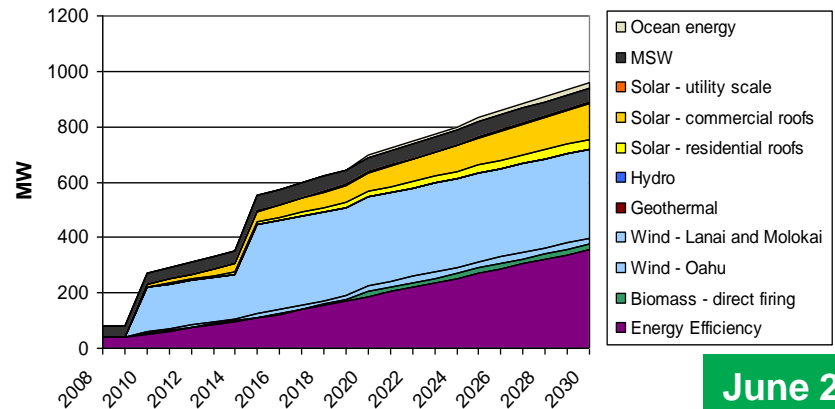
Kauai



Maui



Oahu

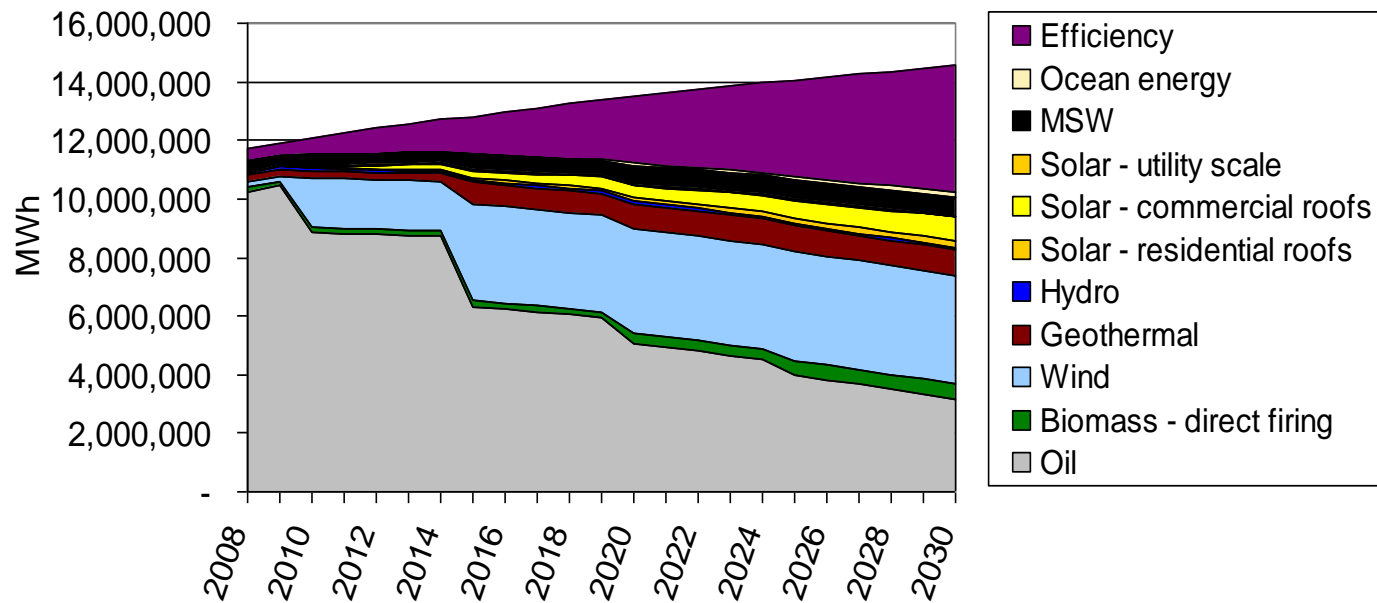


June 2008

Analysis Step 5 – Roll up information to the State level to highlight necessary policy decisions

State of Hawaii electricity generation

(Delivered capacity)



June 2008

Analysis Step 6 – Compare scenarios to identify a target scenario for policy insights and decisions

	2030 End-state for Each Scenario (installed capacity)							
	1	2	3	4	5	6	7	8
Efficiency	220	220	220	220	495	495	495	495
Biomass - direct firing	93	93	120	120	56	56	83	83
Wind	276	1076	276	1076	223	1023	260	1060
Geothermal	102	102	102	102	102	102	102	102
Hydro	36	36	40	40	24	24	24	24
Solar (residential roofs)	182	182	205	205	166	67	179	179
Solar (commercial roofs)	633	633	712	712	578	232	622	622
Solar (utility scale)	29	29	29	29	22	22	29	29
MSW	77	77	79	79	77	77	77	77
Ocean energy	53	53	53	53	53	3	53	53
Dispatchable	271	271	301	301	235	235	261	261
Non-dispatchable	1209	2009	1316	2116	1065	1370	1167	1967
Electricity Sector Clean Energy %	46%	65%	46%	63%	58%	70%	57%	70%
Oil reduction (million bbls in 2030)	10.0	14.0	11.5	15.5	12.5	15.1	14.0	17.3
CO2 avoided (million tons in 2030)	5.1	7.2	5.9	7.9	6.4	7.7	7.2	8.8
Transportation Sector Clean Energy %	30%	30%	57%	57%	30%	30%	57%	63%
Oil reduction (million bbls in 2030)	4.7	4.7	9.0	9.0	4.7	4.7	9.0	9.9
CO2 avoided (million tons in 2030)	2.0	2.0	3.8	3.8	2.0	2.0	3.8	4.2

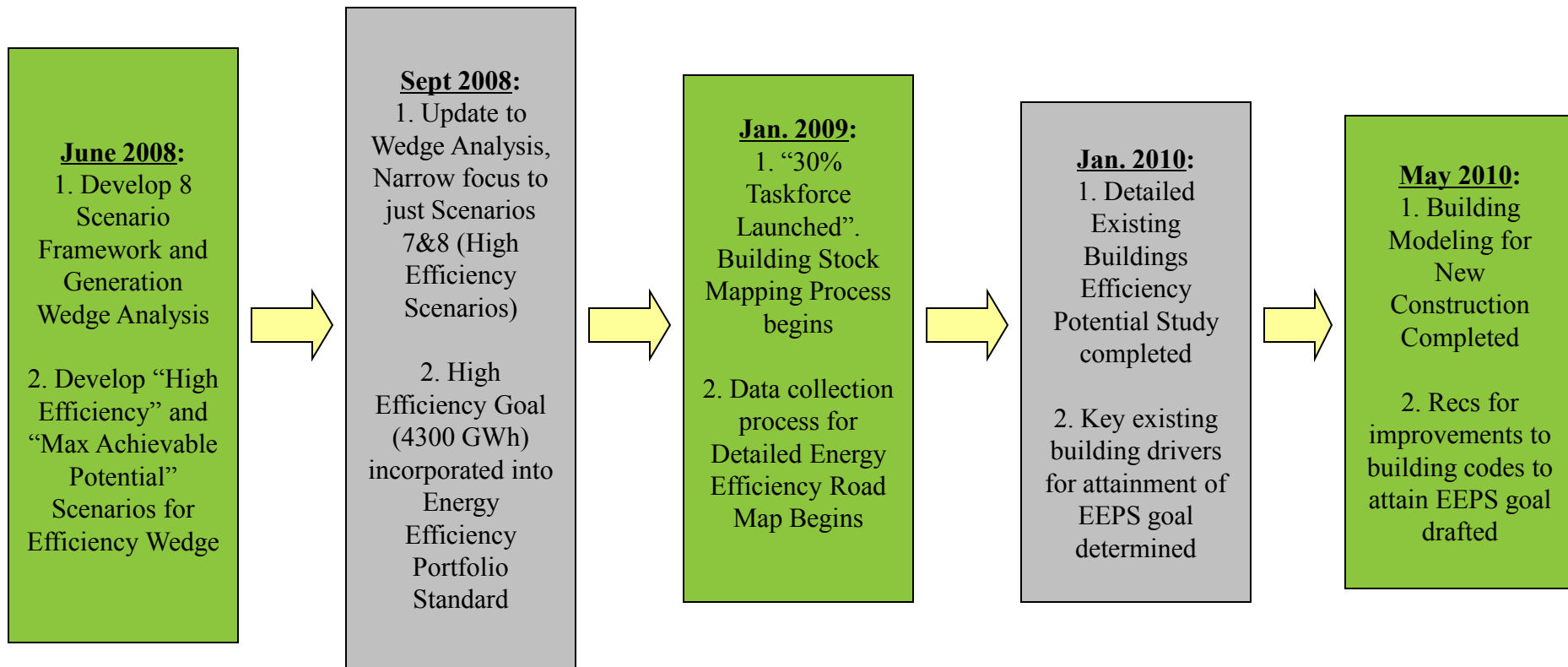
Note: All electricity sector numbers are in total installed capacity needed; transportation sector includes only ground transportation

■ Assumes inter-island cable

June 2008

Since the original scenario analysis was completed, a range of in-depth studies have been conducted

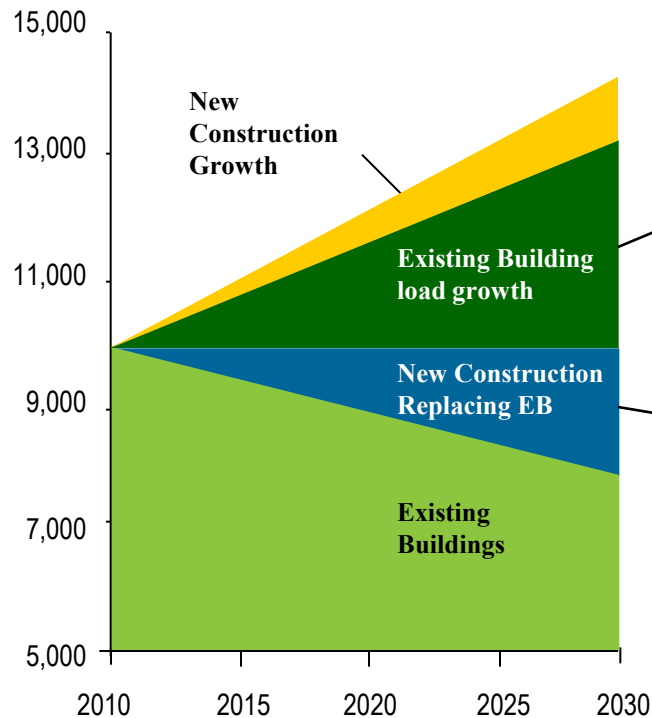
Example: End Use Efficiency Analysis*



*similar analyses were conducted for all Working Group topics

In energy efficiency, we have begun to translate detailed analysis into specific action items

Illustrative: Identification of Energy Efficiency Action Items



Recommendations from HCEI 30% Taskforce Results

Key Existing Building Next Steps:

1. Identify 2nd Generation technologies that can mitigate existing load growth (e.g. LEDs, Sea Water AC)
2. Expand education and outreach programs to encourage/incentivize private investment in building retrofits (via PACE Program?)

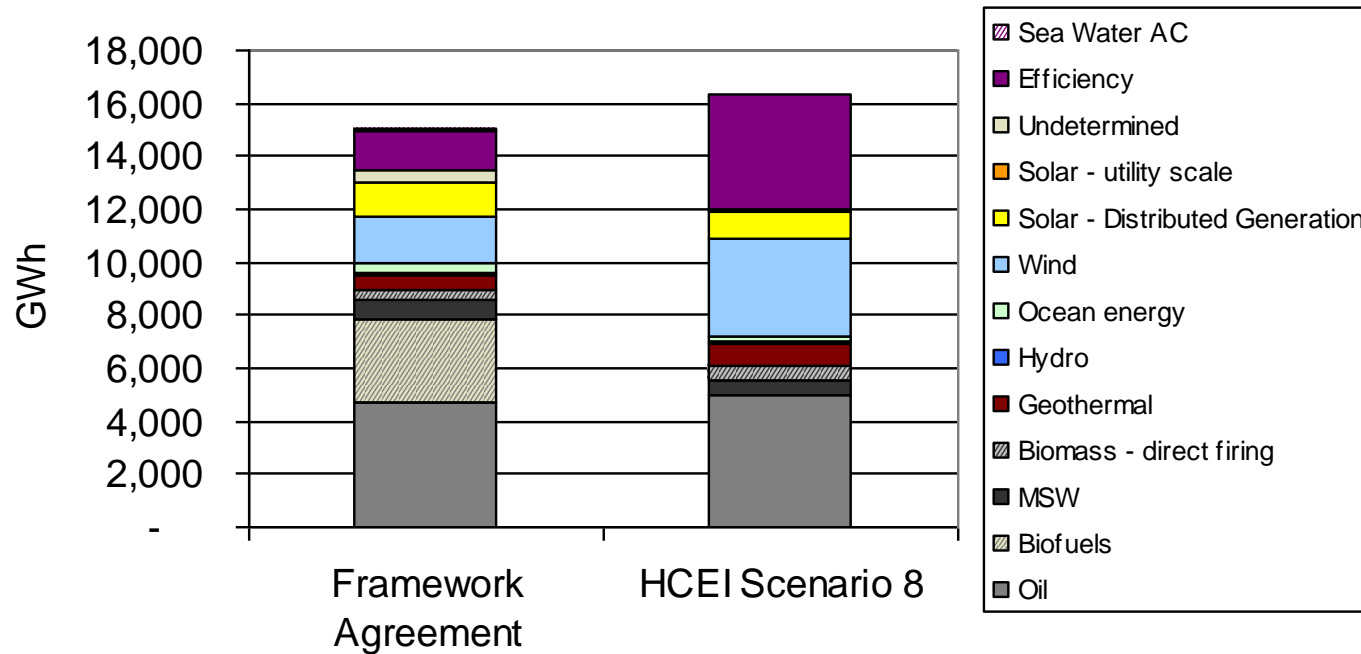
Key New Construction Next Steps:

1. Evaluate building stock to identify which buildings are the least cost effective to retrofit and would be optimal replacement candidates
2. Enhance building codes to ensure that all replacement construction is highly energy efficient

May 2010

In the electric generation case, the update is to better understand plans developed by key partners

HCEI Scenario 8 vs. Framework Agreement - Generation / Energy Efficiency Mix (2030)



Note: The difference in magnitude of total generation is due to different assumptions for PHEV/ electric vehicle deployment and resulting electricity demand

Feb. 2009

An update to “fuels” incorporated finer detail and supply estimates from the Bioenergy Master Plan

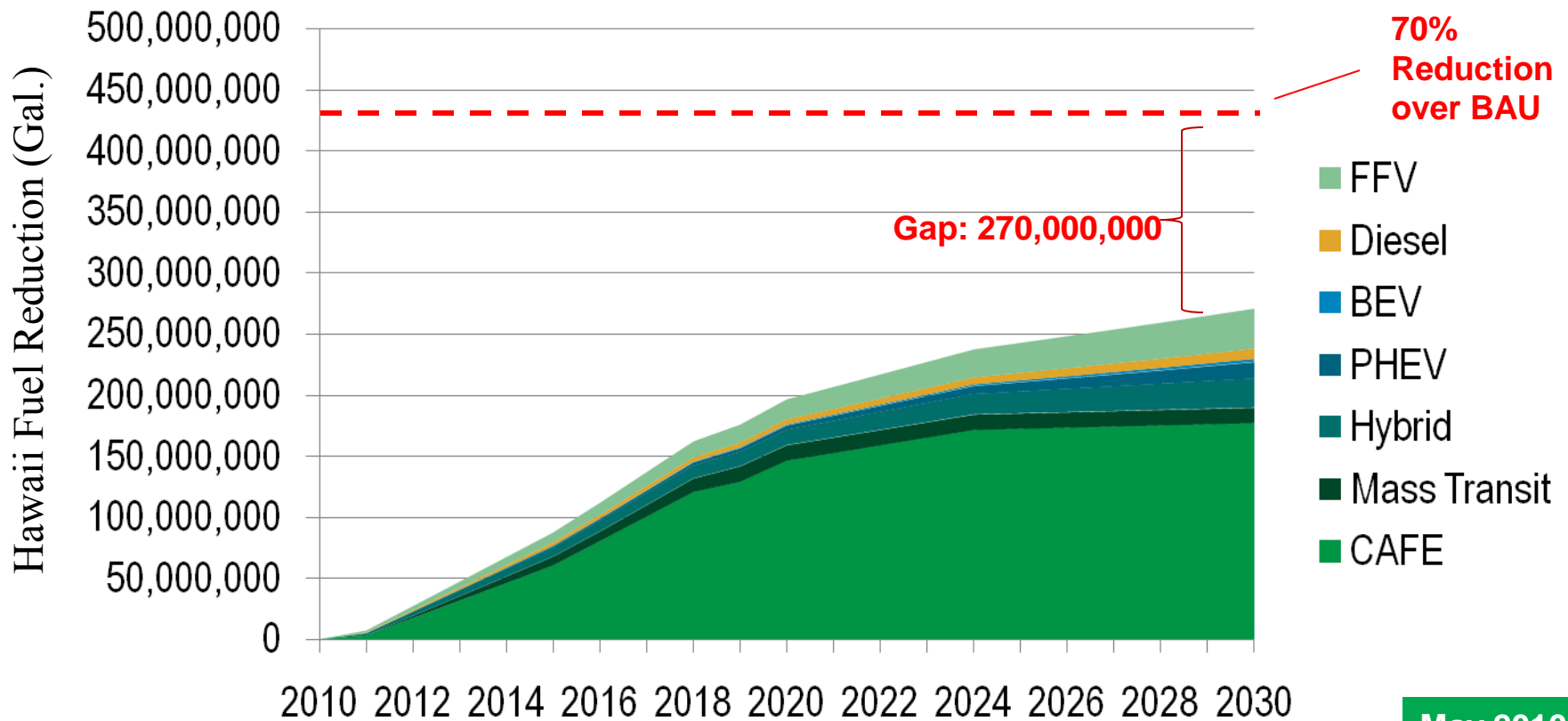
Projected 2030 Demand To Achieve 70% Clean Energy Target		Vehicles	Elect. Generation	Maritime	Aviation
→		486 MGY EtOH	233 MGY RD	29 MGY RD	585 MGY RJF
→		50 MGY RD	138 MGY RFO	76 MGY RFO	
Projected 2030 Supply**	Ethanol →	94 MGY EtOH			
	Renewable Diesel →	50 MGY RD	54 MGY RD	0	
	Renewable Fuel Oil →		79 MGY RFO	0	
	Renewable Jet Fuel →				0
Difference Required		Vehicles	Elect. Generation	Maritime	Aviation
→		392 MGY EtOH	179 MGY RD	29 MGY RD	585 MGY RJF
→			59 MGY RFO	76 MGY RFO	

**Supply from Hawaii Bioenergy Master Plan

Nov. 2009

Updates to vehicles projections are currently being used to evaluate implementation actions

Transportation Fuel Saving (Probable Scenarios)



May 2010

Assumed probable scenarios for each option with alternate vehicles replacing a standard, probable CAFE vehicle. See appendix for additional assumptions

We are finalizing a database to track implementation of both projects and enabling actions

Working Group	Action Type	Project Name	Island
Biofuels	Enabling Action	RPS Carve-out policy	All
Biofuels	Enabling Action	Land usage policies and incentives	All
Biofuels	Enabling Action	Water usage policies and incentives	All
Biofuels	Project	Refined Generation Fuel Production	Kauai
Biofuels	Project	Refined Green Fuel Production	Oahu
Biofuels	Project	Gay & Robinson, Pacific West Energy	Kauai
Biofuels	Project	Biodiesel from algae, pilot scale demonstration	
Energy Efficiency	Enabling Action	The Hawaii Energy Efficiency Program	All
Energy Efficiency	Enabling Action	The Hawaii Energy Efficiency Program	All
Energy Efficiency	Enabling Action	IECC 2006 Building Codes	All
Energy Efficiency	Enabling Action	IECC 2009 Building Codes	All
Energy Efficiency	Enabling Action	Rate Decoupling	
Energy Efficiency	Enabling Action	Energy efficiency potential study (including appliance saturation survey)	Kauai
Energy Efficiency	Project	DAGS Energy Performance Contract - Phase I	
Energy Efficiency	Project	DAGS Energy Performance Contract - Phase II	

May 2010

The roadmap compares where we are with goals, lists milestones and implementation actions—it's not static

2008-2015

Create milestones and detailed implementation targets for each working group area with a specific emphasis on:

1. Identification of key projects to focus on/implement
2. Identification of HCEI enabling actions that are necessary to ensure projects are developed on necessary scale
3. Identify regulatory or policy needs that HCEI should target to encourage private investment

2016-2024

Sketch out more general goals focusing on:

1. Identification of 2nd generation technologies to track and potentially incentivize
2. Monitoring of pilot projects in Hawaii and elsewhere for useful data
3. Implementation of policies/regulatory changes to attract investment to the state

2025-2030

While specifics will be difficult to pin down for this timeframe, focus should be paid here to

1. How to monitor and verify success
2. General milestones that must be met for goal to be attained in a reasonable manner
3. What constitutes an appropriate sunset policy for HCEI?

HCEI: 2008-2030

The roadmap as a document should align with HCEI Working Groups and identify critical actions

- Present an overall, integrated strategic vision
- Provide more detail in each of the four Working Group areas (include quantification started in 2009 as part of the Master Plan effort)
- Provide a measure of where are/progress today
- Identify HCEI partners and roles
- Highlight critical projects and enabling actions with specific plans for next steps

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Current Status - Energy

- **100% of dollars awarded for energy activities received.**
- **We have met the USDOE's goal of obligating 85% of SEP funding by June 30, 2010, and are on track to meet the grant requirement of 100% obligation prior to September 30, 2010. The SEEARP grant is completed, awaiting invoices. The EECBG & Energy Assurance grants both expect to meet their deadlines for project completion.**
- **Hired eighteen (18) additional staff to manage and implement the ARRA SEP initiatives. Expect to hire two (2) more personnel.**
- **DBEDT is enabling public / private sector participation via:**
 - rebates (2)
 - grants (2)
 - Requests for Proposals (6)
 - Professional Services procurements (3)
 - Memoranda of Agreement (8)
 - Sole Source contracts (3)
 - Government to Government contracts (4)
 - Purchase order (1)

Government & Residential Efficiency Program

- Project Description: Upgrade through retrofits energy efficiency measures in State, County, and residential buildings.
- Project Amount: \$6.2M
- Implementation: via MOA with PUC
- Project Status: Contract signed 5/31/10
- Actual / Anticipated Economic Impact: Annual energy cost savings and the creation of jobs.

Homestead Energy Program

- **Project Description:** This project will conduct home energy audits and assessments; deliver energy efficiency and conservation education/training; and retrofit/install homes with solar water heating systems/energy-efficient lighting.
- **Project Amount:** \$2.9M
- **Implementation:** via MOA with DHHL
- **Project Status:** Funds are 100% obligated. Contracts are in place; work has begun.
- **Actual / Anticipated Economic Impact:** assist DHHL homestead communities covering 400 homes (5% of homesteads).

Kauai Energy Efficiency Programs

- **Project Description:** Energy efficiency rebate program for the County of Kauai government and residential electric utility customers.
- **Project Amount:** \$500,000 (\$200K-SEP, \$200K-EECBG, \$100K-SEEARP)
- **Implementation:** sole source (HRS-103D) with KIUC
- **Project Status:** Notice to proceed issued.
- **Actual / Anticipated Economic Impact:** Generates cost-efficiencies by using existing programs to penetrate the market and leverage contracts and infrastructure already in place for managing and implementing the rebate.

WAP Supplemental

- **Project Description:** Increase the energy efficiency of dwellings owned or occupied by low-income persons, reduce their total residential expenditures, and improve their health and safety. The WAP priority population is persons who are particularly vulnerable such as the elderly, persons with disabilities, families with children, high residential energy users, and households with high-energy burdens.
- **Project Amount:** \$500,000
- **Implementation:** via MOA with DLIR
- **Project Status:** Funds for (4) DLIR contracts being encumbered
- **Actual / Anticipated Economic Impact:** The supplemental will increase the percentage level of aid available to qualified low-income households. Energy efficiency measures to include compact fluorescent light fixtures and the installation of solar hot water systems in 750 households.

Technical Assistance for Energy Star Hotels

- **Project Description:** Conduct Energy Star benchmarking and verification for Hospitality Sector Energy Efficiency Program statewide.
- **Project Amount:** \$119,000
- **Implementation:** via RFP (HRS-103D) procurement
- **Project Status:** RFP issued / award posted
- **Actual / Anticipated Economic Impact:** Greening provides major Hawaii attractions a stronger marketing edge and operating / economic efficiencies.

Technical Assistance for Green Buildings

- Project Description: accelerate adoption of LEED green building standards.
- Project Amount: \$300,000
- Implementation: RFP (HRS-103D) procurement
- Project Status: RFP issued / Award posted
- Actual / Anticipated Economic Impact: enable 30% increased efficiency in energy and environmental design.

Technical Assistance for Energy Efficient Buildings

- **Project Description:** technical assistance and training to building owners, developers, design professionals, and county building code officials to ensure that new and renovated buildings are designed and built with high efficiency.
- **Project Amount:** \$367,000
- **Implementation:** RFP (HRS-103D) procurement
- **Project Status:** RFP issued / Award posted
- **Actual / Anticipated Economic Impact:** accelerate adoption of highly energy-efficient buildings. Reduce Building impacts on electricity consumption, carbon dioxide emissions, raw materials use, waste output, and potable water consumption.

Seawater Air Conditioning

- **Project Description:** Startup project to expedite implementation, attract financing, and document data on high efficiency/renewable energy application of sea water air conditioning for Waikiki hotels, the Hawaii Convention Center, and other nearby appropriate facilities.
- **Project Amount:** \$200,000
- **Implementation:** via government to government procurement (HRS-103D) with UH-Sea Grant
- **Project Status:** Contract signed
- **Actual / Anticipated Economic Impact:** Will accelerate this project moving from concept to construction.

PV for State Buildings

- **Project Description:** This project will be a PV demonstration to reduce energy consumption within public buildings.
- **Project Amount:** \$3M
- **Implementation:** via MOA with DAGS
- **Project Status:** Funds are 100% obligated. Contract is in place; work will begin at the end of July, 2010.
- **Actual / Anticipated Economic Impact:** The DAGS goal is to achieve 40 percent reduction in energy consumption for State office buildings under its management and control.

On-line Permitting System

- Project Description: Develop a permitting portal for renewable energy projects to provide an automated process for permit selection and coordination.
- Project Amount: \$375,000
- Implementation: via MOA with DOH
- Project Status: MOA executed 5/27/10
- Actual / Anticipated Economic Impact: Will allow developers a more cost-effective process for permitting projects.

Permitting Guidebooks & On-line Information

- **Project Description:** complete the Hawaii-specific renewable energy permitting guidebooks for each of the main renewable energy technologies and for each of the Counties.
- **Project Amount:** \$150,000
- **Implementation:** Professional Services (HRS-103D) Procurement
- **Project Status:** solicitation for this contract is being finalized. Work is scheduled to begin September, 2010.
- **Actual / Anticipated Economic Impact:** users will be able to create individual project files (permit plans) to identify necessary permits and estimate project development timelines.

Bio-energy Implementation

- **Project Description:** collaborative bio-energy, integrated agricultural and energy analysis, and food-and-fuel development.
- **Project Amount:** \$60,000
- **Implementation:** Purchase Order (HRS-103D) Procurement
- **Project Status:** Funds for this project are 100% obligated.
- **Actual / Anticipated Economic Impact:** conduct a net energy analysis of a plantation-scale Eucalyptus production system, and identify the carbon and greenhouse gas implications of utilizing existing Eucalyptus trees for bioenergy production.

Renewable Energy Tipping Point (Battery Energy Storage)

- **Project Description:** Demonstrate energy storage on the electrical grid to enhance grid stability and "tip" intermittent energy projects from concept into matter-of-fact by enabling technical solutions to interconnection concerns.
- **Project Amount:** \$2.1M
- **Implementation:** sole source (HRS-103D) procurement with HECO
- **Project Status:** funds to be fully obligated by August.
- **Actual / Anticipated Economic Impact:** diversify Hawaii's energy sources and improve price predictability, stability, and energy security for Hawaii's electric utilities and energy consumers.

Interisland Cable EIS

- **Project Description:** Perform required environmental, cultural, and biological studies for the interisland cable EIS and required grid upgrades on Oahu; support drafting of environmental assessment components; host stakeholder meetings on Molokai, Lanai, Maui, and Oahu.
- **Project Amount:** \$2.99M
- **Implementation:** via RFP (HRS-103D) procurement with AECOM
- **Project Status:** Contractor selected / Project initiated
- **Actual / Anticipated Economic Impact:** Directly shorten the critical path for the deployment of the undersea cable.

Undersea Ocean Floor Surveys

- Project Description: survey potential cable routes.
- Project Amount: \$300,000
- Implementation: via government to government (HRS-103D) procurement with UH-SOEST
- Project Status: project funds encumbered
- Actual / Anticipated Economic Impact: Provides evidence to substantiate implementation feasibility and cost implications of potential cable routes.

Special Deputy AG for Interisland Cable

- Project Description: Aid in the development of the interisland cable by advising DBEDT on legal, regulatory, business, financing, and strategic decisions.
- Project Amount: \$200,000
- Implementation: via government to government (HRS-103D) procurement with the Office of the Attorney General
- Project Status: encumbering project funds
- Actual / Anticipated Economic Impact: Reduce risk for the state and consumer, and shorten the timeline for getting the undersea cable in place.

Request for Information for the Interisland Cable

- Project Description: Enable DBEDT and the Hawaiian Electric Company (HECO) to collect information on the financing and development of the interisland cable via a cable developers' conference. The results of the RFI will be used in the Request for Proposal for the interisland cable.
- Project Amount: \$50,000
- Implementation: via sole source (HRS-103D) procurement with HECO
- Project Status: project funds encumbered
- Actual / Anticipated Economic Impact: Directly reduce ambiguity and cost for the cable.

Subject Matter Expert

- Project Description: The SME will help draft the RFP for the cable system, provide technical expertise, and will help develop the financial plan for the cable project.
- Project Amount: \$700,000
- Implementation: via MOA with DAGS
- Project Status: DAGS issued Professional Services notice
- Actual / Anticipated Economic Impact: Reduce risk for the state and consumer, and shorten the timeline for getting the undersea cable in place.

Transportation Energy Diversification Program

- **Project Description:** Develop a plan for rapid transformation of the energy demands of Hawaii's transportation sector. Grants and rebates for early adoption of commercially available technologies, vehicles, and infrastructure per Act 156 (2009).
- **Project Amount:** \$4.02M
- **Implementation:** via MOA with DCCA
- **Project Status:** MOA signed
- **Actual / Anticipated Economic Impact:** Will add another element in stimulating the economy.

Alternative Fuel Vehicles & Infrastructure

- Project Description: Deployment of electric vehicles in State fleets and installation of charging stations in State owned facilities.
- Project Amount: \$475,000
- Implementation: via MOA with DAGS
- Project Status: MOA signed June 30, 2010
- Actual / Anticipated Economic Impact: initiate energy demand transformation.

HCEI Outreach

- **Project Description:** Public relations, website support, community meetings, and other outreach efforts across the State for HCEI and the interisland cable.
- **Project Amount:** \$500,000
- **Implementation:** RFP (HRS-103D) procurement
- **Project Status:** 7/22/10 estimated contract award
- **Actual / Anticipated Economic Impact:** showcase energy projects and programs in order to stimulate job growth and economic development opportunities.

Energy Conference Services

- **Project Description:** provide technical assistance, training, and public education activities to encourage the use of energy-efficient and renewable energy technologies.
- **Project Amount:** \$160,000
- **Implementation:** via government to government (HRS-103D) procurement with UH Conference Center
- **Project Status:** Funds for this project are 100% obligated; contract signed on June 15, 2010.
- **Actual / Anticipated Economic Impact:** showcase energy projects and programs in order to stimulate job growth and economic development opportunities.

Innovative Clean Energy Financing

- **Project Description:** apply innovative clean energy financing initiatives to support public adoption of energy technologies by overcoming up-front economic costs and risks.
- **Project Amount:** \$2.9M
- **Implementation:** Professional Services (HRS-103D) procurement
- **Project Status:** notice at ATG for review
- **Actual / Anticipated Economic Impact:** leverage private investment and mitigate risks associated with loans.

Energy Assurance

- **Project Description:** *Address energy supply disruption risks and vulnerabilities* to assist Hawaii develop a standardized energy assurance and resiliency plan that it can rely on during energy emergencies and supply disruptions.
- **Project Amount:** \$230,000
- **Implementation:** RFP (HRS-103D) procurement
- **Project Status:** Notice at ATG for review
- **Actual / Anticipated Economic Impact:** Better planning efforts will help contribute to the resiliency of the energy sector and contribute to less costly impacts.

ARRA Evaluation Consultant

- **Project Description:** independent program evaluator to assist the State in planning and conducting evaluations of all ARRA funded energy projects managed by the State Energy Office.
- **Project Amount:** \$200,000
- **Implementation:** Professional Services (HRS-103D) procurement
- **Project Status:** Notice drafted/pending ATG review
- **Actual / Anticipated Economic Impact:** ensure accountability and transparency, using guidance from the U.S. Department of Energy and the State ARRA Coordinator.

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Four Major Traditional Barriers Need Change

First, Policy/Regulatory Framework

- No clear policy direction or incentives for driving increased renewable generation, energy efficiency and advanced T&D
 - Significant and broad shift in policy and regulatory framework
- No alignment of Interest – Utilities:: Pass-on all the risk of fossil fuel cost; no revenue-based incentive to transition to renewables and energy efficiency
 - Regulatory dockets (e.g., decoupling, cost recovery) and energy agreement
- No alignment of Interest – Consumers:
 - De-link just and reasonable rate for nonfossil fuel generated electricity from utilities' "avoided costs"
- No alignment of Interest – IPPs: Mitigate project risk and increase financial certainty
 - Feed-in tariffs; 40% RPS in statute with incentives and penalties; renewable energy project facilitation; orient land and water use policies
- Lack of clear pathway for variable and distributed renewable generation to interconnect with the grid (net metering, interconnection, etc.)

Four Major Traditional Barriers Need Change

Second, Technology Deployment & Integration at System Level

- Historically piecemealed and stove-piped approach
 - Taking a portfolio-of-renewables+liquid fuels+efficiency+T&D+vehicles approach
 - Major effort to bring traditionally *Balkanized* sector together
- No solution for (and therefore **perceived** unacceptable risk of) integration of high levels of variable renewable generation into traditional grid
 - National labs and public/private partnership projects critical: Modeling of island grids; Maui integration with First Wind, GE, MECO; Technical Review Committee for integration of 400 MW wind into 1200 MW grid; testing storage and firming technologies, others
 - Smart grid pilot projects (ARRA and DOD)
- No strategy integrating electricity and liquid fuels solutions
 - Biofuels Master Plan
- No complementary policies on energy and food security

Four Major Traditional Barriers Need Change

Third, Capital & Financing

- Need a healthy and financially viable utility to make necessary investments
 - Energy Agreement brings in the utilities
 - Decoupling docket
 - Working with “Wall Street” analysts
- Significant private investments required to fund the *capital asset turn-over* needed for a new innovation-based clean energy system
 - Price signal: e.g., Feed-in Tariff; ease of PPA negotiations; tax incentives
 - Scale signal: e.g., Energy agreement with utilities; RPS and EEPS; NEM
 - Speed signal: e.g., Renewable project facilitation
 - Federal or state loan guarantees
 - Innovative capital – revolving loan fund, property assessed financing
- True costs have to be understood and rates/cost recovery designed to balance utilities' and consumers' financial needs
 - Focus of PUC and Consumer Advocate

Four Major Traditional Barriers Need Change

Fourth, System Planning

- Hawaii's embedded energy system is built on the assumption of consistent supply of low-cost oil, central power plants, one-way grids and utilities structured to control transmission and distribution as well as generation
- New system has high levels of distributed and renewable generation with T&D systems based on instantaneous information processing leading to instantaneous control and adjustment based on balancing ever-changing generation and demand
 - PUC docket on Clean Energy Scenario Planning (replacing IRP)
 - HCEI Master Plan
 - Cost recovery for T&D
- Need higher fidelity, greater visibility and continued accountability of HCEI pathway
- PUC and policymakers: What will HCEI's total cost going to be? How ensure the consumers and the economy will truly benefit? What are the applicable ROIs?

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Key “Take-Aways”

- Energy system transformation “at speed and at scale” is possible and achievable
 - Need an integrated “systems” approach
 - Need analytical-intensive methodology
- Role of state government ...
 - set compelling but achievable “stretch” goals;
 - lead planning, convene stakeholders and establish metrics;
 - focus on policy and regulatory framework;
 - “lead by example”, including show political will; and
 - communicate, communicate, communicate!

... to facilitate markets to drive the necessary system transformation
- Real change depends on market-based policies that unleashes private innovation and capital

Key “Take-Aways” – continued

- Role of federal government and national laboratories
 - **Analytics – policy, technical, financial, other technical support**
 - **Broader perspective – best thinking and best practices**
 - **Resources – way beyond “mere” budgetary**
 - **Validation and sanity-check**
 - **“Encouragement” and “confidence”**
- Public/government funding can be catalyst and can point the direction; however, private industry funding and participation is critical
- Role of technology
 - **Needs to be a broad portfolio – no silver bullet**
 - **Mature technologies – encourage adoption (tax incentives, “mandates”)**
 - **New technologies – encourage R&D partnerships (with universities or national labs) and seek “cost buy-down” (e.g., federal loan guarantees, big buyers such as DOD/DARPA/DESC)**

Key “Take-Aways” – continued

Project facilitation – getting government out of the way – is important

- Success requires broad and strong collaborative effort within the energy sector and between energy and other sectors (e.g., agriculture) – and constantly checking and re-checking who needs to be involved
- “Change is a pain in the neck; transformation hurts all over”
 - **“Success” is when everyone is equally uncomfortable**”

Our Future Is Bright and Before Us!

Working as partners, we can achieve together what none of us could do alone

“We can create a future of energy, economic, and environmental security by taking the needed steps now. HCEI will provide clean and secure sources with stable costs, supporting a healthy and strong economy and environmental sustainability.”

