Kaua`i Energy Sustainability Plan

KIUC Board of Directors Stakeholder Meeting

8:30-10:30 am

April 3, 2009

TEAM / MANAGEMENT LEAD

Doug Hinrichs

- Midwest farm boy
- Master's training in Environmental Studies/Alternative Energy
- International Society for Ecological Economics Exec. Dir.
- Clean energy consultant for 13 years
  - Rebuild America (energy efficiency)
  - Distributed Energy (cogeneration)
  - Solar
  - Wind
  - Project development, market transformation
- Hawai`i Clean Energy Initiative
  - Manage 5 Partnership Projects (Lanai, Forest City, Bioenergy, HELCO, KIUC)
  - Clean Energy Investment Strategies and Advisory Group
  - Feed-in Tariff program/rate design
  - Utility decoupling and new business models

TEAM

TEAM / SENTECH HAWAI`I

SENTECH Hawai`i

Vision: To accelerate the nation's use of clean, responsible, and secure energy

TEAM / LEADS

Team Leads

Doug Hinrichs

SENTECH Hawai'i, LLC

Diane Zachary

Kaua`i Planning & Action Alliance

Maurice Kaya

Maurice Kaya, LLC

PROCESS

PROCESS / TIMELINE

KESP Development Process and Timeline

<u>Community Input</u>

- 10 targeted *Stakeholder Meetings*
- 5 public *Community Meetings*

<u>Energy Analysis</u>

- Kaua`i's energy use baselines
- EE/RE potential

<u>Report Development and Review</u>

- The community/stakeholder input + energy analysis = Draft Report
- Presented to the community through a "webinar" and public rollout
- One month period for feedback
- Final Plan presented in January 2010
- Vision/Goals/Barriers/Strategies/Implementation

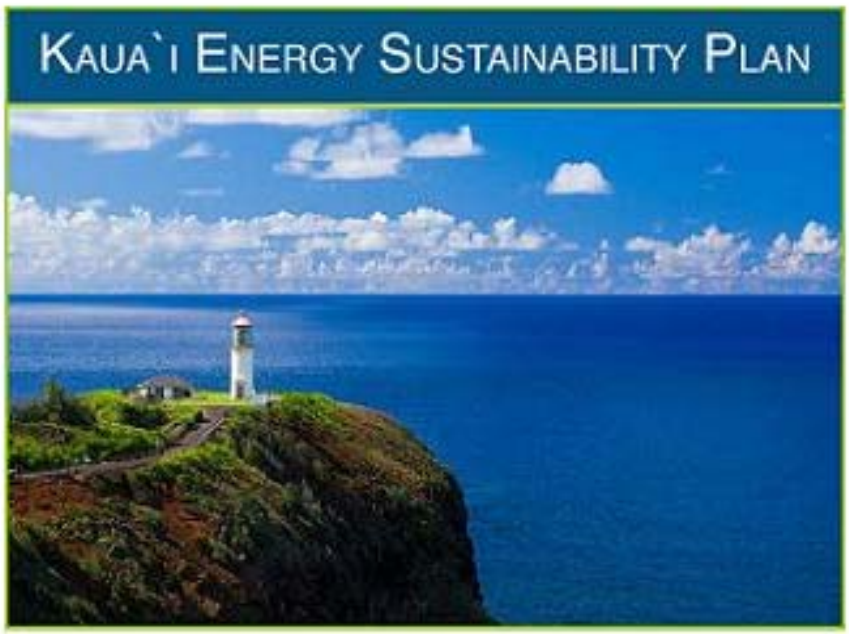
PROCESS / WEBSITE

Organizing Website

Kauai Energy Sustainability Plan

The Process | Vision and Goals | Opportunities, Barriers, and Strategies | Get Involved | Sustainable Energy Overview | Library | The SENTECH Hawai`i Team

The Kaua`i Energy Sustainability Plan (KESP) is being developed for the County of Kauai. KESP will integrate stakeholder and public interests with objective energy analysis to draft an implementable energy plan that will light the path for Kaua`i to utilize local, sustainable energy.

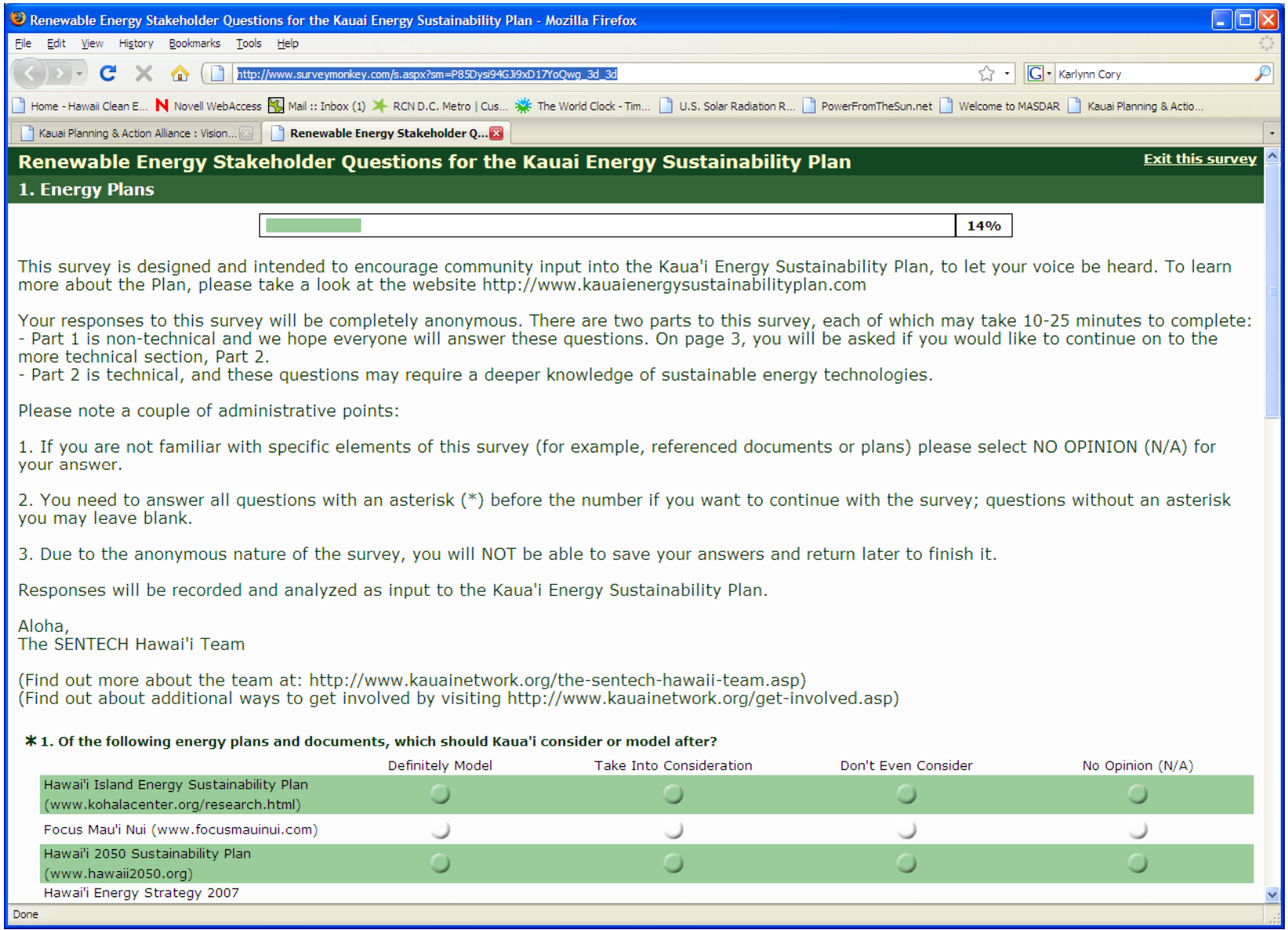


Kaua`i is the oldest, the westernmost, windiest, rainiest, and perhaps the most ruggedly beautiful of the Hawai`ian islands. The people of Kaua`i have a reputation for being independent, dating back to the time when they resisted King Kamehameha's two attempts to conquer it during his 18th-century campaign to unify the islands. Kaua`i was unified with the other islands through a negotiated agreement between the reigning ruler of Kaua`i, King Kaumuali`i, and King Kamehameha on O`ahu in 1810.

Today, the people of Kaua`i can use this same independence and willingness to negotiate for the greater good to help them overcome a modern-day threat—an overdependence on imported oil to meet their energy needs.

PROCESS / SURVEY

Survey Monkey



PROCESS / STAKEHOLDERS

10 Targeted *Stakeholder Meetings*

Meeting	Date
Renewable Energy (*KEDB RE Committee*)	April 1
KIUC Grid Stability	April 1
KIUC Board of Directors	**April 3**
Demand Side Efficiency	April 6
Government	April 6
Business, Economic Development, Agriculture	April 27
Environmental/Sustainability (*w Kirsten Turner*)	April 27
Biofuels and Ground Transportation	April 28
Large Landowners	April 28
All Stakeholders	May 14

PROCESS / COMMUNITY

5 Public *Community Meetings*

Meeting	Location	Date
East	Kapaa Middle School Cafeteria	April 30
West	Kekeha Neighborhood Center	May 4
South	Koloa Neighborhood Center	May 5
North	Hanalei Elementary School	May 12
Central	War Memorial Convention Hall, Lihue	May 13

VISION

VISION FOR 2030

A Vision for Sustainable Energy on Kaua`i in 2030

On Kaua`i in 2030, we have realized our vision for sustainable energy and we are…

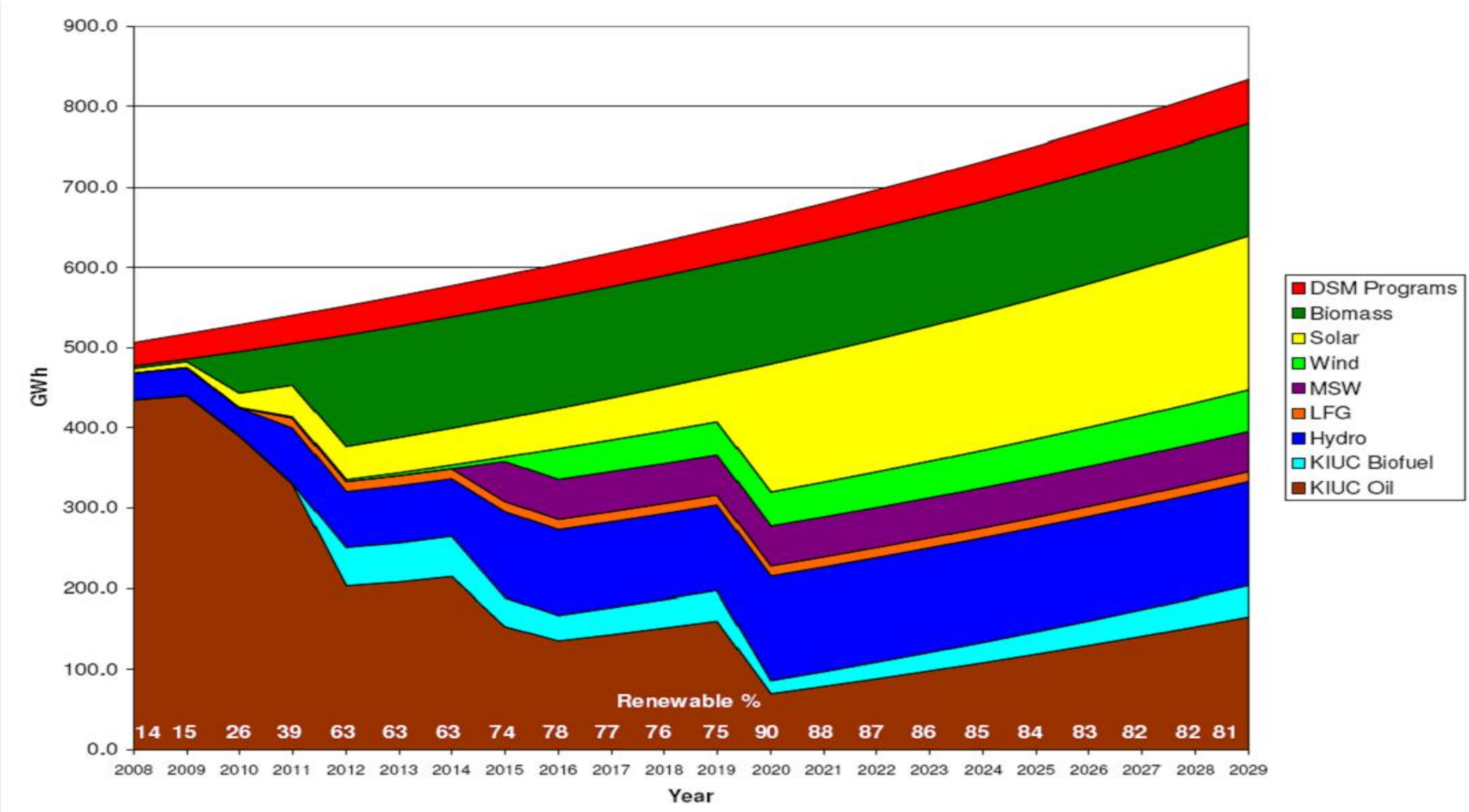
- A “garden island” of unsurpassed natural beauty whose population size and economy have been shaped to sustain our natural beauty, rural environment and lifestyle.
- Using smart growth principles to guide land use and manage energy demand to limit our carbon footprint.
- A diversified, sustainable green economy with green job opportunities.
- A community which cares for its land and waters, and has achieved a balance in utilizing land for agriculture and renewable energy production.
- An agricultural center that produces a wide range of crops, food, biofuels and biomass for local use and export.
- Utilizing our natural and plant resources efficiently and sustainably to maximize opportunities to produce renewable energy to increase our self-reliance.
- Achieving a balance in producing affordable renewable energy and in complying with environmental laws to protect wildlife.
- Selecting technical options that are cost effective and take into account Kaua`i’s scale.
- Integrating the waste stream into renewable energy production.
- Finding ways to educate and empower our citizens about energy options and how they can actively contribute to energy efficiency.
- Assisted by government at all levels in the legislative and regulatory support needed for renewable energy development and production.

NOTE: This does not address ground transportation.

GOALS

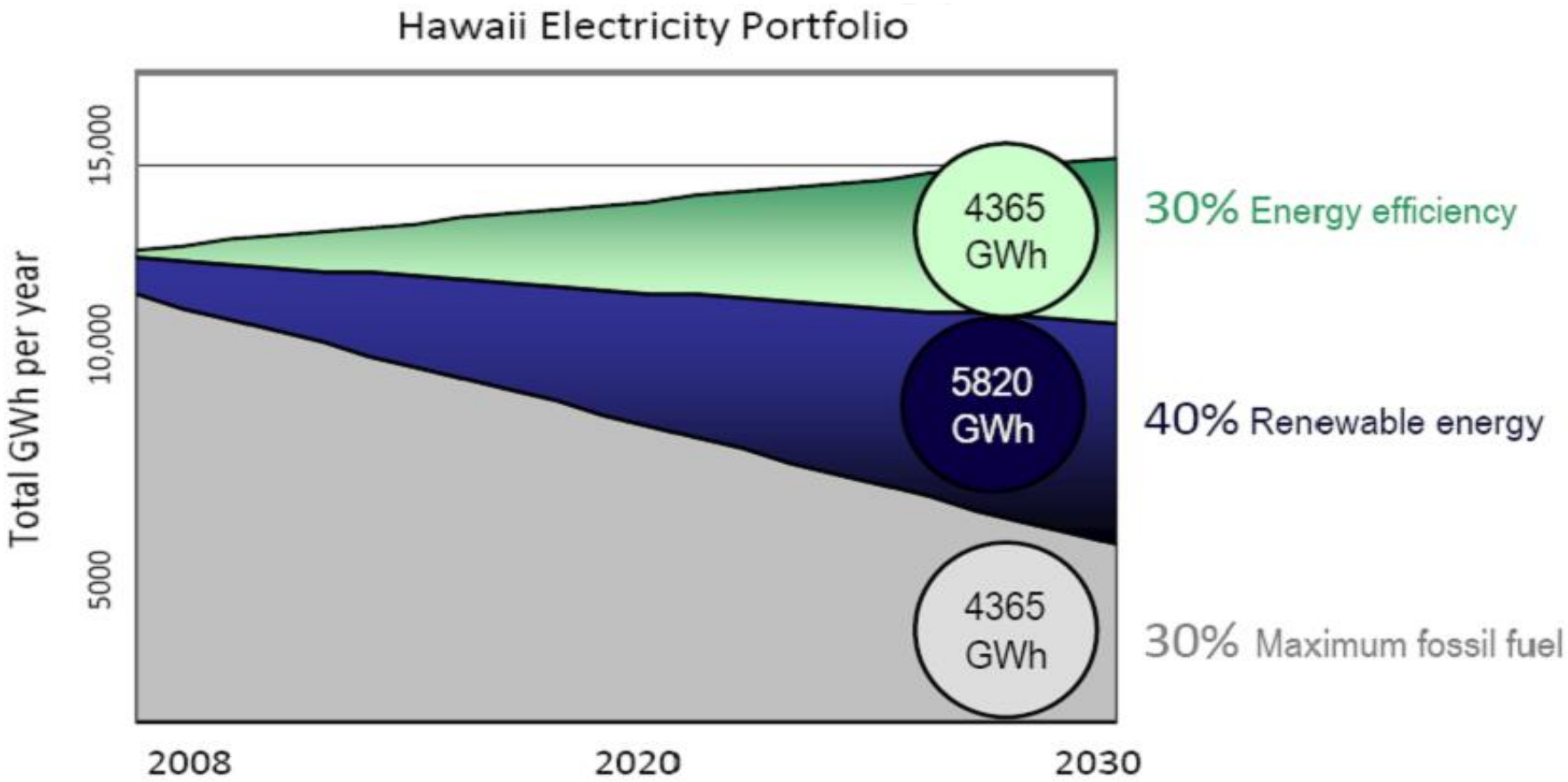
GOALS / KIUC

KIUC 50% Goal



GOALS / HCEI

HCEI 70% Goal



Note: This just reflects 2030 electricity targets; still need interim targets and transportation targets

ACTION ITEM: FEEDBACK

Goal Elements to get to XX% by 2030

DEMAND

- Current or projected by 2030?
- How do we predict load growth?

TRANSPORTATION

- Demand reduction?
  - Conservation
  - Energy efficiency
- Renewable fuels (e.g. ethanol)?
- PHEVs/EVs?

ELECTRICITY

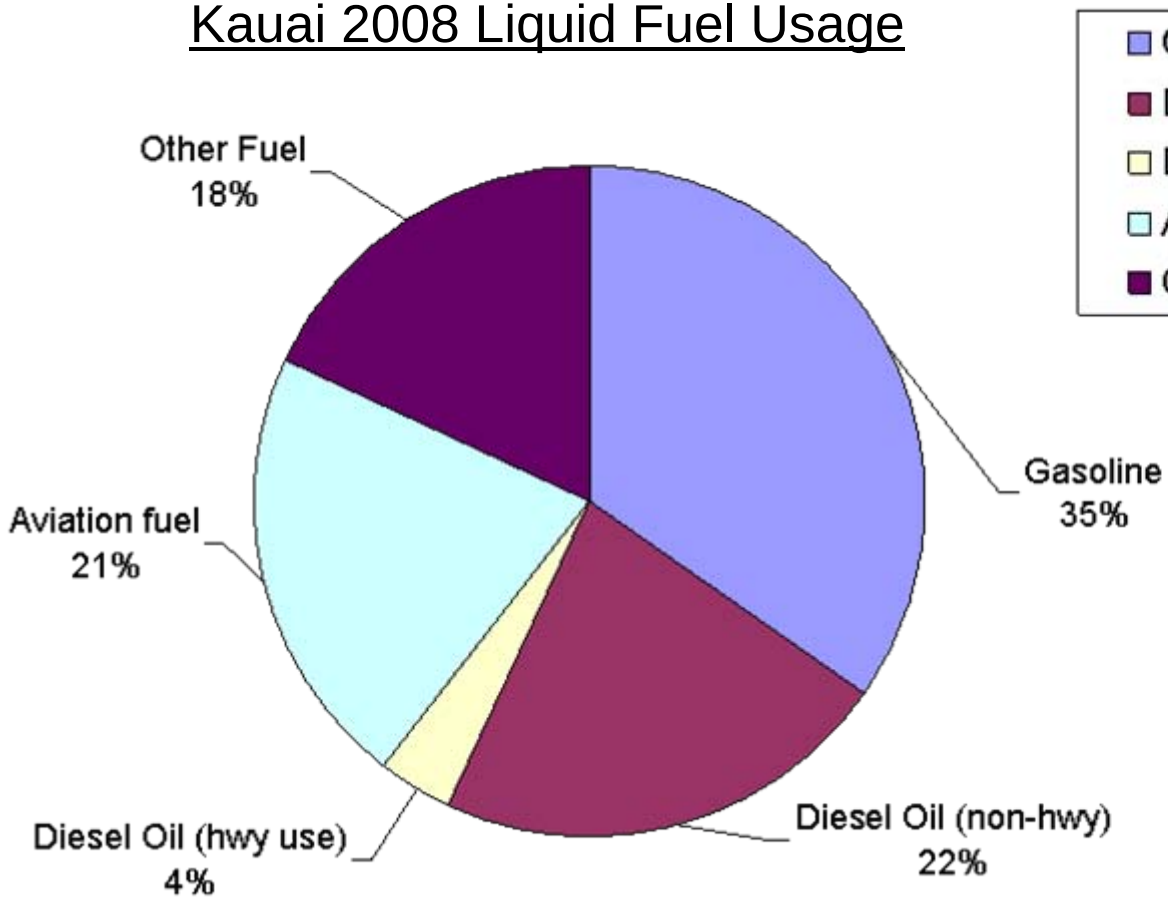
- Demand reduction?
  - Conservation
  - Energy efficiency
- Renewable energy?
- Renewable fuels (e.g. biodiesel)?
- Load management (e.g. from Smart Grid, demand response)?

BASELINE

BASELINE / TRANSPORATION

Transportation Baseline/Consumption

Kauai 2008 Liquid Fuel Usage

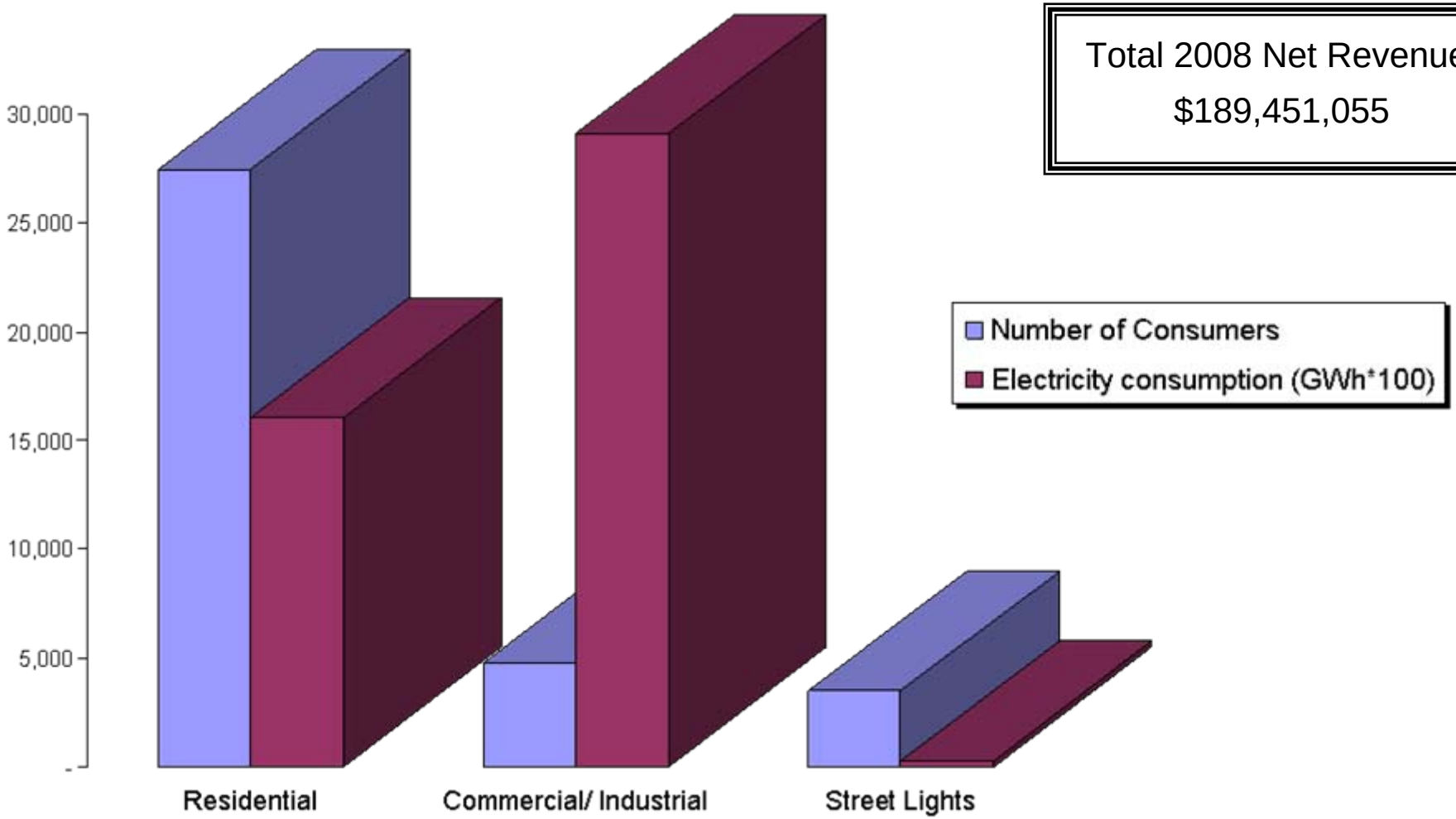


Total: ~80 MMgal/yr

BASELINE / ELECTRICITY

Electricity Baseline/Consumption

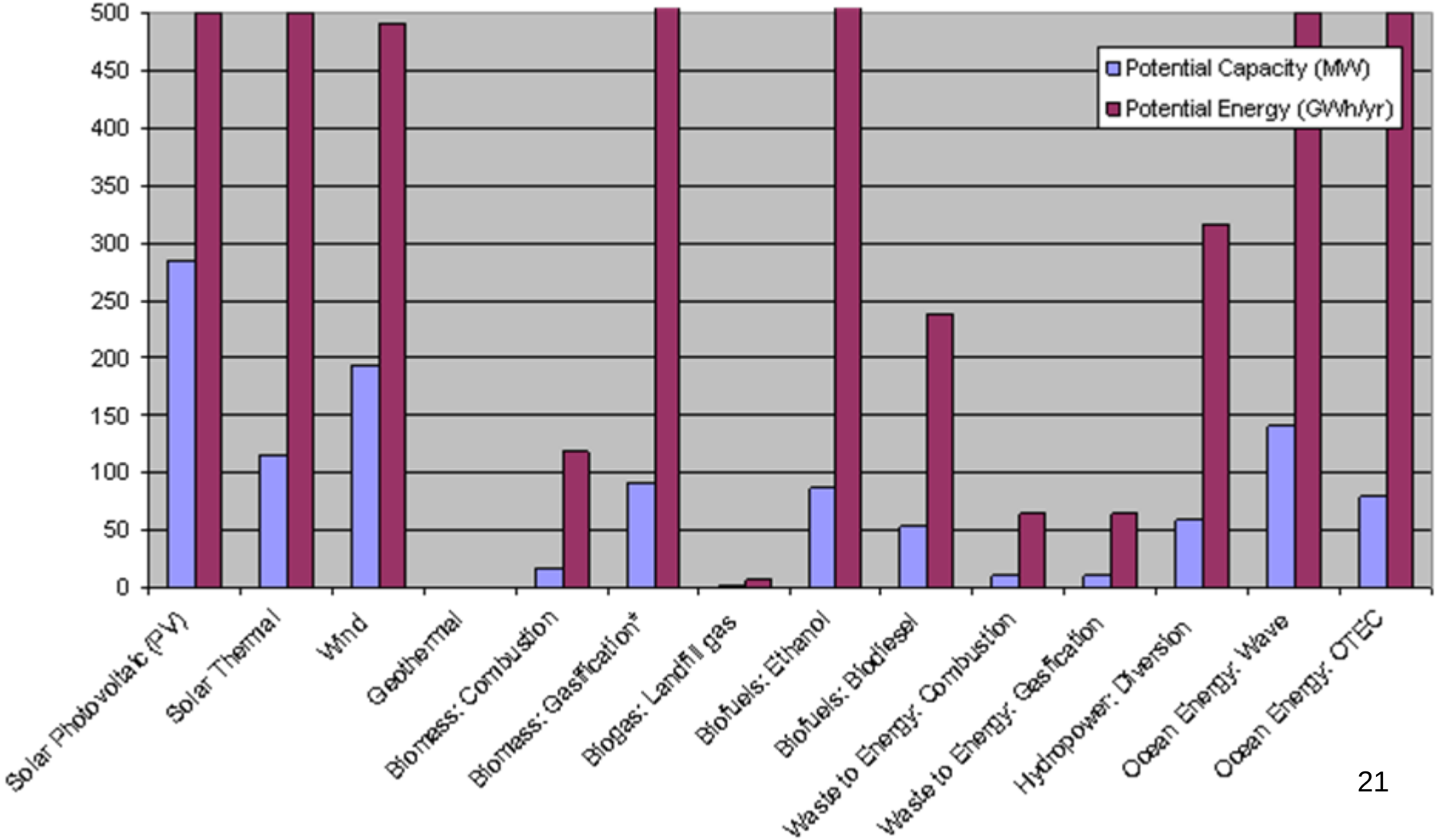
Total 2008 Net Revenue:
$189,451,055



BASELINE / ELECTRICITY

Electricity Baseline/Current Use

Kauai's current energy requirement is approximately 500 GWh/yr



Electricity Baseline/KIUC

- KIUC has 116 MW of firm, net generating capacity
  - All-time peak demand on the KIUC system is 77 MW
- In 2006, 8.2% of KIUC supply-side electrical generation was from renewable sources
  - Adding demand-side energy savings to this number brings the total to 13.9%
  - Significant additional renewable generation is required to meet 20% by 2020 RPS goals
- 2006, 90% of Kauai's electricity was produced from oil
  - Remainder came from biomass, hydroelectric, and PV
- 93 customer-sited renewable energy systems installed in 2008 with a generation capacity of 1859kWdc
- Has started an Advanced Metering Infrastructure initiative
  - Could become backbone of Smart Grid for demand response and load management

Policies

- DOD Renewable Energy Goal
- Federal and State Incentives
  - Act 211
- Hawaii Renewable Portfolio Standard and Renewable Fuel Standard
- Energy for Tomorrow Legislation of 2006
  - Savings Through Efficiency
  - Independence Through Renewable Energy
  - Fuels Through Farming
  - Security Through Technology
  - Empowering Hawaii's Consumers
- Hawaii Clean Energy Initiative
  - Market transformation model, e.g. FITs and decoupling
  - New business models
  - Agreements with Phoenix Motorcars and Better Place
- KIUC/DBEDT/CA Agreement
  - Details TBD

FITs In the News

FITs in Gainesville, FL

- Adopted country's first real Feed-in Tariff in Feb. 2009
  - o Rate increases capped at 1%/year
- Developer leasing 80 rooftops x 25 kW/rooftop = 2 MW of PV
  - o Has rights to 50 more rooftops
- Venture will cost between $16 - 20 million and bring in $1.4 million/year

HCEI White Paper

- Feed-in Tariff Case Studies

BASELINE / TECHNOLOGIES

Conventional & Emerging

- KESP Website has *Sustainable Energy Overview*
- Conventional
  - Initial focus on hydro, biomass, solar, storage, energy efficiency
- Emerging
  - PHEVs
  - Cellulosic ethanol
  - Biodiesel from jatropha, palm oils, etc.
  - Algae to fuels
  - Concentrating Solar Power distributed tower + molten salt storage
  - Distributed CSP (Organic Rankine Cycle power block) + hot oil storage
  - Pumped seawater hydro
  - Solar thermal absorption cooling
  - Wave, current, OTEC
  - Smart Grid

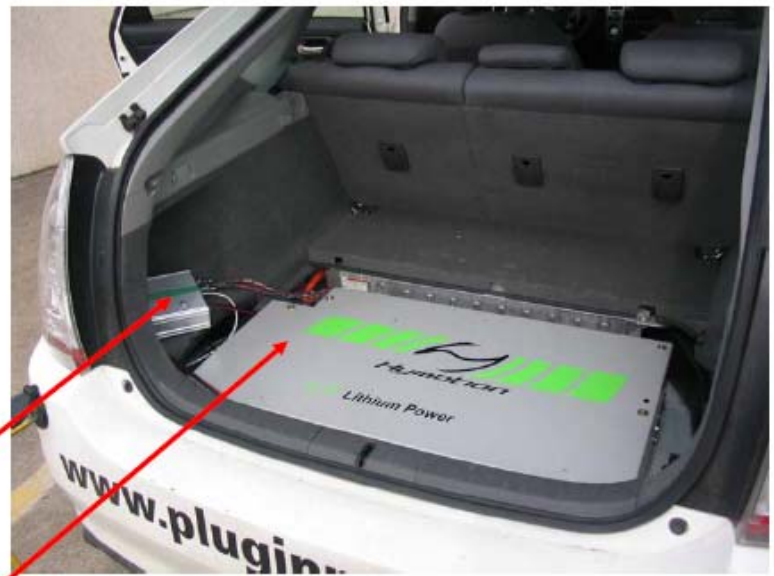



AE PHEV Pilot Project

- 2 Toyota Prius Hybrids – Charge Management Pilot
- 100,000 PHEVs Modeled on Austin Energy Grid

V2Green Charge Management System

A123 Systems Hymotion L5 Conversion



OPPORTUNITIES

OPPORTUNITIES / BIOFUELS & EVs

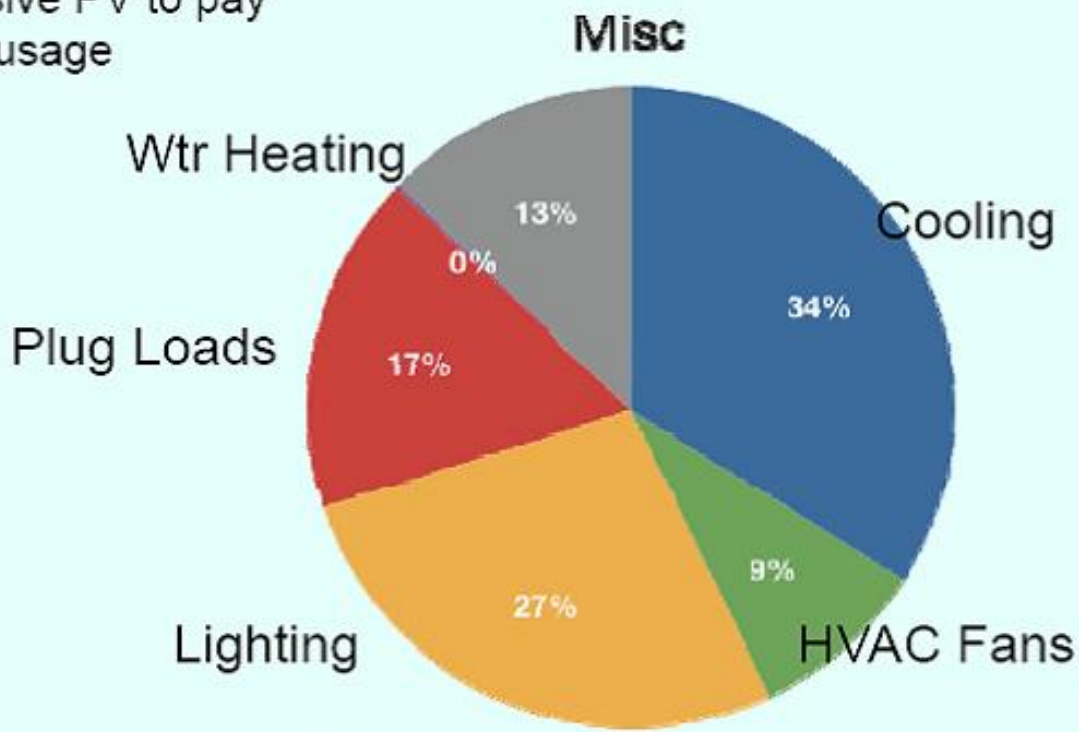
Low-Hanging Fruit?

- Existing sugar plantation and other land assets available
  - Planned algae R&D for biofuel outputs
  - Biodiesel feedstock trials
  - Cellulosic ethanol
- Unique transportation characteristics
  - Limited driving distances
  - Perfect for demo of Electric Vehicles or Plug-in Hybrid Electric Vehicles

OPPORTUNITIES / ELECTRICITY

Energy Efficiency—the Best First Investment?

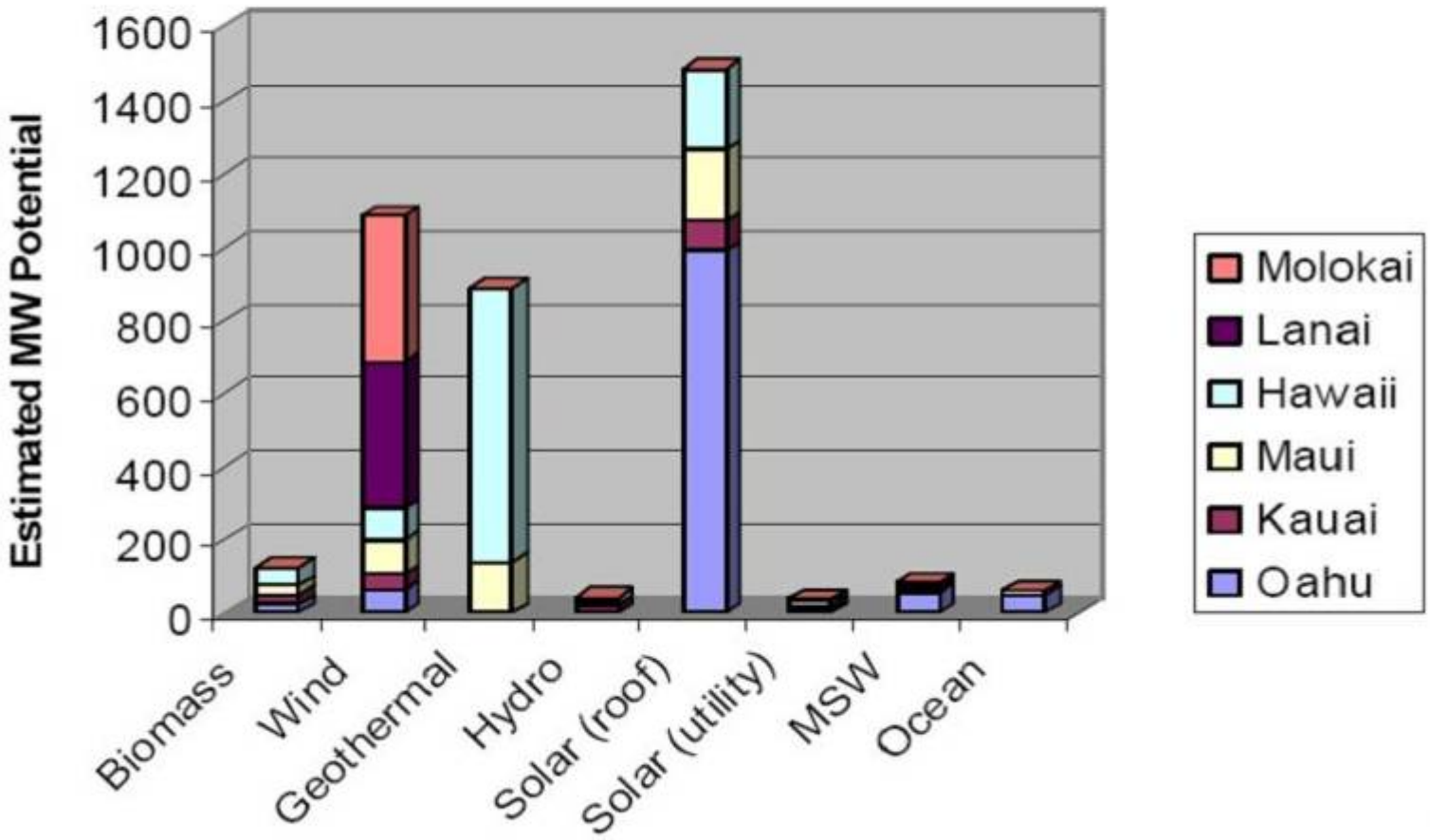
*Typical Energy Reductions: 30=%
*Typical Building Paybacks: <5 yrs
*Lighting Paybacks: < 2 yrs
*Do not install expensive PV to pay for inefficient usage



17

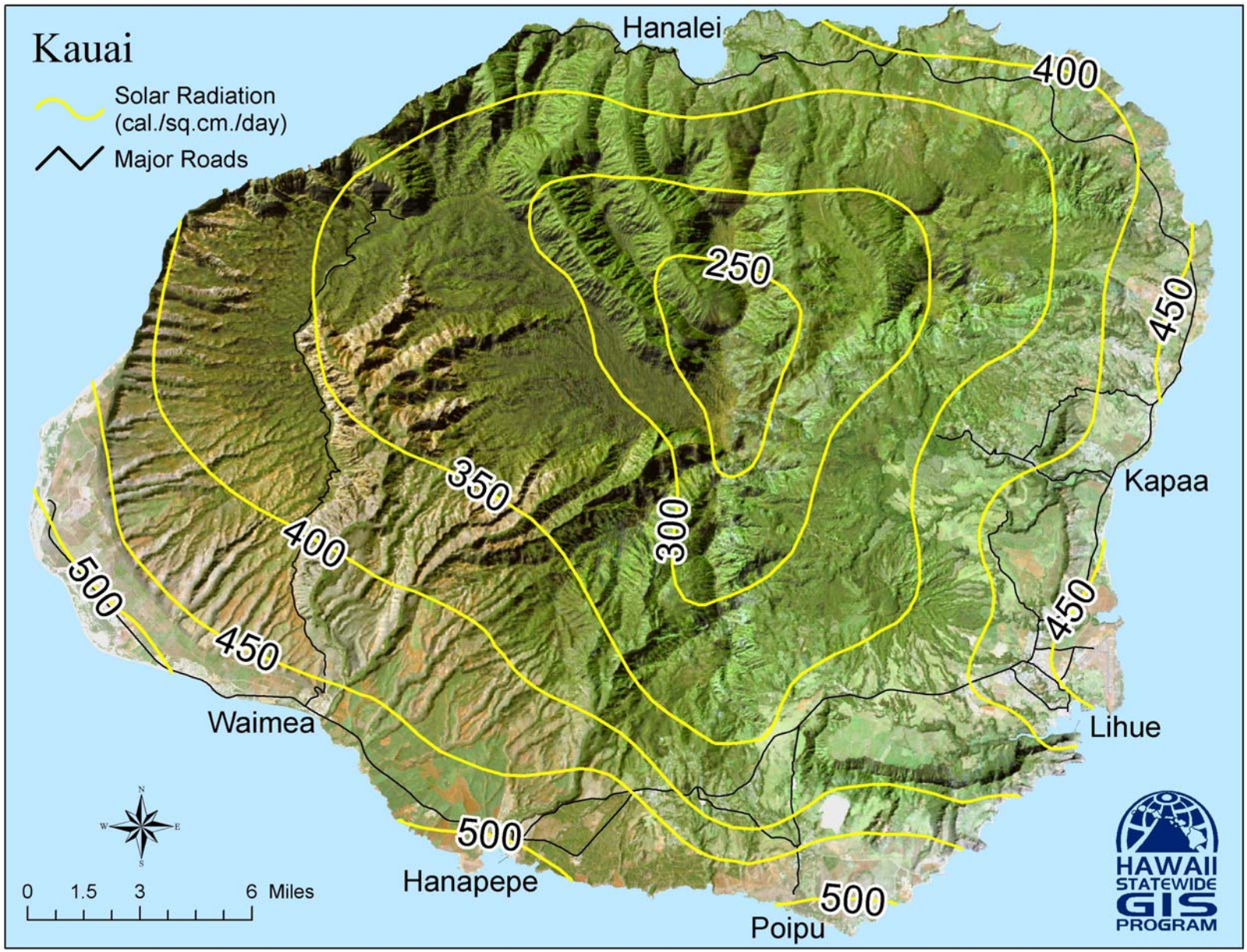
OPPORTUNITIES / RE POTENTIAL

Electricity Opportunities/RE Potential



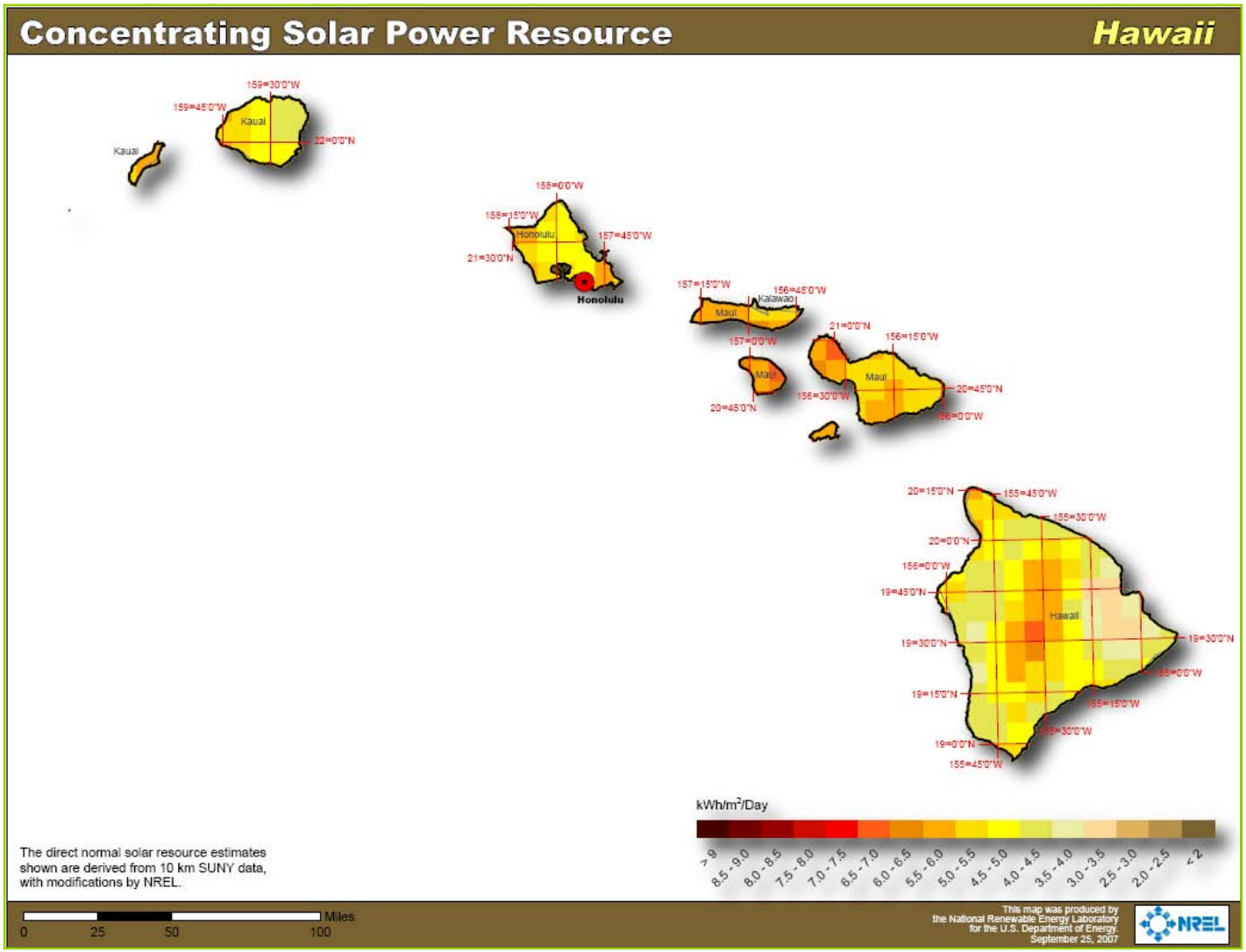
http://hawaii.gov/dbedt/info/energy/

OPPORTUNITIES / RE POTENTIAL

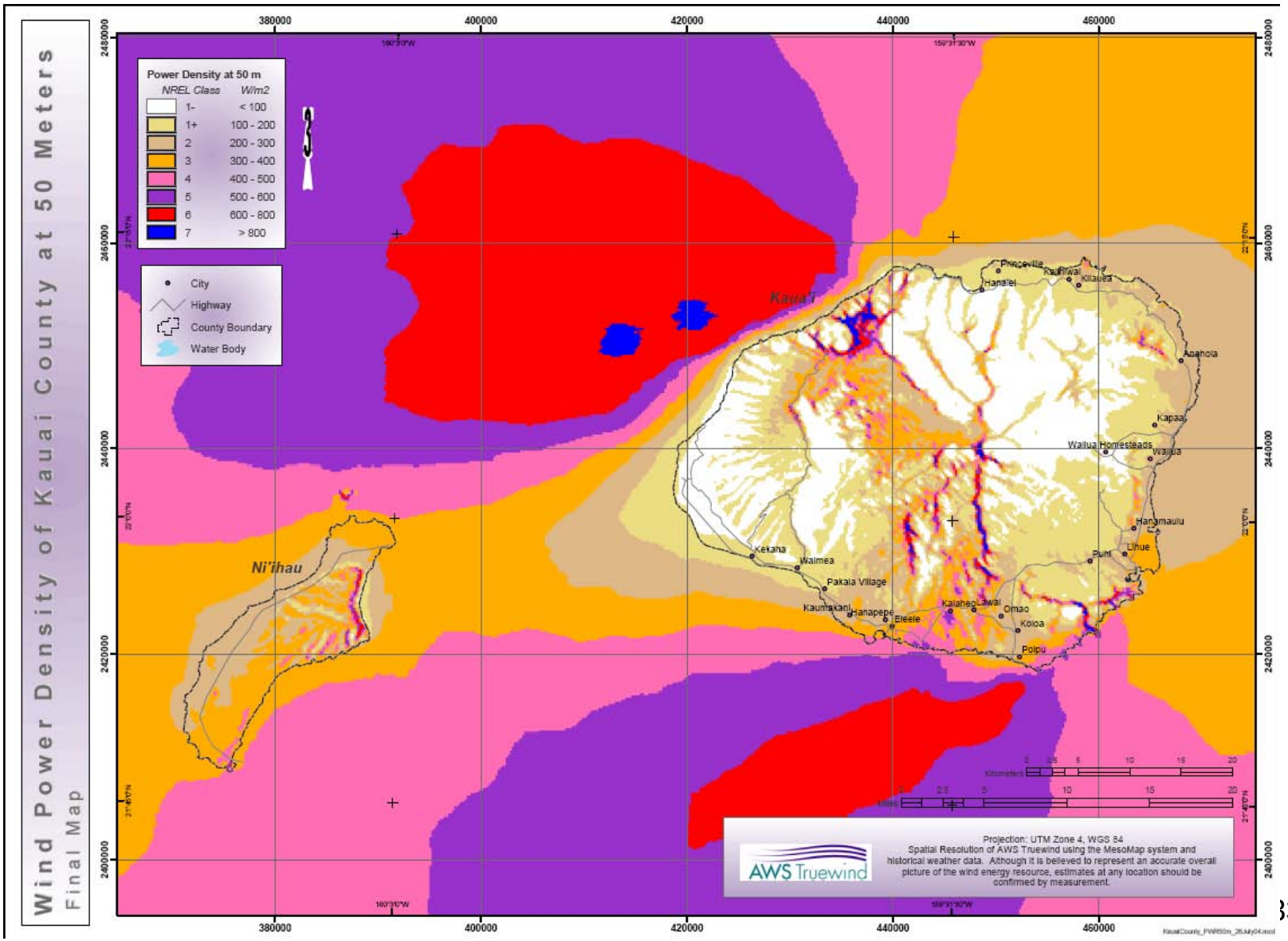


OPPORTUNITIES / RE POTENTIAL

Electricity Opportunities/Solar CSP Potential



OPPORTUNITIES / RE POTENTIAL



OPPORTUNITIES / TECHNOLOGIES

Emerging Technologies

Emerging

- PHEVs
- Smart Grid
- Distributed CSP (Organic Rankine Cycle power block) + hot oil storage
- ***Concentrating Solar Power (CSP) distributed tower + molten salt storage***
- ***Pumped seawater hydro***
- ***Solar thermal absorption cooling***

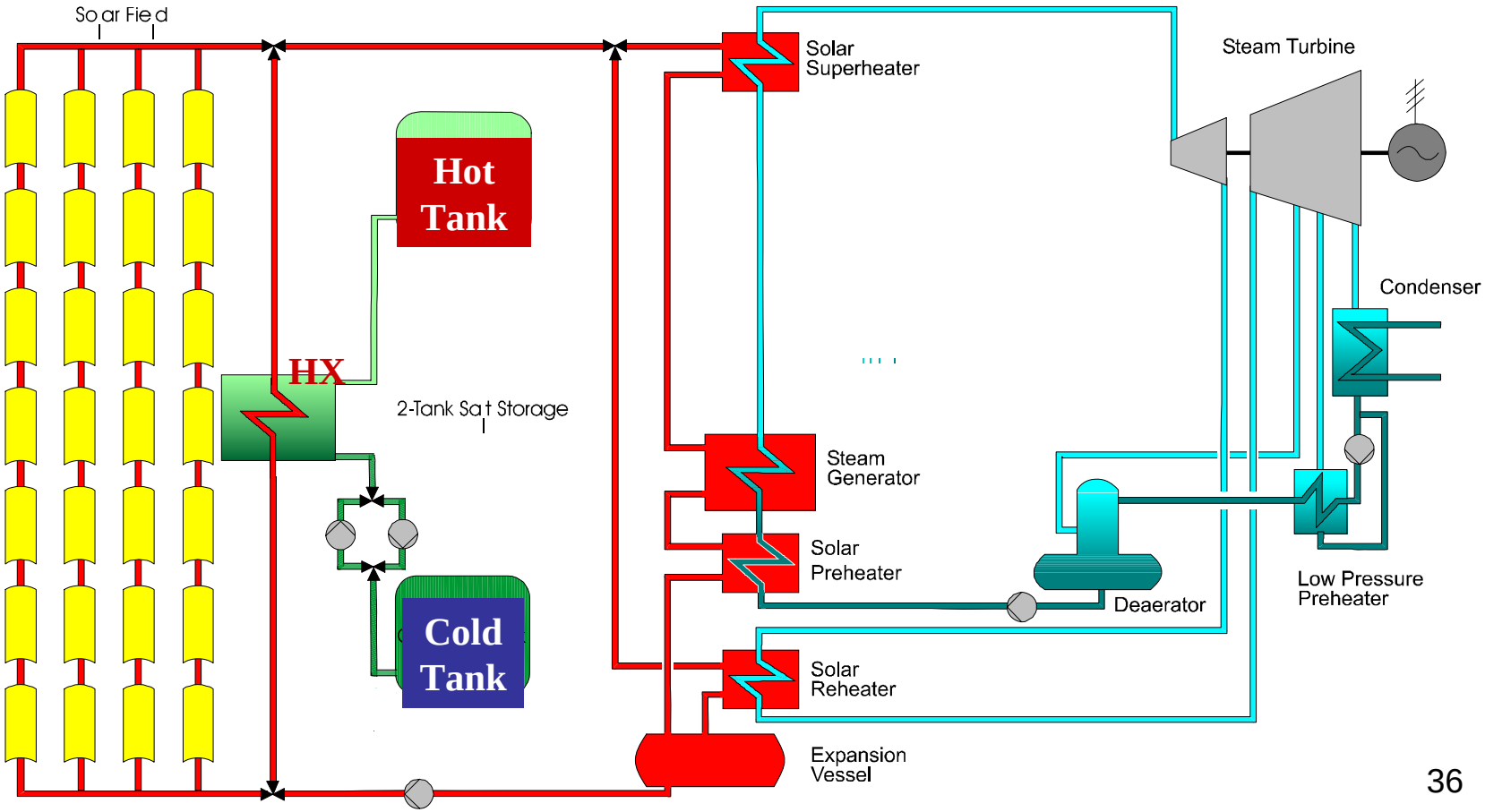
OPPORTUNITIES / TECHNOLOGIES

New Collector Materials

- Typical CSP costs are $4k/kW
- Another $2k/kW for 6 hours of storage
- Polymer reflective surfaces can cut costs up to 35%

OPPORTUNITIES / TECHNOLOGIES

6hr Molten Salt Storage



OPPORTUNITIES / LOAD MANAGEMENT

Smart Grid / Load Management

- Smart Grid Demonstration
  - – Athens (TN) Automation and Control Experiment
  - – Portland (OR) Automated Demand Response Programs
- Smart Grid Pilot Programs
  - – Excel Energy (Boulder)
  - – Duke Energy
  - – Austin Energy

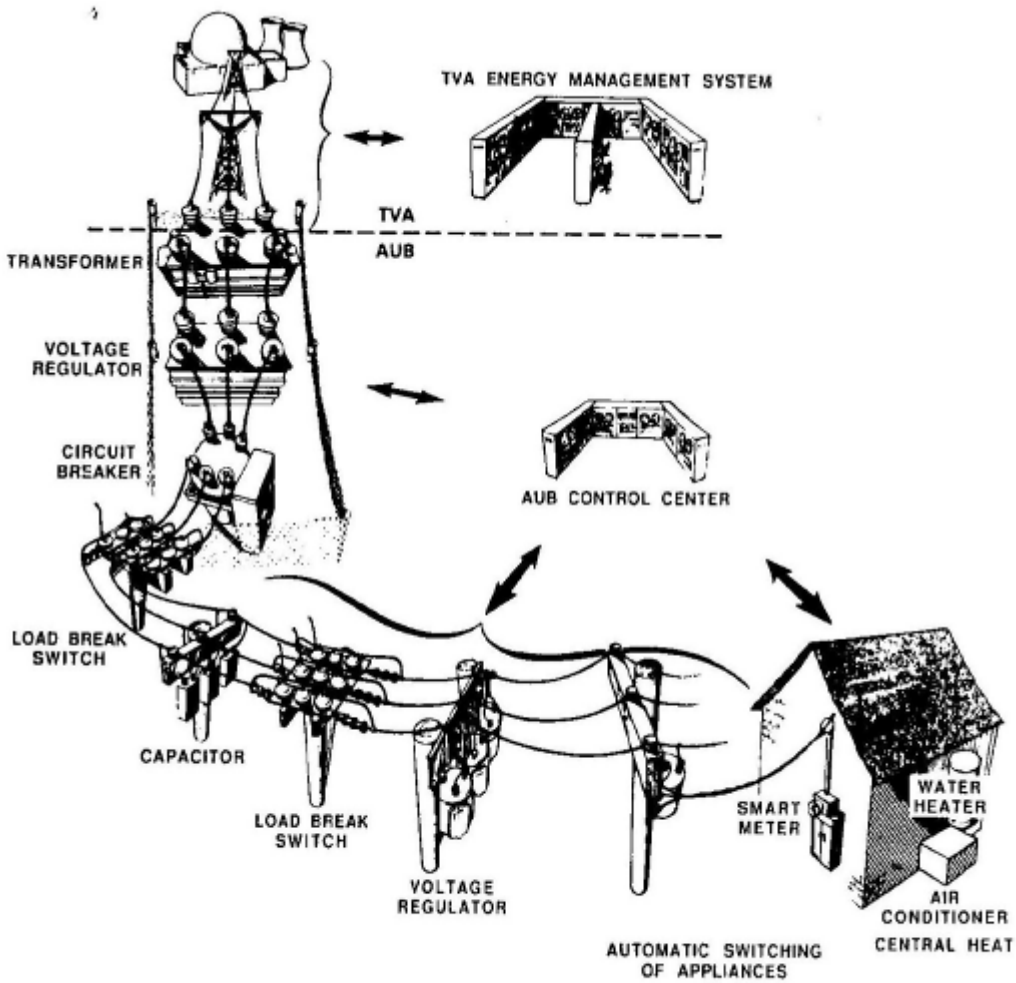
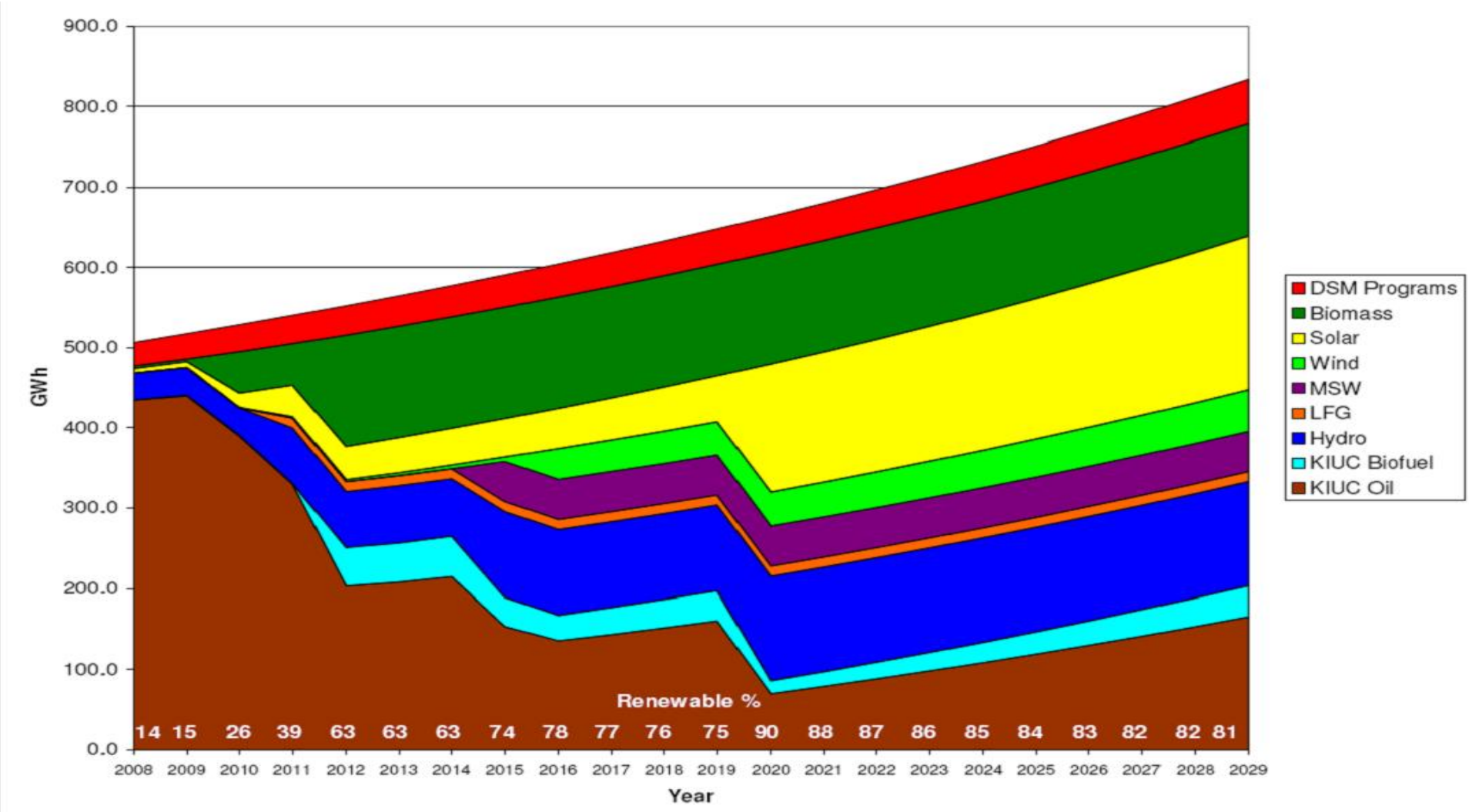


Figure 1-1 Automated equipment for the Athens Automation and Control Experiment.

BARRIERS AND STRATEGIES

BARRIERS / GOALS

KIUC 50% Goal



BARRIERS / PROJECTS

KIUC Projects

Technology	Project Overview	MW	Annual Production MWH	Commercial Operation Date	Land/Rights Owner	Issues	Status	Location
Solar								
	Parabolic Trough technology with four hours thermal storage	6 to 10	19,447	12/31/2011	KAA/DLNR/Grove Farm/A&B	Secure land, Permit Use, Negotiate PPA	Potential project for RFP	Kekaha or Koloa or Port Allen
	Parabolic Trough technology with four hours thermal storage	30.0	99,230	12/31/2020	KAA/DLNR	Future expansion of technology after initial installation.	Future project	Kekaha or Salt Ponds
	Photovoltaic Farm	5.0	8,760	12/31/2010	KAA/DLNR	Secure land, Permit Use, Negotiate PPA	Potential project for RFP	Kekaha
Biomass								
	Project to be completed in conjunction with sugar expansion	20.0	90,280	12/31/2012	PacWest	PacWest Asset acquisition	Finalize terms as asset acquisitions happen	Kuamakani
	Gasification plant utilizing Albezia tree chips	6.4	48,560	12/31/2010	Green Energy Hawaii	Revised PPA pending PUC approval	Online late 2010 per PPA terms	Knudsen Lands
Wind								
	KIUC Small Wind 100kW turbines two per year	4.0	12,264	12/31/2011	Numerous	Avian issues and expand powerline easements	Under consideration	South and East
	Wind Farm	10.5	31,390	12/31/2016	South Shore	Negotiate PPA or land lease, avian and grid stability issues exist.	Future project	South Shore
WTE(Waste to Energy)								
	Potential project to utilize the islands waste.	5.3	49,860	12/31/2015	County	County working with RW Beck. KIUC needs to be part of the process, present thinking is that KIUC must purchase at avoided cost. Capital cost of this project is of concern.	Waiting for County RFP	County

BARRIERS / PROJECTS

KIUC Projects

Landfill Gas								
	Project will involve the installation of a collection system, gas treatment and IC engines	1.6	12,500	12/31/2011	County	If KIUC project, need to negotiations with county for gas rights, and permit	County working with PMRF	Kekaha
Hydro								
	Project will upgrade the existing upper Waiahi unit to utilize all existing water supply	0.3	1,800	12/31/2012	KIUC	Long-term lease	Completing cultural study for long term lease	Upgrade Waiahi
	Irrigation water previously used for cane to be diverted for this new project	4 to 10	35,000	12/31/2011	Gay & Robinson	Negotiations and project permitting	Preliminary discussions underway	Olokele Ditch
	Project to utilize hydro power potential between Puu Lau Reservoir and Kitano Reservoir. 1145 ft head @ 40 cfs	3.0	13,666	12/31/2015	KAA	Negotiations if PPA, Conservation District Use permit and DLNR lease required. Prior environmental assessments indicated few obstacles to develop.	Encouraged lease holder to pursue project, would like to develop as KIUC project	Puu Lau Kitano
	Project to utilize hydro power potential between Kitano Reservoir and Waimea River. 2093 ft head @ 30cfs	4.0	18,221	12/31/2015	KAA	Negotiations if PPA, Conservation District Use permit and DLNR lease required. Prior environmental assessments indicated few obstacles to develop.	Encouraged lease holder to pursue project, would like to develop as KIUC project	Waimea Kitano
	Project to utilize hydro power from Kitano to irrigation outlet 1123 ft head @ 10cfs	0.7	3,189	12/31/2015	KAA	Negotiations if PPA, Conservation District Use permit and DLNR lease required. Prior environmental assessments indicated few obstacles to develop.	Encouraged lease holder to pursue project, would like to develop as KIUC project	Waimea Kitano WS2
	Upgrade unit from 1MW to 2.8MW	2.9	3,900	?	KAA	No recent water studies and limited annual production increase potential	Unknown	Waimea Mauka
	2.1 miles above existing hydro unit. 560 ft heat @ 100 cfs	4.0	23,000	12/31/2020	A&B	Conservation District Use permit and construction obstacles. Newcomb snail issues likely.	Future project	Upper Wainiha
	Construct 23 ft high and 508 ft long dam, 1000 feet upstream of the falls. 4800 ft penstock supplying a 1.8MW unit when flows are 30-100cfs and supplying a 4.8M unit when flows are 100-265 cfs	6.6	16,000	?	Pacific Energy Resource	Developer re-applying for FERC License, past public opposition killed project. Newcomb snail issues likely.	Future project	Wailua Falls

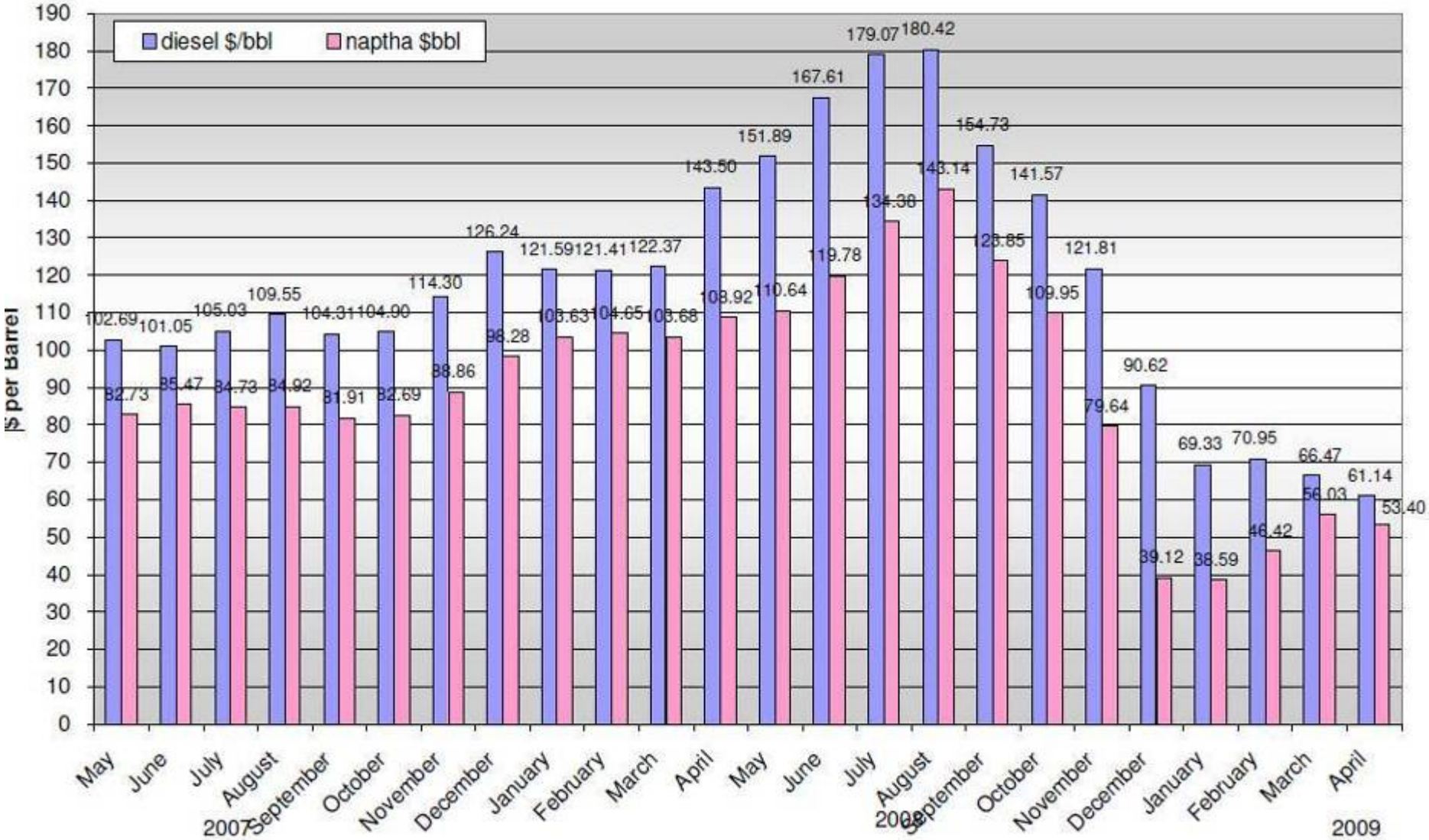
BARRIERS / PROJECT-SPECIFIC

KIUC Project "Issues" Summary

Technology	Annual Production	Operation Date	Issues
Solar, Parabolic Trough	118,677	2011-2020	• Secure land • Permit use • Negotiable PPA
Solar, PV Farm	8,760	2010	
Biomass, Combustion	90,280	2012	• PacWest Asset Acquisition
Biomass, Gasification (Albezia)	48,560	2010	• PPA pending PUC approval
Wind, Small (2 turbines/year)	12,264	2011	• Avian issues • Expand powerline easements
Wind, Central Farm	31,390	2016	• Avian and grid stability issues • Negotiate PPA or land lease
Waste to Energy (WTE)	49,860	2015	• High capital cost • KIUC involvement
Landfill Gas (LFG)	12,500	2011	• Gas rights and permit • KIUC and/or PMRF involvement
Hydro	up to 115,000	2011-2020	• Negotiations, permitting, leasing • Environmental assessments • Public opposition

BARRIERS / PRICE VOLATILITY

Fuel Oil Prices (KIUC)



BARRIERS / BROAD LIST

Real/Perceived Barriers

1. Oil price volatility (hard to make investment decisions)
2. Land availability and use
3. Siting, permitting, environmental, wildlife regulations
    a) Avian issues
4. Lack of awareness of costs and benefits of sustainable energy (e.g. RE may cost more)
5. Insufficient investment dollars, strategies and tools
6. Insufficient policy or price supports (ITC, PTC, FIT, etc.) to mitigate risk
    a) Not enough tax appetite from local third-parties to utilize incentives
7. Physical limitations on how much RE the KIUC grid can handle
8. Developers don't always present well-developed projects to KIUC
9. Lack of progress in negotiating deals/PPAs between developers and KIUC
10. Adherence to avoided cost basis of HRS 269

POSSIBLE STRATEGIES

REAL/PERCEIVED BARRIER	POSSIBLE STRATEGIES
Oil price volatility (hard to make investment decisions)	• Increasing reliance on renewables • Feed-in Tariffs
Land availability and use	• Open negotiations with land owners • Assessing siting, permitting, EIS regulations • Eminent domain
Siting, permitting, environmental, wildlife regulations /Avian issues	• Better coordination of HRC plans between KIUC, County, and State • Look at other successful models
Lack of awareness of costs and benefits of sustainable energy (e.g. RE may cost more)	• Awareness campaigns from KESP • KESP Stakeholder and Community Meetings • HCEI
Insufficient investment dollars, strategies and tools	• Encourage “outside” dollars, e.g. from Middle East, Asia, Europe • HCEI Clean Energy Strategies

POSSIBLE STRATEGIES

REAL/PERCEIVED BARRIER	POSSIBLE STRATEGIES
Insufficient policy or price supports (ITC, PTC, FIT, etc.) to mitigate risk / Not enough tax appetite from local third-parties to utilize incentives	• Feed-in Tariffs • Identify banks, ESCOs, etc. with tax appetite
Physical limitations on how much RE the KIUC grid can handle	• Modeling by KIUC, HCEI • Assess European models
Developers don't always present well-developed projects to KIUC	• Have standardized criteria or form that developers need to submit to KIUC • 2 or 3 phases (chicken and egg)
Lack of progress in negotiating deals/PPAs between developers and KIUC	• Standardized criteria/form • KIUC/Developer "open book negotiations" – FEMP RE example • Third-party project evaluator/facilitator
Adherence to avoided cost basis of HRS 269	• Open discussion of rate structures to better understand avoided cost • Change in legislation • Mechanism to pass on higher RE costs to consumers, e.g. RECAC or FITs

THE END

Mahalo! Questions?

Doug Hinrichs
dhinrichs@sentech.org
301-219-7647

www.kauaienergysustainabilityplan.com