

KAUA`I ENERGY SUSTAINABILITY PLAN

A scenic view of the Hanalei Lighthouse on a cliffside. The lighthouse is a white tower with a red roof, situated on a green cliff overlooking the blue ocean. The sky is bright blue with scattered white clouds. The overall scene is peaceful and picturesque.

Community Meeting

Hanalei

May 12, 2009

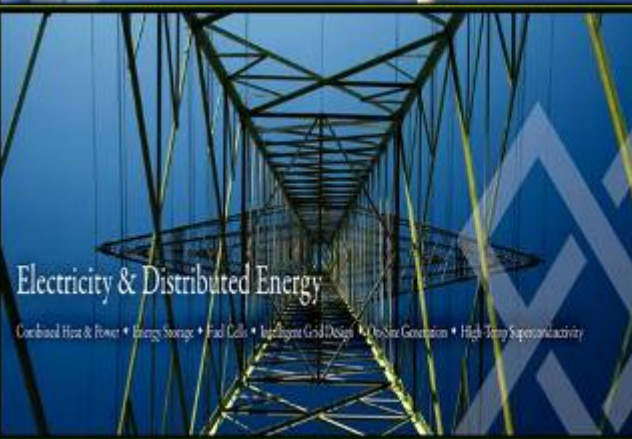
6:30 – 8:30 pm

TEAM

SENTECH HAWAII

SENTECH

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



SENTECH HAWAII

- Sentech, Inc. (MD, TN)
 - 120+ employees
 - Areas of expertise: Clean Energy Supply, Sustainable Buildings, Advanced Transportation, Electricity and Distributed Generation
- Doug Hinrichs
 - VP of Market Development and Transformation
- Jill Sims
 - Systems Integration Engineer
 - Master's training in Business Development
 - 8 years experience in Hybrid Vehicles and Renewable Energy Technologies
- Hawai`i Clean Energy Initiative
 - Manage 5 Partnership Projects
 - Investment Strategies and Advisory Group
 - Feed-in Tariff program/rate design
 - Utility decoupling and new business models
 - Compilation of clean energy project regulations



TEAM LEADS

Team Leads



Doug Hinrichs

SENTECH Hawai'i, LLC



Diane Zachary

Kaua'i Planning &
Action Alliance



Maurice Kaya

Maurice Kaya, LLC

Today's Agenda

Energy Choices for Kaua'i

Goals/Vision

Process

Supply

Conversion Technologies

Distribution

End-Use

Stakeholder Meeting Lessons

Today's Rules

Be Respectful

2-Minute Limit

Take Turns

No Speechmaking

No Debating

**Correct Any Mistakes on Easel
Notes**

ENERGY CHOICES FOR KAUA`I

ENERGY CHOICES FOR KAUA'I

SUPPLY



Transportation

Electricity

CONVERSION TECHNOLOGIES



DISTRIBUTION



END-USE



ENERGY CHOICES FOR KAUA'I

costs to ratepayers; and

(2) Posted and updated on the supplier's Internet website, if any.

(d) As used in this section, the term "fuel mix" means the electricity sold to retail electricity customers expressed in terms of percentage contribution by generation category. The total fuel mix included in each disclosure shall total one hundred per cent. [L 2003, c 147, §2]



Fuel Mix Generation*	2003	2004	2005	2006	2007
Biomass	1,431,000	1,884,000	2,175,000	1,971,638	1,400,362
Fossil Fuel	427,451,988	430,840,756	430,274,405	436,740,493	461,001,302
Hydro	23,613,993	35,493,318	36,895,645	36,888,298	26,300,465
Photovoltaic	66,000	90,315	202,500	373,000	522,769
Total	452,562,981	468,308,389	469,547,550	475,973,429	489,224,897

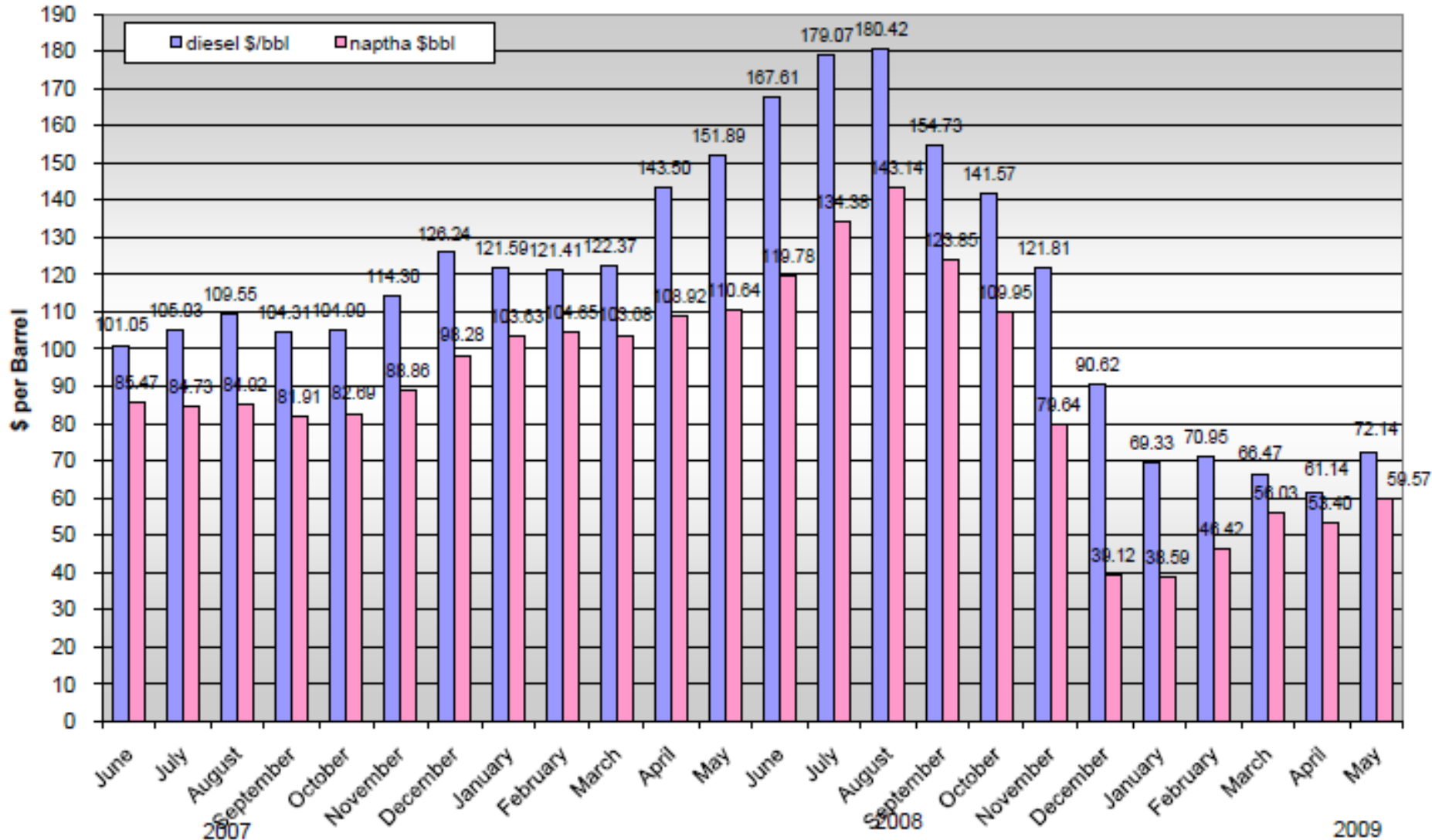
* Gross Generation kWh

Fuel Mix Percentage	2003	2004	2005	2006	2007
Biomass	0.3%	0.4%	0.5%	0.4%	0.3%
Fossil Fuel	94.5%	92.0%	91.6%	91.8%	94.2%
Hydro	5.2%	7.6%	7.9%	7.8%	5.4%
Photovoltaic	0.0%	0.0%	0.0%	0.1%	0.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

KIUC is an equal opportunity provider and employer.

ENERGY CHOICES FOR KAUA'I

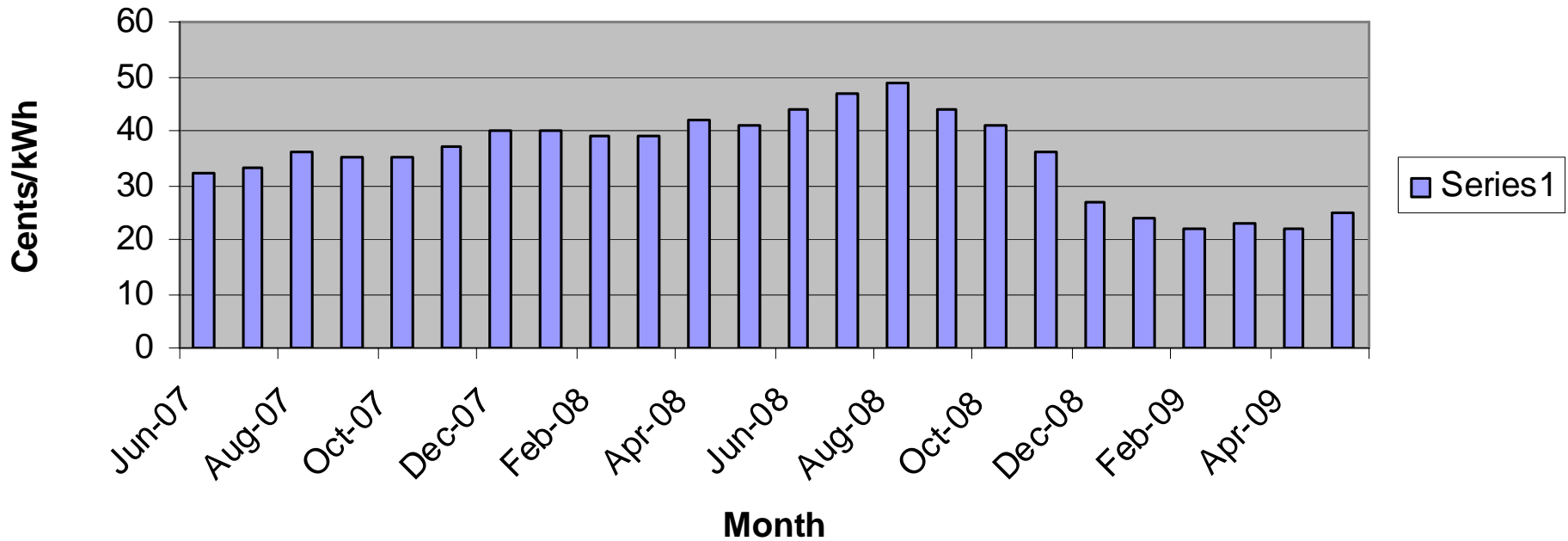
Fuel Oil Cost



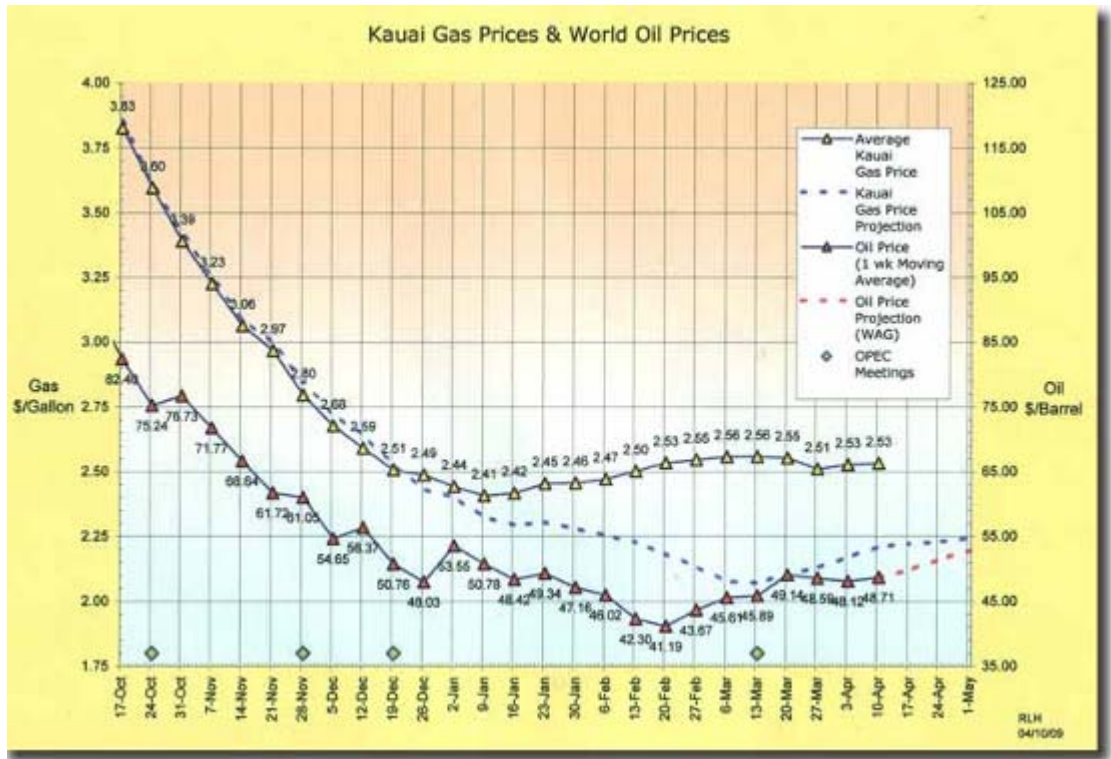
SOURCE: KIUC website

ENERGY CHOICES FOR KAUA'I

KIUC Schedule "D" Residential Rates



ENERGY CHOICES FOR KAUA'I



SOURCE: <http://www.kauaiworld.com/gasprices/>



ENERGY CHOICES FOR KAUA'I

EMISSIONS BY GENERATION TYPE (lb/MWh)

GENERATOR TYPE	NO _x	CO ₂	SO _x
NATURAL GAS COMBINED CYCLE GAS TURBINE	.09-3.8	770	~ 0
OIL (2.2% SULFUR) FUELED STEAM ELECTRIC PLANT	3.0-3.7	1,770	25.4
OIL (0.3% SULFUR) FUELED COMBUSTION TURBINE	3.7-6.8	2,200	4.4
COAL-STEAM ELECTRIC	6.1-9.4	2,300	48.6
LEAN-BURN GAS ENGINE (WITHOUT AFTERTREATMENT)	2.0 - 6.0	970	0.01

ENERGY CHOICES FOR KAUA'I



ENERGY CHOICES FOR KAUA'I

SUPPLY



Transportation

Distributed Electricity

Centralized Electricity

CONVERSION TECHNOLOGIES



DISTRIBUTION



END-USE



ENERGY CHOICES FOR KAUA'I

KIUC/Developer 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

ENERGY CHOICES FOR KAUA'I

KIUC/Developer 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 head @ 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

ENERGY CHOICES FOR KAUA'I

KIUC/Developer Project “Issues” Summary

Technology	Annual Production	Operation Date	Issues
Solar, Parabolic Trough	118,677	2011-2020	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Avian issues • Expand powerline easements
Wind, Central Farm	31,390	2016	<ul style="list-style-type: none"> • Avian and grid stability issues • Negotiate PPA or land lease
Waste to Energy (WTE)	49,860	2015	<ul style="list-style-type: none"> • High capital cost • KIUC involvement
Landfill Gas (LFG)	12,500	2011	<ul style="list-style-type: none"> • Gas rights and permit • KIUC and/or PMRF involvement
Hydro	up to 115,000	2011-2020	<ul style="list-style-type: none"> • Negotiations, permitting, leasing • Environmental assessments • Public opposition

ENERGY CHOICES FOR KAUA`I

	Imported Oil	Sustainable Energy from Kaua`i
<i>Costs</i>	<ul style="list-style-type: none"> • Energy dollars leaving the Island • Oil price fluctuations • Emissions • Not sustainable 	<ul style="list-style-type: none"> • Will cost more in “upfront” capital investments • Variable energy (solar, wind) • Land/water use • Slow, difficult to get approvals
<i>Benefits</i>	<ul style="list-style-type: none"> • Dispatchable (on-demand) energy • Existing generation and distribution network • Cheaper (for now) 	<ul style="list-style-type: none"> • Energy dollars will stay on Island • Cost-effective (probably) over lifetime of the equipment • Zero/low emissions • Local “green” jobs

ENERGY CHOICES FOR KAUA`I

SENTECH Hawai`i Team Role

- Gather Stakeholder and Community perspectives
- Help Kaua`i make informed choices through objective analysis
- Help Kaua`i set its Energy Sustainability Goals and Vision
- Help Kaua`i balance the costs and benefits of imported oil vs. local energy sustainability
- Work with the County, Stakeholders, Community and others to make specific recommendations (actions, timeline, implementers) on how Kaua`i can achieve its energy goals

Today's Rules

Be Respectful

2-Minute Limit

Take Turns

No

Speechmaking

No Debating

Correct Any
Mistakes on
Easel Notes

DISCUSSION

About the Team

Energy Choices for Kauai:

Electricity Rates

Current Generation

KIUC Planned Projects

Project Issues/Challenges

Agenda

Energy Choices
for Kaua`i

Process

Goals/Vision

Supply

Conversion
Technologies

Distribution

End-Use

Stakeholder
Meeting Lessons

PROCESS

PROCESS

KESP Development Process and Timeline

KAUA'I ENERGY SUSTAINABILITY PLAN (KESP) TIMELINE



Stakeholder/Community Input

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

Energy Analysis

- Kaua'i's energy use
- EE/RE potential
- Grid load management

Report Development and Review

- 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

Informational, Interactive Website

Kauai Energy Sustainability Plan

[The Process](#)

[Vision and Goals](#)

[Opportunities, Barriers, and Strategies](#)

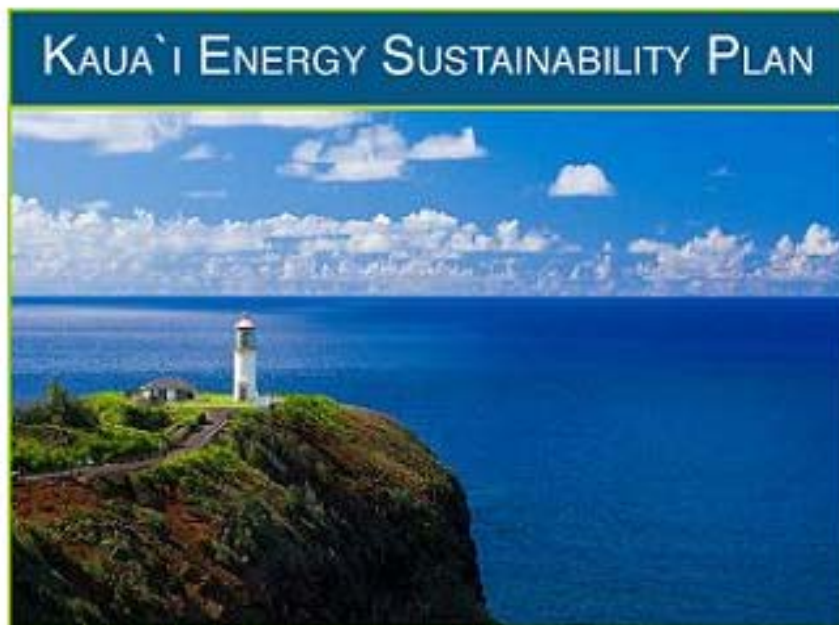
[Get Involved](#)

[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



Sustainable Energy Plan Examples:

- [Hawaii County Energy Sustainability Plan \(Executive Summary\)](#) (PDF, 185 KB)
- [Hawaii County Energy Sustainability Plan](#) (PDF, 1,860 KB)
- [Hawaii Sustainability 2050 Plan](#) (PDF, 9,862 KB)
- [Focus Maui Nui \(Executive Summary\)](#) (PDF, 667 KB)
- [California Energy Action Plan](#) (PDF, 324 KB)

Kauai-Specific Information

- [A Catalog of Potential Sites for Renewable Energy in Hawaii](#) (PDF, 2,950 KB)
- [Kauai Economic Development Plan: Kauai's Comprehensive Economic Development Strategy \(CEDS\) Report 2005-2015](#)
- [Kauai County General Plan Required Implementing Actions, by County Department](#) (PDF, 74 KB)
- [The General Plan for the County of Kauai](#)
- [2008 Kauai Renewable Energy Conference](#)

Information from Kauai Island Utility Cooperative (KIUC)

- [2009 House & Senate Energy Committee Briefing: KIUC Update](#) (PDF, 1,673 KB)
- [KIUC IRP: Plan Recommendation](#) (PDF, 2,829 KB)
- [2008 House & Senate Energy Committee Briefing: KIUC Update](#) (PDF, 820 KB)
- [KIUC Strategic Plan 2008-2023](#) (PDF, 1,231 KB)
- [IRP: A Process for Meeting the Electrical Needs of Kauai's People](#) (PDF, 486 KB)
- [KIUC Renewable Energy Technology Assessments](#) (PDF, 4,998 KB)

Other Energy Reports in Hawaii

- [Energy Agreement Among the State of Hawaii, Division of Consumer Advocacy of the Dept of Commerce and the Hawaiian Electric Companies](#) (PDF, 1,180 KB)
- [Assessment of the State of Hawaii's Ability to Achieve 2010 RPS](#) (PDF, 383 KB)
- [Hawaii Energy Strategy 2007](#) (PDF, 608 KB)
- [Hawaii Clean Energy Initiative](#)
- [HCEI Energy Efficiency Portfolio Standard](#) (PDF, 443 KB)
- [Feed-in-Tariff Case Studies: A White Paper in Support of HCEI](#) (PDF, 710 KB)

PROCESS

Online Survey

Renewable Energy Stakeholder Questions for the Kauai Energy Sustainability Plan - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.surveymonkey.com/s.aspx?sm=P85Dysi94GJ19xD17YoQwg_3d_3d

Karlynn Cory


Home - Hawaii Clean E... Novell WebAccess Mail :: Inbox (1) RCN D.C. Metro | Cus... The World Clock - Tim... U.S. Solar Radiation R... PowerFromTheSun.net Welcome to MASDAR Kauai Planning & Actio...

Kauai Planning & Action Alliance : Vision... Renewable Energy Stakeholder Q...

Renewable Energy Stakeholder Questions for the Kauai Energy Sustainability Plan

[Exit this survey](#)

1. Energy Plans

 14%

This survey is designed and intended to encourage community input into the Kaua'i Energy Sustainability Plan, to let your voice be heard. To learn more about the Plan, please take a look at the website <http://www.kauaienergysustainabilityplan.com>

Your responses to this survey will be completely anonymous. There are two parts to this survey, each of which may take 10-25 minutes to complete:

- Part 1 is non-technical and we hope everyone will answer these questions. On page 3, you will be asked if you would like to continue on to the more technical section, Part 2.
- Part 2 is technical, and these questions may require a deeper knowledge of sustainable energy technologies.

Please note a couple of administrative points:

1. If you are not familiar with specific elements of this survey (for example, referenced documents or plans) please select NO OPINION (N/A) for your answer.
2. You need to answer all questions with an asterisk (*) before the number if you want to continue with the survey; questions without an asterisk you may leave blank.
3. Due to the anonymous nature of the survey, you will NOT be able to save your answers and return later to finish it.

Responses will be recorded and analyzed as input to the Kaua'i Energy Sustainability Plan.

Aloha,
The SENTECH Hawaii'i Team

(Find out more about the team at: <http://www.kauainetwork.org/the-sentech-hawaii-team.asp>)
(Find out about additional ways to get involved by visiting <http://www.kauainetwork.org/get-involved.asp>)

*** 1. Of the following energy plans and documents, which should Kaua'i consider or model after?**

	Definitely Model	Take Into Consideration	Don't Even Consider	No Opinion (N/A)
Hawai'i Island Energy Sustainability Plan (www.kohalacenter.org/research.html)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focus Mau'i Nui (www.focusmauinui.com)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hawai'i 2050 Sustainability Plan (www.hawaii2050.org)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hawai'i Energy Strategy 2007	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Done

PROCESS

10 Targeted *Stakeholder Meetings*

Meeting	Date
Renewable Energy (<i>KEDB RE Committee</i>)	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	April 27
Biofuels and Ground Transportation	April 28
Large Landowners	April 28
All Stakeholders	May 14

PROCESS

5 Public *Community Meetings*

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

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DISCUSSION

Plan Development Process and
Timeline

Website

Online Survey

Stakeholder Meetings

Community Meetings

Agenda

Energy Choices
for Kaua'i

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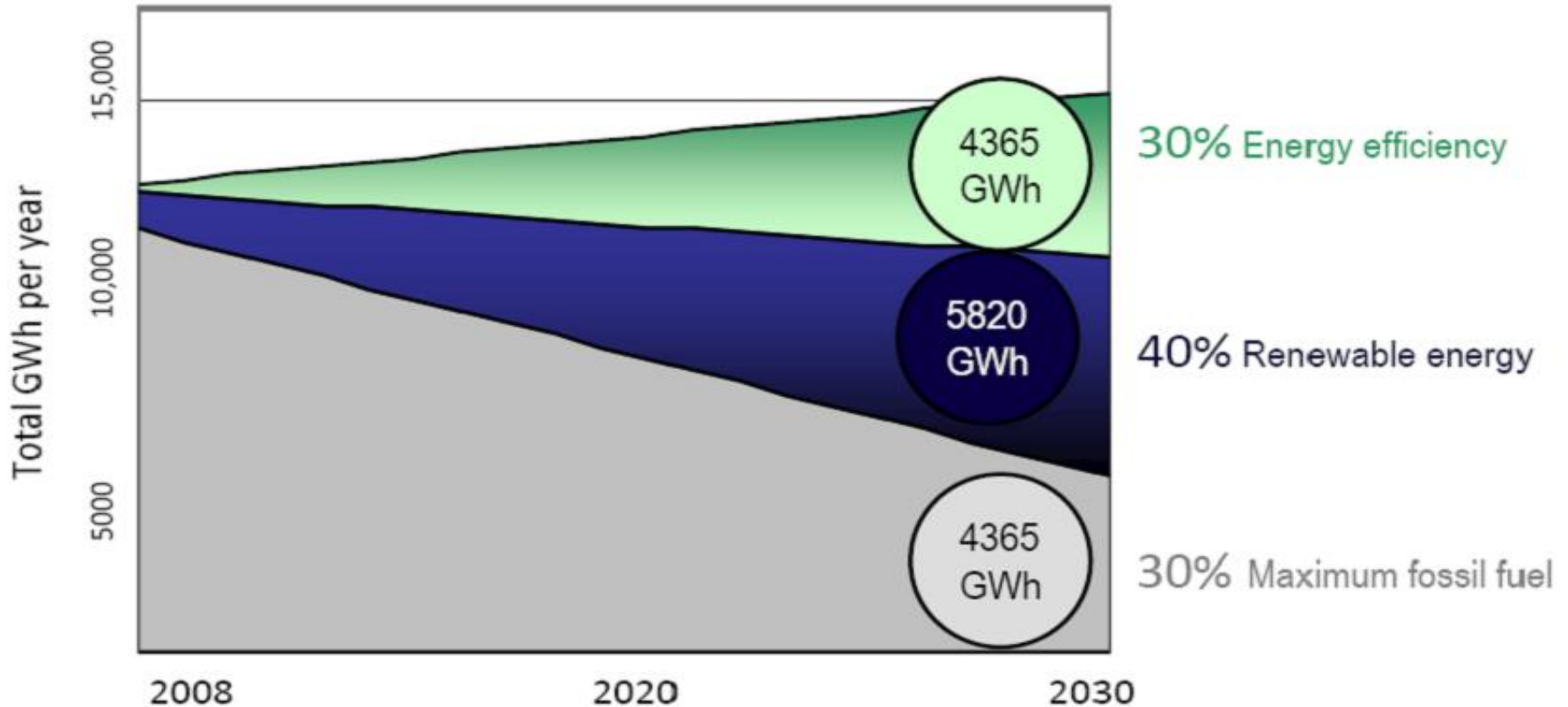
Stakeholder
Meeting Lessons

GOALS / VISION

GOALS

HCEI 70% Goal

Hawaii Electricity Portfolio



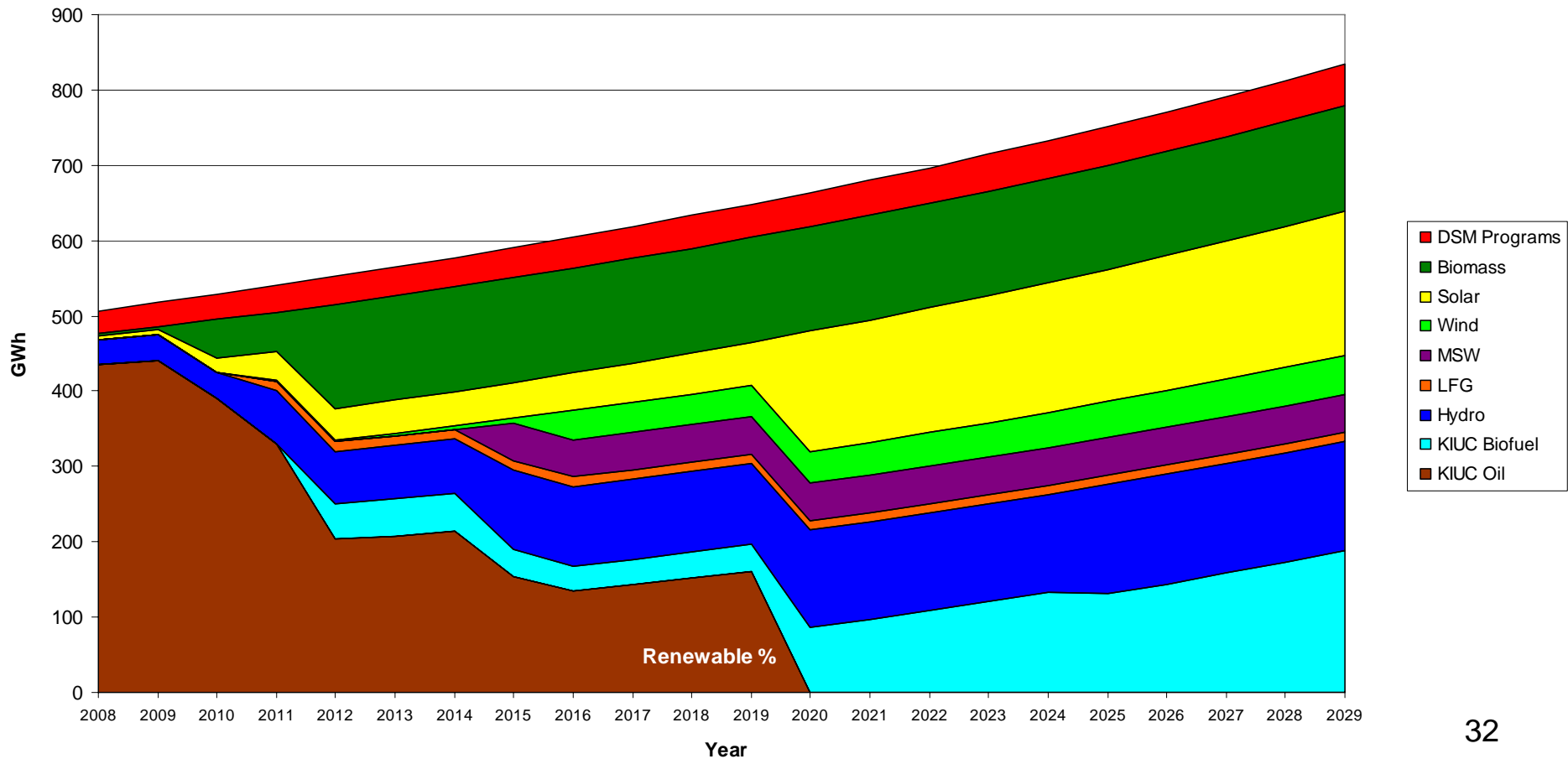
Note: This just reflects 2030 electricity targets; still need interim targets and transportation targets

GOALS

KIUC 50% Renewable Energy by 2023 Goal

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

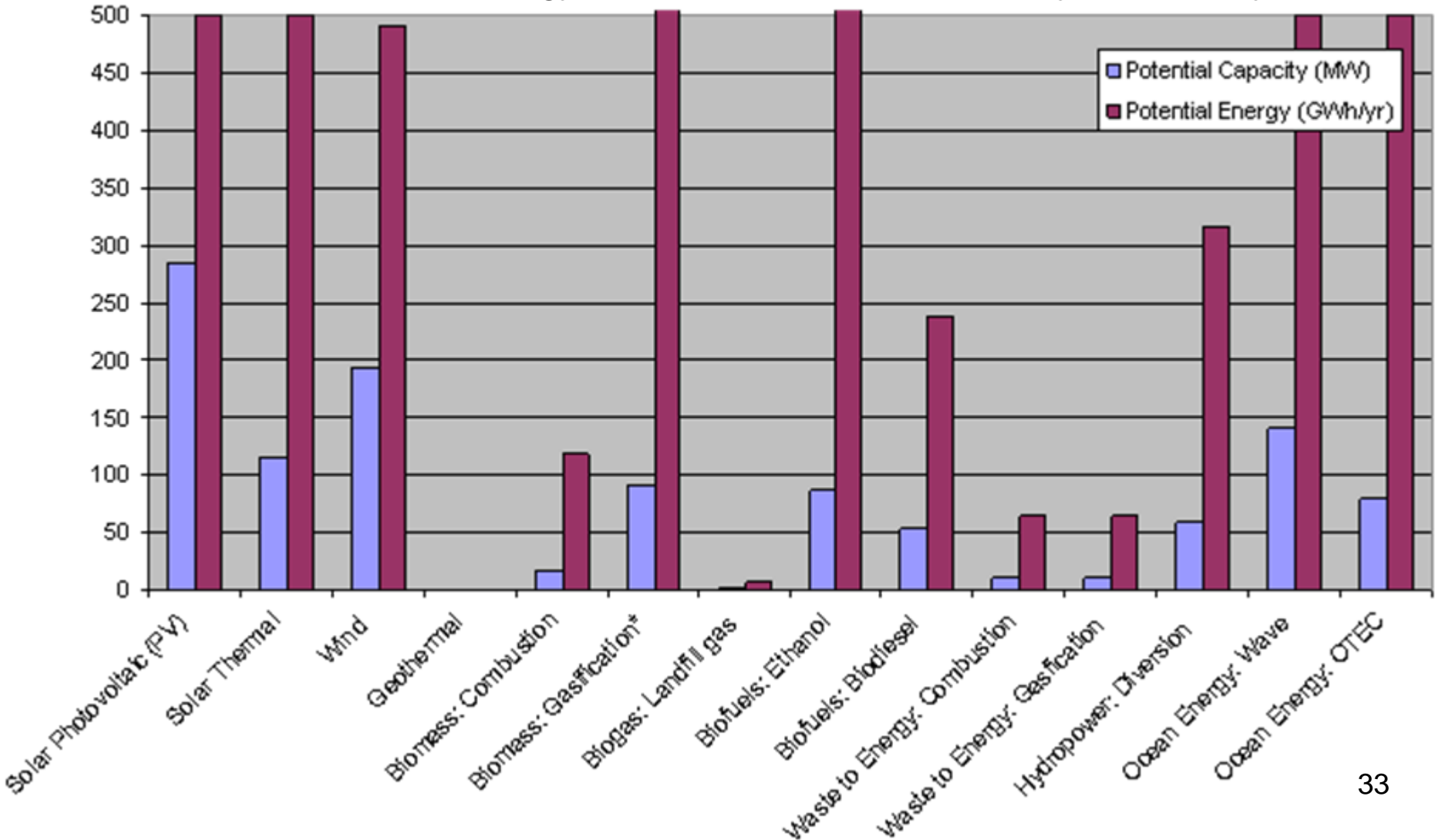
KIUC's Potential Generation Wedge



GOALS

Technical Potential Renewable Energy (GWh/yr)

Kauai's current "Energy" requirement is approximately 500 GWh/yr



VISION

A Proposed Vision for Energy Sustainability on Kaua`i

On Kaua`i in 2030, we have achieved 100% local energy sustainability and we have...

- Maintained the beauty of our “garden island” and our rural lifestyle.
- Incorporated sustainability and smart growth principles into our land use plans.
- Built a strong, sustainable green economy with green job opportunities.
- Utilized land efficiently for agriculture and renewable energy production.
- Educated our citizens on energy conservation and efficiency and for green job opportunities.
- Reduced our energy demand through conservation and efficiencies.
- Determined the new and emerging technologies best suited to Kaua`i.
- Achieved self-reliance in renewable energy and fuel production for electricity and transportation, while protecting our endangered wildlife.
- Considered social equity and cultural impacts when siting new energy facilities.
- Established an effective multi-modal transportation system that shifts use from cars to mass transit and non-motorized modes.
- Followed existing and crafted new County, state and federal legislation regulations to help meet our electricity and ground transportation needs.

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DISCUSSION

HCEI 70% Goal

KIUC 50% Goal

Vision

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SUPPLY

SUSTAINABLE ENERGY FROM KAUA'I

SUPPLY



Transportation

Distributed Electricity

Centralized Electricity

CONVERSION TECHNOLOGIES



DISTRIBUTION



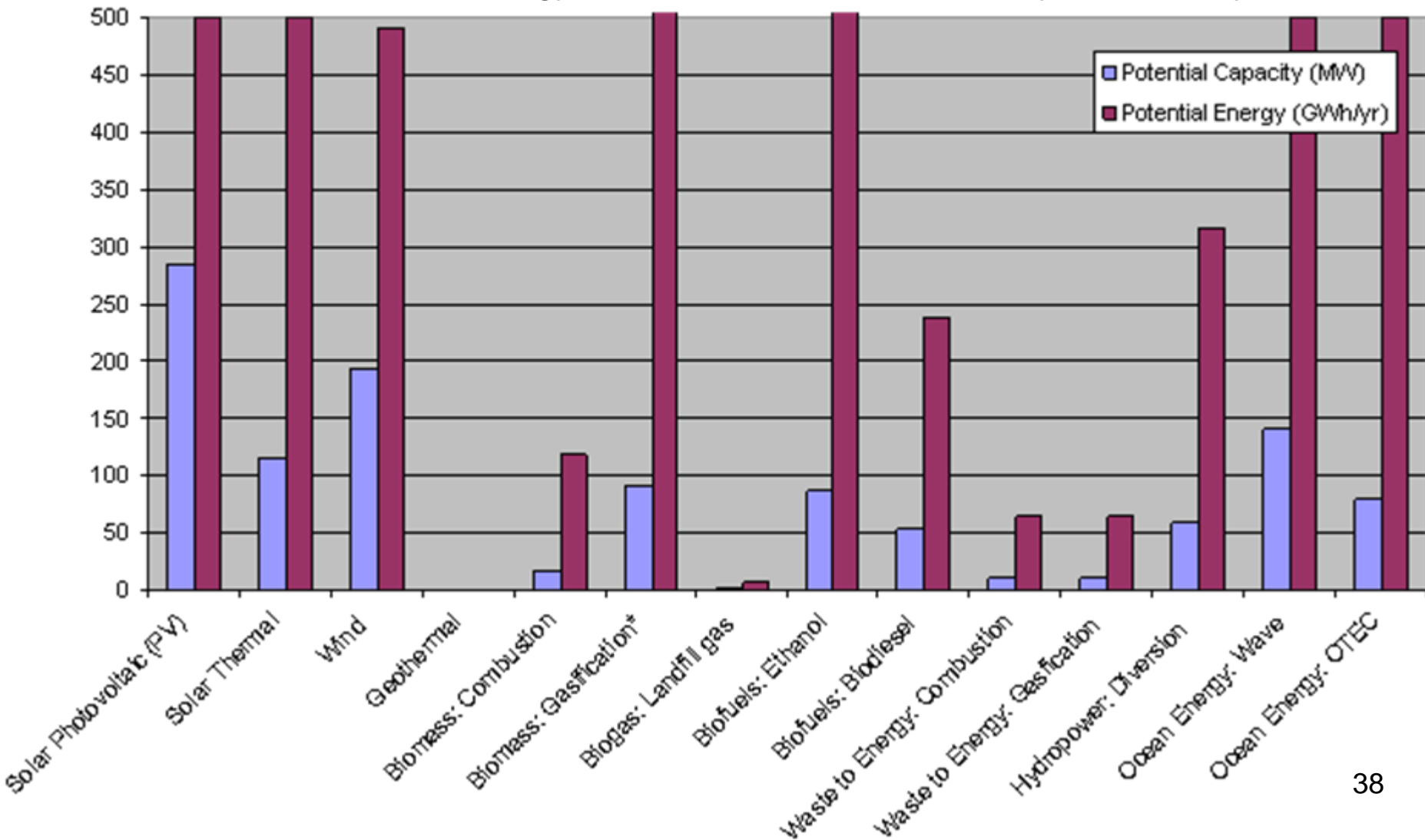
END-USE



SUPPLY

Plenty of Potential...

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

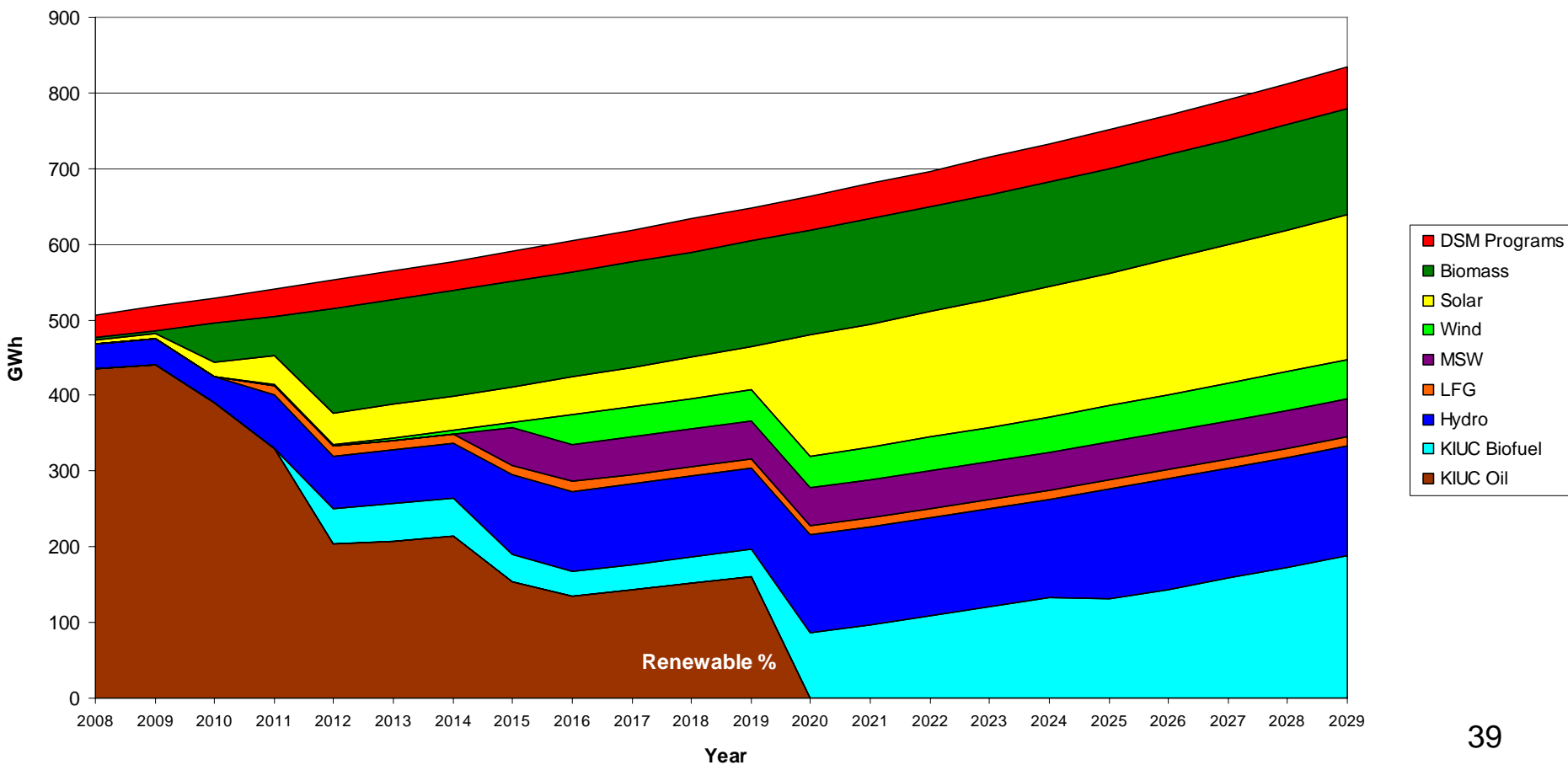


SUPPLY

KIUC 50% Renewable Energy by 2023 Goal

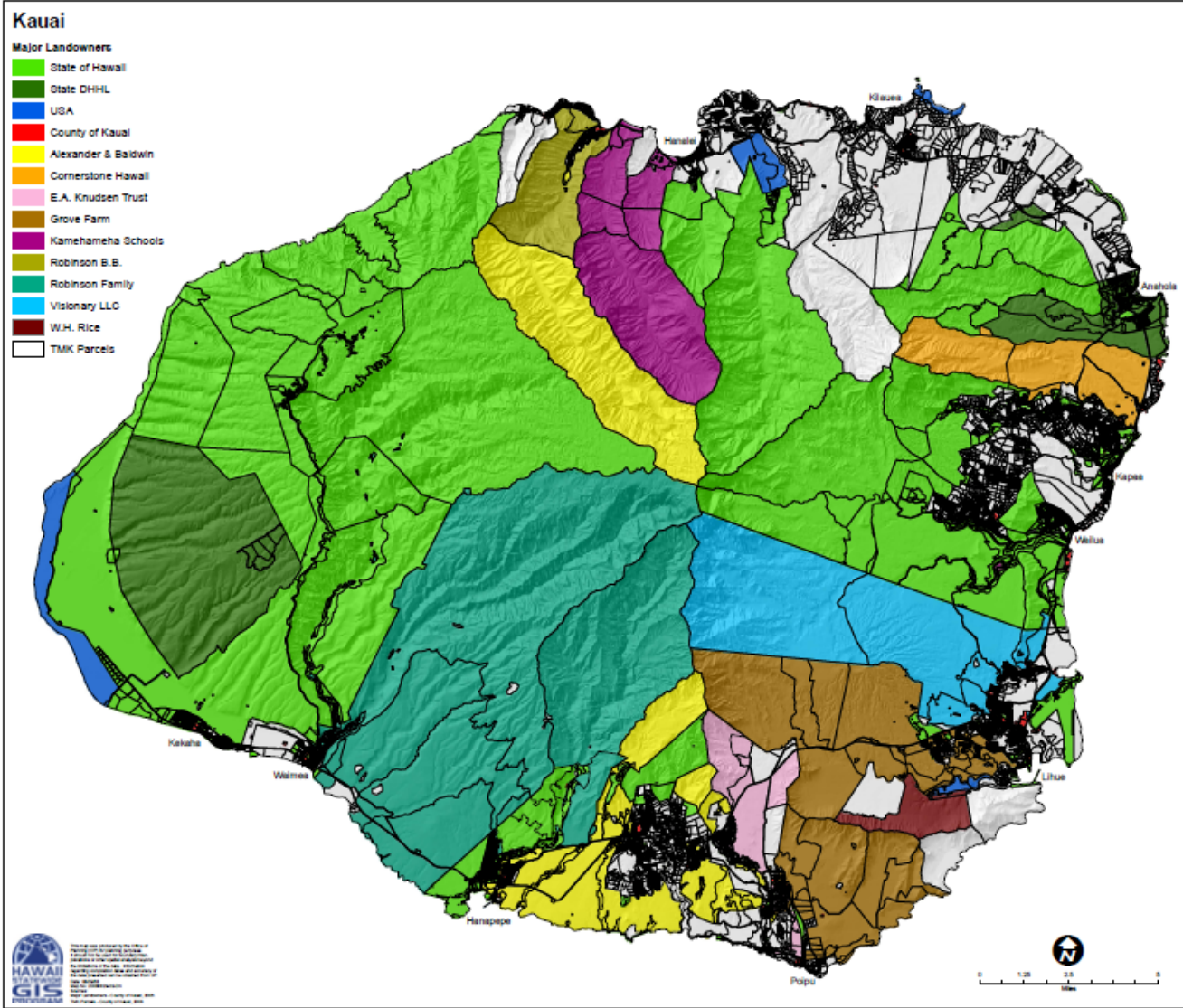
Kauai's current energy requirement is approximately 500 GWh/yr

KIUC's Potential Generation Wedge



SUPPLY

Land Ownership and Use



SUPPLY

GIS Assessment of Potential Oil Crop Land in Hawaii based on Soil Suitability & Other Factors



Kauai



Oahu

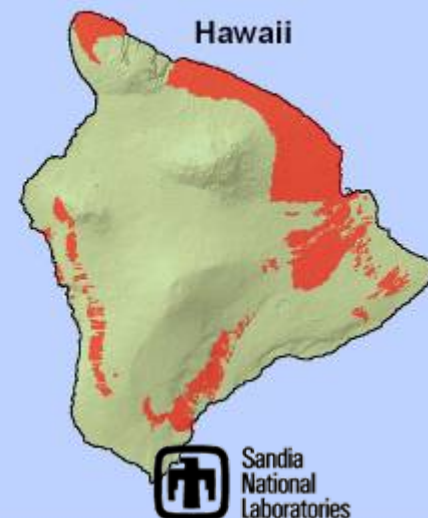


Molokai

Lanai

Maui

Kahoolawe



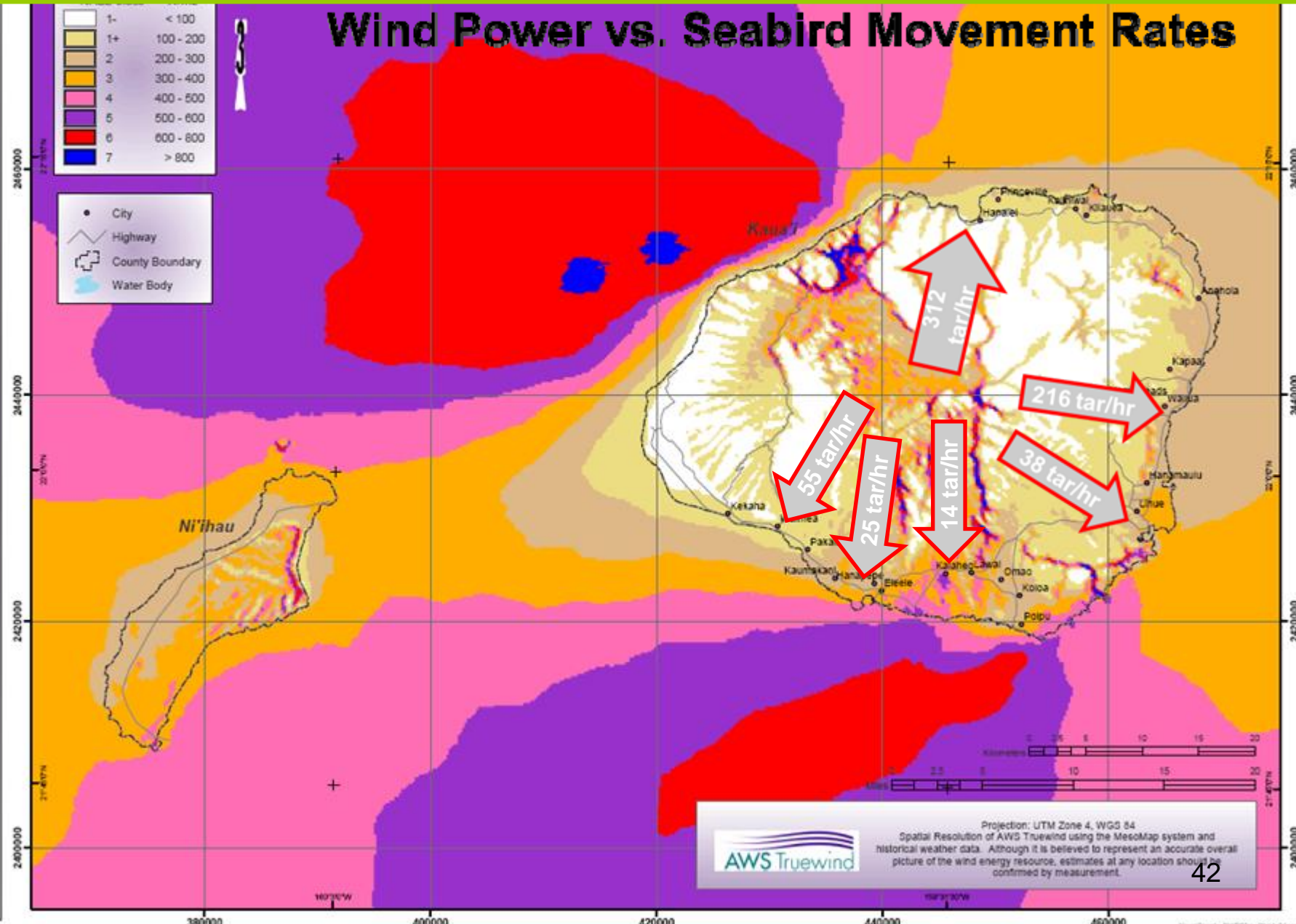
Hawaii

ISLAND	ACRES
Oahu	56,859
Molokai	40,295
Maui	90,547
Kauai	81,056
Hawaii	389,062
Lanai	20,634
Suitable Land (based on soil type)	678,453
Total Land Area	4,042,796

SUPPLY

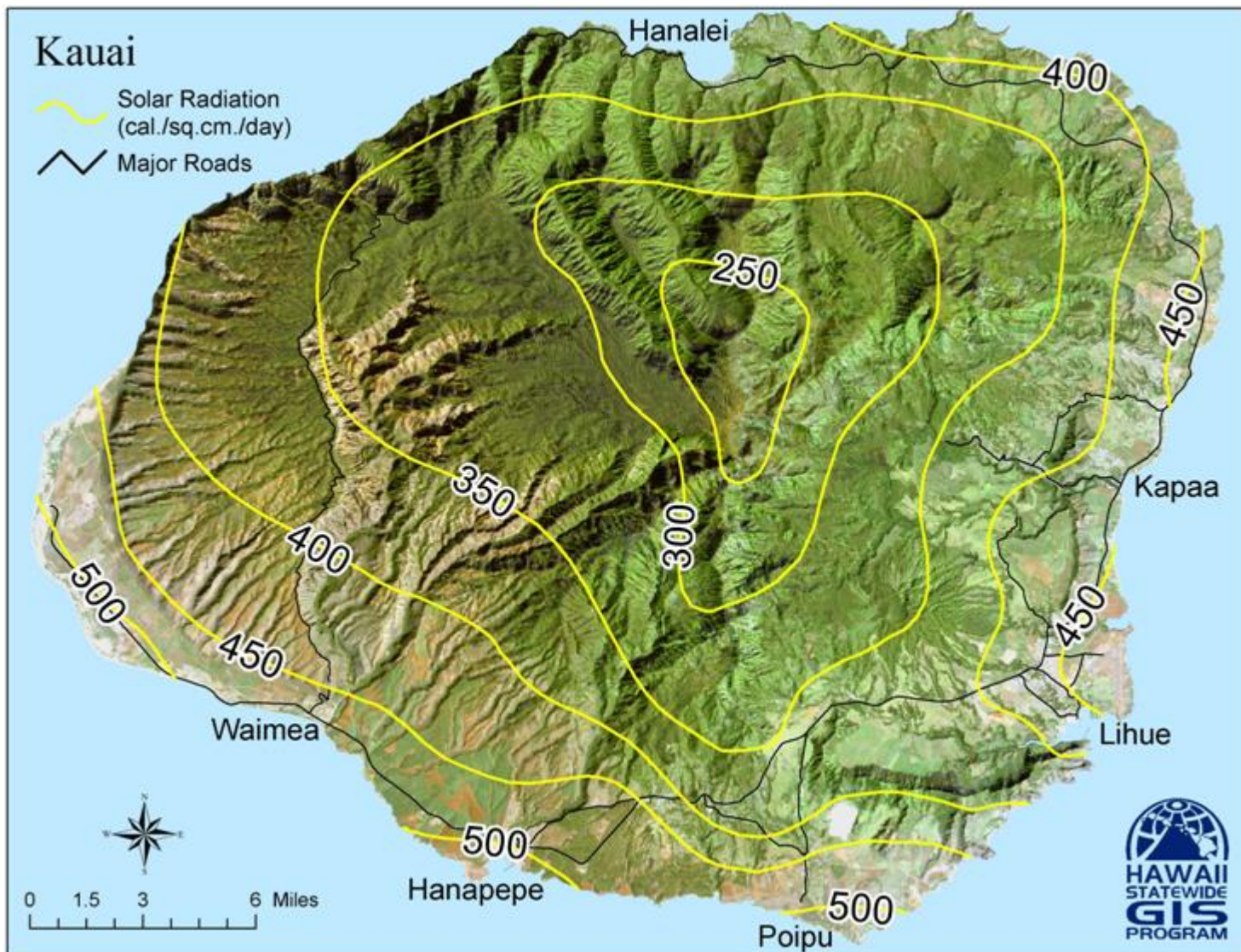
Wind Power Density of Kauai County at 50 Meters
Final Map

Wind Power vs. Seabird Movement Rates



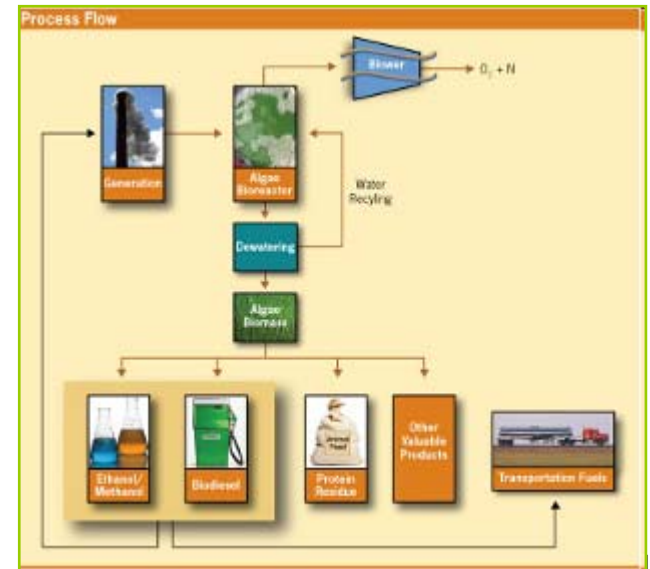
SUPPLY

Solar "Insolation"



SUPPLY

Biomass and Algae



SUPPLY

Hydropower and Pumped Hydro Storage



SUPPLY

Municipal Solid Waste



Energy Policies, Laws and Regulations

- Federal and State Incentive Legislation
 - HB 1270 would change “avoided generation cost” clause
 - Local tax appetite mandates could change with proposed legislation
- Hawaii Renewable Portfolio Standard and Renewable Fuel Standard
- Energy for Tomorrow Legislation of 2006
- Hawaii Clean Energy Initiative
- KIUC/DBEDT/CA Agreement
 - Feed-in Tariffs could give developers price stability
- Regulations such as Renewable Energy Project Permitting

SUPPLY

Applicable Laws*

- HRS 343 – Environmental Impact
- HRS 205 – Land Use Commission
- HRS 196 – Energy Resources
- HRS 201N – Renewable Energy Siting
- HRS 342B – Air Pollution Control
- HRS 342D – Water Pollution



* Partial list

SUPPLY

Scope of Permits in Hawaii

- Possibly over 100 permits
- 25 Federal, State, and County Agencies
- Agencies with the most impact
 - State DOH, DLNR, Office of Planning; U.S. EPA; County planning offices
- Energy projects are also dependent on the Public Utilities Commission (PUC)
 - Power Purchase Agreements (PPA)
- Transmission



SUPPLY

Categories of Permit

- Three main categories of permits
 - Environmental Permits
 - Land Use
 - Construction and Operation



SUPPLY

Permits that may be required for a renewable energy project

	Env. Review	Env. Impact	Const/ Op	Land Use/ Zoning	Total
Federal	3	15	3	2	23
State	2	19	16	17	54
County	1	3	10	18	32
Total	6	37	29	37	109



SUPPLY

Speed up the process

- State of Washington “Local Government Permitting Best Practices”, published in 2008
- Six key points to expedite permits
 - Build mutual understanding
 - Contact stakeholders early
 - Ensure complete applications
 - Analyze process, performance, costs
 - Use information technology
 - Implement system of staff flexibility



Today's Rules

Be Respectful

2-Minute Limit

Take Turns

No

Speechmaking

No Debating

Correct Any
Mistakes on
Easel Notes

DISCUSSION

Renewable Energy Potential

Land Use and Ownership

Renewable Energy Technologies

Laws and Regulations

Permitting

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CONVERSION TECHNOLOGIES

SUSTAINABLE ENERGY FROM KAUA'I

SUPPLY



Transportation

Distributed Electricity

Centralized Electricity

CONVERSION TECHNOLOGIES



DISTRIBUTION



END-USE



CONVERSION TECHNOLOGIES

Electric Vehicles



Project Better Place
www.projectbetterplace.com



Tesla Motors
www.teslamotors.com

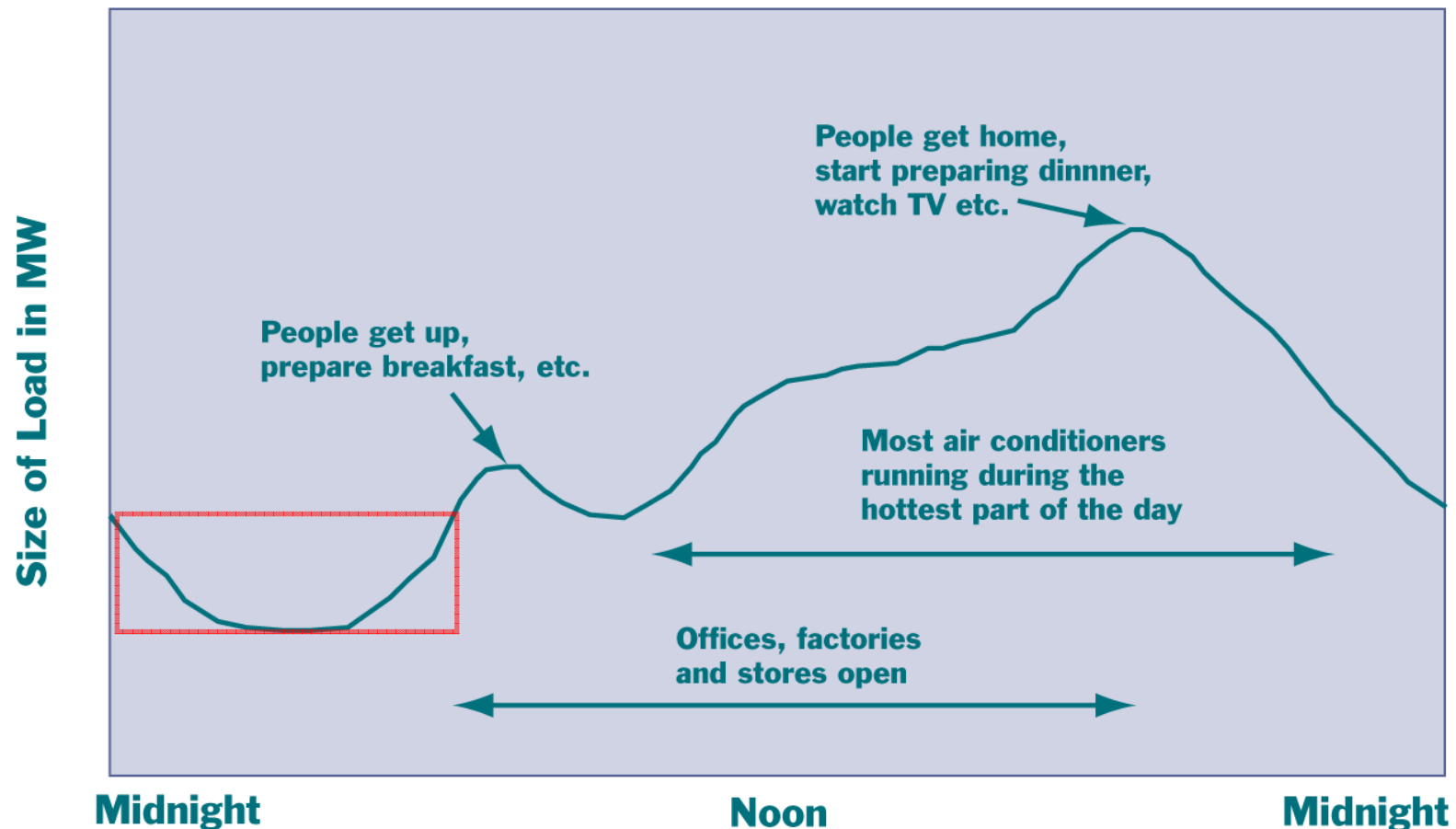


Phoenix Motorcars
www.phoenixmotorcars.com

CONVERSION TECHNOLOGIES

Night-time Electricity could Charge Vehicles

Typical Load Curve with Summer Air Conditioning



CONVERSION TECHNOLOGIES

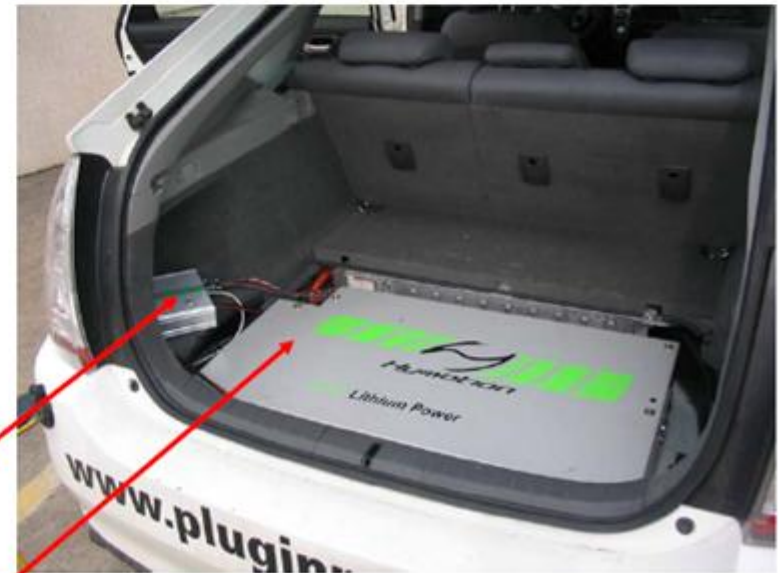


AE PHEV Pilot Project

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



V2Green Charge Management System



A123 Systems Hymotion L5 Conversion



Results Summary

(assuming 1.0 kW per hour charging rate)

- No new generation required to charge 100,000 PHEV on AE grid between 12:00 AM and 8:00 AM
- Value of AE grid ancillary services
 - One Way (Grid-to-Vehicle only): \$122 per vehicle
 - Two Way (Grid-to-Vehicle & Vehicle-to-Grid): \$225 per vehicle
- ~ 50% of AE premises are multi-family (no PHEV outlet)
- Transformer loading is a potential issue without PHEV charge management

CONVERSION TECHNOLOGIES

Centralized Electricity



CONVERSION TECHNOLOGIES

Distributed Electricity



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SUSTAINABLE ENERGY FROM KAUA'I

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CONVERSION



DISTRIBUTION



END-USE



DISTRIBUTION

KIUC Data

- 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

DISTRIBUTION

Smart Grid / Load Management

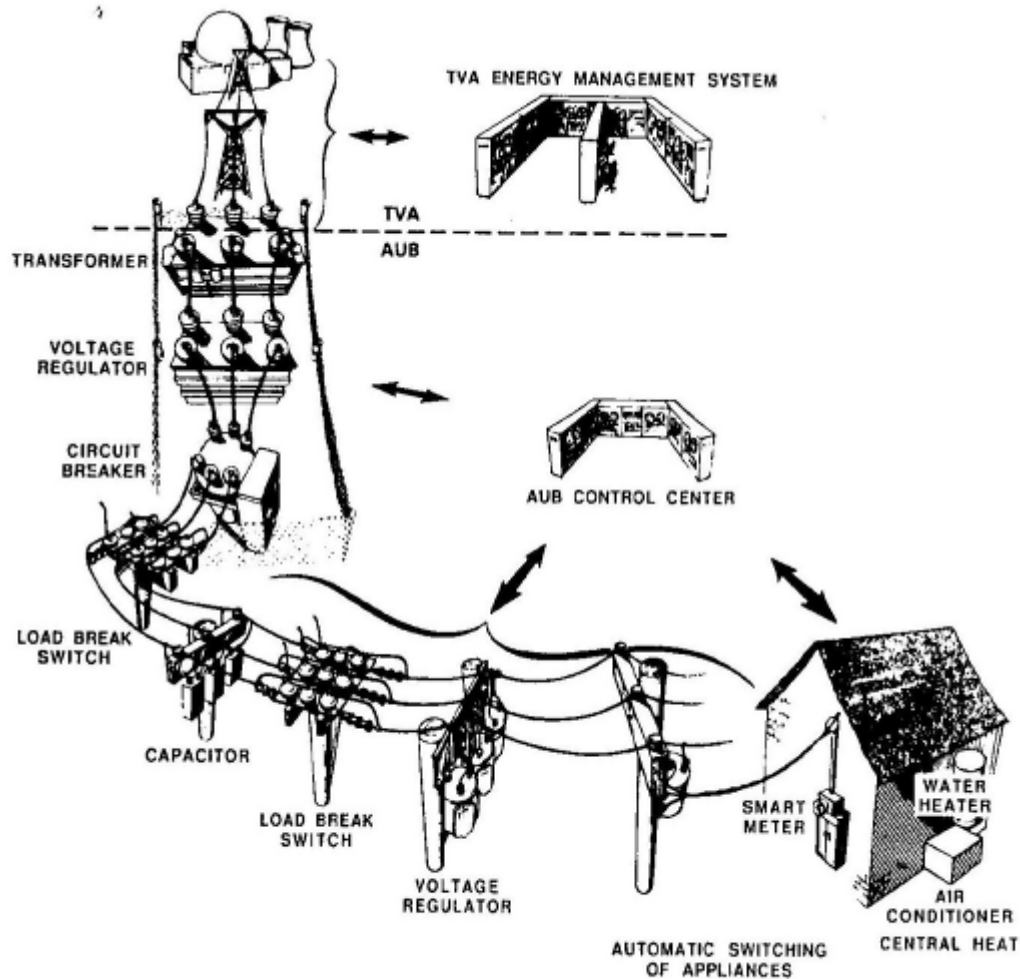


Figure 1-1 Automated equipment for the Athens Automation and Control Experiment.

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SUSTAINABLE ENERGY FROM KAUA'I

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CONVERSION TECHNOLOGIES



DISTRIBUTION

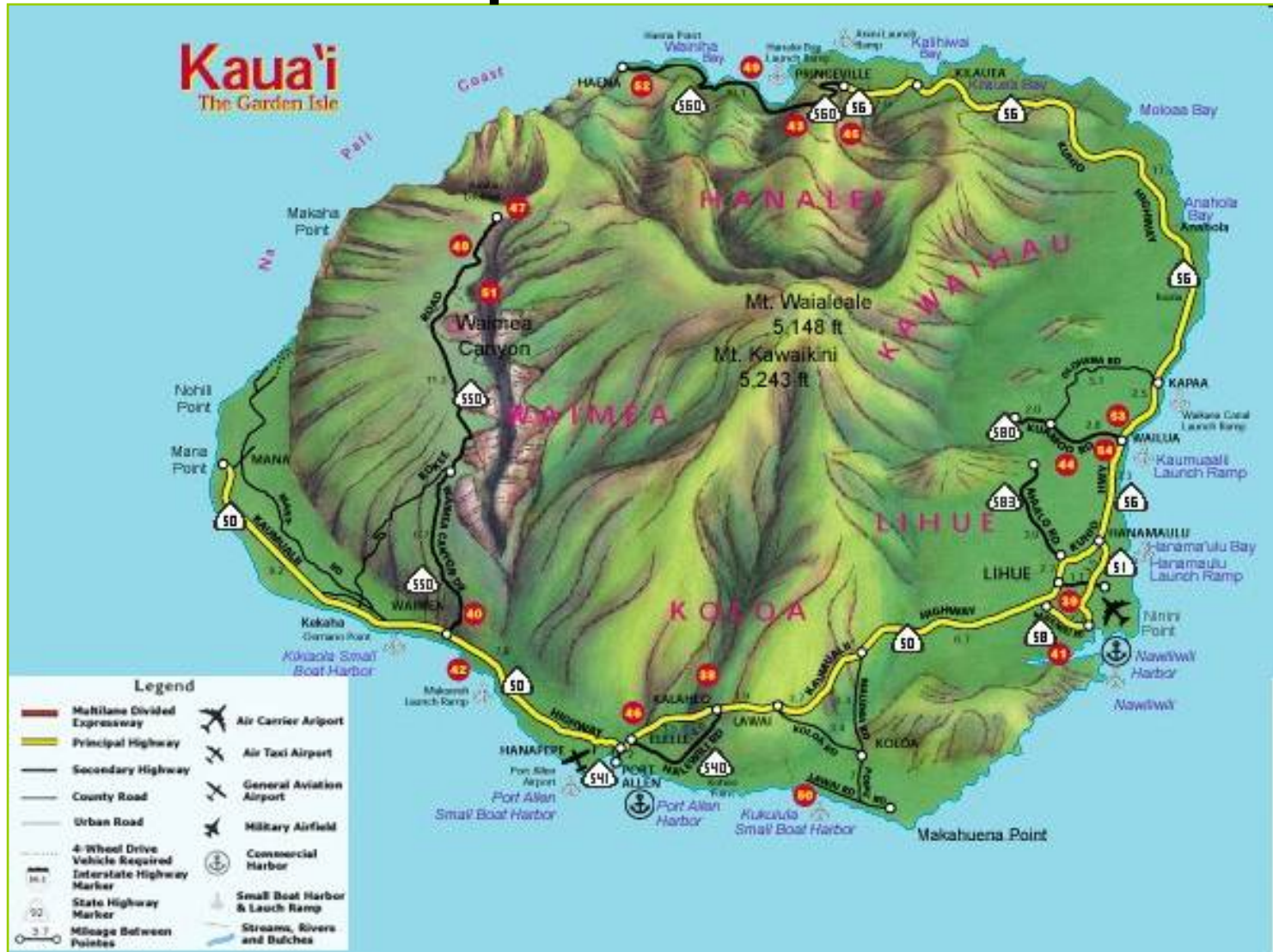


END-USE



END-USE

Transportation Routes



END-USE

Bike Plan Hawaii

Transportation

Easy way to complete short trips and reduces traffic congestion.

Health

Excellent form of exercise

Economics

Promotes economic development, sporting events and eco-tourism

Community

Defines a community's character and inter-connectivity

Environmental

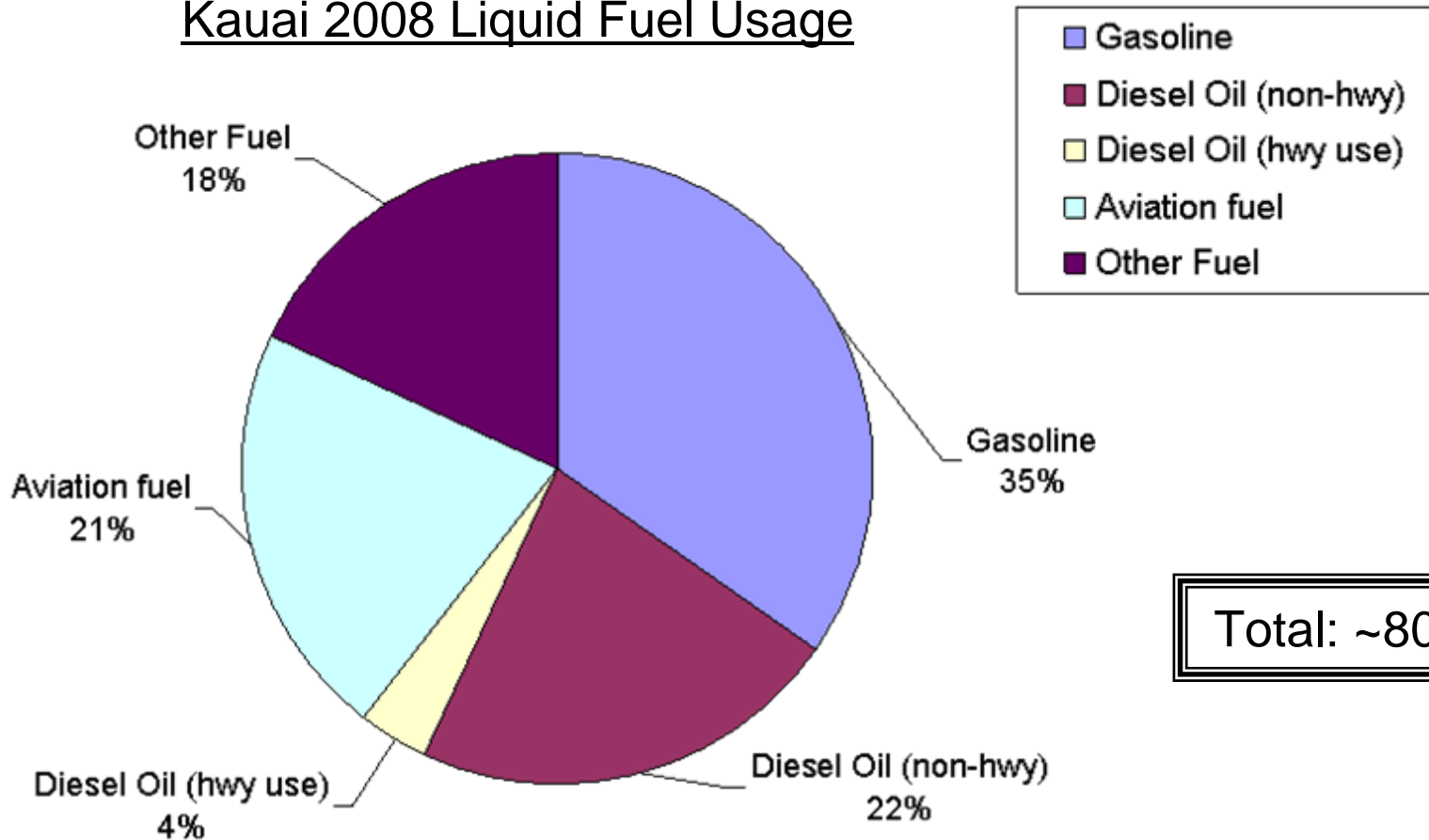
Produces no air pollutants and doesn't consume fossil fuels



END-USE

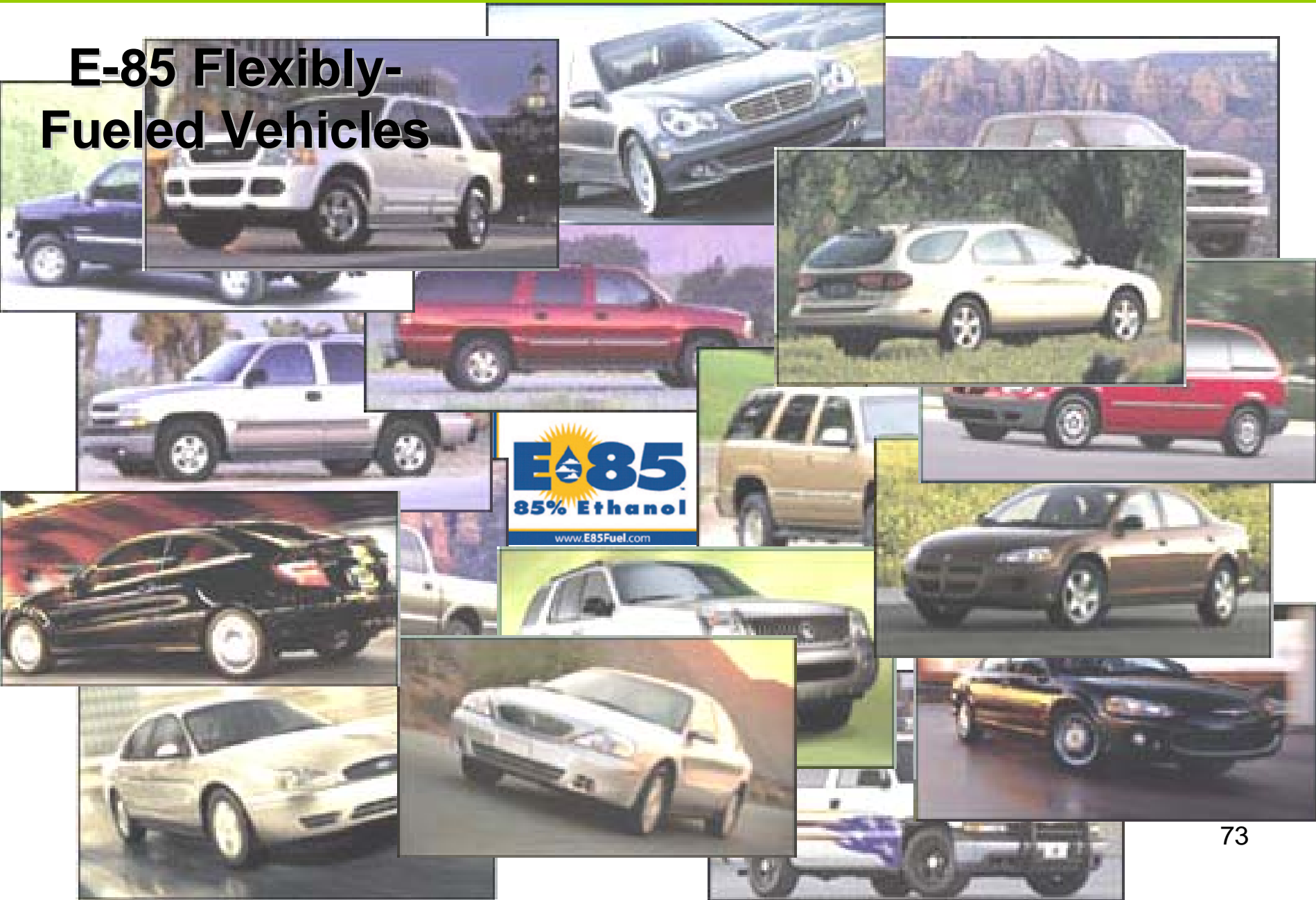
Transportation Liquid Fuel Use

Kauai 2008 Liquid Fuel Usage



END-USE

E-85 Flexibly-Fueled Vehicles



END-USE

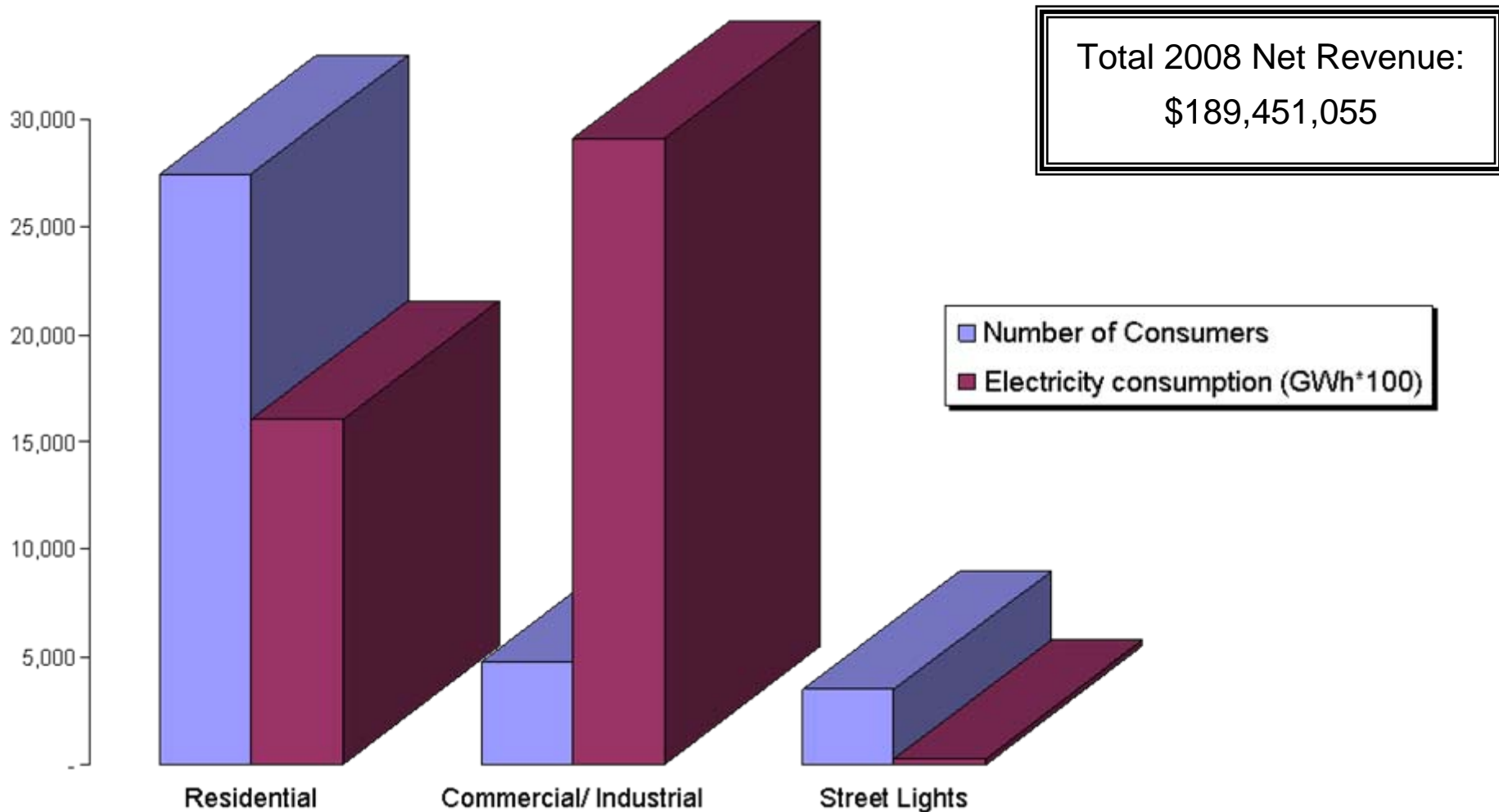
Biodiesel

- Produced commercially (Maui & Oahu) from used cooking oil
- Can also be produced from oilseed crops
- For use in diesel engines
- Available at retail stations on Oahu and Maui



END-USE

Electricity Consumption by End-Use

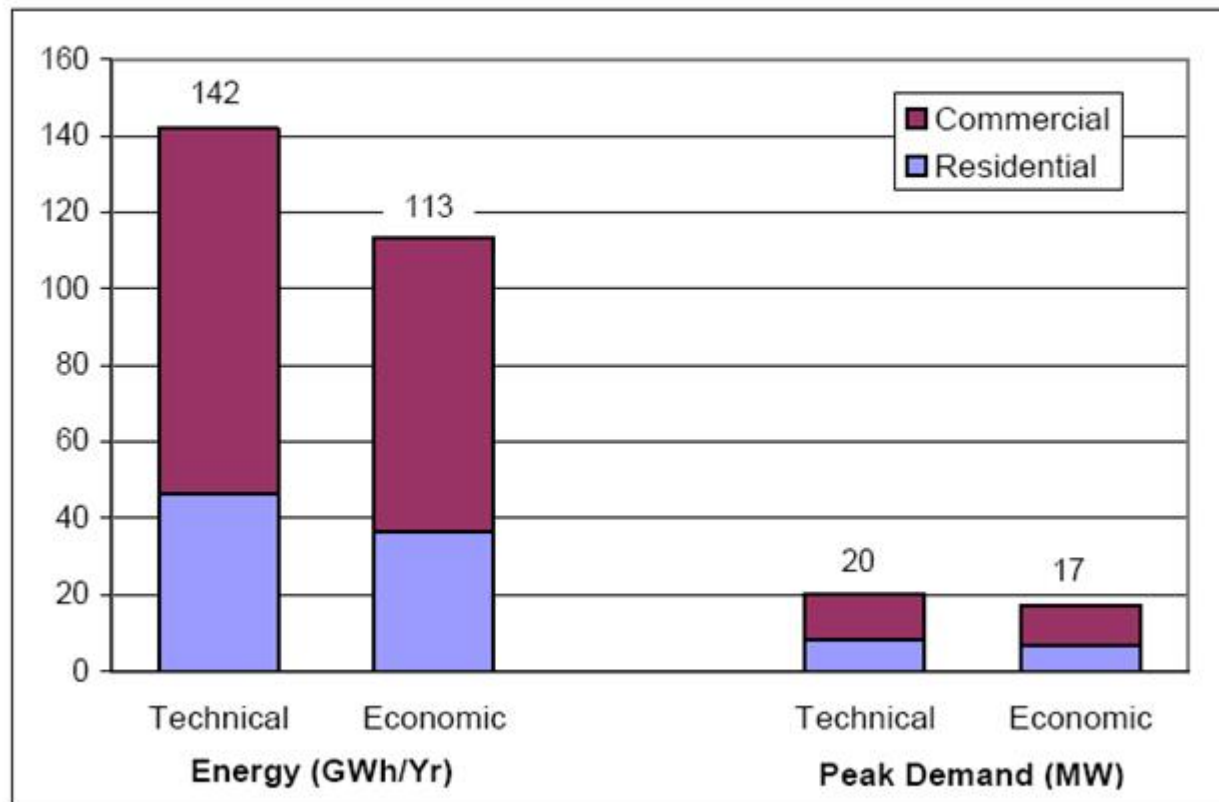


END-USE

Technical and Economical Potential Savings

Figure E-1

Estimated Technical and Economic Energy Efficiency Potential Through 2014



END-USE

Large Potential in Residential Solar Water Heating

Figure E-2
Residential Economic Energy Savings Potential by End Use (2014)

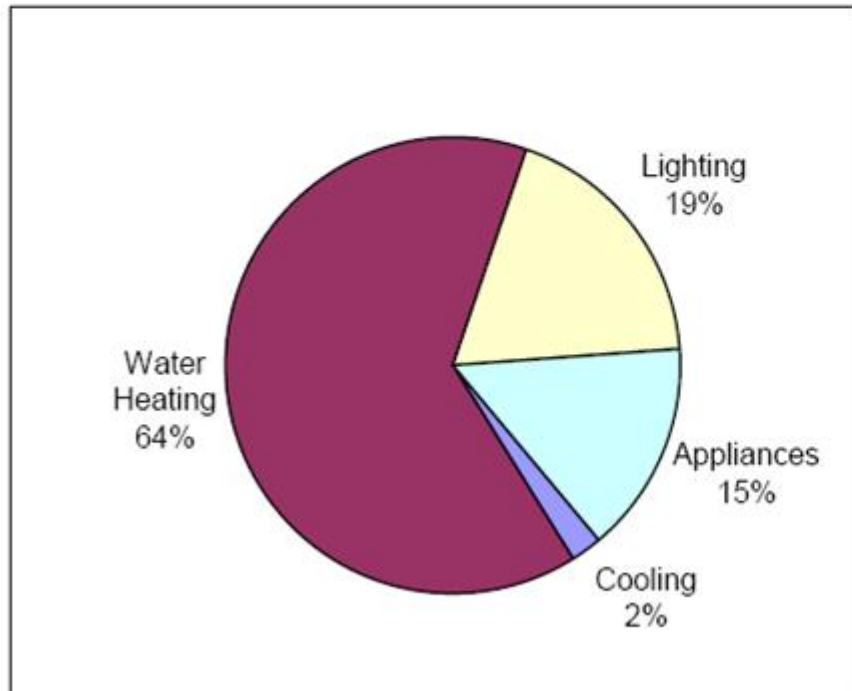
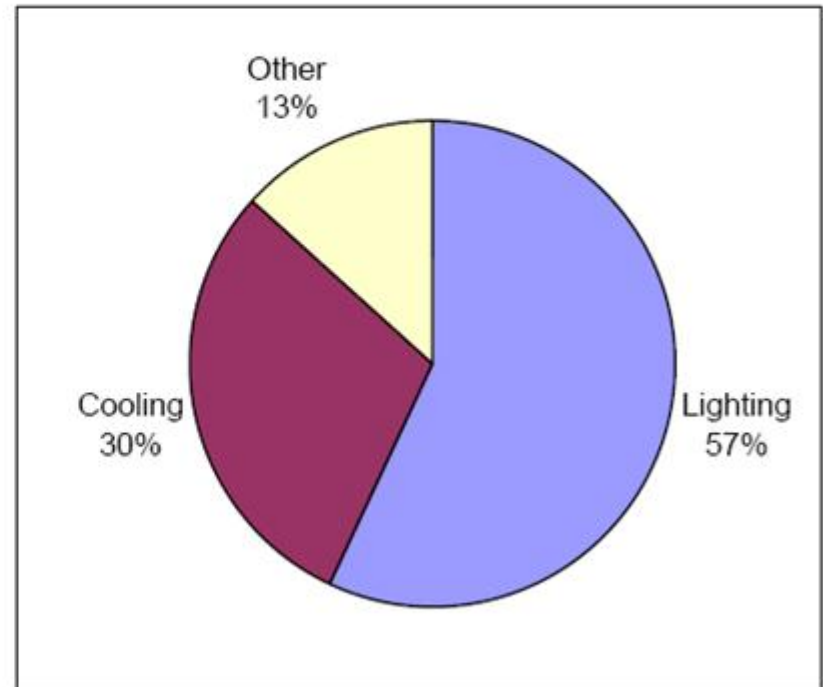


Figure E-3
Commercial Economic Energy Savings Potential by End Use (2014)



Today's Rules

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Easel Notes

DISCUSSION

Transportation Modes:

Vehicles and Bikes

Transportation Fuels:

Ethanol and Biodiesel

Energy Efficiency

Solar Water Heating

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STAKEHOLDER MEETING LESSONS

STAKEHOLDER MEETING LESSONS

Stakeholder Meeting	Lessons Learned
<i>Renewable Energy</i>	<ul style="list-style-type: none"> • Project developers can only be paid the “avoided cost of generation” for renewable energy projects—often too little • There is very little “local tax appetite” to let developers take advantage of Hawaii state tax incentives • Power Purchase Agreement with KIUC could be streamlined with “open book” negotiations
<i>KIUC Grid Stability</i>	<ul style="list-style-type: none"> • Electric grids have physical limitations on how much variable renewable energy they can accept • Storage and controls can help • Dispatchable (on-demand) resources and technologies may be needed to allow more renewables
<i>KIUC Board of Directors</i>	<ul style="list-style-type: none"> • KIUC could more easily reach its renewable goals without the “avoided cost of generation” legislation • KIUC is currently conducting “open book” negotiations with a developer and would like to do more • KIUC would like to explore financing options such as revolving loans
<i>Demand Side Efficiency</i>	<ul style="list-style-type: none"> • Hotels have seen economic benefits by investing in energy efficiency • Kaua`i Water Department is open to considering advanced technologies, phase-shifted puming, etc. to conserve energy

STAKEHOLDER MEETING LESSONS

Stakeholder Meeting	Lessons Learned
<i>Government</i>	<ul style="list-style-type: none"> • The State is adopting IECC efficiency standards
<i>Business, Economic Development, Agriculture</i>	<ul style="list-style-type: none"> • Agriculture land owners and developers are faced with tough economic decisions • Need to make decisions that will let them stay in business
<i>Environmental / Sustainability</i>	<ul style="list-style-type: none"> • There is some community resistance to municipal solid waste incineration • The environmental/sustainability community seems to be willing to work with energy sustainability developers to craft workable solutions • At the southern tip of Kaua`i, there may be enough continental shelf to construct off-shore wind, which would be under FERC jurisdiction
<i>Biofuels and Ground Transportation</i>	<ul style="list-style-type: none"> • The State and County have many ongoing studies and programs to reduce transportation demand and increase biofuel production • Maria Tome from DBEDT is leading the State's Bioenergy Master Plan
<i>Large Landowners</i>	<ul style="list-style-type: none"> • Landowners are in somewhat of a holding pattern until they can decide best paths forward—bioenergy crops, food crops, grain crops, commercial development, etc.
<i>All Stakeholders</i>	<ul style="list-style-type: none"> • TBD (May 14—after all 5 Community Meetings)

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THE END...FOR NOW

Mahalo!

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