

First Steps on the Pathway

The Kauaʻi Energy Sustainability Plan Final Report



DRAFT RECOMMENDATIONS



DRAFT RECOMMENDATIONS / Public Rollout

January: Public rollout of draft recommendations



DRAFT RECOMMENDATIONS / Summary

Draft recommendations summary

SECTOR	GOAL	OBJECTIVE: REDUCE CONSUMPTION	OBJECTIVE: INCREASE SUSTAINABLE SUPPLY
Transportation 	100%	<ul style="list-style-type: none"> • 50¢/Gallon Fossil Fuel Tax • \$186M Alternative Transportation Modes & Fuels Fund <ul style="list-style-type: none"> –Improved Bus Service –HEVs –PHEVs 	<ul style="list-style-type: none"> • \$186M Alternative Transportation Modes & Fuels Fund <ul style="list-style-type: none"> –Ethanol/biodiesel biorefinery –Support ethanol vehicle market
Electricity 	100%	<ul style="list-style-type: none"> • IECC 2009 + LEED Building Codes • 15% Diversion of KIUC Franchise Tax to Enable County to Manage ESCO Work 	<ul style="list-style-type: none"> • Sustainable Electricity Targets • Feed-in Tariffs <ul style="list-style-type: none"> –Pay Down Higher Upfront Costs of Sustainable Electricity • Wind on Hold • Waste-to-Energy on Hold

DRAFT RECOMMENDATIONS / Reaction

Reaction was not entirely positive



The screenshot shows the website 'THE GARDEN ISLAND.com' with a navigation menu including Home, News, Sports, Opinion, Lifestyles, Entertainment, and Market. The article title is 'Members criticize 'ridiculous' 50-cent fuel tax proposal'. The byline is 'By Michael Levine - The Garden Island | Posted: Friday, January 15, 2010 12:00 am | (0) Comments'. The article text reads: 'LIHU'E — While Councilman Tim Bynum pointed to a "non-starter" 50-cent fuel tax proposal to undermine other recommendations in the final draft of the Kaua'i Energy Sustainability Plan Wednesday, his colleagues offered much harsher criticisms of the fuel tax a day later. "It's ridiculous, totally ridiculous," Councilman Daryl Kaneshiro said Thursday. "I don't know where the hell they came up with that thinking." Kaneshiro specifically criticized the work of consultant Douglas Hinrichs, Vice President of Market Development and Transformation for Sentech Hawai'i. "He's out of his mind, completely out of his mind," Kaneshiro said. "It blows me away that we pay a

Ground Transportation

- *Fuel tax is too high*
- *Fuel tax would overburden working class*
- *Isn't clear if biofuels would be taxed*

Electricity

- *Feed-in Tariffs are too general*
- *Hydropower target is too high*

DRAFT RECOMMENDATIONS / Additional Feedback

February: Solicited additional feedback

- County Council members
- KESP Energy Plan Advisory Committee
- County Planning Department
- County Buildings Department
- County Transportation Department
- Mayor Carvalho
- KIUC
- KEDB Renewable Energy Committee
- KEDB CEDS Renewable Focus Committee
- KEDB Executive Committee
- PacWest
- Grove Farm
- Pacific Missile Range Facility

FINAL RECOMMENDATIONS PREVIEW

FINAL RECOMMENDATIONS PREVIEW

■ Principles

- Community priorities and acceptance
- Sound scientific principles and analysis
- Available energy resources
- Commercial, least-cost technologies
- Reduce demand, increase local & sustainable energy/fuels

■ Ground Transportation Highlights

- Greater impact from *demand reduction* (bus, efficient vehicles, etc.)
 - *Increased supply* trickier due to land costs and availability
- Lower level of Fossil Fuel Tax = lower level of energy sustainability
- At some point, refineries may switch to 100% “drop-in” biofuels

■ Electricity Highlights

- Greater impact from *increased supply* of sustainable electricity—can still realistically reach 100% energy sustainability
 - *Demand reduction* less of an opportunity since homeowners don't use much electricity, solar water heating is widespread, hard to influence small business owners
- Success dependent on community acceptance of higher upfront costs for long-term benefits

FINAL GROUND TRANSPORTATION RECOMMENDATIONS



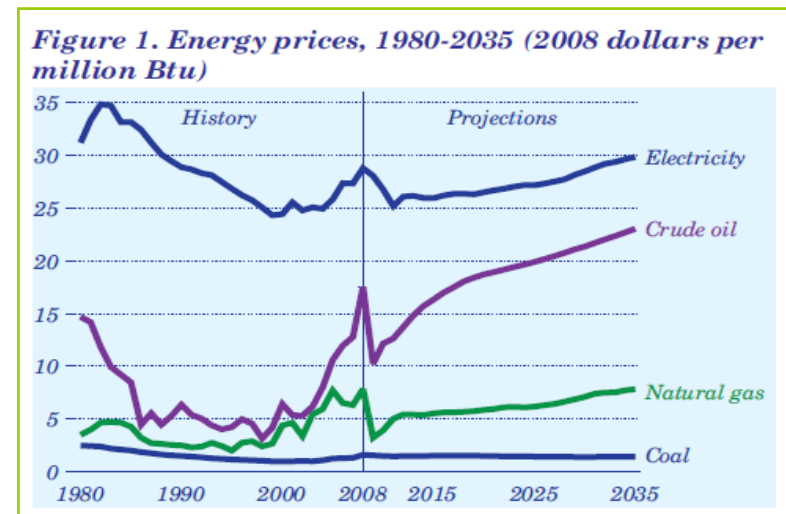
RECOMMENDATIONS / Ground Transportation

RECOMMENDATION 4.1: To Reduce Consumption of Fossil Fuels, Pass 2% *Fossil Fuel Tax*

- 2% *Fossil Fuel Tax* would decrease impact on Kaua`i citizens

- Tied to oil commodity prices

- Must take into account state barrel tax legislation



- Fossil Fuel Tax would build **\$42.6M** *Alternative Transportation Modes & Fuel Fund*

- Lower fund levels = lower energy sustainability goals

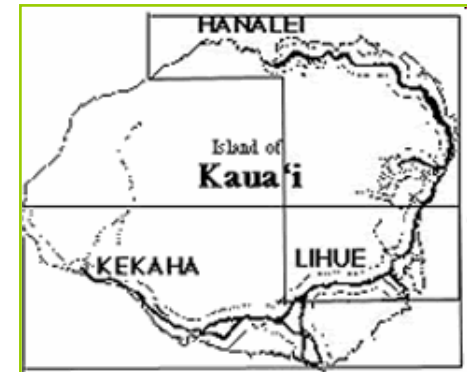
- Fossil fuel tax is a *First Step on the Pathway* to energy sustainability



RECOMMENDATIONS / Ground Transportation

RECOMMENDATION 4.2: To Reduce Consumption of Fossil Fuels, Improve *Kaua`i Bus System*

- Extend geographic service
- Increase route frequency
- Extend evening and weekend hours
- Add surfboard racks
- Wireless Internet for younger crowd
- Park'n'Rides and bus stop shelters
 - o Neighborhood competition for shelters
- Replace buses with diesel-hybrid buses
 - o 68% better fuel economy
 - o No additional cost





RECOMMENDATIONS / Ground Transportation

RECOMMENDATION 4.3: To Reduce Consumption of Fossil Fuels, Offer Hybrid Electric Vehicle Incentives

- Incentives would make HEVs cost the same as conventional internal combustion vehicles
- HEVs use 40% less gasoline than conventional internal combustion vehicles





RECOMMENDATIONS / Ground Transportation

RECOMMENDATION 4.4: To Reduce Consumption of Fossil Fuels, Support “As Needed” Visitor Vehicle Rentals

2008 Island of Kauai Inventory of Visitor Accommodations by Property Type		
Property Type	Number of Properties	Number of Units
Apartment/Hotel	3	8
Bed and Breakfast	30	110
Condominium Hotel	37	2,556
Hostel	1	40
Hotel	13	2,575
Individual Vacation Unit	567	1,621
Timeshare	19	2,276
Other	9	17
Total	679	9,203

- Many hotels have “gone green”
 - Other lessons from Green Hotel Association
- Hourly visitor vehicle rentals would reduce road congestion
 - Alternative vehicles/fuels given preference
 - Visitors have better “aloha experience”





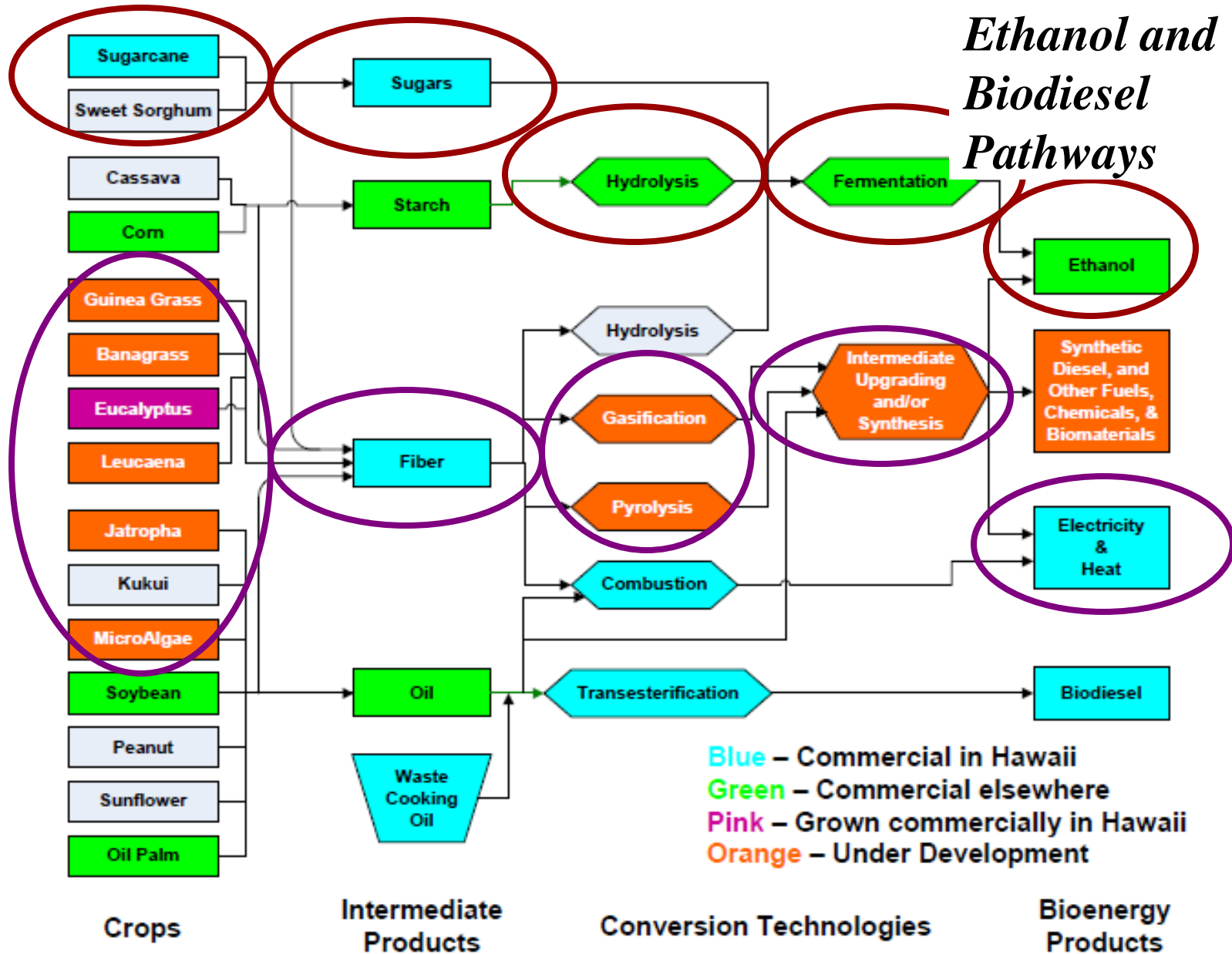
RECOMMENDATIONS / Ground Transportation

Potential Benefits to Visitors

	GUEST MEMBER BENEFITS	HOSPITALITY PARTNER BENEFITS	GreenCar Hawaii BENEFITS
COST	<p>Guests only pay for a car as needed on an hourly basis; the cost-conscious visitor does not have to pay for gas or insurance (it is a cost saving and inclusive service). Additional savings are realized when guests can avoid paying hotel overnight parking fees.</p>	<p>Hospitality Partners have an opportunity to capture greater percentage of the tourist budget (GCH shares their revenue with the hotel).</p>	<p>Produces a meaningful return to investors, reduces carbon emissions and enhances our position for tax incentives.</p>
CONVENIENCE	<p>The guest experience is significantly enhanced as the car rental portion of a visit typically provides unnecessary stress (lines, fees, complicated forms, terms, insurance choices). Having instant access to vehicles that are waiting at the hotel valet is a convenience that improves the entire travel experience.</p>	<p>HP's enhance their service offerings for guests enabling better customer satisfaction and greater guest re-capture upon return visits.</p>	<p>Delivers an immediate benefit to Hawaii: vitalize hospitality revenue, introduce & promote "green" technology, reducing traffic and carbon emissions.</p>
EXPERIENCE	<p>Guests have access to a new fleet of Hybrid vehicles to explore Hawaii and experience the latest alternative energy "green" automotive technology. It allows tourists to feel good about being a responsible visitor and appreciate the natural beauty of Hawaii.</p>	<p>HP's provide a "green" alternative to the standard guest-transportation model taking advantage of the growing interest in Eco-tourism. Additionally, hotels can make a positive impact on Hawaii's environment.</p>	<p>Builds upon success to expand "Green Umbrella" initiatives for Hawaii. Incrementally delivering alternative energy models and creating good jobs for the local Hawaiian economy.</p>



RECOMMENDATIONS / Ground Transportation





RECOMMENDATIONS / Ground Transportation

RECOMMENDATION 4.5: To Increase Renewable Fuel Production/Use, Purchase 5 Vegetable Oil Presses to Allow Small Farmers to Produce *Straight Vegetable Oil*

- Small farmers can grow jatropha (or other vegetable crops) on marginal lands to produce *Straight Vegetable Oil* (SVO)
 - Off-road vehicle
 - Kaua`i Bus willing to experiment with old bus
 - Electricity generation by KIUC?
- 5 multi-crop presses could be shared by small farmers to produce SVO
 - Agricultural condos, Farm Bureau could play coordination role

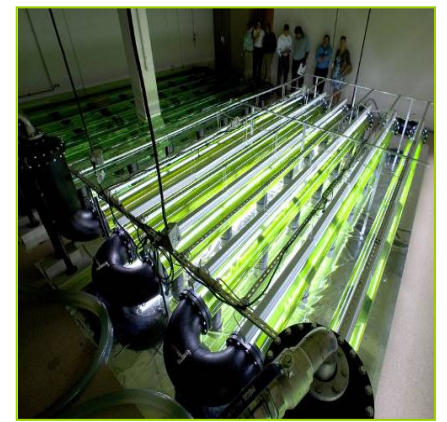




RECOMMENDATIONS / Ground Transportation

Algal Oil Production Could Radically Change Biodiesel Supply

- Algae-to-Liquids could revolutionize biodiesel production
- 3,000-5,000 gallons of biodiesel per acre would help Kaua`i meet diesel replacement for ground transportation + electricity generation
- Could bring many “high tech farming” jobs to Kaua`i
- Department of Defense





RECOMMENDATIONS / Ground Transportation

UNCLASS

As of Jan 2010

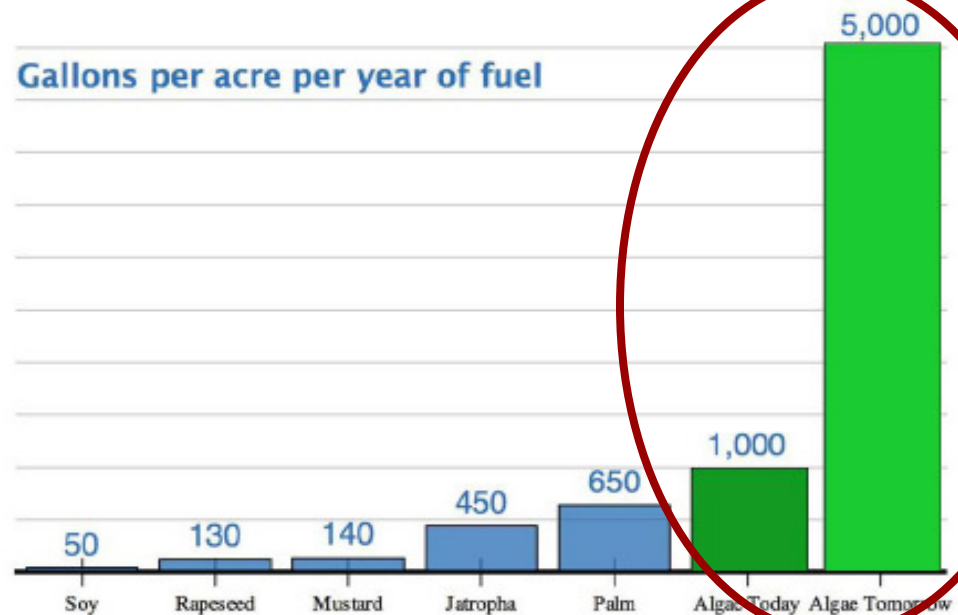


Proposed Solution: Algae Bio-oil

- Advantages of Algae Oil:
 - Can produce locally grown jet fuel and other refined petroleum products
 - Long carbon chain oil
 - Does not compete with food crops for resources
 - No potable water required
 - Can grow in brackish or waste water
 - Can use marginal land
 - High oil productivity per acre
 - Fast growth rate
 - High percentage of plant is oil
 - Photosynthetic
 - Main inputs are sunlight and CO₂
 - Algae is a net carbon absorber—good for the environment

- Risks of Algae Oil:
 - Scale for energy needs to be 1000-100,000 times greater than current commercial production
 - High capital cost (\$10,000/acre) relative to agriculture
 - Difficulty of extracting oil from an organism 10 microns in diameter

Gallons per acre per year of fuel



Source: LiveFuels Inc Nov 2007



RECOMMENDATIONS / Ground Transportation

RECOMMENDATION 4.6: To Increase Renewable Fuel Production/Use, Offer Incentives to Convert Gasoline Vehicles to Gasoline/Ethanol Flex Fuel Vehicles

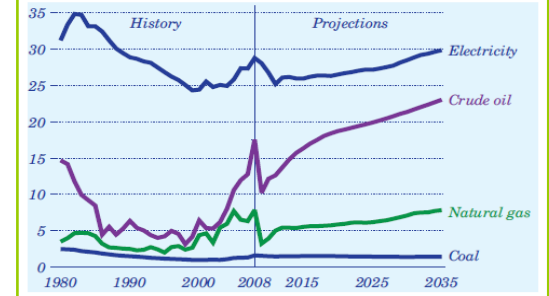
- Hawai`i currently imports ethanol to meet State E15 mandates
- PacWest project will generate 12-15M gallons of ethanol/year
 - o Could meet E15 mandates on Kaua`i
 - o Fuel many gasoline/ethanol Flex Fuel vehicles
- Brazil is leading the world in (sugar cane) ethanol production and advanced ethanol vehicles
 - o High compression engines are approaching efficiencies of gasoline engines
- o Inexpensive conversion kits would let regular gasoline engine cars to also use ethanol



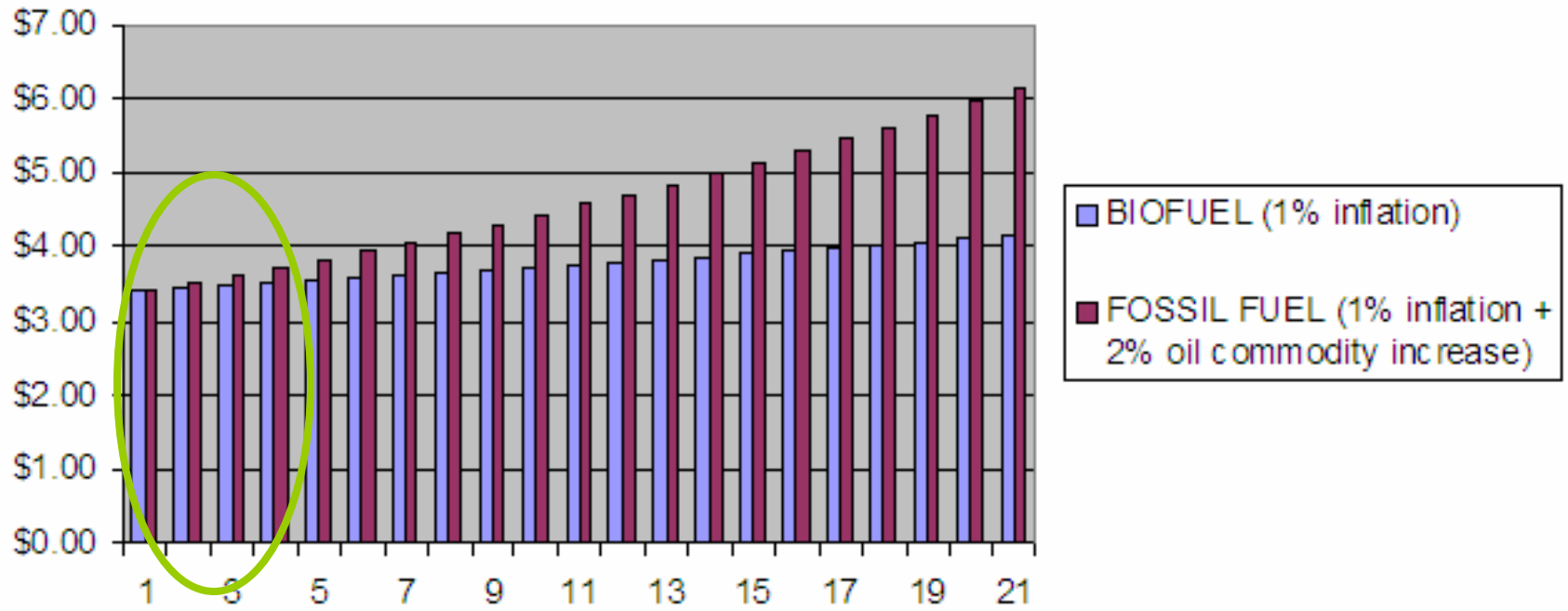
RECOMMENDATIONS / Ground Transportation

Commodity Costs Make a Difference

Figure 1. Energy prices, 1980-2035 (2008 dollars per million Btu)



2% Oil Commodity Price Increase - Effect on Fuel Prices

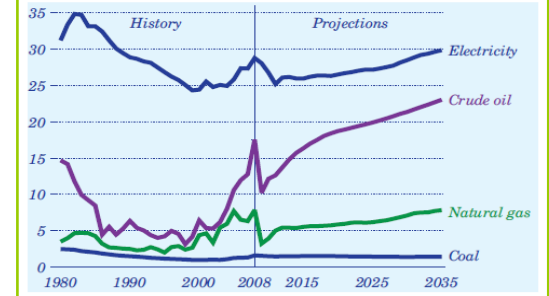




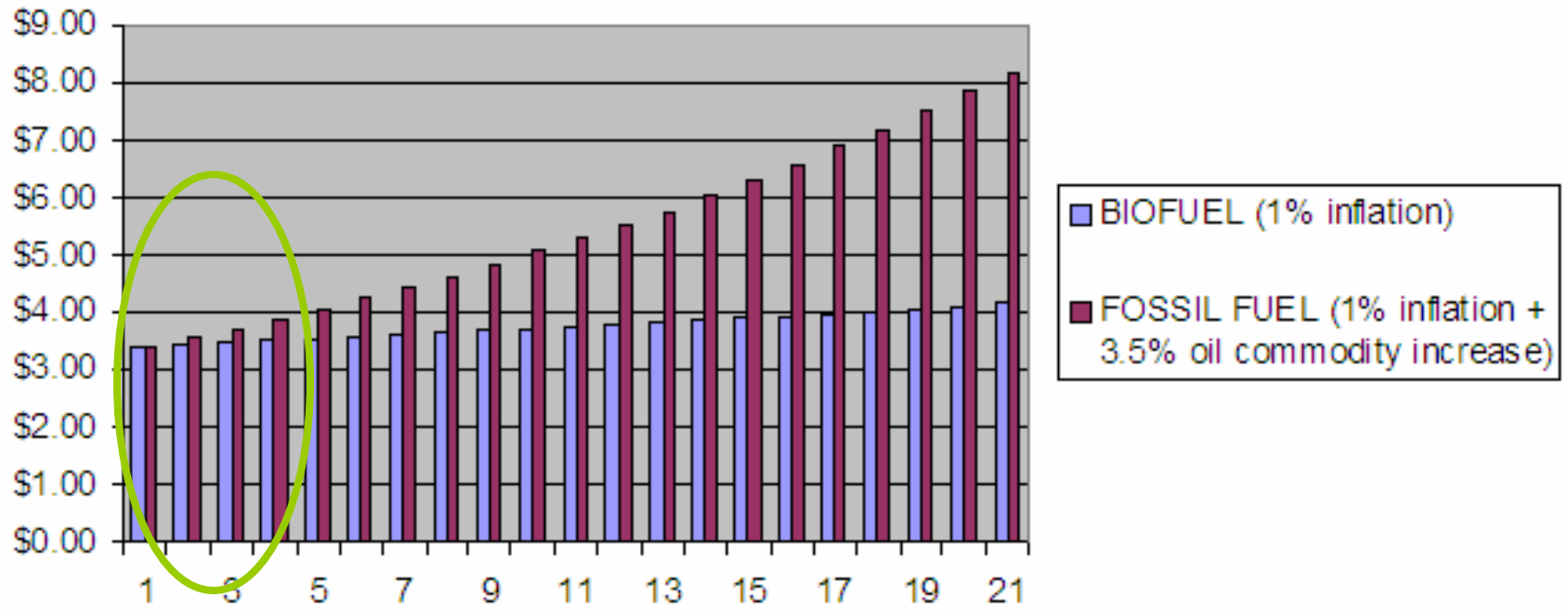
RECOMMENDATIONS / Ground Transportation

Commodity Costs Make a Difference

Figure 1. Energy prices, 1980-2035 (2008 dollars per million Btu)



3.5% Oil Commodity Price Increase - Effect on Fuel Prices





RECOMMENDATIONS / Ground Transportation

RECOMMENDATION 4.7: To Increase Renewable Energy Use for Ground Transportation, Offer PHEV Incentives and Support Night-Time Charging Infrastructure

- Night-time biomass and hydro power can be used to charge Plug-in Hybrid Vehicles (PHEVs)
- Charging infrastructure
 - KIUC Smart Grid
 - Residential chargers
- Offer incentives for PHEVs and HEV/PHEV conversion kits
 - PHEVs are up to 50% more fuel efficient than internal combustion engine vehicles



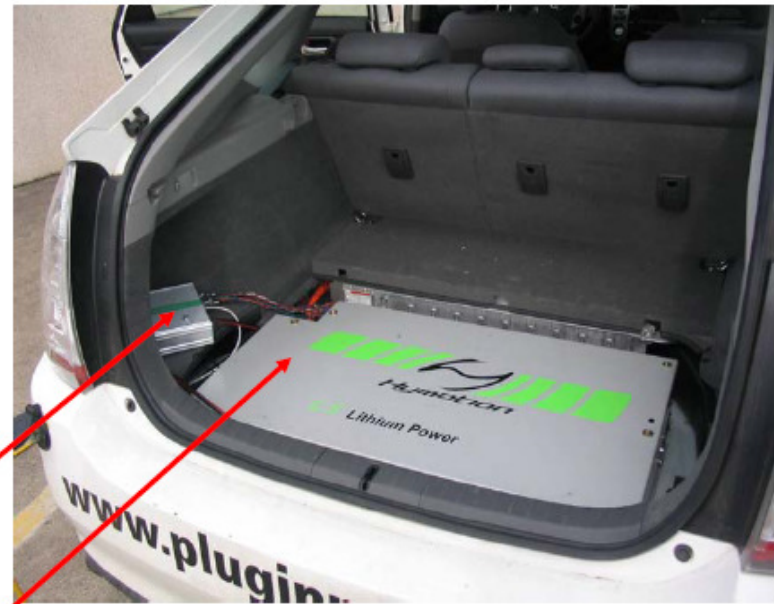


RECOMMENDATIONS / Ground Transportation



AE PHEV Pilot Project

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



V2Green Charge Management System

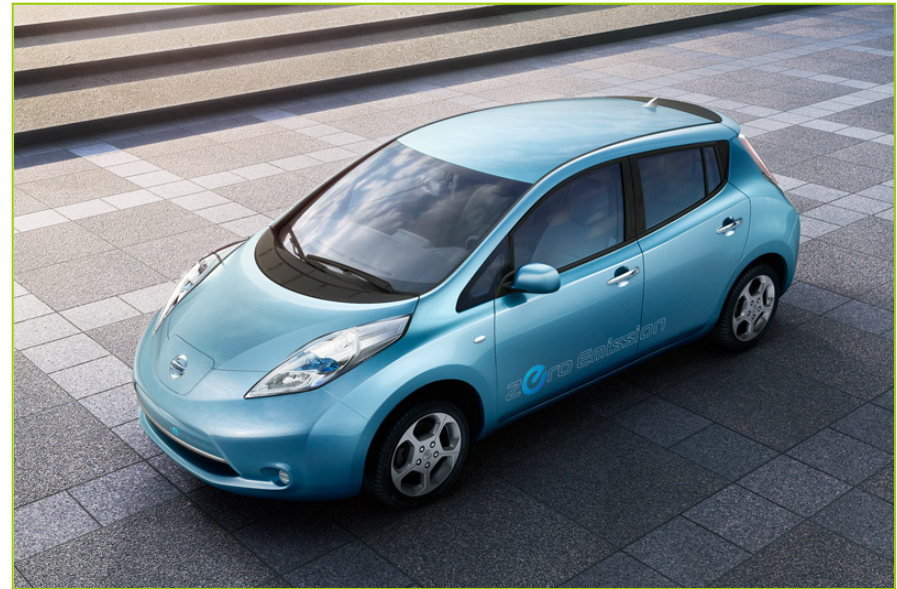
A123 Systems Hymotion L5 Conversion



RECOMMENDATIONS / Ground Transportation

Popular Electric Vehicles (EVs) May Pave the Pathway for PHEVs

- April rollout of Nissan Leaf
 - 0-60 in 10 seconds
 - 100 mile range
 - 8-hour battery charge with 220
 - Battery weighs same as ICE engine, drive train, and gas tank
 - Cost ~\$25,000



- Joint commitment with Hertz, the world's largest general market rental brand, to bring car rental to the US and Europe in 2011.



RECOMMENDATIONS / Ground Transportation

Ground Transportation Recommendations Costs

Recommendation	Details	Costs
4.1: Fossil Fuel Tax / Alternative Transportation Modes & Fuels Fund	2% tax on gasoline and diesel from imported oil to build Alternative Transportation Modes & Fuels Fund (administered by <i>Sustainable Energy Team @ 5% fee which would also allow community outreach, education</i>)	\$2,130,000
4.2: Improve Kaua'i Bus	Extend service and range, add surfboard racks, add wireless Internet to 20 buses for 5 years, build 5 Park-and-Rides, build 10 shelters	\$3,300,000
4.3: Hybrid Electric Vehicle Incentive Program	\$2,500 HEV incentive program for 5,000 cars	\$12,500,000
4.4: Hourly Visitor Vehicle Rental Program	Competitive solicitation to develop hourly visitor vehicle rental program using efficient vehicles, using biofuels	\$2,000,000
4.5: 5 Multiple-Crop Oil Presses	5 presses @ \$2,000 apiece to allow small farmers, agriculture condos to produce Straight Vegetable Oil	\$10,000
4.6: Ethanol/Gasoline Flex Fuel Incentive Program	\$2,000 conversion kits for 5,000 cars	\$10,000,000
4.7: Plug-in Hybrid Vehicle Incentive Program	\$5,000 PHEV incentive program for 2,000 cars/chargers + \$2.5M for Smart Grid charging infrastructure	\$12,500,000
TOTAL COSTS		\$42,440,000



RECOMMENDATIONS / Ground Transportation

Alternative Transportation Modes & Fuels Model

Basic Assumptions:

2007 baseline Gas Consumption	35,700,000	gallons
Initial Price of Gas	\$3.40	
Proposed Tax	\$0.34	
New Gas Price	\$3.74	
Price elasticity Ratio	(40%)	
Net Increase / (Decrease) in Consumption	(3.6%)	
Population Growth of Cars on Road	1.1%	
Inflation	1.0%	
Commodity Price Increase	3.0%	

Vehicles Replaced Due to Incentive
 Gallons Consumed Pre-Tax
 Gallons Consumed Post-Tax
 Gals Avoided Post-Tax
 Gals Avoided w/ Tax Proceeds to Fund HEVs
 Potl Efficcy Gain w Incent. Vs CAFÉ Stds
 Total Efficiency Gains - incl. Incents
 Yrs of Consumption Displaced

	Average/Year	10 Years -Tot.	20 Years -Tot.
Vehicles Replaced	12,112	29,966	96,898
Gallons Consumed Pre-Tax	41,012,991	387,718,272	820,259,813
Gallons Consumed Post-Tax	24,708,863	322,236,127	494,177,251
Gals Avoided Post-Tax	16,304,128	65,482,145	326,082,562
Gals Avoided w/ Tax Proceeds to Fund HEVs	5,149	12,738	41,190
Potl Efficcy Gain w Incent. Vs CAFÉ Stds		1%	46%
Total Efficiency Gains - incl. Incents	39.7%	16.9%	39.8%
Yrs of Consumption Displaced	7.95	1.7	8.0

CAFÉ Standards	Gal/Yr	
Avg Distance/Yr	10,000	
MPG - Pass Veh	26	385
MPG - Lt Trucks	24	417

Pricing Coefficient: Standard vs PHEV vs After-market Conversion

Cost	Car	Truck/SUV	Car	Truck
Standard	25,000	30,000	Percent Difference in Price	
Hybrid	30,000	35,000	20%	17%
Conversion Kit	35,000	40,000	40%	33%
PHEV	40,000	48,000	60%	60%

Assumed Quils (% Best/Worst)

Federal Incentives	HEV		Conversion Kit		PHEV	
	Best Case	Worst Case	Best Case	Worst Case	Best Case	Worst Case
Average PHEV Credit	\$ 3,000	\$ 1,000	\$ 4,500	\$ 2,000	\$ 5,500	\$ 3,500
Freebate (Annual Cost Offset)	\$ -	\$ -	\$ 500	\$ 500	\$ 6,300	\$ 2,000
Federal Battery Warranty*	\$ -	\$ -	\$ 2,550	\$ 1,000	\$ 5,100	\$ 5,100
Total	\$ 3,000	\$ 1,000	\$ 5,638	\$ 3,500	\$ 12,438	\$ 6,138

* Can only be used to fund battery replacement. Assumed use 1x/vehicle lifetime: 8
 *PHEV conversions come w 5 yr battery warranty Or an annualized amount of: \$ 638

Allocation of Gas Tax Proceeds	Allocation %	1	2	3	4	5	6	7	8	9	10	11	12
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Fund Management	3.0%	\$ 380,236	\$ 385,351	\$ 390,230	\$ 395,057	\$ 399,098	\$ 399,176	\$ 399,345	\$ 397,018	\$ 390,648	\$ 381,559	\$ 371,018	\$ 359,393
Demand Reduction		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Efficient Vehicle Incentive	66.0%	\$ 8,365,197	\$ 8,477,727	\$ 8,585,055	\$ 8,691,262	\$ 8,780,147	\$ 8,781,872	\$ 8,785,594	\$ 8,734,389	\$ 8,594,257	\$ 8,394,297	\$ 8,162,397	\$ 7,906,648
County Visitor Shuttle Service	0.5%	\$ 63,373	\$ 64,225	\$ 65,038	\$ 65,843	\$ 66,516	\$ 66,529	\$ 66,558	\$ 66,170	\$ 65,108	\$ 63,593	\$ 61,836	\$ 59,899
Add'l Deisel-Hybrid Public Buses	1.0%	\$ 126,745	\$ 128,450	\$ 130,077	\$ 131,686	\$ 133,033	\$ 133,059	\$ 133,115	\$ 132,339	\$ 130,216	\$ 127,186	\$ 123,673	\$ 119,798
Pilot Deisel-Hybrid School Buses	1.0%	\$ 126,745	\$ 128,450	\$ 130,077	\$ 131,686	\$ 133,033	\$ 133,059	\$ 133,115	\$ 132,339	\$ 130,216	\$ 127,186	\$ 123,673	\$ 119,798
Biodeisel Cars and Trucks Incentive	6.0%	\$ 760,472	\$ 770,702	\$ 780,460	\$ 790,115	\$ 798,195	\$ 798,352	\$ 798,690	\$ 794,035	\$ 781,296	\$ 763,118	\$ 742,036	\$ 718,786
Ethanol/FF Conversion Kit Incentive	12.5%	\$ 1,584,318	\$ 1,605,630	\$ 1,625,957	\$ 1,646,072	\$ 1,662,907	\$ 1,663,938	\$ 1,663,938	\$ 1,654,240	\$ 1,627,700	\$ 1,589,829	\$ 1,545,909	\$ 1,497,471
Sustainable Energy Supply		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Smart Grid Upgrades for PHEV Chrgi	5.0%	\$ 633,727	\$ 642,252	\$ 650,383	\$ 658,429	\$ 665,163	\$ 665,293	\$ 665,575	\$ 661,696	\$ 651,080	\$ 635,932	\$ 618,363	\$ 598,988
Outreach and Education Fund	1.0%	\$ 126,745	\$ 128,450	\$ 130,077	\$ 131,686	\$ 133,033	\$ 133,059	\$ 133,115	\$ 132,339	\$ 130,216	\$ 127,186	\$ 123,673	\$ 119,798
Contingency Fund	4.0%	\$ 506,982	\$ 513,802	\$ 520,306	\$ 526,743	\$ 532,130	\$ 532,235	\$ 532,460	\$ 529,357	\$ 520,864	\$ 508,745	\$ 494,691	\$ 479,191
Total	100.0%	\$ 12,674,541	\$ 12,845,041	\$ 13,007,659	\$ 13,168,578	\$ 13,303,252	\$ 13,305,867	\$ 13,311,506	\$ 13,233,923	\$ 13,021,602	\$ 12,718,633	\$ 12,367,269	\$ 11,979,769

Effect of Tax on Gas Consumption	Type Tax Rate Preference:	1	2	3	4	5	6	7	8	9	10	11	12
Use Real or Nominal Tax Rate?	Nominal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Real Effect of Price Elasticity		(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)	(3.64%)
Effect of Inflation on Nominal Prices		100.00%	99.01%	98.03%	97.06%	96.10%	95.15%	94.20%	93.27%	92.35%	91.43%	90.53%	89.63%

FINAL ELECTRICITY RECOMMENDATIONS



RECOMMENDATIONS / Electricity

RECOMMENDATION 6.1: To Decrease Electricity Demand, Divert 7.5% of KIUC Franchise Tax to Enable County to Lead Energy Efficiency Initiatives

- Would raise \$255,000—enough for 2 FTEs—for 2 years until Franchise Tax could be raised

- Energy Manager

- Manage Energy Savings Performance Contract (ESPC) projects
- Enforce 2009 IECC codes
- Engage with DBEDT and PUC on policy

- Facilities Specialist

- Manage buildings retrofits
- Assess new energy-savings technologies such as Internet-based energy management systems





RECOMMENDATIONS / Electricity

Example of Energy Manager Duties – Codes and Standards

- IECC 2009 adopted for new construction
 - Includes stricter energy efficiency standards than LEED
- IECC 2009 could be applied to building retrofits
 - KIUC Demand Side Management program could help pay down above-code electric equipment costs for existing commercial buildings
- Data unavailable to estimate energy savings





RECOMMENDATIONS / Electricity

Example of Facilities Specialist Duties – Assess Energy-Saving Technologies

- Department of Water is third largest energy consumer on Island
- Variable speed/frequency drive pumps, auto start, offpeak pumping, and other controls may increase efficiency
- Additional gains from ensuring pipe integrity
- County, KIUC, solution providers need to engage Department of Water to assess and implement energy saving measures





RECOMMENDATIONS / Electricity

RECOMMENDATION 6.2: To Increase Large-Scale Renewable Energy, Increase KIUC Franchise Tax by 30% to Facilitate *Open Source Project Development Process*

- Recent renewable energy and biofuels projects have run into financing trouble
- If KIUC Franchise Tax was increased, *Open Source Project Development Process* would projects more “bankable” by reducing risk and costs to investors
- KIUC Franchise Tax: County gets 2.5% of KIUC gross receipts
 - KIUC expects to have gross annual receipts of \$137,268,331 in 2010*
 - Franchise Tax owed to the County in 2010 = \$3,431,708
 - 30% increase would yield **\$1,029,512/year** (in 2010)



RECOMMENDATIONS / Electricity

Open Source Project Development Process Examples

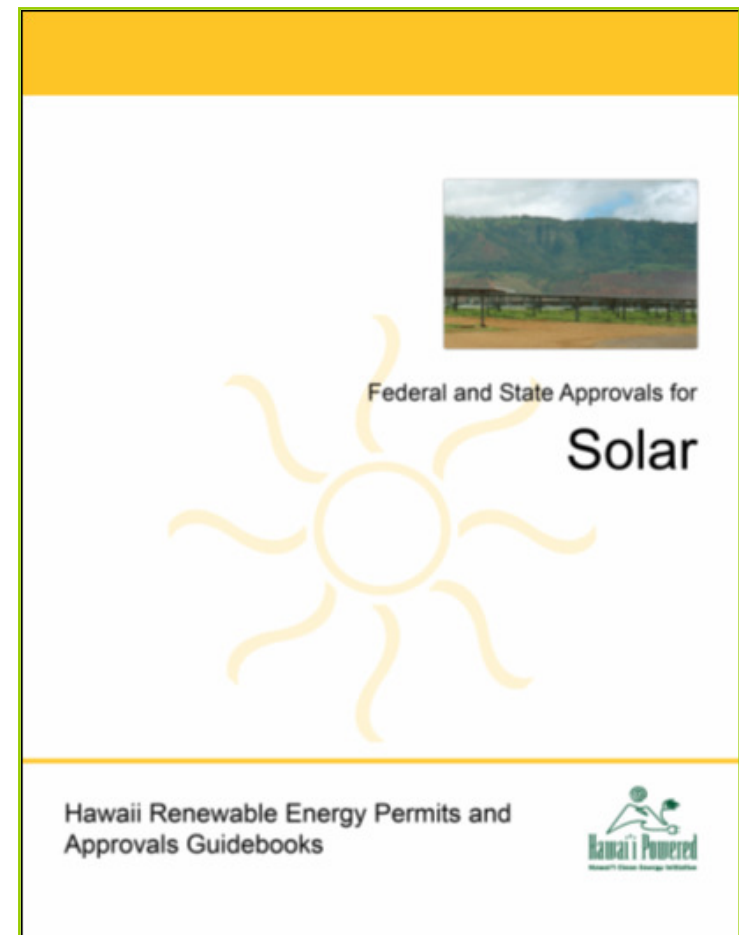
- Early community engagement
 - The community would be engaged by Sustainable Energy Team to encourage early buy-in, identify barriers, assess overall opportunity to reduce risk to developers.
- Developer's project data checklist
 - KIUC would develop and post on their website a Developer's Data Checklist that details data points that any renewable energy project development group would need to bring to KIUC in order to enter into negotiations; data points may include capacity, total annual energy, secured land, secured financing, point of grid interconnect, etc.
- KIUC grid data share
 - KIUC would develop and post on their website data on their grid infrastructure, single line drawings, substations, additional capacity needs, and KESP renewable energy targets
- Standardized project technical/economic feasibility study specifications
 - KIUC assesses the feasibility of hundreds of renewable energy projects, with varying feasibility study specifications; a standardized form, developed by KIUC and posted on their website, would greatly expedite its project review process
- Sustainable Electricity Price Targets
 - Rather than one-price-fits-all Feed-in Tariff offerings, KIUC will make available on their website projected non-generation + generation rate targets (with reasonable return) as a starting point for Power Purchase Agreement (PPA) negotiations.



RECOMMENDATIONS / Electricity

Open Source Project Development Process Examples

- Environmental assessments
 - Could rule out risky projects
- Reasonable and non-redundant interconnect study
 - Will facilitate a more streamlined and non-redundant interconnect approach.
- Open-book PPA negotiations
 - PPA negotiation parties will open their financial books to expedite negotiations and reduce risks/costs to all parties.
- Streamlined project permitting
 - Will allow developers to know exactly how to navigate through complex permitting process.
 - Renewable energy projects that are deemed bankable by KIUC and that advance the County's KESP renewable energy targets will get preferential treatment at all County permitting, siting, building and construction agencies.





RECOMMENDATIONS / Electricity

Setting Realistic Sustainable Electricity Capacity/Energy Targets

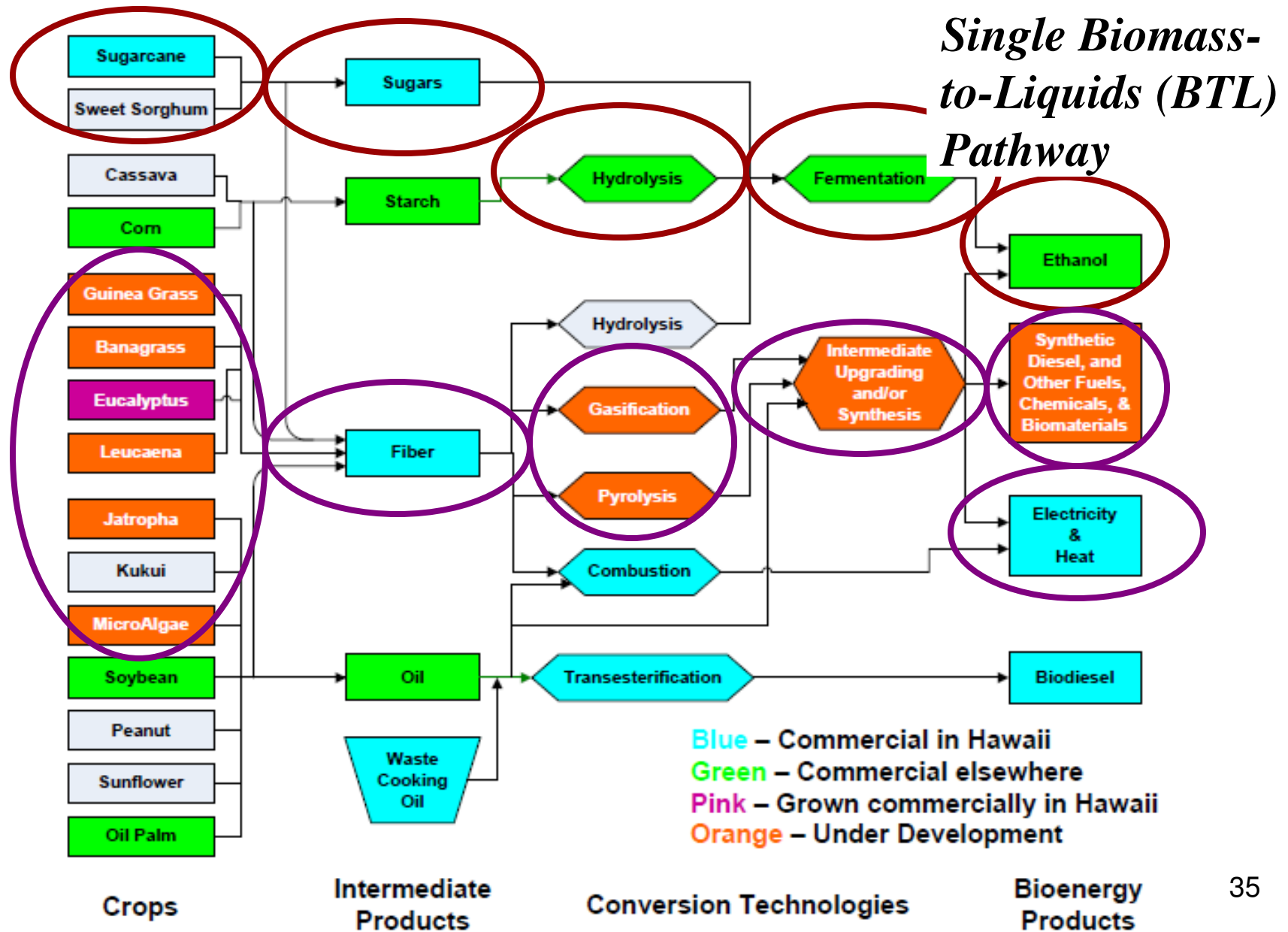
Resource / Technology	Capacity (MW)	Electricity (GWh/yr)	Capacity Factor (%)	Initial Install Year	SENTECH LCOE (\$/kWh)	KIUC LCOE (\$/kWh)	Assumed LCOE
Concentrating Solar Power (with storage)	50	140.3	32%	2011	0.143	0.125	0.125
Photovoltaics Farms (with storage)	15	26.3	20%	2010	0.182	0.138	0.138
Hydropower	22	100.3	52%	2013	0.087	0.110	0.110
Biomass/Biodiesel	45	339.2	86%	2012	0.072	0.167	0.167
Landfill Gas/Engine	1.6	12.5	89%	2011		0.116	0.116
TOTALS	133.6	618.6					

- Endangered aquatic species regulations will slow scale and pace of hydropower on Kaua`i
 - Reduced hydro capacity from 45 to 22 MW
- KIUC will need to align generation and load profiles





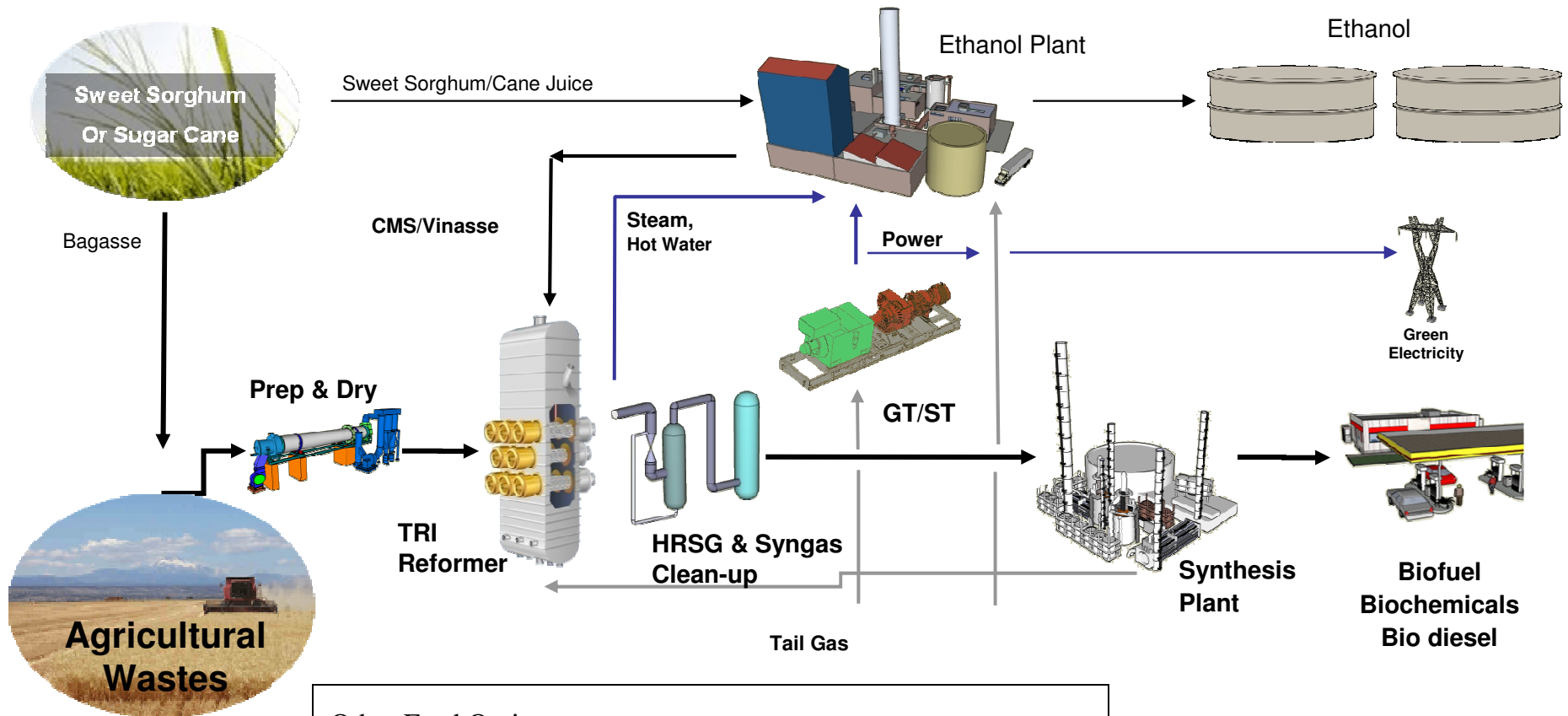
RECOMMENDATIONS / Electricity





RECOMMENDATIONS / Electricity

Municipal Solid Waste can be Added to BTL Gasification Pathway



- Other Feed Options:
- Municipal solid waste – as rdf
 - Lumber mill surplus – “hog fuel”
 - Agricultural process surplus



RECOMMENDATIONS / Electricity

Wind Still on Hold

- Federal ESA regulations on Newell Shearwater and other endangered species
- Community opposition to visual impacts
- Remoteness of the best potential sites

Endangered Species Occurring on Kaua'i
Waterbirds, Bats, and Seabirds

 <small>@JackJettrey</small>	 <small>USFWS</small>	 <small>Rob Shallenberger/USFWS</small>	 <small>@JackJettrey</small>
Hawaiian Goose / <i>Brania sandvicensis</i> / Nene	Hawaiian Stilt / <i>Himantopus mexicanus knudseni</i> / Ae`o	Hawaiian Duck / <i>Anas wyvilliana</i> / Koloa maoli	Hawaiian Hoary Bat / <i>Lasurus cinereus semotus</i> / `ope`ape`a
	 <small>Steve McConnell</small>		
Newell's Shearwater / <i>Puffinus auricularis newelli</i> / `A`o	Band-rumped Storm Petrel / <i>Oceanodroma Castro</i> / `Ake`ake	Hawaiian Petrel / <i>Pterodroma phaeopygia sandwichensis</i> / `Ua`u	



RECOMMENDATIONS / Electricity

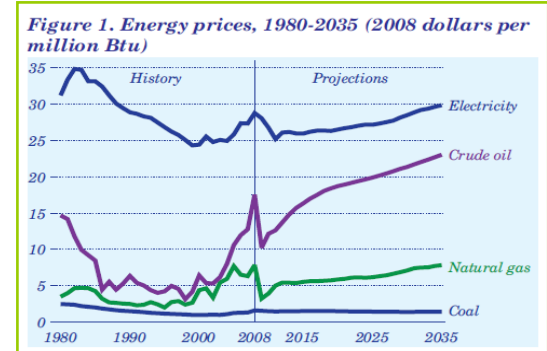
Setting Sustainable Electricity Price Targets

Resource / Technology	LCOE / Generating Costs (\$/kWh)	+ 15% Return on Investment (\$/kWh)	+ Non- Generating Costs (\$/kWh)	Full Electricity Rate Charged to Consumer (\$/kWh)
Concentrating Solar Power (solar thermal energy, with thermal storage)	\$0.125	\$0.144	\$0.150	\$0.294
Photovoltaic Farms (solar electric energy, with battery storage)	\$0.138	\$0.159	\$0.150	\$0.309
Hydropower	\$0.110	\$0.127	\$0.150	\$0.277
Biomass/Biodiesel	\$0.167	\$0.192	\$0.150	\$0.342
Landfill Gas (ignited in diesel engine or CHP system)	\$0.116	\$0.133	\$0.150	\$0.283
<i>Weighted Average</i>	<i>\$0.144</i>	<i>\$0.166</i>	<i>\$0.150</i>	<i>\$0.316</i>

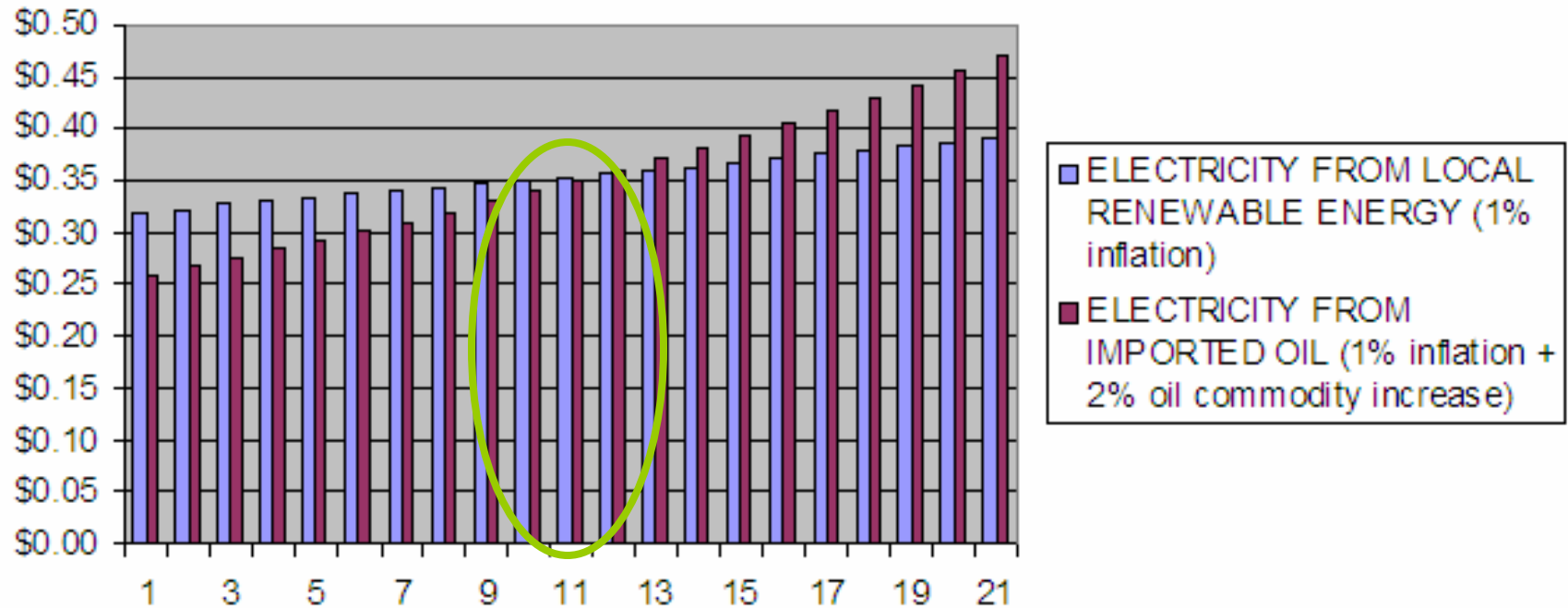


RECOMMENDATIONS / Electricity

Commodity Costs Make a Difference



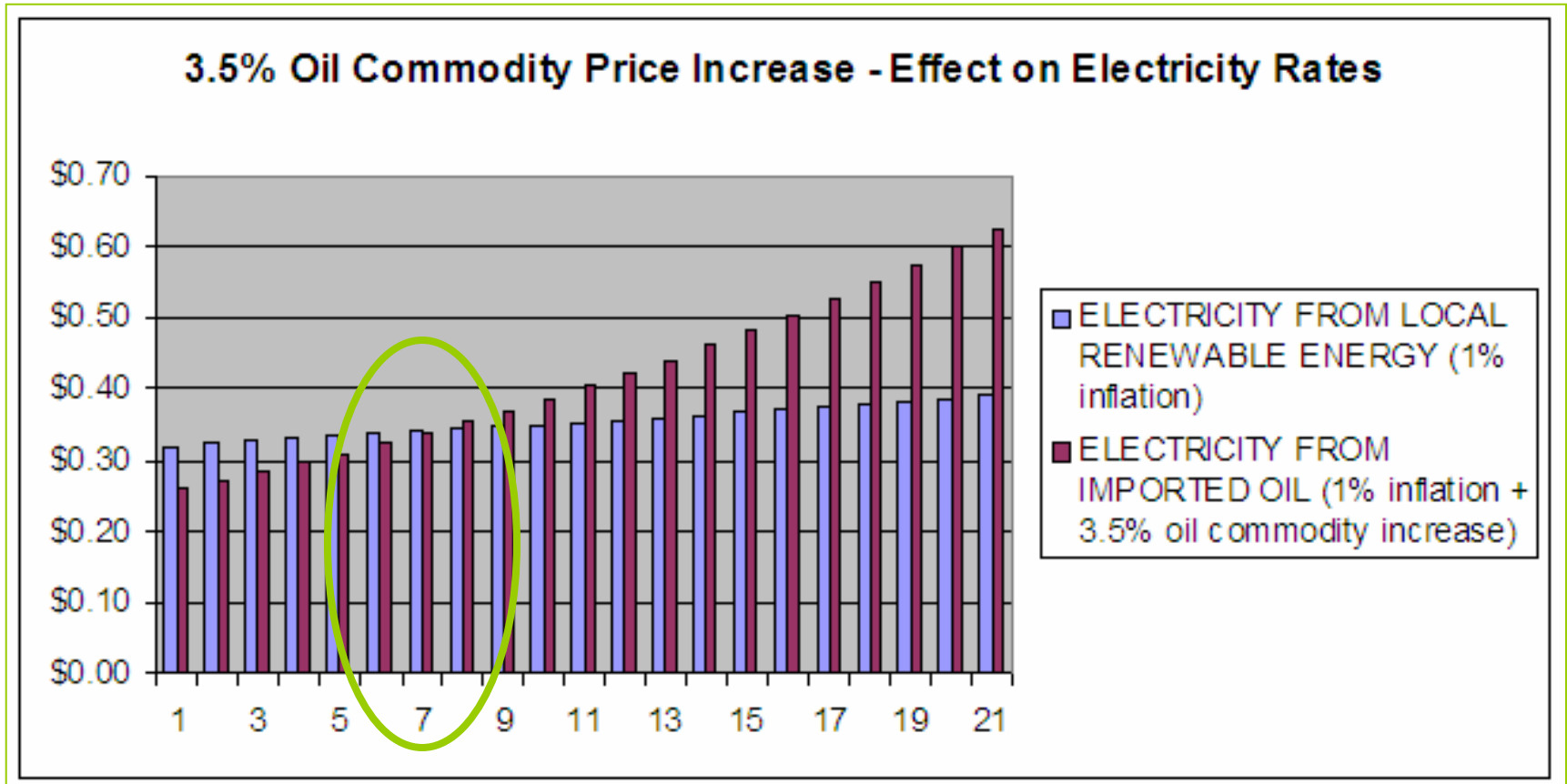
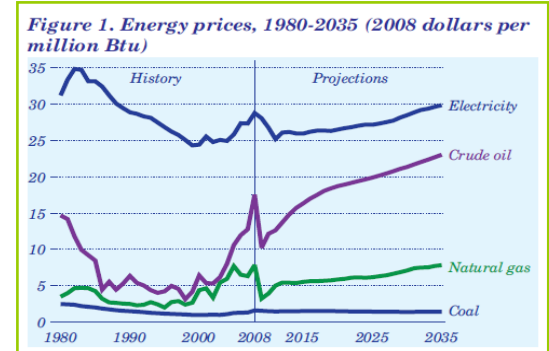
2% Oil Commodity Price Increase - Effect on Electricity Rates





RECOMMENDATIONS / Electricity

Commodity Costs Make a Difference





RECOMMENDATIONS / Electricity

RECOMMENDATION 6.3: Participate in *PACE* Program to Increase Distributed Energy Capacity

- *Property Assessed Clean Energy* (PACE) bonds allow home owners to pay for distributed energy projects through property tax bill
- Kaua`i has ~3.8MW of PV currently (largest per capita rate in U.S.)
- Kaua`i could participate in PACE program to increase PV + micro-hydro + energy efficiency projects
 - o Some micro-hydro companies are offering their own capital to develop projects





RECOMMENDATIONS / Electricity

Electricity Recommendations Costs

Recommendation	Details	Costs
6.1: Divert 7.5% of KIUC Franchise Tax to allow County to Lead Energy Efficiency Efforts	County to fund Energy Manager, and Facilities Specialist in OED by temporary diversion of KIUC Franchise Tax. County to work with HI State Legislature to permanently raise KIUC Franchise Tax.	\$255,000/year
6.2: Permanently Raise KIUC Franchise Tax to Mandate <i>Open Source Project Development Process</i> for Large-Scale Renewable Energy	<ul style="list-style-type: none"> •County to fund Renewable Energy Project Facilitator in OED • County to conduct Environmental Impact Assessments •<i>Sustainable Energy Team</i> to conduct community outreach. 	<ul style="list-style-type: none"> •\$150,000/year •\$150,000/year •\$300,000/year
6.3: Property Assessed Clean Energy Bonds for Distributed Energy	County to fund PACE Bonds Manager in Real Property office.	\$122,500/year
TOTAL COSTS		\$977,500/year

IMPLEMENTATION CONSIDERATIONS



IMPLEMENTATION / Considerations

KESP Legislation by Mayor, County Council

- Debate
- Craft legislation
- Adopt legislation
- Work with Finance to levy taxes
- Set up Sustainable Energy Team



IMPLEMENTATION / Considerations

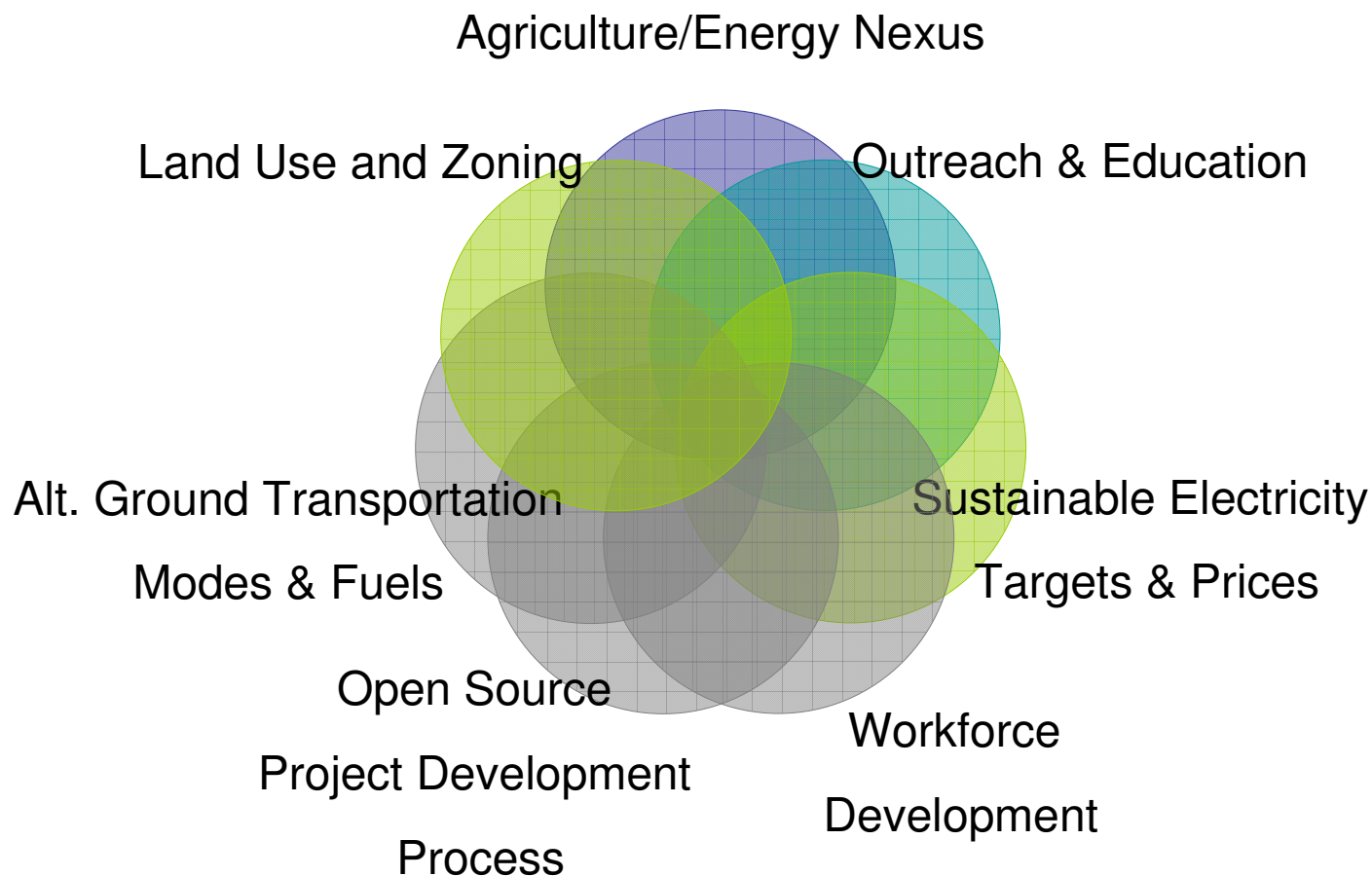
KESP Coordination by Sustainable Energy Team

- Meet quarterly to ensure progress
- Report to Mayor's Office
- Funded by County Fossil Fuel Tax + KIUC Franchise Tax Increase
- Facilitated by third party to ensure objectivity
- Structure
 - *Executive Committee*
 - Track funding & expenditures, set course for implementation, conduct outreach
 - Members could include County Office of Economic Development, KIUC, EPAC
 - *Topical Issues Committees*
 - To assess information on special topics, make recommendations to Executive Committee
 - Participants could include KEDB, Farm Bureau, Environmental Groups, Kaua'i Community College, Investment Community, DBEDT, Auto Dealers, Refineries, Developers, Land Owners



IMPLEMENTATION / Considerations

Examples of Topical Issues





IMPLEMENTATION / Considerations

Outreach is Vital, e.g. on Sustainable Energy Benefits

- **Local Energy Dollars**
 - In 2009, Kaua`i spent **\$56,684,483** on imported oil
 - 36% for Ground Transportation = **\$20,406,414**
 - 43% for Electricity Generation = **\$24,374,328**
- **Jobs**
 - OMB: For every \$92,000 in renewable energy, 1 job will be retained or created
 - If \$1.5B invested over 20 years, 16,304 renewable energy-related jobs would be created
 - More jobs from ground transportation e.g. biomass-to-liquids, algae-to-liquids, vehicle maintenance, etc.
- **Cleaner, Healthier Environment**
- **A Model of Sustainable Living for the World**
- **Less Dependence on Imported Oil—Wise Investment**

QUESTIONS? COMMENTS?

Douglas Hinrichs, SENTECH Hawai`i

dhinrichs@sentech.org

301-219-7647

Diane Zachary, Kaua`i Planning & Action Alliance

dzachary@kauainetwork.org

808-632-2005