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KUKUIPAHU ENERGY LLC



a conversation about Hawai'i's energy future

Kukuipahu — Lighting the Way

ku'kui-pä'hu: pierced candlenut; also a land section in Kohala, Hawai'i



Kukuipahu, Candlenut Torch
Bishop Museum exhibit

In old Hawai'i, native Hawaiians made torches and candles from strings of roasted kukui nuts pierced with a splinter of bamboo or the rib of a coconut leaf – hence, the “candlenut” tree. Lit as a torch or candle, kukuipahu made a fine illumination indoors or out. After the top kernel burned, the flame consumed each nut in descending order.

The kukui is Hawai'i's state tree. The versatile kukui nut is used for making leis, a relish to eat with poi, and the gum of the tree once was used to prepare a varnish for tapa. Burned as charcoal and pulverized, kukui was used for tattoos or as paint. From 1840-1850, Hawai'i exported thousands of gallons of kukui oil used to oil Chinese paper umbrellas and as a wood preservative.

Today, the native kukui tree and its oil-rich nut light the way for a new venture – a clean, renewable biofuel made in Hawai'i – Kukuipahu Energy LLC.

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MISSION STATEMENT

Charting a course toward energy security for Hawai'i's people in the 21st century, Kukuipahu Energy LLC will develop commercial production of clean biomass-to-liquid (BTL) transportation fuels employing advanced refinery technology and renewable feedstocks grown in Hawai'i. With nurturing regard for Hawai'i's native resources and culture, Kukuipahu Energy LLC will integrate sustainable agricultural practices with the strategic development of synthetic biodiesel fuels, fuel-efficient automotive performance, and smart transportation systems and infrastructure.

THE CHALLENGE

A dramatic confluence of global events — the depletion of known oil reserves, growing worldwide energy demand, and apprehension about climate change — compels a concerted effort to develop new, clean fuels from renewable biomass sources for Hawai'i's transportation sector.

Hawai'i's geographical isolation, coupled with its dependence on imported Mideast oil and systemic high energy costs, render the islands vulnerable to crippling price spikes, scarcities, and geopolitical events beyond our control.

Energy producers in Hawai'i are uniquely able to harness and generate independent energy supply for the utilities sector. Electricity may be generated by solar, geothermal, wind, hydropower, waste-to-energy incineration, ocean thermal energy conversion, and wave energy sources. However, Hawai'i remains challenged to develop island-made liquid fuels for the transportation sector.

The clock is ticking. Enlightened democratic societies must summon the resilience and political will to address the looming energy crisis and to reduce CO₂ emissions. A failure to act will almost certainly lead to command management of dwindling petroleum supplies and grim austerity scenarios. Posterity will judge our actions and resolve.

PRESENTING OPPORTUNITIES

There is strong support throughout Hawai'i for a sustainable future based on astute resource management, agricultural production assuring food security, the preservation of open space, and dynamic economic diversification — not rampant land development. A new state 2050 Sustainability Plan recently endorsed the development of island-produced biofuels to assure that preferred future.

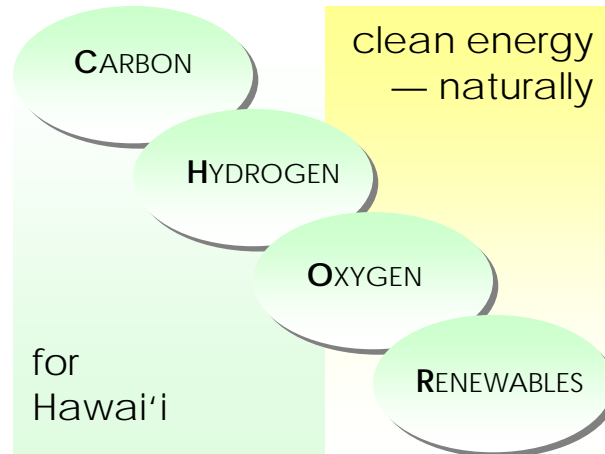
Already, eucalyptus forests on the Island of Hawai'i provide a commercial feedstock to produce high quality biodiesel fuel. Many thousands of acres of fallow agricultural lands are available for an array of other promising fuel crops.

Kukuipahu Energy LLC, a company formed by Michael Saalfeld, is prepared to make significant investments to launch the production of biodiesel fuel in Hawai'i. Our strategic alliance with Choren Industries and its patented Carbo-V® gasification process offers the opportunity to deploy a pioneering technology to meet Hawai'i's automotive fuel needs.

PERSPECTIVE

No "silver bullet" technology will satisfy *all* of Hawai'i's liquid fuel needs. Sustainable fuel development is not the pursuit of a single "fix" or mandated outcome. It is a market process driven by raw material supply, economy of scale, manufacturing costs, competitive pricing, and consumer acceptance. It requires adaptation, ongoing research, innovative technologies, a commitment to productive land use, and cooperation between the private and public sectors.

The necessary synergy of agriculture and energy — each in the renewable service of the other — holds the key to an emerging biofuels economy in Hawai'i. With respect for Hawai'i's traditions and the urgency of the task at hand, Kukuipahu Energy LLC welcomes the opportunity to partner for the common good.





MICHAEL SAALFELD
GENERAL PARTNER

Michael Saalfeld was born in 1952 and raised in Hamburg, Germany. After spending part of each year in Hawai'i since 1992, the Saalfeld family moved to Kohala in 2006. Mr. Saalfeld founded Kukuipahu Energy LLC in 2007 to explore bringing Choren technology to Hawai'i.

He studied law at the University of Hamburg and began his professional career assembling complex real estate projects in Germany and Switzerland. He was soon attracted to the financing of environmental infrastructure projects. In the mid-1980s, he developed the first public/private partnership in Germany, a municipal landfill degasification and cogeneration facility near Frankfurt. In 1988, his company developed the first and largest windfarm project in Europe and numerous other windfarms and cogeneration facilities.

After the fall of the Berlin Wall and German reunification, he saw the great need for new municipal power plants. He subsequently planned, owned and operated many utility facilities throughout Germany. After the liberalization of the German power market in 1996, he launched a joint venture with Vattenfall AB, a Swedish utility, resulting in the consolidation of three major utilities and the formation of the third largest utility company in Germany.

In 2000, he started Lichtblick GmbH, a company concentrated on green power. Today it is the largest independent power company in Germany with a strong growth trajectory. He also became the major shareholder in Choren Industries in 2000, leading Choren from R&D to its ascendance as one of the world's leading coal gasification and biomass-to-liquid synthetic diesel fuel producers.

JOHN RAY
GENERAL MANAGER



John Ray has long experience in civic and board service, the successful launch of Hawai'i business ventures, and the thoughtful stewardship of community development. He served as a Trustee of the Parker Ranch Foundation Trust from 2004 until December 2007, and played a key role in the successful diversification and asset appreciation of the Trust.

As a consultant to Forest Solutions, Inc. since 2006, he has worked to expand business opportunities in plantation and native forestry. From 1999–2004, he served as president of the Hawai'i Leeward Planning Conference, a West Hawai'i membership-based planning and advisory organization.

John Ray served two terms on the Hawai'i County Council from 1994–1998 representing North and South Kohala, and co-founded the Waimea Water Roundtable, a pioneering forum for the discussion of water resource issues. After his County Council service, he chaired the County of Hawai'i Charter Review Commission.

He has been active on numerous civic councils and committees island and statewide and currently serves on the State Department of Transportation Commission, the Hawai'i Association of Watershed Partnerships, the Hawai'i Island Community Development Corporation, and the West Hawai'i Housing Foundation. He was a founding director of the Waimea Main Street Program, a community-based planning and development initiative modeled after the national Main Street Program.

His past business start-ups include the Paniolo Pizza and Paniolo Country Inn restaurants and Orca Sea Farms, a Molokai shrimp farm and aquaculture development company.

key facts and trends

Oil

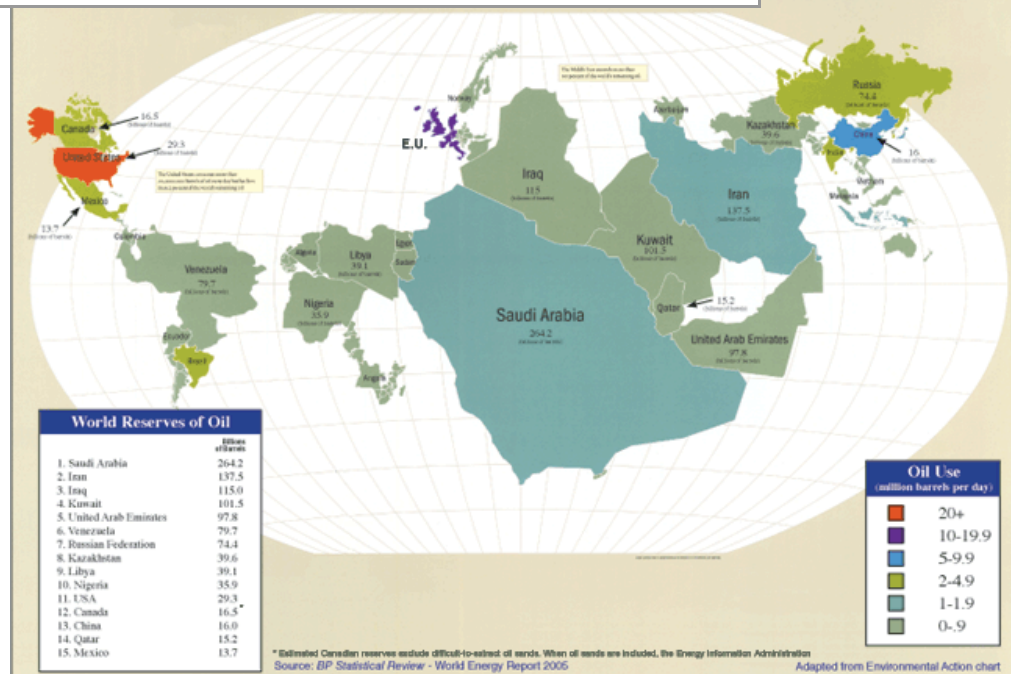
- Worldwide oil consumption now totals 88 million Bbls/day (1.35 trillion gallons/year).
- From 1900 to 1990, oil demand grew to 66 million Bbls/day. During the past 17 years, oil demand grew another 22 million Bbls.
- There are now over 900 million vehicles on the planet. Fifty million vehicles are added to the global fleet each year.
- During the five years spanning 2001-2006, demand for oil in China grew by 43%; in Singapore, by 27%; in India, by 13%. Population growth, booming economies and a market for personal vehicles is driving demand for petroleum products and rising prices.
- In Hawaii, gasoline consumption increased 20% from 1999-2005 while the average pump price of regular gasoline increased by 77%.
- Hawaii is the most oil-dependent state in the nation, relying on imported petroleum for 90% of its primary energy. In 2005, only 11.4% of the crude oil shipped to Hawaii came from U.S./Alaska. The largest supplier of crude oil to Hawaii in 2005 was Saudi Arabia.

“One thing is clear: the era of easy oil is over. What we will do next will determine how well we meet the energy needs of the entire world in this century and beyond.”

— David J. O'Reilly, Chairman & CEO, Chevron Corporation, July 2005

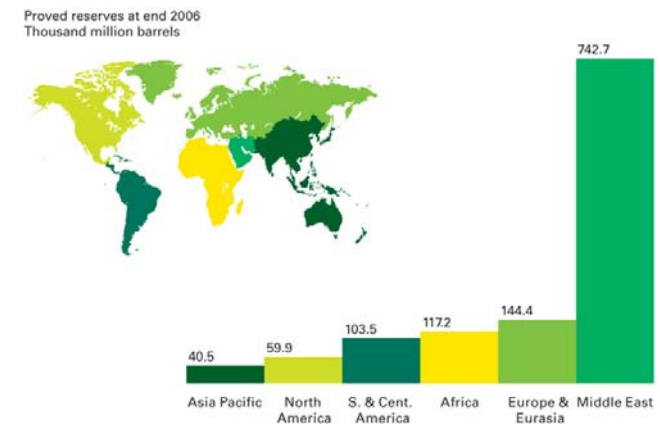


Who has the oil?



If the territory of nations were determined by known oil reserves, a handful of MidEast countries would dwarf the continents of Europe, Asia, Africa, and North and South America.

Map of proved oil reserves at end 2006



BP Statistical Review of World Energy 2007

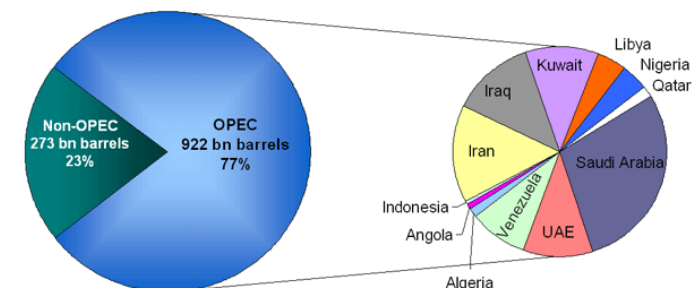
© BP 2007

At the end of 2006, proven world crude oil reserves stood at 1,195,318 million barrels, of which 922,482 million barrels, or 77.2 percent, was in OPEC member countries. Formed in the 1960s, the Organization of Petroleum Exporting Countries today includes Algeria, Angola, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela. Although oil imports from Canada and sub-Saharan Africa have increased dramatically in recent years, the United States remains dependent on oil from OPEC nations.

Total U.S. Total Crude Oil and Petroleum Products Imports From OPEC Nations (Thousand Barrels)							
YEAR	1993	1994	1995	1996	1997	1998	1999
	1,589,348	1,550,153	1,544,232	1,541,303	1,667,525	1,790,434	1,807,788
YEAR	2000	2001	2002	2003	2004	2005	2006
	1,904,188	2,017,878	1,680,889	1,884,084	2,086,462	2,039,288	2,013,603

Source: U.S. Energy Information Administration

OPEC Share of World Crude Oil Reserves (2006)



Has 'Peak Oil' arrived?

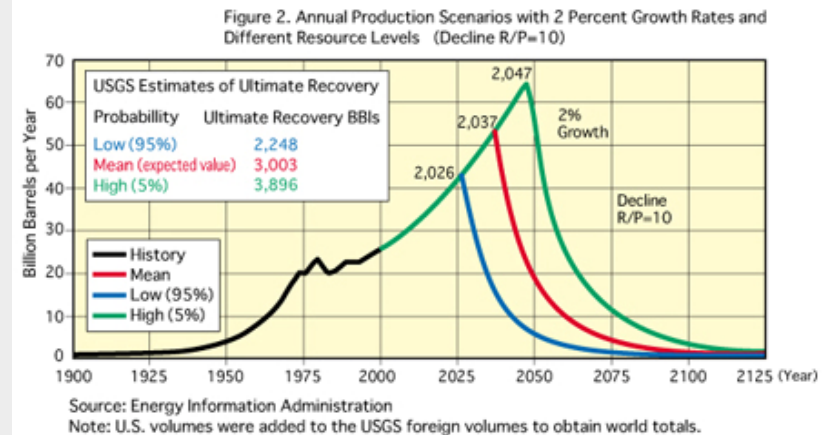
'Peak oil' – the moment when the *rate* of petroleum pumped from the ground lessens and worldwide supply declines – is a subject ripe for endless debate and prognosis. Petroleum, after all, is a finite, non-renewable resource. Some grimly argue that the advent of peak oil already has arrived. Most experts project dates in the not-so-distant future like the scenarios of the U.S. Geological Survey (shown at right). Whether the due date of peak oil is 2025, 2050 or the end of the 21st century, one thing is certain: a rendezvous with the decline (though not the end) of the petroleum extraction age is coming. It will affect the lives of our children and grandchildren.

The compelling, inevitable question is: what can we do now? What is immediately clear is that there are many answers, not just one, and that the predicament of energy supply invites astute appraisal of natural resources, an era of adjustment, trial-and-error, mobilization and many tests of political will. Seen in this light, debates over predicted calamities are far less interesting than the imperative to act. The same holds true for the subject of global warming. Reasonable people can debate the effects of man-made CO₂ emissions and the myriad causes of climate change, but it is readily apparent that setting a course to reduce atmospheric greenhouses gases simply makes sense.

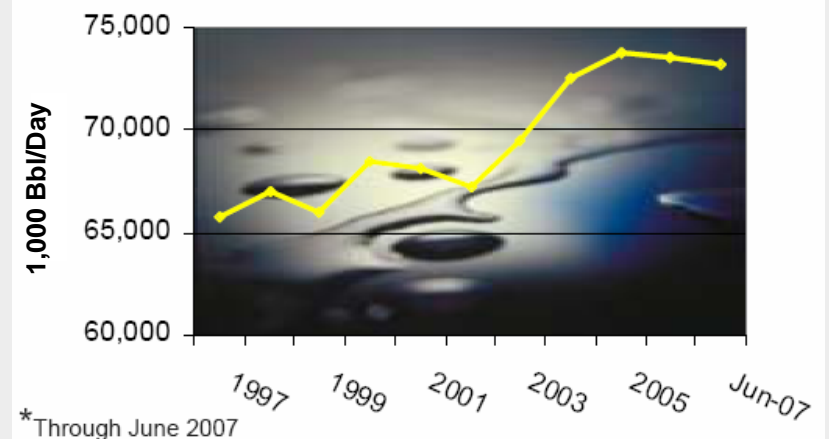
How will we do that? Few people seriously contemplate or advocate the abandonment of automobiles. Nor should they. Motor transport is fundamental to the remarkable standard of living enjoyed in modern industrial societies. Our large physical plant – towns, commercial centers, schools, beaches, recreational destinations and sprawling residential landscapes — requires efficient mobility. The existing infrastructure of storage facilities and fueling stations is entirely serviceable for most alternate liquid fuels. We practically are wed to cars, though we can make great strides in their performance, longevity and economical use.

Clearly, we can make more fuel-efficient cars, adjust driving habits, design smarter transportation grids, and develop environmentally benign liquid fuels. The great challenge for fuel security in Hawai'i is one of scale. The prospectus for clean biomass-to-liquid fuels is superb – if we knowingly embrace a great undertaking of renewable agriculture, technological enterprise, and purposeful land use. Therein lies the answer to the question posed by the prospect of peak oil. We can dwell in passive dread, blithely hope for a magic solution, or we can roll up our sleeves. The question, finally, is not where will we be in 20 years, but where do we want to be.

A Peak Oil Prospectus



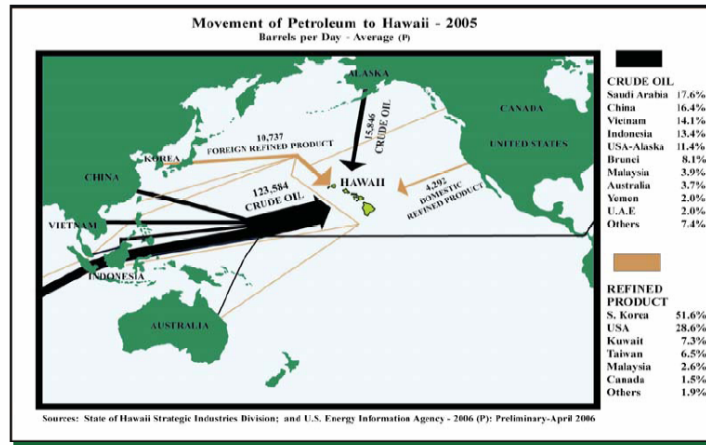
World Crude Oil Production*



Source: EIA International Petroleum, September 2007

Hawai'i's increasing dependence on foreign oil

Hawaii's Petroleum Imports 2005



NOTE: Arrows' width are roughly proportionate to percentages of oil imports from sources.

Hawai'i is no exception. Twenty years ago, most of Hawai'i's crude oil came from Alaska's North Slope. In 1987, 52% of Hawai'i's crude oil imports came from Alaska. Then production in the North Slope oilfields declined. By 2005, only 11% of Hawai'i's oil originated from Alaska. Crude oil imports from the Middle East averaged less than 1% annually from 1992 to 2004. Then Saudi oil vaulted to the top of the list of Hawai'i's suppliers. In 2005, Saudi crude accounted for 17% of oil imports. Imported oil from all MidEast nations totaled over 25% in 2005.

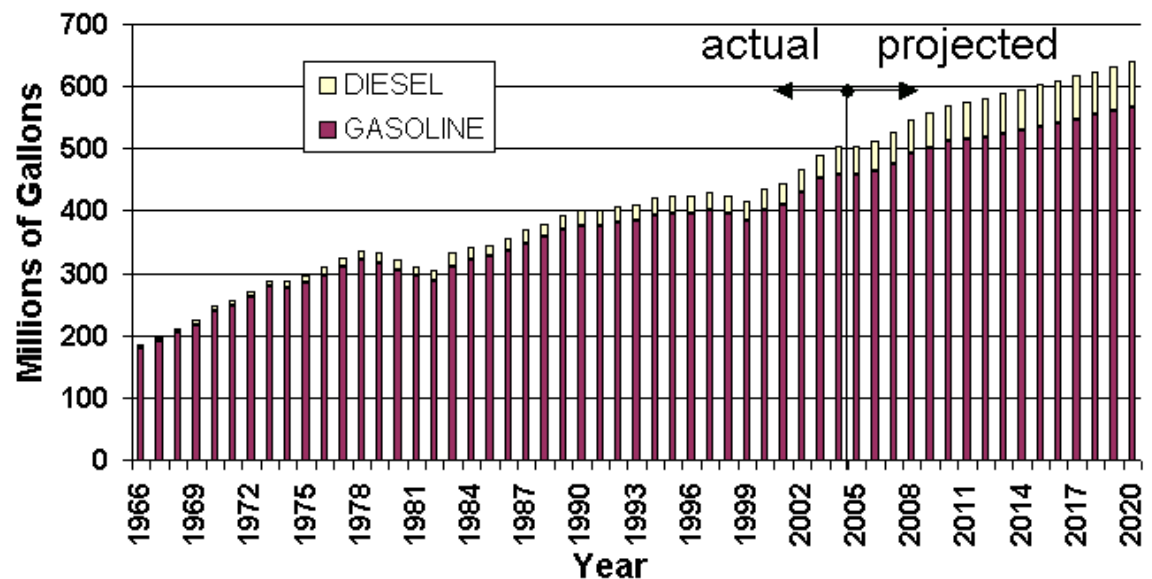
Hawai'i's Department of Business, Economic Development & Tourism proposes a different trajectory: "Diversification of fuel supplies can reduce Hawai'i's future dependence on imported fossil fuels and the impacts of oil price increases or supply disruptions."



Contrary to widespread belief, the top supplier of crude oil to the United States is not Saudi Arabia. It is our northern neighbor, Canada.

In the tar sands pits of Alberta, shovel trucks load dirt into dump trucks that are so gigantic a driver has to climb a ladder attached to the front grille to get behind the steering wheel. Canada, the top supplier of crude oil to the United States in 2005, provided about 16% of U.S. imports. Crude oil mined from the tar sands of Alberta accounts for an increasing share of what Canada sends to the United States. Even so, development of the oil sands is not happening fast enough to significantly reduce American dependence on Mideast oil.

Hawai'i's Ground Transportation Fuel Demand



When the facts change

“When the facts change, I change my mind,” quipped the famous economist John Maynard Keynes. Such resilient intellectual integrity now is needed to squarely address Hawaii’s energy *insecurity*.

The facts demonstrably show that Hawaii is more dependent on foreign oil than ever before. Moreover, while renewable energy sources are rapidly providing more electrical generation in the islands, Hawaii’s transportation sector – motor and aviation fuel – consumes two-third’s of the state’s petroleum supply annually.

In the first week of January, 2008 the State of Hawaii Department of Business, Economic Development and Tourism issued its *2007 Energy Resources Coordinator Annual Report*. The report stated: “The economic security and stability of the State of Hawaii continue to remain extremely vulnerable to threats due to Hawaii’s overdependence on imported oil. This vulnerability is exacerbated since nearly 77% of the state’s electricity and over 99% of its transportation fuels are produced from petroleum fuels.” The report added: “Experts believe that the cost of petroleum has reached a new plateau and will stay high.”

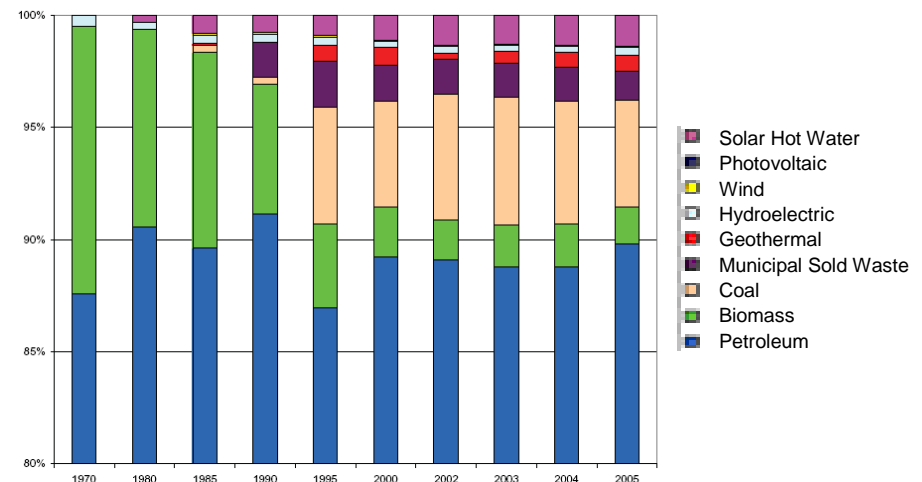
In all, imported fossil fuels – coal and oil – account for 94% of Hawaii’s energy consumption. Moreover, DBEDT reported, imported petroleum generates nearly 89% of Hawaii’s total energy.

The DBEDT report is largely silent on the subject of coal. Yet, since the demise of Hawaii’s sugar industry, coal, more than any other energy source, has replaced biomass provided by sugar, as shown in the graph [at right] tracking Hawaii’s primary energy sources from 1970-2005.

The report heralded a 9.8% increase in Hawaii’s renewable energy production during 2005, attributed largely to generation from municipal solid waste, hydroelectricity and wind, which increased by “about 12%, 13% and 1,123%, respectively, over 2005 figures.”

The Hawaii Renewable Development wind facility and Kaheawa Wind Power’s newly completed 30MW wind farm accounted for much of the quantum advance of wind energy in the state. Nonetheless, the report stated that wind-generated power was “still less than 1% of total primary energy” in Hawaii.

Primary Energy Sources in Hawaii, 1970-2005, Selected Years



Hawaiian Electric Industries (HEI) and its neighbor island subsidiaries (MECO, HELCO) justifiably tout their progress to meet mandated targets set by Hawaii’s Renewable Standards (RPS) law—7% by 2005, 10% by 2010, and 20% by 2020. While declaring its commitment to meet RPS targets, HEI says “fossil fuel will continue to play a critical role as a 24-hour source of energy needed for our islands’ stand-alone electric systems.”

Among HEI’s commitments to renewable fuel use is a 110MW generating plant at Campbell Industrial Park on Oahu slated to come online in 2009. The plant will be powered by biofuels. Another HEI biodiesel-powered generating plant, the Maalaea Power Plant on Maui, also is planned for completion in 2009.

On the Big Island, 23.4% of electricity generated by HELCO in 2006 came from renewable sources, primarily geothermal, supplemented by the new 10.6 MW wind farm at Hawi and the improved Puueo hydro plant in Hilo. Installation of another 20.5MW wind farm at South Point in 2007 buttressed HELCO’s renewable energy portfolio.

Meanwhile, Act 234, adopted by Hawaii’s legislature in 2007, mandates that the state’s greenhouse gas (GHG) emissions be reduced to 1990 levels by 2020.

Act 234 directs a 10-member Greenhouse Gas Emission Reduction Task Force co-chaired by DBEDT and the Department of Health to prepare a work plan and proposed regulatory scheme to achieve “the maximum GHG reductions in a practical, technically feasible, and cost-effective manner.” The task force must submit its plan before the 2010 regular legislative session.

Despite this lofty and ambitious mandate, state spending for energy initiatives reported by DBEDT in 2007 was directed almost entirely to the “power/renewables” utilities sector. Of the \$12,549,301 in state funds and federal grants for the fiscal year ending June 30, 2007, \$11,486,982 was spent on renewable power projects. Total spending for the transportation sector was a measly \$25,000. And yet transportation motor and aviation fuels account for two-third’s of Hawaii’s imported petroleum.

Hawaii Spending for Energy Initiatives: FY Ending 6-30-07

Description	State Funds	Federal Grants	Total
Education	\$ 200,000	\$ 19,950	\$ 219,950
Transportation	0	25,000	25,000
Buildings	500,000	304,869	804,869
Industrial	0	12,500	12,500
Power/Renewables	10,241,000	1,245,982	11,486,982
Totals	\$ 10,941,000	\$ 1,608,301	\$ 12,549,301

Energy Resources Coordinator’s 2007 Annual Report
State of Hawaii Department of Business, Economic Development & Tourism

What is increasingly apparent is that while Hawaii is registering laudable progress to employ alternate energy sources – including biodiesel fuels – to generate electricity, there is no comparable trajectory on the transportation front.

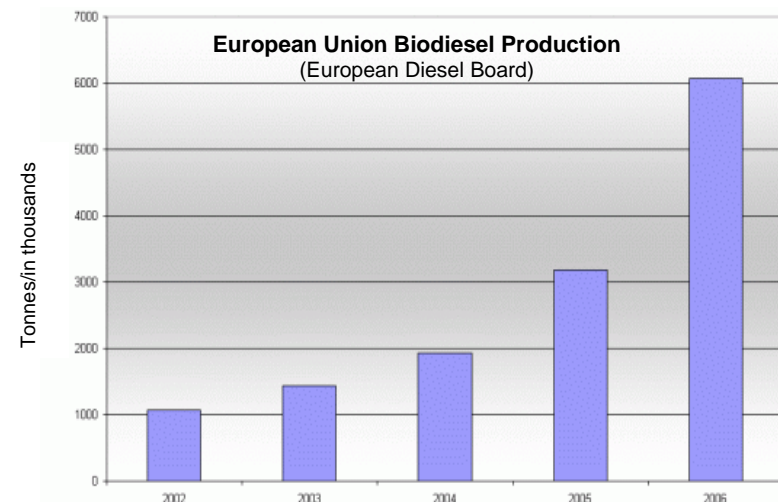
How will we drive in the year 2020? What fuel will we put in our gas tank?

Reporting on transportation initiatives, DBEDT cited a two-year project to assess “potential feedstocks and technologies” for ethanol, biodiesel and renewable hydrogen. Funds for this examination were provided by Act 240 in 2006. A complementary “Bioenergy Master Plan” was established by Act 253 in 2007. DBEDT says the master plan “is expected to encourage strategic partnerships for the research, development, testing and deployment of renewable biofuels technologies and the production of biomass crops.”

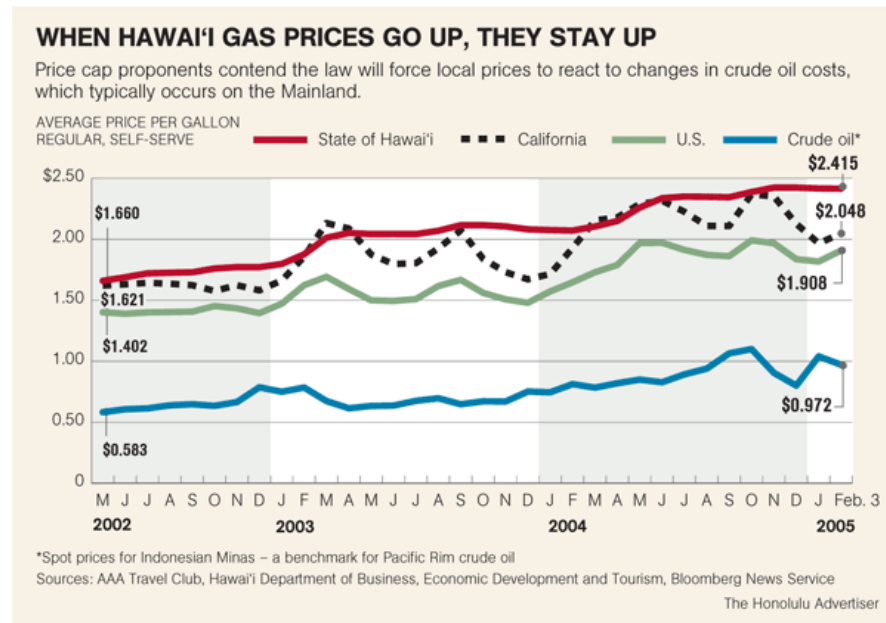
Together, these *studies* are intended to meet the state’s target to have 20% of its transportation fuels from renewable resources by the year 2020. While the State Department of Agriculture says it believes Hawaii can produce “enough biodiesel to reduce imported diesel by 20%,” DBEDT says a report released in 2006 states that “it might take five to ten years to determine the best crops and locations for production.”

Estimates of Hawaii’s ground transportation fuel needs in the year 2020 project consumption of over 600 million gallons of gasoline and diesel annually, twice the state consumption recorded in 1981.

Can Hawaii pick up the pace to match the trajectory of biodiesel production now occurring in Europe? Is Hawaii’s mandate-based bureaucratic game plan up to the task?



Two critical trends remind us that the facts are changing in Hawaii. The first is the everyday experience of coping with rising prices at the gas pump. Hawaii's consistently high gas prices, oftentimes the highest in the nation, have defied market trends, as shown in the graphic below. An ill-fated "gas cap" law enacted by the legislature and later withdrawn revealed how a world market commodity can vex local price controls.

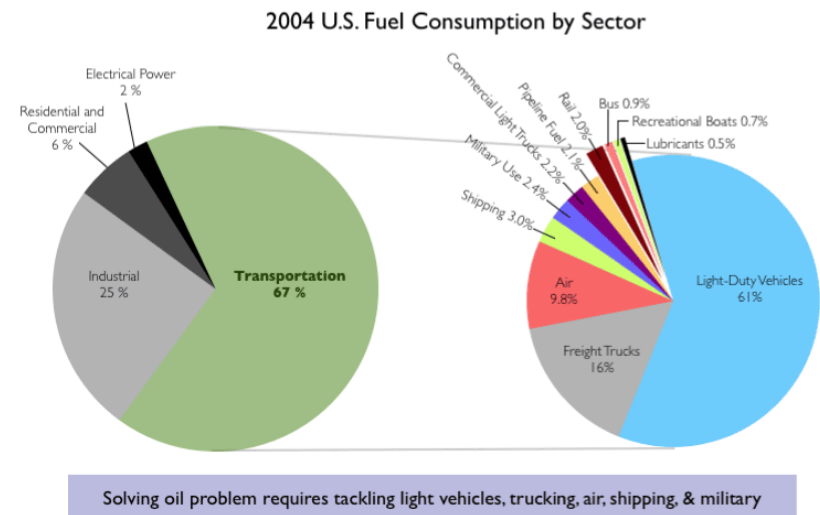


The second trend is even more harrowing. Gas prices in Hawaii, like electric bills, drive up Hawaii's already high cost of living. When the cost of living, coupled with skyrocketing real estate values, overwhelms low and middle-income families, the final option is flight. Increasingly, and in familiar cycles, Hawaii's people are voting with their feet and abandoning their island home. In 2007, a robust economic year by most standards, over 10,000 people left Hawaii, the largest out-migration since the 1990s. During the decade of the 90s, the Census reported that over 100,000 people left Hawaii. The reasons for out-migration are many and the quiet departures often are barely noticed. Births, and the steady in-migration of U.S. mainlanders and Asian immigrants, mask the extent of the exodus of Hawaii's people.

But the end result is a kind of market driven ethnic cleansing, as displaced islanders depart for California and Las Vegas, replaced by conspicuous legions of wealthy second-home owners from the mainland. It is a dynamic that has the potential to tear apart the fabric and good nature of a society.

One fact remains a constant in island life, however – the dependence on automobiles, particularly on the Island of Hawaii. Much of the population on the Big Island is dispersed in both old and new rural subdivisions. Cars and trucks are undeniably necessary.

Transportation Uses More Than 2/3 of Oil in the U.S.



Source: EIA, Annual Energy Outlook: 2007 with Projections to 2030, Tables 2 and 7, Report #DOE/EIA-0383(2007). Retrieved on 6 August 2007 from <http://www.eia.doe.gov>

To sustain preferred lifestyles in Hawaii and a sustainable future, the facts are clear. Hawaii needs to develop its own supply of transportation fuels. And while this shift away from expensive and dwindling oil supplies presents daunting challenges, success may newly invigorate our island ingenuity, civic spirit and community pride. There is a reward for facing the facts squarely. A shining and vital purpose can galvanize our best efforts.

CHOREN: Pioneering Biomass-to-Liquid Fuels

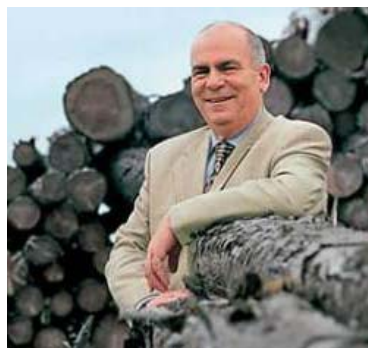
CHOREN is a world leader in the field of bio-gasification and production of “second generation” diesel fuel. Presently, it is the only company with a proprietary gasification system able to directly convert biomass feedstocks into a tar-free synthetic gas.

The company’s roots go back to the East German Deutscher Brennstoff Institute (German Combustion Institute), where its founder, Bodo Wolf, was technical director. There he developed equipment to turn coal into chemicals, motor fuels, and electricity. After the fall of the Berlin Wall and German unification, Wolf, joined by a select group of technologists and former DBI colleagues, founded Choren Industries.

Wolf solved a problem that had long stalled the development of biomass-to-liquid fuels. The equipment used in coal gasification clogged easily due to the sticky tar-like complex hydrocarbon molecules contained in biomass feedstocks. Wolf added a processing step. He heated the biomass to 500°C, causing the tars to turn into a gas. He then ground the leftover char into a powder blown into a high-temperature chamber along with the gaseous tar. At temperatures of 1600°C, chemical reactions broke down the tars while converting the carbon char into a synthetic gas pure enough for subsequent Fischer-Tropsch chemistry to produce a liquid fuel.

Choren’s advanced thermal gasification process accepts any number of cellulose-based feedstocks – trees, forest waste, construction debris, straw, municipal solid waste, treated sewage sludge, even old tires. The process allows a change of feedstocks without the “bio-refinery” shutting down.

The result is a clear, tar-free synthetic diesel fuel marketed under the registered trademark “SunDiesel.” Choren SunDiesel is nearly “CO₂-neutral,” generating only 10% of the well-to-wheels emissions of petroleum-based fuels. Remarkably, it is not only a benign fuel for a greenhouse gas-free atmosphere; it is a high performance automotive fuel.



Choren founder Dr. Bodo Wolf

Steve Brown, a London-based commercial manager for Shell Oil biofuels, told M.I.T.’s *Technology Review* (November/2005) that Choren SunDiesel outperforms both petroleum and plant oil-based biodiesel. Brown said SunDiesel “produces 85-90% less climate-changing carbon dioxide than fossil diesel.” Choren’s fuel generates less soot and smog because it contains none of the sulfur found in conventional diesel and few aromatic hydrocarbons, such as benzene.

Carmakers DaimlerChrysler and Volkswagen, partners in the development of Choren’s plant in Freiberg, Germany, test-drove the fuel and measured a 30-50% drop in exhaust soot and up to 90% less smog-forming pollutants, compared to the cleanest grades of conventional diesel.



Choren’s pilot facility in Freiberg, Saxonia, the world’s first commercial biomass-to-biodiesel refinery. The ‘beta’ generation plant produces 15,000 tons of biodiesel annually. Coming next are five Choren ‘Sigma generation’ biodiesel refineries. The first, located in Schwedt, is slated for completion in late 2011. The plant will produce 200,000 tons of biodiesel annually.

Partners and Progress



In October 2007, two German car manufacturers, Daimler and Volkswagen, each acquired a minority equity position in Choren Industries. Daimler and VW have worked with Choren since 2002 to evaluate BTL's (Biomass-to-Liquid) technical, commercial and environmental impact. The participation of the two companies in Choren is, they say, a strong sign of commitment towards the use of second generation biofuels and supports the project development of world scale BTL manufacturing plants.

Dr. Herbert Kohler, Vice President, Vehicles Powertrain Development Research and Advanced Engineering & Chief Environmental officer of Daimler AG stated: "Our ongoing BTL tests, on a wide variety of diesel motors, have proven to be the most promising of any renewable fuels for today's engines and thereby represent an important building block in our environmental strategy. The wide spread introduction of BTL has the potential to significantly reduce total CO2 emissions from passenger as well as commercial vehicles. We are therefore supporting the development and commercialisation of BTL fuels as an important step towards sustainable mobility."



"Volkswagen has long been a proponent and supporter of the industrial development of 2nd generation biofuels" underscored Dr. Wolfgang Steiger, Head of Corporate Development of Drive Systems. "Compared to 1st generation biofuels, Sunfuel [Choren's 2nd generation biodiesel] has a three times higher yield per unit area, does not compete with food crops, and enables up to 90% reduction in green house gas emissions. Volkswagen's participation under the "Driving Ideas" campaign is an investment in the introduction of industrial scale biosynthetic fuels production on the way towards sustainable mobility."



In August 2005, Shell Oil acquired a minority equity stake in Choren Industries, setting the stage for construction of the world's first commercial facility to convert biomass into high-quality synthetic bio-fuel, marketed by Choren as SunFuel. Shell's announcement noted that SunFuel is supported by carmakers such as Volkswagen and Daimler-Chrysler because it can be used without modification in any diesel engine without compromising performance and with a substantial reduction in harmful emissions.



"We believe that the leadership combination of both companies' experience and complementary technologies will enable the construction and operation of the first medium-sized 'Biomass to Liquids' (BTL) plant. This plant will be located at Choren's premises in Freiberg and will pave the way towards more attractive large-scale plants," explained Rob Routs (Executive Director Downstream) from Shell.

In December 2007, U.S. Secretary of Energy Samuel W. Bodman announced that DOE had issued the final regulations for the loan guarantee program authorized by Title XVII of the Energy Policy Act of 2005 (EPAAct). DOE's action paved the way for federal support of clean energy projects using innovative advanced technologies.

DOE invited 16 selected project sponsors, who earlier submitted pre-applications, to submit full applications for loan guarantees. Projects supported by loan guarantees will help fulfill the goal of reducing U.S. reliance on imported sources of energy by diversifying our nation's energy mix and increasing energy efficiency. Among the five biomass projects selected by DOE for its loan guarantee program was **Choren USA** for construction of an industrial-scale biomass gasification facility for clean synthetic diesel fuels in the southeastern United States

Considerations and questions for a secure energy future

Considerations

The goal and ethic of energy security enjoys broad public support in Hawai'i and throughout the nation. But the challenge is great and will require commitments of natural resources, capital and political will commensurate to the immensity of the task.

Choren BTL technology is one of many solutions that can lead Hawai'i toward renewable liquid fuel independence. Ethanol production and bio-diesel produced from used vegetable oils already contribute to an emerging biofuels island economy. Economy of scale presents a critical determining issue for Hawai'i. Biomass-to-liquid fuel production, if undertaken on a scale sufficient to move Hawai'i toward energy independence, can provide a dynamic purpose for Hawai'i's untapped agricultural land base.

BTL technology seeks to tap lignocellulosic crop potential in a way that does not compete with vital food production or drive up food commodity prices. It is also a technology that promises a new generation of fuels from sources that sequester carbon in trees and other crops while lowering harmful emissions from the vehicles we drive.

Advances in engine performance and fuel-efficient automotive design complement the development of clean synthetic diesel fuels. BTL fuels require no change in fueling station infrastructure. The commitment of Shell Oil and automakers Daimler-Chrysler and Volkswagen to BTL fuel development attests to a strategic marriage of smart car manufacturing and new clean fuels for the next generation of cars we drive.

The dawn of an environmentally friendly island energy economy awaits our determination to make major decisions and commitments. A purposeful, continuing dialogue is essential for consideration of biomass agriculture and the industrial footprint that accompanies fuel manufacturing.

Kukuipahu Energy LLC welcomes opportunities to promote energy security and to join the fertile, ongoing discussion of Hawai'i's sustainable future.

Questions

1. Can we assemble a large agricultural landscape on the Big Island – as much as 130,000 acres devoted to high-yield cellulosic feedstock production – in proximity to a 'Sigma-generation' biorefinery site?
2. Can we build agronomy research partnerships to explore the cultivation of feedstock crops suited to varying soil, rainfall and climate conditions and the field testing of energy crops?
3. Can we build an energy crop economy that complements and supports local food/livestock agriculture and moves Hawaii toward food security every bit as much as energy security?
4. Can we engage a hopeful, civil and rational community discussion among energy producers, landowners, environmentalists, government agencies and the public to plot out a strategic course of action for sustainable liquid fuel security in Hawaii?
5. Can we spark public interest and enthusiasm for the wide range of new vehicles – high performance diesel, hybrid, and electric cars, etc. – that promise greater fuel efficiency, lower CO₂ emissions, and deliberate consumer commitment to energy security?
6. Can we integrate advances in island-produced liquid fuels with 'smart' transportation planning and infrastructure supported by state and county government?
7. Can we build an innovation economy that provides challenging and rewarding career employment for the booming enrollment in the U.H. College of Tropical Agriculture and Human Resources and U.H. Hilo's Forestry and Natural Resources Program?



Daimler's 'SmartCar' coming to the U.S in 2008 delivers 41mpg by 2008 EPA standards for a base sticker price under \$12,000.