A Sustainable Future For Hawaii

The problem: We're dependent on undependable things

Residents of Hawaii live in the middle of the sea 2,500 miles from the nearest continent; and we produce few of the things we consume. We are totally dependent on oil-powered shipping and airlines to bring in the everyday necessities that our lives depend on: energy (oil, really), food, technology, and tourists. Our ability to access and consume **depends** on oil staying cheap and readily available.

As little as 30 years ago, Hawaii produced pineapple and sugar in amounts large enough to significantly support the State's economy, but those are bygone days. Now, Hawaii doesn't produce much of anything, and is almost entirely dependent on tourism. Our economy **depends** on it being affordable for the rest of the world to come to Hawaii and spend their money here, and that depends on cheap oil. We're hostage to cheap oil, as is much of the rest of the world.

- **Food:** Although Hawaii produced large amounts of agricultural commodities in the past (1700's to 1990), we produce very little now. Although Hawaii farmers produce some of the food items that we consume here (17% of the beef, 34% of the fresh vegetables, and 32% of the fresh fruit), estimates are that from 88% to 92% of the **total** food consumed is imported. The average Hawaiian farmer is 58 years old, and there are no young people replacing them.

- **Energy:** Energy usage in Hawaii is totally **dependent** on cheap oil imported from the mainland. We don't have hydroelectric power (from dams), we don't have coal-fired power plants (no coal, and not a good idea anyway), and there are political barriers to developing the geothermal power source on the Big Island (which could power the entire state with sustainable energy).

  But, you say, we have 12% "**sustainable** energy" sources (such as solar, geothermal, and wind), right? Won't we still have those, even if oil gets more expensive or less accessible; and can't we simply "build more"? Unfortunately, the answer is **no**: being able to use these alternate energy sources is totally **dependent** on having the existing oil-fired "grid" they can tie in to. This is because the amount of energy the renewable energy sources produce fluctuates; while the demand for energy does not. **Here's how it works:**

  A Hawaiian electric utility grid that has too many solar panels tied into it will have to fire up a **lot** of big diesel generators to make up the power shortfall when all those panels stop putting out power at sunset. They have to turn off those big generators again in the morning when the solar panels start producing. This on/off cycling is incredibly expensive in terms of labor, but is the major source of wear and tear on those big diesel generators. The electric utility tries to avoid it whenever possible, because it increases maintenance expense astronomically.

  The same holds true of wind generators tied into the grid; the power from them also fluctuates as the wind speed fluctuates, and the grid needs those big diesels or it can't guarantee power availability. And there's currently no technology for storing large amounts of electrical power produced by "sustainable" sources for later use. In other words, if the oil supply is shut off for some reason, and

Helco's big diesel generators shut down, we are **not** left with 8 to 12% of the energy we had before, we're left with **none**. As oil gets more expensive, our electricity will continue to cost more and more; and we will be forced to find alternatives because we simply won't be able to afford the electric bill.

- **Transportation:** There are no passenger ferries operating between the Hawaiian Islands. Travel between islands and from Hawaii to other places (as well as UPS, FedEx, and USPS service) is **dependent** on jet planes, and they are **dependent** on the cheap oil used to produce jet fuel. As oil gets more expensive, accessible air travel to and from Hawaii will become more expensive, and may become inaccessible altogether for the common person. A round trip ticket from the Big Island to Oahu is $200 to $300 (2018). We feel it will be over $500 within five years, and over $1,500 within ten.

- **Consumable Goods:** Delivery of hard goods to Hawaii from other places is completely **dependent** on motorized cargo ships and jet planes, and they are dependent on cheap oil. As oil gets more expensive, goods will get more expensive because of the increased delivery cost. The market will eliminate goods that are "too expensive", and those items will no longer be shipped to Hawaii. Because of this, both the volume and variety of goods delivered to Hawaii will decrease into the foreseeable future.

Hawaii's vulnerability is our total dependence on the availability of cheap oil for the bulk of our food, energy, and transportation. At some time in the future, the rising cost of oil will seriously affect our ability to fulfill our basic needs.

Everything we take for granted now comes into question then, because everything we consume is produced using oil, transported in oil-powered ships, distributed in diesel-powered trucks, and kept in markets that are refrigerated using electricity generated with oil, that we need oil-powered vehicles to access. We are completely **dependent** on a huge, complex system of food and goods production and distribution for everything we need, that is in turn completely **dependent** on oil.

If you think this is an extreme view, please take a look around your house and see how many things you can identify that would still be there without being grown, manufactured, transported, and stored courtesy of cheap oil. You may have some tangerines on the table from your backyard tree, or some flowers from your garden that didn't require oil to get there; but everything else in your house was produced using oil, packaged using oil, shipped to Hawaii using oil, and is being refrigerated and kept frozen using oil.

We think it is not a matter of if, but simply when, this system experiences some kind of failure or interruption that results in Hawaii being cut off or drastically rationed.

We need a **Hawaiian Sustainable Future. The Splash Project** creates the context for the solution of **one part** of this problem: interisland transportation.

The Solution:

This is really simple: grow our own food, create our own energy, and build and maintain our own transportation network; all of which must be self-sufficient without

ongoing oil inputs. So how do we do that? This isn't simply a logistics problem; we can't just teach people how to do all this and then they'll magically do it.

It's also a political problem: the people who make money from bringing oil into Hawaii, then refining and distributing it, is so dependent on their oil revenues that anything that upsets this apple cart is bound to generate strong opposition from them. This oil fuels local food production, food importing and distribution, the generators that make our electricity, the airplanes we fly between islands on, and the barges and ships that ship goods to Hawaii.

Any move that would tend to decrease oil consumption, no matter how "green" it sounds or how obviously beneficial it might be, will most likely be viewed in a political light rather than on its own merit, at least by some people. And that makes solving "the problem" a lot more complex than just coming up with solutions that work from the standpoint of logistics and technology.

But what's possible?

- **The Food Problem:** Hawaii island has 595,301 acres of usable agricultural land; Maui has 164,567; Oahu has 60,814, Molokai has 52,964, Lanai has 25,285, Kauai has 95,738 (source: Abbey Seth Mayer, State of Hawaii Office of Planning; Hawaii Biomass and Bioenergy Workshop, September 24, 2010).

- **Possible Solution: this is enough space** to grow **all** the food for 5 million to 35 million people, depending on the methods used and the energy inputs that are available. Sound easy enough, but the real barrier here is still our dependence on oil for food production. We feel the most likely way to impact this situation is to teach everyone how to grow their own food in their backyards, with aquaponics, permaculture, and traditional Hawaiian methods.

- **The Energy Problem:** Energy usage in Hawaii is totally dependent on cheap oil imported from the mainland. But we have from 8-12% **"sustainable and renewable energy"** sources (such as solar, geothermal, and wind), right? Wouldn't we still have those? Unfortunately, the answer is no: utilization of these sources is totally dependent on having an oil-fired "grid" they can tie in to. As we explained earlier in this paper, if the oil supply is shut off, we are **not** left with 8 to 12% of the energy we had before, we have **none**.

- **Possible Solution: the geothermal resource on the Big Island alone** is large enough to power the entire island chain for the foreseeable future; if we can figure out how to get the power from Hawaii to the other islands. And this is not an intermittent energy source as is wind and solar; geothermal, if it has enough redundancy, is a prime-power energy solution. The most likely way to impact this situation is to teach everyone how our current utility system is dependent on oil, and to show them the relative safety, sustainability, and lack of pollution that utilizing geothermal power could bring us.

- **The Transportation Problem:** Travel between islands and from Hawaii to other places (as well as UPS, FedEx, and USPS service) is totally dependent on jet planes, and they are dependent on the cheap oil used to produce jet fuel. If the planes stop, all travel between our islands and to the rest of the world stops.

- **<u>Possible Solution: Hawaii is in the tradewind belt:</u>** the amount of dependable wind we get here is as high or higher than anyplace on the globe; this makes Hawaii a perfect candidate for regular, sail-powered transportation and shipping between the islands. The traditional wooden schooners of the late 1800's were relatively slow, with one- to two-day transit times. However, we've made huge technological advances in the materials, concepts, and designs of modern sailing vessels since then. Today, we can **dependably** have a 12-hour sailing passage from Hilo to Honolulu (and often this will be an 8-hour passage when winds are fair); and a **dependable** 18-hour sailing passage from Honolulu back to Hilo (which is often a 12-hour passage when winds are fair).

  Not as fast as an airplane, but these speeds make sail transportation of passengers and light cargo a very attractive alternative when fuel for planes gets up into the $10-$15 per gallon range, and a ticket to Honolulu from the Big Island might be $1,000 instead of the $200 or so it is now. A lot of people might be willing to take a 12-hour sailing trip to save $800, especially since the sailing vessel allows you two bags for free, and also allows you to bring your cooler along (no alcohol, of course). Coolers are a **big** thing in Hawaii, and you can't take one on the airplane! :-)

  This applies to package service also; a FedEx package to Honolulu from the Big Island costs $6/lb to transport now, with fuel roughly $3/gallon. If this same package costs $15/lb to transport on the plane when fuel costs soar, and the sailboat gets it there for $2/lb ten hours after the plane does, there will be a **lot** of people willing to wait the extra ten hours for their packages to save $13/lb shipping costs.

  Both air passenger service and package service have a hidden cost factor that may make predicting future prices for airline tickets and package delivery very difficult to quantify: the fact that "per-unit" costs increase when the volume of business decreases.

  When an airline or a package service raises their rates, there is a certain amount of "fallout" in lost customers; this is because people don't fly as often nor ship packages as often because the cost of the service increased. When people use the service less, the airline has less volume than they had before, and their cost per unit for producing their services goes up. This increases their cost to provide these services even more. This can turn into a vicious spiral, because everytime the airline increases their prices, the airline loses volume, which in turn causes their costs to go up.

  The airlines, with their dependence on oil, are a dinosaur waiting for an extinction event to come along. They have no "Plan B"; they can't use solar panels or geothermal power to run an airplane. But this is actually an opportunity, not a disaster.

  An appropriately designed and operated sailboat can transport passengers and light cargo between the Hawaiian Islands profitably, safely, sustainably, and with style. "The right tool for the job" in this case is the 150-foot fast multihull sailboat we're calling the Island Carrier. This vessel can make the Hilo to Honolu run in 8-12 hours, and the run from Honolulu back to Hilo in 12-18 hours.

The carrying capacity of this vessel is 150 passengers, each with a two-bag allowance and a small cooler full of food and soft drinks. If we charge each one of them $150 for a round-trip ticket, or $100 one-way (remember, in ten years the airlines may be up around $1,000 round-trip), that's $15,000.

But this ship will also carry 35 tons of refrigerated cargo, an additional 25 tons of packages and mail, at $0.60 to $1/lb, which is another $78-130,000, for a total gross income of $93,000 to $145,000 per one-way run. The vessel can make 6 of these one-way trips per week, with one rest/maintenance day, or $558,000 to $870,000 gross income per week.

The pleasant surprise the sailing vessel offers us is its fuel consumption: a motor vessel with this carrying capacity and speed would consume from $95-165,000 worth of fuel each week (plus another $12,000-$16,000 of maintenance costs to amortize on the big engines and equipment), which would make profitability problematical. The sailing ship uses the engine when entering and leaving harbor; using around $2-3,000 worth of fuel in the same week. The engine in the sailing ship is also much smaller, which means much lower maintenance, repair, and replacement costs.

Net profit? From $110,000 to $145,000 per week. This includes all operating expenses, labor and all benefits with good wages to all employees, general overhead, insurance, a yearly 2-week service shutdown for repair and maintenance, amortization, depreciation, and taxes at 25%. This is $5.7 to $7.2 million per year, a yearly profit of 16% to 21% on an investment of $35 million that does good at the same time it makes money.