Second Hawaii Energy Strategy2007 Stakeholder Meeting
State Capital Auditorium
October 24, 2006

[Note: The following represents the best efforts of the HES staff to capture stakeholder comments by taking notes. The comments and responses are paraphrased, rather than directly quoted. They are also organized topically rather than in order of discussion.]

Greenhouse Gases, Climate Change, and Other Environmental Impacts

Henry Curtis (Executive Director: Life of the Land): In RMI's opinion, what is minimum cut we need to make on greenhouse gases in next 20 years?

Kyle Datta (Senior Director, Rocky Mountain Institute): In our opinion as RMI, it's important to try to move society towards Kyoto targets on the global level because of the broad importance of climate change to society and the economy. This modeling process is important because it shows us how prices and technology affects the players in the market, without policy changes. In other words, if consumers, customers, and everyone were rational, what would they do? We see from the model that even as people adopt more renewables, it takes a long time for the system to move, and the change in GHG is not fast enough, in the absence of any policies.

Henry Curtis: The increase climate volatility leads to more rainstorms, droughts, and alien species. Have you looked at how that may impact the price and availability of energy crops and will they compete with food crops?

Kyle Datta: Thanks for brining that point up. At the Hawaii Biofuels Summit, and during the modeling process, we talked a lot about the differences between the two biofuels: ethanol and biodiesel. Ethanol tends to be larger scale, more plantation like in how it's grown. Crops like sugarcane, large amounts of forestry products, and banagrass, are all more of a large-scale effort. It was important to us to look at the lands being used in Important Agricultural Lands (IAL) process, and that we not impact food production in the islands in a negative way.

It's very different for biodiesel. If you're producing biodiesel in the Islands, you have to grow oil seeds and crush oil out of them. The rest of that seed can be used as an animal feed of some sort. It will be fed to biotic organisms which will augment the food growth because we won't have to import meat and feed, and it can be done organically. We can take this further and create biogas from the animals and use their waste to fertilize more biodiesel crops.

Unlike ethanol, think of biodiesel as small-scale farm for tree crops. It's a different situation. We can't paint everything with one brush.

The larger question for Hawaii, which imports both fuel and food, is whether biofuels impact the food chain or the environment in a negative way? The answer is that it can if

it's not done right. If we rely too heavily on starch based fermentation nationally, we could impact too much on the, say, corn crop, which has a negative impact on corn price and animal feed and general food prices all down the chain, in developed and developing nations. Cellulosic conversion is much better on this problem, because no one eats grass or trees. [**Editor's Note:** Hawaii's own use of any feedstock would be so small relative to the global commodity market as to have no effect on it. The local issues are whether key elements of diversified agriculture are displaced and, then, as discussed in the meeting, where the energy crops are grown.] The issue with sugarcane and oil palms is one of habitat. Are we tearing down the rainforest? It has to be done sustainably. The impact of biofuels is not black and white.

As for climate volatility, there are a lot of studies out there, and more everyday. At this stage, there's no question that the climate is changing. It's hard to predict the impact on crops. We don't really know how it's going to shift, that's why there's so much risk. But we don't have enough specific information to calculate it in our model.

Henry Curtis: From a policy perspective, should price be the driver or climate survivability?

Kyle Datta: From policy perspective there should not be just one driver. We should care about price measured in several metrics. From the environment perspective we should care not just about climate change but also water, land use, impacts on native indigenous peoples, food supply, habitat and species. All those are important elements. We have to care a bit about national security. We have to worry about whether we're exporting dollars to countries that don't like us very much and the military costs we incur to defend our supply lines.

There are three policy dimensions, all of which matter, and which point to set of solutions that solve all three. If correctly developed, renewable energy, end-use efficiency, shifting vehicle fleets to more efficient types, producing biofuels in the state, etc., are solutions that are in our control. By coordinating between sectors, we can create shifts that will help us be more sustainable. We have to think whole system. We must make all the pieces fit together and then iterate back and forth. Then we can identify leverage points and see how much we can do in absence of policies. Finally, we add in policies.

Seawater Air Conditioning, "SWAC"

David Rezachek (Hawaii SWAC): In the IRP for HECO they say Ocean Thermal Energy Conversion (OTEC) is 6-10 years off, but NELHA is putting OTEC in now, and you don't include until 2025. Why?

Kyle Datta: Good question. I think you'll find that if you have a big chilling load you'd use it directly to chill, and not use it to make energy. It's easier to use existing water to cool down town than to build a new facility.

David Rezachek: I notice in your presentation you showed different types of renewables and contributors to energy needs. They appear to be all renewable energy generation technologies. You neglected solar water heating and SWAC. Have you incorporated these into your model and if so, how?

Kyle Datta: The slides shown to the group here are the renewable power technologies, to show the power generation options. There's also efficiency and displacement technologies, David is exactly right. We felt the best way to model these technologies would be to value them, and to add them in as reductions in demand, because that's how they'll affect the system ultimately. We add those in to reduce demand and then iterate the supply side.

Kitty Wang (principal, RMI): For this round, SWAC was not modeled. We have received information on SWAC from you. We w also sought information from independent sources such as EPRI, but we were unable to do so. It's difficult to make an assessment about SWAC with numbers from a single source. We decided to hold off until we could validate and analyze the numbers further.

David Rezachek: Did you contact SWAC systems in Toronto, or Cornell, or several systems in Sweden

Kitty Wang: No, we're concentrating our efforts on systems in Hawaii. We tried to track down projects being planned on the Big Island. So far, we've been unsuccessful in obtaining those numbers.

Kyle Datta: SWAC is a big issue I think we have to factor in as a legitimate case. We should expect this technology to be put in place. It may not make it in low oil price case [**Editor's Note**: Adequate Supplies scenario], but we think it might make into high [**Editor's Note**: Constrained Supplies scenario]. It will be interesting to see how it will behave. We have enough information from you, but we do have to cross check sources and it remains to be factored in as a reduction in load. After we do so, we will reiterate the model to see how it supplies the load. We brought it up today to see the magnitude of this and wave and solar thermal. These become the big issues that we have not previously considered in other studies that we will need to go in depth in the next phase of this study.

David Rezachek: What do you mean by calling certain technologies "wildcards"?

Kyle Datta: SWAC and wave both exist today, and solar thermal has existed 15 years in Nevada, Arizona, and California. It's there and we know it works. If we can see it, touch it. With SWAC and wave they are on the cusp of commercialization of these technologies. Here you need significant major scaling up because if you did, you can see in the high [**Editor's Note:** Constrained Supplies] oil case, that the system will incorporate these technologies as much as you can feed it. It will have significant affect in demand and supply, on most of the islands. We call it a wildcard because it becomes a big deal, but it becomes a big deal in the future.

David Rezachek: Are you aware we've been working since 2003?

Kyle Datta: We are aware, but relative to systems such as wind, wave power and SWAC are in what we call the emerging commercialization phase. You can see it, go visit sites, but need to focus on deployment on a much larger scale and with greater ubiquity than they currently exist. Hence we put it in the wildcard category to focus on it. Like cellulosic ethanol, it exists, but we're talking about a much larger scale. It is also a wildcard because we know that if it comes it will be a big deal to the balance in the state. It can be huge and we want to put some chips down on something like that. Today, the model tells us about policies we want and R&D to accelerate these technologies.

David Rezachek: So the bottom line is you haven't incorporated SWAC into model but intend to?

Kyle Datta: Correct, we know magnitude, we know the number of islands from bathymetric point of view, but we have to do further work to incorporate. We look forward to you help and participation.

Technology

Bill Cowern (President and CEO, Hawaii Mahogany Inc.): I noticed was no real discussion of electric or plug-in hybrid vehicles. Electric vehicles are starting to come out in the test level this year. Does this have an impact?

Kyle Datta: In our next round of scenarios, we will include them, especially now we see the model wants to pull in wind. PHEV (plug-in hybrids) increase the off-peak demand in a system, which is important especially since our model likes wind. We may find we need PHEVs to fully justify the amount of renewables and wind we're going to put in. If you were just running the system on oil, there is not a lot of value in taking oil through a plant at horrendous efficiency and running it down a wire to a car at equally horrible efficiency. But once you switch to renewables, it does make a difference. Thank you for your point.

Modeling Process

Bill Cowern: The EIA has been consistently wrong in their projections. Why do you continue to use their data?

Kyle Datta: Yes, the EIA has generally been wrong; forecasting is more of art than a science. **[Editor's Note**: We know of no forecast that has been precisely accurate over the long term.] What we have are two real boundary conditions. The point is not the price. What matters is, once oil is below $40/barrel, you always make the same decisions, so if it's $20 /barrel or $30/barrel, who cares. From a decision-making point of view, we need to identify the boundary conditions, high and low, to understand at which points our decisions change. The two boundaries of EIA scenarios are pretty close to those breakpoints. In our view, they're strawmen, they are not conditions we're likely to see [as

a continuous trend] for a 40 year period, but for maybe a decade, because commodity prices are cyclical. Ten-year periods of highs and lows are more typical. Today we presented the two strawmen to see which way the system will go. Next we will look at the cyclical case --which I think is the case we should be concerned with the most--what if oil prices stay high for a number of years, then drop for a decade, and thereafter start to rise again? What happens to our decisions and our policies? We need to make decisions now that are robust whether the price drops or rises.

Warren Bollmeier (President, Hawaii Renewable Energy Alliance): Is the analysis currently being constrained by way the RPS is set up? Specifically, when you state the percentage of renewables being of achieved in a given year, you are using the definition of renewables in the current law, which includes both renewables and certain energy efficiency and conservation measures. Is that correct?

Kyle Datta: Actually, this analysis is a technical-economical analysis. Technically, if I have X technologies and systems with Y turnover of capital stock, and Z set of prices for stocks and fuels each year, what is economically best seeing that I have a certain total capacity? This study is not in any way constrained by state law. It also differs in regards to efficiency. Instead of saying I have X program, it says "if I gave consumers the choice, what would they chose based on their past behavior?"

Henry Curtis: To clarify, Kyle mentioned three drivers. But only one affects price right now. Because we pay for the national security through taxes, not the cost of oil itself. The externalities are not added to the price of oil. While you have three drivers, only one directly impacts what happens.

Kyle Datta: That's correct for these base cases until you add the policy. Again, from the absence of any change in policy, how will the market behave? So you get a baseline. Then you can ask "what if you add in externalities? What will it take to make the system really shift?" What if you add in programs to provide incentives to people to shift their cars to more efficient models, or do more efficiency, would you see more efficiency show up rapidly? We have to create these baseline states to understand how policy will really affect what happens. What we'll show you next time is how the system changes and how fast as a result of systematically adding incentives.

Luis Vega (Program Manager, PCHTR): These are comments, actually.

We all agree that we need many components in the energy mix. I'm glad we have bright people in Hawaii doing work on biodiesel and ethanol.

Regarding seawater air conditioning, I believe the discussion is straight forward. For example, the biggest centralized AC load is found in Waikiki with approximately 32,000 rooms corresponding to an installed capacity of 25 MW and with seawater air conditioning you can reduce the electrical load by 90%. You would only need about 2.5 MW to operate pumps required to use the cold seawater as the coolant. There is no need to seek advice from the federal government the information was developed in Hawaii.

One can simply estimate the AC load that could be practically met with seawater AC and quantify energy savings.

Another issue is that ocean thermal energy conversion (OTEC) for electricity production needs to be incorporated into the report. No one familiar with the experimental work doubts that it works 24-7-365 and that the resource is plentiful to meet all of our electricity needs in Hawaii. The only question is: at what size is it cost-effective? We estimated that OTEC plants sized at 50 to 100 MW were required to compete with $30/barrel petroleum fuel. No one will disagree that oil in our lives will be above $40-$50/barrel, so clearly OTEC can come to fruition now.

The only State that can use OTEC directly is Hawaii, but unfortunately we have the islander mentality and tend to follow the continental USA instead of leading. We must seek federal assistance.

Kyle Datta: Thank you for that comment. It does appear at this time to us, that some of the wave technologies will be the stronger vectors from the oceans energy.

Jim Mistysyn (BEI Hawaii) This is my first time attending a session like this. And I'm a little out of context with acronyms used here. An impression I have is that the largest piece of discussion has to do with biofuels. A concern I have is that they are still providers of CO2. **[Editor's Note:** Biofuel crops take in CO2 in the growth cycle and emit CO2 when used. They are generally carbon neutral unless fossil fuels are used in their production.]It seems in the way the models are generated, it doesn't seem like we're looking at non-biofuel components of the energy situation. It's just an impression I get form the way the presentation moves, and I think this is important as it goes to public.

Kyle Datta: Good point. This was partially because I wanted to share information from the august meeting on biofuels. But just to reiterate, so we're all clear about findings to date on how to change system: You start with efficiency. If you really want to change carbon or price exposure, the most important thing is efficiency. What this shows you is that even with high process, capital stock turns over slowly and consumers faced with high prices are also slow to change. But efficiency is the first thing.

Once efficiency is addressed, we have to ask, if we're supplying primary energy, where will we get it from? It's clear we have three primary sources for major new supply from the renewable sector: Biofuels are a big deal, ocean as waves or cold water becomes a big deal, and we've always known about wind and it's important (though there are only a certain number of sites). Wind is not as infinite as we would like. One of the reasons we were talking more about biofuels is that there's been reasonable success moving wind and solar forward. **[Editors Note**: Although this discussion focuses on biofuels, wind, and ocean energy, additional solar photovoltaic, solar thermal, and geothermal will likely play a future role in Hawaii's energy future along with possible additional hydroelectricity to include pumped hydro storage. Biofuels also include energy from direct combustion of energy crops, agricultural waste, and municipal waste. In other words, the full panoply of renewable energy must be brought to bear.] Biofuels have had some real problems and

haven't gotten off the ground. Similarly with ocean energy; we've known about it for a long time but not gotten it off the ground. We need to spend a little more time figuring out how to get these off the ground.

Relationship to Policy

Senator Kalani English (Chairman of Senate Committee on Energy, Environment, and International Affairs): Kyle, I wanted to ask you about ethanol. You mentioned that certain states have been doing in-state production incentives. What are their incentives---because we have to deal with ICC and world trade agreements.

Kyle Datta: Those of you who are part of the Hawaii Energy Policy Forum will get to hear more about this at tomorrow's meeting. A couple of states are linking detaxation to the percentage of in-state feedstock used in ethanol production. Thus if a producer wants to detax the fuel, they must use a certain percent of in state producers or feedstock to get the tax reduction. So far there have been no real challenges. I think they are important for our state, because if we just import ethanol or biodiesel, we will diversify our fuel mix and that's good. But if we really want true energy security and all its benefits and to recycle money paid now for imported oil into our agricultural sector, then we want to provide any State incentives to in-state companies. And if we want some degree of protection from lower cost imports, which in turn avoids different back costs in terms of land, labor, and environmental impact, we have to make adjustments and link our detaxation to in-state production. We're taking dollars already in treasury and shifting them to something we very much want. We detax, but if there's nothing produced, we keep our money until it is. We will detail two types of sliding scale incentives that will address these questions.

Abel Konan (Hawaii Department of Agriculture): My question is about the transfer between consumer and producer as market prices are moving because they go up and down. Give us a range to which we can perceive what the consumer is willing to pay, or producer is wiling to charge. Since government intervention will be so important in this process, as you mentioned (taxation, detaxation, fiscal incentives), how can we capture this range of fluctuation (about $1) of the market price (High $3.20 Low $1.80 per gallon) to stimulate renewable energy development (using taxation, detaxation, fiscal incentives), while minimizing distortions resulting from the government intervention? The facts showed that the consumer was willing to pay the market price of $3.20. What resources can the state tap into?

Kyle Datta: To restate what I understand to be the situation you describe. You have a volatile energy market that has a mean and standard deviation, and can oscillate at decade-long cycles. That's the energy side. On the renewable side you've got two types of trade-offs. If the renewable energy is for power production, you tend to trade-off known higher capital costs per kW for a renewable power generator, such as wind against volatile costs of fuel.
If the renewable energy is biofuels, you have other complexities; you have underlying agricultural commodities that are independently volatile. Now there are two variables

(fossil fuel cost and agricultural commodities cost) each with their own mean and standard deviation. The problem is fundamentally different.

The question you're raising is what will it take for private capital to invest? Nothing will happen unless private capital decides it's a good investment. If it is, there's not as much, or any, need for additional intervention.

Or are the risks too great? What are the most important things that would lower those risks, what are the costs of doing that, and how should it be socialized among the parties who are taking risks? Government can take almost all the risks and costs. There has to be an allocation of these risks and that's what the policy dialogue becomes. You're shifting your investment and income stream, and how do we share the social benefits?

On the fuel side there are different issues in terms of mitigating the spread between cost and market price, between the relative prices of different fuels, and making the floors. And government can help, given that Hawaii has agricultural commodities. How do we change the dimension of time for all these sectors? If things take too long because of lack of the right policies, regulation processes, or resources, then the risk goes up significantly because of volatility. If you accelerate, you speed up capital pay back and greatly reduce risk.