Initial set of comments on Biomass Energy Master plan

Comments on Sections 2.1, 2.6, 2.7, 2.8 will be forthcoming

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I have read and reviewed the overall summary of the Hawaii Biomass Energy Master Plan, as well as most of the individual chapters. My comments follow.

Overall Summary Document (090904 Bioenergy Master Plan draft.pdf) (dated 9/9/2009)

I assume that this document supersedes the document entitled "090630 Bioenrgy Mstr Plan DRAFT.pdf" dated 7/17/2009.

I did not read Appendix A.

The master document would benefit from streamlining. For example, the summary on pages iii – vi is repeated on pages 69-72. There is also a lot of repetition among these summaries and Section 2, Section 3.2.1, Section 3.2.2.2 and Section 3.2.2.3. I felt like I was reading the same summaries and recommendations over and over. I understand the rationale for trying to present the results of the plan along the lines of the expected outcomes of the legislation, however I think more people would read this if it were more concise and straightforward if they could read a ~ 20 page summary document vs a 92 page document

A general comment – is anyone thinking about how to assess resource optimization/strategic valuation? This issue needs to be raised more forcefully in the report – at least as something needing further analysis. For example, given a constrained biomass supply, what is the best use for any given ton of biomass, and who gets to decide that? So as a society, should Hawaii produce biomass for electricity, for fuels or both? If both, how does one figure out the percentage to each, given the fact that it looks like there is not enough to meet the demands of both sectors? Is it more efficient to produce ethanol for cars, or electricity to charge a revamped fleet of PHEVs or electric cars? Do we just leave it to the market to decide? Is the focus on ethanol, oil crops for biodiesel, bio-butanol, renewable diesel, pyrolysis oils, or solid fuels? If there is a limited supply of feedstock, how is that scarce resource best allocated? Is food self-sufficiency a high priority as well? How much land can be used for bioenergy is one thing – but how much should be used is another. These questions may already be answered somewhere and I may have missed them, but would be useful to discuss with the group.

I also think there should be a discussion of the potential strategic value of distributed biomass generation. Are there ends of lines or areas where grid overload problems could be avoided through the deployment of small bioenergy power generation on the order of 1 -10 MW? Are there any grid benefits to deploying biomass such that it can contribute to a smarter, more stable grid and perhaps avoid costly

upgrades? I would think the answer is yes, and that the utilities will know their problem spots on their system. Could small systems be deployed to provide power during the day, and storage at night. Maybe even storage in PHEVs scattered throughout the community.

The California Energy Commission did some interesting work in this area – modeling power flows in the grid, and then determining where small generation (< 20 MW or so) should be connected to minimize overload. GIS was used to overlay the wind, solar, biomass and geothermal resources and costs at each location, thus the optimum spots to build plants were identified. The concepts apply equally well in Hawaii, and it may be easier to do the analysis because HI is not as complicated a grid as CA.

The approach and methodology are explained here.
http://cwec.ucdavis.edu/forum2005/proceedings/presentations/Nakafuji%20-%20SVA%20-%20CWEC%20Forum%2005.pdf

Although the presentation is focused in CA and wind, biomass was included in the analysis as well. Slides 7-19 explain the process. Slide 15 is key. We could do the same thing for biomass – to deploy the systems in the most strategic locations, especially if greenfield project are envisioned anywhere. I realize there are some locations where infrastructure already exists and may need to locate a plant there. But from a planning perspective, SVA makes sense.

Perhaps this concept is something that should be kicked over to the electricity or integration group. But overall, it will help optimize the use and deployment of all renewable resources – whether it is biomass, solar, wind, geothermal.

I apologize if these issues have been looked at or are being looked at now. If that is the case, I would appreciate references to the work.

Specific comments for the report follow:

Executive Summary

Suggest moving the table on pages iii-iv and the discussion of the top 8 suggestions to the end of page x, call it Industry Roadmap Summary as a subheading in the Executive Summary, and then reference it in the last sentence on page ii. This may improve readability. I got a little confused on page ix where it was discussing the top recommendations and then it started the paragraph " Section 3.3 Strategic Partnerships…."

Typo in the table on page iv, 4th cell up from bottom. Recharge not recharged.

Program Level Coordination. On wages, I do not see rationale for the state to only seek to support projects that attract above manual labor wages. While this may be a noble goal, what if the economics only work out for certain projects if manual labor is required for parts of the operation? Aren't some new or saved jobs better than none?

Under the **Availability and Use of Resources** section: I understand the need for a consistent policy on use of state lands, but developing a policy by December 2011 seems like a long time to wait. What about people who are working on putting projects together now and need to firm up resources? While a consistent policy is needed, this should not be done at the expense of projects that need to lease lands now. Are all developers working in this space supposed to put their plans on hold for the next 2 years while a policy is worked out? Will this shift development to private lands where maybe oversight is not so strong? OR maybe the lack of access to state lands for a few years will kill the economics of a project due to geographic proximity to the proposed conversion site.

Under **Value Chain Co-Dependencies**, or perhaps this should be under **Availability and Use of Resources**: there is no mention of trying to promote the use of waste products or residues that are generated by other operations. For biomass, the plan should be to focus on resource optimization. So if there were more use of waste, residues from agriculture, manufacturing residues, biosolids from waste water treatment plants, construction waste, landfill gas, etc, then more of the land base would be freed up for food or more biofuels. For crops, this is somewhat mentioned on page v, 4th cell down – but the focus should also be on residues that are byproduct of any crops grown. There should be a significant effort made to capture all waste/byproducts in the system in all of the counties.

Page vii, Item 1. Is a total budget for 3 staff positions of $340k per year sufficient to attract technically trained people who can make a difference from day 1? Will this cover all fringe, overhead, retirement plan, etc? it seems a little light – if there are 3 $75k/yr positions and loading is 2x, then this would need to be $450k/yr for salaries.

Page viii, Item 3. What is to happen in the two years that it takes to develop the policy? Will all leasing be put on hold? What would that do to existing developers trying to cobble together land for a project?

Items 4 and 5 – if projects are to be evaluated such as proposed here, who will do the evaluations and for what purpose will the results be used? Must every project in Hawaii meet certain thresholds? If so, who will set these thresholds and what will they be? Will state LCA and economic valuation supersede that of the developer and the market? I also think these recommendations can be combined into one item.

Section 1.0.

Top of page 4, paragraph that starts “The increased…” - I think there should be a mention here of food vs fuel concerns? If not here, I think somewhere in the document. In the overall context of sustainability, what are the ramifications of devoting land to producing energy feedstocks if Hawaii is dependent on imports for food? When the next price spikes come and people see land locked up for producing ethanol but food prices skyrocket because of added shipping costs, this will not sit well with the public.

Page 6. Insert a figure for the Value Chain, similar to that on page 8 of this;
http://www.epa.gov/cleanenergy/documents/bioenergy.pdf

Bottom of page 6 – in addition to the statement that biofuels will impact the environment, this might be the place to discuss food vs fuel as well as mention some detail on the Indirect Land Use Change Impacts associated with biofuels production.

Page 11 – make the section titles/author a table instead of listing out this way. If the report is to be a pdf file, can you provide links to the individual chapters here? So the reader can click on land and water and then it will take them to that document? Just an idea if all of this is to be posted on line.

Page 13, First use of ALISH – spell this out here, not on page 14. Typo in third full paragraph under the bullets – should be "large-scale" bioenergy not "large-scale of bioenergy." Fourth paragraph under Input from Stakeholders subhead. Change first sentence to say "The authors obtained input from stakeholders (participants of ….and then continue with the rest.

Page 14 – discussion on supplemental sources of water, mention rainwater catchment systems.

Table 1, pg 16 – maybe make landscape and stand-alone page. It is hard to read as is.

Page 21, 2nd paragraph. Combining should be combine. Third para. 80,000 lbs not likely to be reached as trucks will fill up on volume first.

Table E.1, pg 25. Numbering not consistent with previous tables. Under gasification, then power – there should be a sub row for Close-coupled gasification (produce gas, ignite it, use the heat to produce steam for turbine) and Direct Use (gas, clean-up, and then us in internal combustion engine. Close coupled gasification to steam is commercial; Gas to IC engine is pilot and demo.

Page 26. no bullets/recommendations listed here. Other subsections have bullets following text. Report should be consistent,

Page 32. Direct and Indirect Land Use Changes need to be listed as bullets as potential impacts.

Page 33, item 2. Who will perform the LCAs? What will be done with the information? Is the state willing to deny permits if the analyses do not clear certain thresholds, and if so, who determines the threshold?

Page 34, number 8. The second paragraph (under 8) states focus of certification should be on local problems. What about indirect land use changes on a global basis? The potential for future requirements for including ILUC in certification programs should be considered in any HI certification program. The entire ILUC impacts expected from increased biofuels production in HI needs to be looked at.

Page 38, Table 2. You list total liquid fuels, and then total fiber. But how much fiber would be needed to produce the liquid fuels required? What is the total tonnage of biomass required to meet the solid fuel and liquid fuel requirements? Then assuming a certain biofuel crop mix and yields per acre, how many acres of land would need to be under production to meet those demands?

Page 39, Land and Water, last paragraph. Create a table to show the number ranges (e.g. 71-110, 91-220, etc.) for the various fuels and various feedstocks - it is hard to read as it is listed. What are the

assumed yields of gallons of fuel per ton of feedstock for each of the fuels/feedstock combination options? It looks like the numbers show there is not enough feedstock to produce the biodiesel – with a demand of 103.7 and 78.6, and expected production of 22-50 for oil palm and 8-78 for jatropha, it appears sufficient biodiesel can not be produced. Am I reading this right?

Page 40, first paragraph, last sentence. In addition to renewable diesel, should include an estimate of expected yields of pyrolysis oils converted to renewable diesel in existing refinery. Which pathway uses less resources – gasification to RD via FT, or pyrolysis oils to RD via refining? What about biomass to bio-butanol vs ethanol?

Pages 41-52 – there is a great deal of repetition between Section 3.2.1 and Section 2. Report would benefit from consolidation.

Page 44, third bullet down, Should be suit not suite. This section lists bullets, other subsections use numbers for the main recommendations

Page 47, Permitting, Item 3. Consider setting up a one stop shop for permits – the developer turns application in to one agency, and then that agency coordinates with all of the others to get the proper permits, or at least coordinates between the developer and the various jurisdictions and regulatory needs of agencies. Having a one stop shop permitting would greatly streamline the process.

Page 51. All of the other recommendations on pages 43-50 (Section 3.1) are bullets or numbers, and no more than a sentence or so long. All the items on pg 51 and pg 52 are full paragraphs – consistency is needed in the format for all of the subsections in Section 3.2.1 in particular, and the rest of the report in general.

Page 54-62 – it is hard to understand how this table is organized. Some better grouping and explanation is needed. Also, most of the information in this table is repeated from section 2 or section 3.2.1

Pages 64-67 – more repetition of the information from Table 4 as well as the other sections. Same comments on streamlining apply.

Pages 68-75. Table 6 summarizes the results of the other tables and section 2 and 3.2.1. this table is of value and should be more prominent. But it only needs to be in the report once – not twice as it is now.

Page 76, list of questions about ¾ down the page. These are important questions that need to be answered. They get lost way back here in the report.

Page 92 – the information

2.1 Land_Water_0809 draft.pdf (dated 9/9/2009)

Have not yet read.

2.2 Bioenergy Infrastructure DRAFT.pdf (dated 7/17/2009)

I found this to be one of the most important chapters of the overall report. It really spells out the potential downfalls of a myopic focus on ethanol and biodiesel, and details the potential benefits of a stronger focus on producing fuels that have better integration capabilities with the existing infrastructure.

This chapter lays out the justification for future analyses focused on the production of fungible fuels – bio-butanol, renewable diesel, pyrolysis oils, and torrefied wood (for co-firing in the AES coal plant located on Oahu.)

Page 3-2, last paragraph. When referencing the weight limit of 80,000 pounds per truck, it should be mentioned that the trucks will usually fill up on volume first before weight limits or reached. I think most truck load weights for biomass are in the 20-22 ton range. I think this is mentioned in the report, but should be spelled out here as well.

Page 3-21. Second paragraph under Biodiesel. Second to last sentence. Re word to say: Biodiesel is distinct from "renewable diesel " which can meet all of the requirements of ASTM D975, Standard Specification for Diesel Fuel Oils.

Page 3-23, top line – should read "reconfigured to bio-butanol" not bio-ethanol.

Page 3-24, section 4.2. It is very hard to read the table. It should be reformatted to improve readability.

Page 3-27, under Power Generation, fuel and steam turbines for large central power generation. In addition to SVO, should mention pyrolysis oils, renewable diesel in either stand alone applications or co-fired with fossil fuels. Under small scale systems, should mention the potential to fire pyrolysis oils in modified combustion gas turbines, as per facility that Dynamotive has in Canada using an Orenda CT. http://www.renoil.com.au/renewable.html

Page 3-32, second paragraph from the bottom. "Currently" spelled wrong.

Page 3-37, last paragraph. Should read "more or less" compatible, not "less or not" compatible.

Page 3-45, section 9. This section should discuss the potential benefits of pelletization or making briquettes out of biomass – especially in terms of improving the energy density of the fuel and reducing moisture content. Also, there is no mention of torrefaction. These should be discussed. Can biomass be co-fired in the AES coal plant, and at what levels?

2.3 Green Jobs.

Table 7 – what are the units for column called biofuel production increase?

No other comments.

2.4 Technology Task.

In general, I thought this section was very well done. Very few comments.

Table E-1, pg ii. Same comments as above in the Master Plan Summary Document related to status of gasification :

> Under gasification, then power – there should be a sub row for Close-coupled gasification (produce gas, ignite it, use the heat to produce steam for turbine) and Direct Use (gas, clean-up, and then us in internal combustion engine. Close coupled gasification to steam is commercial; Gas to IC engine is pilot and demo.

Section 4 – feedstock discussion. Should mention residues, landfill gas, WWTPs, waste to energy. Has anyone looked at miscanthus or industrial hemp? All potential energy crops should be on the table if Hawaii is serious about getting off fossil fuels.

Page 11 – last sentence – just ends in mid thought.

Pg 12- 47 (after table 14). I would move this entire write-up to an Appendix. It is interesting, but the reader is going to get bogged down in the chemistry. Just summarize the technologies and processes and move the details to Appendix.

Page 25 – some people are taking DDG and DDGS and making pellets/briquettes for energy pur[poses. So markets are not limited to livestock feed.

Page 29, 30 – pictures are very hard to see.

Table 15 – I have a map showing all of these plants (most of them at least). Let me know if you want it and will sned your way.

Page 52 – pyrolysis. Should mention that Orenda has warranted one of their CTs to run on Dynamotive's Bio-oil. Should also mention the growing interest in using the bio-char as a soil amendment (Terra Preta soils) and means to sequester carbon.

Page 61 – after direct combustion, should mention potential to use ORC technologies to produce electric energy from hot water. This technology mix is not mentioned in this report at all. http://www.bios-bioenergy.at/en/electricity-from-biomass/orc-process.html

Page 55 – picture hard to see.

Page 57, section 5.5.1 – Should mention that gas can be oxidized (ignited) to produce steam for steam cycle power generation. A number of gasifier vendors are doing this.

Page 63, para that starts Biofuels Digest … remove "the" before bioenergy.

Page 64, - same comments for ES-

2.5 Permitting.

No comments.

Aloha,

Regarding the draft bioenergy master plan-

Overall, this was clearly and exhaustive and collaborative effort and that really comes through in the draft.

Some comments are:

1) Need for thoughtful financial incentives beyond basic tax credits: The plan refers to the development of tax credits of an unspecified amount to incentivize capital spending by bioenergy producers, for bioenergy transportation and distribution, for irrigation system improvements, etc. Unfortunately for these types of efforts, a simple tax credit would be relatively expensive for the state and be very hard for the developers to work with. Most the entities that would try to do this work (small companies, non-profits, cooperatives, and the large companies that have generated little or profitable income in recent years and therefore have loss of carryforward losses) would not be able to utilize the credits. Tax credits also tend to force projects to be ranked in order of access to financial partners with tax liability, rather than by importance of the project for the state or energy market. I recommend that a sub-committee of people with a mix of public and private experience raising capital for infrastructure and energy projects put together the specific financial incentives to support this plan. (I'd be happy to participate.) Some options that are easier for developers to work with for these types of projects, and have a better link between the activity and the user of the tax benefit are:

    a. GET exemptions for the construction phase (such as currently exist for Enterprise Zones)

    b. A state purchase preference, minimum price, or minimum quantity, to create a baseline market size or income level that developers can take to a lender or investor for financing. The current 10% ethanol blending mandate and federal Renewable Portfolio Standard (discussed exhaustively by UHERO in the Apprendix) are examples of this type of incentive

    c. Allowing income tax credits to be tradeable, so that the entity performing the work does not have to be the same as the one putting up the capital

    d. Tax-exempt or pooled funds or bonds available to small (not just SEC accredited) investors. Special Purpose Revenue Bonds are a starting point for this type of vehicle, but are also very hard for developers to actually use and see any benefits from them, so other instruments, such as open exchangeability and public sale, would have to be added.

    e. Competitive grants

2) Business Cases and Seed Crops: The plan would benefit from development of Business Cases, to place bioenergy crops relative to residential and commercial real estate development, land conservation, and even other growing but still not well recognized agricultural uses, like seed crops. Seed crops have become one of the state's largest agricultural exports, have experienced tremendous year-on-year growth in acreage and dollar value, and seed crop producers enjoy higher margins that allow them

to pay higher lease rates for small parcels of land relative to monocrop plantations like sugar and pineapples. I think it is a fair bet that seed crops also would provide a better financial return per acre and per dollar than biofuels. While the current draft of the plan does a very good job of comparing bioenergy crops to plantation crops, It is hard to tell from a quick glance whether there has been an assessment of how seed crops and bioenergy crops can and do compete for land, capital, and water, and how much seed crops would affect the underlying assumptions in the plan of land available for bioenergy crops that support much of the plan. Also, it would be valuable to learn how much biowaste (if any) is produced from seed cropping .

3) Articulating priorities: The overall goal stated in the road map is to position the Hawaii bioenergy strategy to address vital state interests of carbon use and energy security. Carbon reduction, while it is a worthy and popular goal, doesn't move the electorate as quickly and as thoroughly as do capital flows from tourism and defense spending. Recommended adding the vital state interest of maintaining tourism revenue and image, defense presence and spending, and economic diversification to the actual positioning of the plan.

4) Recommend the fact-finding policy discussion forum mentioned in the introduction have a strong advisory, voting, or veto power over fund allocation decisions made by the Renewable Biofuels Program.

Minor editing points:

5) Recommend adding the participating members of the bioenergy working groups into the list of contributors.

6) It would help to point to specific items in the roadmap if they were numbered.

Sincerely,

Joelle

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October 1, 2009

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RE: **COMMENTS ON THE STATE OF HAWAI'I BIOENERGY MASTER PLAN**

Aloha! We are writing to comment on the recently released State of Hawai'i Bioenergy Master Plan prepared by HNEI for DBEDT pursuant to Act 253 (SLH, 2007).

We first wish to acknowledge and congratulate you for assembling a comprehensive study that addresses a wide range of bioenergy topics in great detail. We were pleased to participate in several stakeholder workshops arranged by your study team, and for the opportunity to submit written comments in response to the draft Bioenergy Master Plan released in June 2009. We are also grateful for occasions facilitated by state agencies for several SunFuels technical presentations to DBEDT and the Board of Land & Natural Resources during the past two years.

Our company, SunFuels Hawai'i LLC, was formed in 2008 by Mr. Michael Saalfeld, a distinguished clean energy entrepreneur, to explore opportunities to develop a biomass-to-liquid (BtL) plant to produce synthetic diesel fuel in Hawai'i. With biomass feedstock supplied by short-rotation tree crops, the BtL production facility would employ patented Carbo-V® gasification technology licensed by Choren Industries and later-stage Fischer-Tropsch ("F-T") hydroprocessing to produce clean transportation fuels trademarked as SunDiesel™, or Synthetic Paraffinic Kerosene (SPK) jet fuel, or other byproducts such as industrial waxes and fertilizers.

In pursuing this investigation for production of motor and aviation fuels in Hawai'i, we were motivated by the fact that, among all biofuels, renewable BtL fuel produced from the gasification of woody biomass and F-T synthesis is the cleanest transportation fuel option and one that can be brought to market quickly, unlike other advanced biofuels still undergoing technological development and demonstration. BtL fuels are compatible with existing fuel infrastructure, enhance emissions efficiency and engine performance, and can be produced from feedstocks grown on marginal arable land otherwise unsuitable for food crops. Moreover, biomass gasification and F-T processes can generate steam as a valuable byproduct for efficient use by an adjacent utility or production facility.

We therefore undertook a very comprehensive analysis of lands and tree species suitable for energy crop production on the Big Island. We retained Forest Solutions, the firm that successfully developed tree plantations on Kamehameha Schools and Parker Ranch lands in the Hilo and Hamakua districts, to look at the potential for biomass production on a landscape extending from Hilo around Mauna Kea to Waimea. We concluded that appropriate lands, not competing with other agriculture or requiring irrigation, can supply feedstock for a biorefinery with a production capacity of up to 15 million gallons of synthetic BtL fuel annually.

A Choren Industries gasification facility offers a wide product and byproduct portfolio. These include clean diesel motor fuel, jet fuel, hydrogen, methanol, mixed alcohols, future fuels such as DiMethyl Ether (DME), electricity, steam, road base, ammonia for fertilizers, and more. Estimated job creation for a Choren biorefinery on the Island of Hawai'i is 40-65 people for biomass production and 100-120 for biorefinery operations.

BtL fuels are far cleaner than other renewable fuels and the petroleum fuels they would displace. In addition to extremely low lifecycle GHG emissions, BtL fuels exhibit far lower conventional pollutant profiles. The benefits of clean synthetic liquid fuels are important for Hawai'i. Earlier this year, a dramatic increase in GHG emissions associated with the transportation sector was documented in a report titled *Hawai'i Greenhouse Gas Emissions Profile 1990 and 2005* (UHERO; Konan et al).

Energy efficiency is also important. To meet renewable energy targets in many states, including Hawai'i, wood from managed forests may supply feedstock for simple combustion-based electricity generation. Such use and diversion of biomass for energy production, however, is inefficient. Typically, permitted biomass to power facilities has a thermal efficiency in the 25 to 30% range (BTU's sold divided by BTU's purchased). In comparison, stand alone BTL facilities will operate in the 40 to 50% range, while those integrated with a steam host will operate in the 60% to 70% range. For electricity, conversion efficiency of biomass to energy via a pyrolysis process is greater than simple burning. Efficient use of biomass matters; the energy source is renewable, but it is not limitless.

Hawai'i's overall energy profile differs remarkably from states in the continental U.S. precisely because Hawai'i is an island state isolated in the Pacific Ocean. Lacking an indigenous supply of fossil fuels, we import petroleum to produce electricity. We consume huge amounts of aviation fuel to sustain a visitor economy, for interisland transportation, and for the military. To date, much of the thrust of Hawai'i's drive toward energy independence and a clean energy future has centered on the renewable generation of electricity. The development of wind, solar, geothermal, ocean thermal conversion and wave energy all contribute to Hawai'i's ambitious goals for renewable electricity.

Clean energy for transportation is equally challenging. We see a promising future for the electric car platform in Hawai'i, one that should be matched by a strategic calculation for our needs for diesel-powered vehicles and equipment for commercial trucking, construction, agriculture, buses, fuel-efficient diesel cars, back-up power generation, and next generation SPK jet fuel. Despite hopes for island-based ethanol production, we cannot help but observe its dismal track record.

Scott Q. Turn, Ph.D.
Maria L. Tome, P.E.
October 1, 2009
Page 3

Accordingly, we think a smart, pragmatic strategy for Hawai'is transportation future will center on (1) support infrastructure for electric cars; (2) clean diesel blends for heavy duty vehicles and equipment; and (3) further development of algae-based and FT-SPK jet fuels for commercial and military aviation. Additionally, we think biomass-to-energy conversion strategies must focus on issues of Btu efficiency, feasible economics, and scalable local opportunities to provide renewable energy to the grid.

With this perspective in mind, we turn to the tome that is the Hawai'i Bioenergy Master Plan. Its astounding length – 867 pages – is a testament to the work of its authors, but it may be unmanageably massive for many readers and policymakers to digest. Last year, the International Energy Agency (IEA) and Organisation for Economic Co-operation and Development (OECD) released a highly competent and ranging report titled *From 1st to 2nd Generation Biofuel Technologies* in 124 mercifully concise pages.

This leads us to our major conclusion about the current state study: It is first and foremost a study, not a plan. As an academic review of many subject areas, it has merit and much useful material for reference. We note that it contains countless recommendations for further studies. This is an understandable stance for academic researchers who thrive on a steady stream of funded research opportunities. However, if Hawai'i is to meet its ambitious 2030 goals for renewable energy, it must differentiate actionable opportunities and real plans from the muddle of endless studies.

We hope to see the state and its consultants do a much better job of integrating private sector talent into real planning discussions and initiatives. The breakthroughs and innovations we all seek rest on the competence, capital and wherewithal of people who deal in actionable ventures and real economic risks. In the area of bioenergy, they include commercial agronomists, foresters, engineers and venture capital fund developers, among others. Their knowledge and ground truth perspectives belong at the center of the discussion, not at its peripheries.

Thank you for the opportunity to comment.

Sincerely,

John Ray, General Manager
Rory Flynn, Communications Director
SunFuels Hawai'i LLC

cc: bionrg@hawaii.edu

A few comments from Tesoro follow on the HBMP. I don't have too many, because most of my prior comments are incorporated into this latest draft.

Thanks for the opportunity to review.

Rick Weyen

Economic Impacts:

Page 8: The second to bottom paragraph says that "the refineries earn $28 million per year" from the federal blending credit. The truth is that the blending credit is implicit in the price of the ethanol that the refineries purchased -- essentially, the blending credit is passed on to the ethanol producers. To say that the refineries profit from blending ethanol because of the credit is false -- is only helps to offset the price that the refineries must pay for the ethanol.

Page 19, second paragraph says that the refineries "began to capture the federal blending credit". This falsely implies that the refineries profited from blending ethanol to recover the capital cost of installing blending facilities. The truth is that the blending credit is implicit in the price of the ethanol that the refineries purchased -- essentially, the blending credit is passed on to the ethanol producers. Having said that, the fact is that the capital spent by the refineries to blend ethanol is sunk capital. It did not get a return on investment, and is not expected to get a return on investment. It was just a cost of doing business in compliance with the law.

Same page, the next few paragraphs talk about the refineries. I disagree that there is diminishing light crude availability -- there is enough light crude for the refineries, but the cost of acquiring this crude in competition with other refineries has increased in recent years. The most important factor is that global refining margins have significantly declined in the past two years, and most industry forecasts (I'd suggest citing EIA as a source) suggest that margins for US refineries will remain slim for many years. The two Hawaii refineries are relatively small, and must compete on a global scale with much larger facilities to sell their products, both in the US and in Asia (such as the new Reliance refinery in India). Major investments to expand the complexity of refineries of the size of the Hawaii refineries are extremely rare anywhere in the US. Given the current outlook for poor global refining margins, regulatory challenges such as the proposed US greenhouse gas reduction legislation, and with decreased in-state demand for petroleum products due to the Hawaii Clean Energy Initiative, one may conclude that significant investments in Hawaii's refineries to increase their crude oil flexibility or conversion capability are extremely unlikely.

On the chart "Pathways for Bioenergy Systems", the only route shown for oil from soybeans, etc. to fuel is via transesterification to biodiesel. This should be modified to reflect the various "renewable diesel" technologies that could allow conversion of oils to renewable diesel and renewable jet fuel.

Aloha

Congratulations on the completion of a bioenergy masterplan. The copy was forwarded to other stakeholders for their comments.

Kindly take into account the comments below. We thank the DLIR Research and Statistics Office labor market information analysts for taking the time from their very hectic schedule to review. The corrections will improve the masterplan.

Table 1 on page 8 - For Average Job Count, they added the annual average for each year and divided by the number of years, but following this method the Agriculture Average Job Count (2000-2008) should be 7,044 and not 6,340.

Table 6 on page 16 - Unemployment for March 2009 of 45.8 when taken on April 19, 2009 was preliminary revised to 45.5.

Table 7 on page 17 - Source cited is BLS, but BLS does not publish unemployment rate for Maui Island, Molokai and Lanai. Source should be HIWI
http://www.hiwi.org/article.asp?PAGEID=94&SUBID=&ARTICLEID=463&SEGMENTID=0
Again, rates for March 2009 when taken on April 19, 2009 would be preliminary and there were some revisions - Hawaii County 10.1, Molokai 12.4, and Lanai 8.7.

Mahalo,
Carolyn

Carolyn Weygan-Hildebrand
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Comments to Draft Hawaii Bioenergy Master Plan
RE Technology

Page viii—bullet 4—sustainability concepts should be included in this methodology.

Page ix—paragraph 5—add major end-users to the following sentence: In keeping with the value chain approach, partnerships including land owners, biomass (agriculture or forestry) producers, technology providers, bioproduct distributors, major end-users, and investors can be envisioned.

Page ix—paragraph 6—add private companies to sentence….Hawaii Agriculture Research Center, private companies, and other research institutions….

Page x—no mention of demonstration projects related to electrical production.

Page 16—table 1--columns need adjustments for text wrap arounds.

Pages 27-28—no specific incentives mentioned—tax credits for irrigation and new infrastructure mentioned earlier on page viii.

Pages 29-30—mentions incentives for first movers and growers. Any consideration for tax credits to landowners and processors?

Page 31—conducted model of sugarcane to ethanol. Similar model needs to be conducted for local plant oils to liquid fuels (palm oil, jatropha, others?).

Page 33—bullet 2—sustainability concepts should be included in this methodology.

Page 47—bullet 6—add other research organizations…where University of Hawaii and other research organizations and Hawaii-based….

Page 49—mentions incentives for first movers and growers. Any consideration for tax credits to landowners and processors?

Page 83—HECO section—add new paragraph. MECO has conducted preliminary testing with B99 biodiesel on various types of diesel generators in its fleet and a combustion turbine. MECO is planning a longer term test on selected generating technologies. HECO is planning to test crude palm oil blends with low sulfur fuel oil at its Kahe 3 steam boiler.

In addition, HECO, MECO and HELCO use B20 biodiesel on all its diesel fleet vehicles.

Pages 86-87--no mention of demonstration projects related to electrical production.

Draft Hawaii Bioenergy Master Plan
Comments
Energy Analysis
October 2, 2009

1) General Comments
   a) Good draft – comprehensive report.
   b) In light of State of Hawaii budgetary constraints, are there any modifications to the Master Plan implementation to be considered? What are the steps to successfully ensure that the program (ten-year term) can be adequately staffed and funded (see page73)?
   c) Add schematic that illustrates key Value Chain components of the process – ultimate users (power generation, transportation), distribution/delivery of fuel, processing plants for liquid/solid fuels, transportation of feedstock, growing feedstock, etc.
   d) In Part 1: Overview, consider including an expanded discussion of justification for the Bioenergy Program and overarching key considerations – energy security, economics, environmental concerns, political (food vs. fuel), drivers (GHG emissions monitoring/regulation). Add a title block for each sub-topic for easy reading.
   e) In Part 1: Overview, consider addition section addressing ways to leverage potential 2009 American Reinvestment and Recovery Act (ARRA) and future stimulus funding opportunities. See also first and sixth bullets on Page 67.
   f) In Part 1: Overview, consider expanded discussion of the Hawaii Clean Energy Initiative agreement and its specific steps related to biofuels.
   g) Format suggestion: as noted above, freely utilize block headings and sub-headings to highlight key topics in each section. See Pages 73-75 for example of succinct presentation.
   h) In Part 1: Overview, consider listing the fundamental questions shown on p. 76. Related to the items on the list, what are the "go – no go" considerations? Will there be an annual update/revisiting of the Master Plan?
   i) In Part 1: Overview, consider including a table with key strategies, goals, and milestones. What metrics will be used to measure progress and success?

2) Detailed Comments
   a) Page iii. Does the State of Hawaii have in the budget the $1.5 million per year to establish three staff positions using up to $340,000 and the balance shall be used to fund assessments and co-fund demonstration projects as identified in the bioenergy master plan?
   b) Page iv. Similar question regarding a matchmaker for partnerships – a position or program.
   c) Page iv. Favorable State land lease terms for bioenergy demonstration projects. What might be the size of the subsidy in the leases? How favorable?
   d) Page v: Develop funding mechanisms to leverage federal and private funds and support demonstration projects. What funding mechanisms are contemplated? Who will take the lead?
   e) Page vii: To carry out the priority issue area recommendations, a Bioenergy Program must be adequately staffed and funded. Q – is this impacted by the current budgetary climate? Program term no less than 10 years?

f) Page ix: Faculty hire in College of Tropical Agriculture and Human Resources at UH (CTAHR) in 2011 to conduct research and demonstration of appropriate bioenergy feedstock harvesting technologies suitable for Hawaii's conditions. Is 2011 too late?
g) Page ix. Strategic partnerships (land owners, biomass (agriculture or forestry) producers, technology providers, bioproduct distributors, and investors). How can partnerships be incentivized and rewarded?
h) Page ix. Demonstrations – verify conversion technologies and transportation applications. Is timing of the demonstration projects early enough to benefit decision making?
i) Page x. Master planning effort proposes a framework….but does not fully address implementation of the full menu of recommendations…. When will implementation be addressed?
j) Page 4, Section 1.2.1, State Policy Support. Consider adding specificity to first sentence, "For a number of compelling reasons, the use of biomass as a locally available source for renewable energy is attractive."
k) Page 4 second to last paragraph. This gives a hint of real challenges: "…despite substantial Federal, State and County incentives to support production and the use of biofuels, no ethanol plants have been constructed, and only two biodiesel plants are in operation, both for the conversion of waste cooking oil." Consider expanded discussion of this topic – why?
l) Page 5. Section 1.2.3 HCEI. Spell out selected provisions and guidance on bioenergy and biofuels included in the HCEI.
m) Page 9. After the list of stakeholder outreach and engagement activities conducted, consider adding references to outcomes from those activities (e.g., table on pp. 55-62) included in the Master Plan.
n) Table on pp. 55-62: reference the April 2009 stakeholder meeting as the source of the comments.
o) Pages 74-75, item 7. Error - Duplication of item 8. Provide revised response. In item 8., please change "inn" to "in."
p) Page 76, Section 3.3, Strategic Partnerships…. The questions in the second to last paragraph are fundamental to the viability of bioenergy in Hawaii. Should these not be highlighted in the Introduction? Perhaps also enhanced discussion such as the length of time to find answers to these questions.
q) Pages 82-83. Hawaiian Electric Company section. Consider mentioning that HECO is a signatory to the October 2008 HCEI Agreement. Add biofuels testing initiatives (see RE Technology comments).

Hawaii Farm Bureau
FEDERATION
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October 6, 2009

University of Hawaii at Manoa
School of Ocean and Earth Sciences and Technology
Hawaii Natural Energy Institute
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via email to bionrg@hawaii.edu

The Hawaii Farm Bureau federation (HFBF) wishes to include additional comments regarding the above plan. A previous letter was sent regarding this draft plan on October 2, 2009. It was later noticed that a major issue regarding the use of the Department of Agriculture's (DOA) 2007 (sometimes referred to as 2008) Agricultural Water Use and Development Plan (AWUDP) was inadvertently excluded from the original letter.

The HFBF was been coordinating with the DOA on the development of the AWUDP for several years now. It is our understanding that the 2007 update of the AWUDP was never accepted by the DOA as there were several issues with the way the data was gathered, the validity of the data, and projections off the data. Several of our members participated on the 2007 update and had expressed serious concerns over the methodology used. These concerns were proven to be justified when the draft AWUDP report was made available for review by selected industry representatives as well as the HFBF.

The concerns over validity of the data were strong enough that the DOA, with concurrence from the HFBF inserted the following language was added to the preface of the plan:

> "During the review of this plan, the Hawaii Department of Agriculture (HDOA) raised the following issues related to the methodology for developing water duties and water demand projections for future agricultural production. The HDOA recommends that a refinement of the survey process and subsequent re-analysis of the methodologies used to develop projections of state agricultural irrigation water demand should be completed during any future study phases:
>
> - Delphi survey process: A panel of twenty-four (24) individuals consisting of a combination of agricultural generalists and experts in specific fields was asked to comment on various constraints relating to inputs, technology, transportation, and markets across different crops. The concern was that the generalists may not know enough about the different constraints facing the different crops and the experts may not know enough on the same constraints outside of their field of specialization.
> - Panel Participation: There are concerns with the significant decline in panelist participation over the succeeding rounds of surveys. Useful information could have been precluded from insightful panelist who failed to respond and simultaneously skew results from the panelists

who did participate. The surveys in successive rounds varied in complexity and may have appeared confusing to the panelist with no formal training in statistics.

- Crop Irrigation Water Duties: The assumed irrigation methods used for certain crops are not necessarily correct and could have impacted results of the irrigation water requirement for crop production. For example, "drip" irrigation was the assumed method used throughout the state for cabbage. However, to control "Diamondback" moth infestation problems, "overhead" sprinkler systems is the method used in portions of the Island of Maui.
- Long-Run Agricultural Potential of Studied Systems: There is no discussion of contradicting model results of two separate "expert" panels. One panel indicated that "Systems in the bottom tier (<65 points without rehabilitation) all experience serious problem(s) with water supply, which the expert panel judged the single most important determinant of long-run agricultural potential for an irrigated area.", while the other panel suggests that "water supplies and irrigation infrastructure will probably not be primary determinants of actual growth in agricultural production". To get a better understanding of the statewide agricultural potential, the remaining 11 unstudied irrigation systems need to be studied.
- Projected Crop Demands of Irrigation Water to Year 2030: The macroeconomic scenarios do not emphasize self-sufficiency and it appears to focus on irrigation needs under average weather conditions. By doing so, farms will fail for a significant amount of time due to inadequate supply of irrigation water. Focus should be on "maximum" irrigation needs which will promote self-sufficiency. This section should also be expanded to determine if there will be adequate irrigation water to meet the 2030 projected crop demands for the various systems.
- Application: The views, opinions, and results of the report appear to be approached from an "academic" viewpoint as opposed to a "practical" viewpoint. There are concerns whether the methodologies and models used would apply to "real world" conditions."

It is our understanding, that with these concerns in mind the HDOA, in talks with the HFBF and other industry representatives decided to close out this phase of the project to address the concerns in future phases. Subsequently, this phase of the project has never been released in it's "final" version. **The HFBF strongly objects to the inclusion of ANY material or conclusions from the 2007/2008 AWUDP update into the Hawaii Bioenergy Master Plan until such time as the HDOA conducts further research regarding the data presented and formally accepts the update in its final version.** We view the AWUDP as the premier plan leading the identification and potential utilization of irrigation water and it is therefore imperative that the data contained in it be as accurate and indisputable as possible.

If there are any questions, please contact Mae Nakahata at 2819716. Thank you.

Sincerely yours,

Dean Okimoto

Dean Okimoto
President

Tesoro Comments on Draft Hawai'i BioEnergy Master Plan

Following are Tesoro's comments on the draft of the Hawai'i BioEnergy Master Plan, issued on June 30, 2009. The comments are broken out by section of the plan, and offered for your consideration in developing the final version of the plan.

Distribution Infrastructure

Section 3.1: Reference that products displaced from refinery production by biofuels may need to be exported, requiring investment in export infrastructure – this is not likely, as the refineries would not likely be competitive as export facilities. Production cuts and potenially refinery shutdowns would be a more likely outcome.

Section 5.4: Discussion about potential need to invest in biofuel import infrastructure during a transition period before in-state production of biofuels begins – this seems to be a poor investment, assuming local biofuels production is imminent. Consideration should be given to continue using fossil fuels until local production of biomass is available. This is especially the case if the imported biofuel is a material which is the source of significant controversy regarding land use change and food vs. fuel such as palm oil.

Section 11: Recommendation 13 lays out two options regarding the impact of local biofuels on the Hawai'i refineries. Tesoro believes that Option One, in which refinery throughputs are reduced as demand for conventional petroleum products declines, is the most likely alternative. Since refinery yield flexibility is limited, reductions in throughput would likely result in an increased requirement for imports of fuels such as jet fuel which can no longer be supplied from local production. However, import facilities for crude oil would in this case be underutilized, which could reduce the capital investment needed to import fuels.

Green Jobs, Biofuels Development, and Hawai'i's Labor Market

On Page 15, the table showing "Anticipated partners and participants" does not include any of the companies involved in supplying the state's current fuel supplies (i.e. the refineries). Is this an intentional omission, or an oversight? Tesoro certainly intends to be listed as a partner and participant in the bioenergy industry!

Conclusions and Recommendations: The recommendations have no mention about the impact of the growth of biofuels on the refining industry. Refineries of the size and complexity of the refineries in Hawai'i are disadvantaged on global scale compared to larger facilities Asia, and are unlikely to be competitive on the basis of exporting product. As a result, as over half of the refineries' local demand for product is displaced by renewable energy sources, it is extremely likely that as a minimum one, and possibly both, of the refineries would be uneconomical to operate and could shut down. This assertion is supported by the recent announcement that Chevron is evaluating strategic

alternatives regarding their Hawai'i refinery, which includes possibly shutting down refinery operations and converting the site into an import terminal.

Shutdown of one or both refineries would put from 200 to 400 high-paying jobs at the refineries in jeopardy. To the extent that the refinery capabilities can be integrated into the production of biofuels, profitability could possibly be maintained to allow preservation of some of these jobs.

Technology

Section 1: The table, "Pathways for Bioenergy Systems," and the balance of the technology section, do not include any mention of the various "green diesel/green jet" technologies. The only "Conversion Technology" pathways shown for the "Oils" intermediate products are transesterfication and direct combustion. The green diesel technologies are commercially proven (reference Neste Oil's refinery in Finland). The fact that these processes allow the creation of an infrastructure compatible fuel certainly should make them worthy of consideration. The state's high demand for jet fuel coupled with the fact that this is the only current technology which could create renewable jet fuel should provide even more incentive for consideration. The fact that integration of these technologies into existing oil refineries can reduce the capital costs to be competitive with transesterfication, while directionally supporting the preservation of refinery jobs, could make them a preferred alternative if sufficient natural oils can be produced in-state. Tesoro believes that this technology deserves strong consideration, pending local availability of a suitable feedstock.

Section 5.1: On page 15, the cost of dry-milling corn ethanol plants is shown as $1.50 per gallon of annual capacity, based on 2006 data. Recent costs have been in the range of $1.80 to $2.00.

Page 44, in the section on value-added products from cellulosic ethanol technology, it should be noted that as an alternative to installing a separate medium-sized gasifier to upgrade lignin, the lignin could be directly burned to produce renewable power for much lower cost.

Section 7: Technology Task Recommendations should include the evaluation of "green diesel" technologies along with the other conversion technologies.

Financial Incentives and Barriers; and Other Funding Sources

Regarding the Recommendations (page 21):

- On the recommendation to "Reconcile investor's concern for exit strategies with biofuels incentives, Tesoro questions the assertion that "biofuels investors plan based on 50 years for biofuel refinery plants" and would suggest that a more typical long-term planning horizon would be between 10 and 20 years.

- On the recommendation to "Align a flex fuel ethanol-based transportation strategy with the emergence of potential new transportation modes, such as rail, and vehicle technologies, such as electric and hybrid vehicles," Tesoro would suggest that this is an extremely important step, but that it should be broadened to include continued supply of infrastructure compatible fuels, whether produced from crude oil or renewable feedstocks. One of the most important outcomes from a road map should be a clear, long-term vision for the state's transportation fuel infrastructure. This is important to avoid large stranded investments in short-lived technologies. For example, if the state has a long-term vision that motor vehicles should largely be powered through plug-in hybrid technologies, then an investment in the shorter term to build extensive ethanol capacity and the required infrastructure to supply this fuel to the market would not be long-lived enough to be justified. Major changes in the state's infrastructure should be carefully thought out to minimize investments which will not have long term benefit.

Economic Impacts

Page 8, the discussion of federal subsidies for ethanol does not recognize the fact that the value of the subsidy is implicit in the price that the refiners pay when the ethanol is purchased from the producer. The assertion that the refiner profits from the subsidy, and the producer does not, is false.

The following comments are offered regarding the section on Refinery Operations (page 18):

- As previously mentioned, while the refinery collects the ethanol subsidy, the value of the subsidy is implicit in the price that is paid for the ethanol from the supplier, so the refinery does not "profit" from the ethanol subsidy.
- The increase in the production of refinery naphtha byproduct which resulted from the ethanol mandate is primarily a function of the fact that the ethanol displaced refinery-produced gasoline. A reduction in gasoline demand can be expected to force a refinery to reduce production rates and/or sell surplus naphtha to balance production, as dictated by economics.
- The "estimated $10 million cost in upgrades to refinery operations to both separate and blend ethanol" are considered sunk investments required for legal compliance.
- The statement that "there are considerable capital costs to developing and building more modern refinery capabilities to adjust to changing crude oil supplies and possible changes to product mix" is true, and is very important. In response to the follow-up that "estimating the costs of this upgrade would be helpful to understand and predict the future of Hawaii's refineries," Tesoro will offer that refineries of the size and complexity of the Hawai'i facilities are disadvantaged on global scale in terms of size and cost structure. In particular, as the local demand for conventional refined products in Hawai'i is reduced with the growth of renewable energy, any investment in increasing

> the capability of a refinery in Hawai'i would have to be justified based upon competition with much larger refineries which are operating and being built in Asia. These refineries would be expected to have considerable cost advantages over the Hawai'i refineries due to their greater size and complexity, closer supplies of crude oil, and lower labor and operating costs. It is extremely unlikely that any significant investment would be made to increase the capabilities of a small refinery in Hawai'i in this environment. The recent announcement by Chevron that they are studying strategic alternatives for the refinery, including possibly shutting it down to convert it to an import terminal, may be seen to support this assertion.

It should be reflected in the economic impacts section that the implementation of the Hawai'i Clean Energy Initiative will potentially result in the shutdown of one, or possibly both, of Hawaii's refineries.

Rick Weyen
Vice President, Renewable Energy
Tesoro Companies, Inc.
July 14, 2009

Date: Fri, 09 Oct 2009 18:52:59 -1000
From: Carolyn.W.Hildebrand@hawaii.gov
Subject: Sorry to have missed your October 2 Schedule.
To: bionrg@hawaii.edu

Aloha

I'm emailing to share my quick thoughts. These thoughts are personal and not those of the WDC. Due to the shortage of time, I am not articulating them as well as I should.

1. Discussion of Skills
I trust that you have ran into a draft version of the WDC Green Report. In said report, a pyramid of skills for the green economy is discussed. The references for the pyramid of skills are:
*(Occupations) National Center for O*Net Development, 2009;*
(Skills) John J. Heldrich Center for Workforce Development, 2009.

I believe the bioenergy masterplan labor/workforce section will be strengthened by discussing "skills". At the very least, the pyramid of skills can be presented and discussed briefly.

2. The broader framework for workforce development in Hawaii is reflected in the 2009-2014 State Comprehensive Workforce Development Plan. visit www.hawaii.gov/labor/wdc for both reports.

3. In my opinion, a discussion of agricultural labor is not complete without touching on the legal issues and barriers to moving global labor in and out of Hawaii.

Thanks,
Carolyn

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October 10, 2009

Comments for the Hawaii Bioenergy Plan Draft:

1. Through all the documents, it is important to distinguish between Biodiesel (ASTM D-6751 spec), Ethanol, Renewable Diesel (no specification exists at this time), Synthetic Diesel fuel (meets D-975 petro diesel spec), and also the various blends of each. The issues with E85, B100, or RD100 are much different than the issues with E10, B5, or RD1.

2. Vol 1 Page 35 Biodiesel is compatible with the petroleum infrastructure at the common blend levels, B5 through B20. Blends less than B5 are not required to even be labeled, since it is very hard to detect. B2 and B5 blends are being sent by pipeline and require not calibration of metering or modification to petro distribution pumps or seals. Pg 20

3. Vol 1 Page 35 The applicability of bio-butanol or renewable diesel is unknown at this time. Neither product has a significant database of usage or has been though Tier I or Tier II EPA testing. Since biodiesel was required to meet these standards prior to getting approval to go to market, one would assume bio-butanol and RD would also. Pg. 20

4. Vol 1 Page 35 "Straight vegetable oil seems to be fully compatible with the distribution system for residual fuel" Not my experience. SVO at 100% will require minor modifications to hoses and rubber components, similar to 100% biodiesel. We have not had success making a 5% or 20% blend of SVO with residual fuel oil. Pg. 20

5. Vol 1 Page 61 "The transport of biofuel (biodiesel and ethanol) by means of tanker trucks may be the preferred transport mode for biofuels in the years to come. Low blends of biodiesel are being moved in existing petro pipelines today in Oregon. Tanker trucks are the preferred method for B100. Pg. 46

6. Vol 1 Page 117 The $.05 per gallon preference for biodiesel is not sufficient to cause any product to be moved to market. This is $.01 per gallon of B20, or about 0.3% of the price. Pg. A-10

7. Vol I Page 157 Suggest you substitute the 2009 Biodiesel Handling and Use Guidelines instead of the 2004 version. Pg. A-50

8. Vol I Page 161 HELCO is currently running its fleet of trucks on imported soy biodiesel instead of locally produced UCO biodiesel. I have to chuckle at the "commitment" to use locally produced sustainable product. Pg. A-54

9. Vol 2.1 Page 55 Replace Maui with the State of Hawaii – Pacific Biodiesel currently produces just under 1mil gallons per year of biodiesel in the State of Hawaii. Maui makes about 300,000gpy and Oahu about 700,000gpy. Pg. 43

10. Vol 2.2 Page 6 Incompatibility with fuel infrastructure. Not true for low blends of biodiesel. Absolutely compatible. Pg. 6

11. Vol 2.2 Page 24 The "soft metals" referred to as being incompatible – only true for high blends, over long periods of time. Low blends have no issues with these metals. Low blends of biodiesel (B20 and below) have virtually the same affinity for water as petroleum diesel. Pg.24

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At the point of blending, the saturation point changes and free water may form. Once blended, the saturation point is almost identical (low blends).

12. Vol 2.2 Page 28 States "Renewable Diesel can be blended in all blending ratios up to RD100" Since there is no spec for RD, this is not true. RD is not allowed by any engine manufacturer at any detectable blend. Under 1% is not detectable. If you are referring to Synthetic Diesel, this is true once Tier I and II testing is complete. Next "SVO can be used in selected diesel engines" – Technically true but shorter engine life, not certified for emissions, major engine failure in DI diesels. I don't know of any engine manufacturer at all that has ever approved SVO. Could use some backup on this statement. Pg. 28

13. Vol 2.2 Page 29 I assume the RD statements were meant for Syn Diesel. Not true for RD Pg.29

14. Vol 2.2 Page 35 Once again, low blends of biodiesel are proven compatible with existing infrastructure without issue. High blends or other biofuels may have issues. Pg. 35

15. Vol 2.2 Page 43 While the pipeline would need modification to run 100% biodiesel, these modifications would likely be minimal – pump seals, rubber components, not leaving pure biodiesel in areas of brass fittings for a long time. The pipeline itself should be no problem. Pg. 43

16. Vol 2.2 Page 52 Any pipeline that is "fully compatible" with SVO is also fully compatible with biodiesel. Not sure why residual fuel lines are anticipated to have no issues, but #2D lines apparently will have issues. Pg. 52

17. Vol 2.4 Page 91 Jatropha – states technology needed to make a non-toxic residue. I suggest technology that creates value for the meal. Some value added products require the toxicity, or are neutral to it. Pg. 85

18. Vol 2.6 Page 17 I didn't know Hawaii "opted-out" of RFS-1. Do you have more info on this? Why was it done? What does it cost to opt-out? Who pays (or doesn't earn credits)? Pg. 17

19. Vol 2.8 Page 21 Banagrass is listed as the only feedstock with positive returns – IF cellulosic technology is developed. ?? Pg. 21

20. Vol 2.9 Page 19 change to: "Currently, Pacific Biodiesel has the capacity to produce approximately 1,500,000 gallons of biodiesel annually at its plants in Honolulu and Kahului for use in local transportation (National Biodiesel Board, 2009)." Pg. 14

Also change the contact info for Pacific Biodiesel as follows:

Pacific Biodiesel Inc. Vol. 2.7, Pg. 64
Website: www.biodiesel.com
Contact: Robert King
Phone: (808) 877-3144
Email: info@biodiesel.com
Location: Kahului, HI
Island: Maui
Oahu
Product: Biodiesel
Status: **Currently performing**
Capacity, Acres:
Capacity, Bioenergy: 1,500,000 gal annually

Pacific Biodiesel, Inc.
40 Hobron Avenue
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www.biodiesel.com

Source: *www.biodiesel.com/index.php/company/about_pacific_biodiesel_inc*
See at beginning of catalog for Framework functions
Headquartered in Kahului, Hawaii, Pacific Biodiesel, Inc. was conceived in 1995 in response to serious environmental and health concerns surrounding unmanageable quantities of used cooking oil at the Central Maui Landfill. Robert King, then owner of King Diesel that maintains the landfill's generators, proposed converting the restaurant waste into biodiesel that would fuel the generators. Within a year, his proposal was a reality. The original small-scale plant — recognized as one of the first commercially viable biodiesel plants in the U.S. — marks the beginning of our company. Sincevol2.7pg64

Mahalo!

Bob

----- Original Message -----
From: "Nakahata, Mae at HCS" <mnakahata@hcsugar.com>
Date: Monday, November 30, 2009 7:17 am
Subject: Bioenergy Plan - Water
To: bionrg@hawaii.edu

Please note that the labels on the map in Fig 22 on page 27 of the Land and Water section are reversed for Central and Wailuku.

If you have questions please call 2819716.

Thank you.

Mae Nakahata

Hawaii Farm Bureau

COMMENTS OF THE GAS COMPANY (TGC) ON 11/09 DRAFT BIOENERGY MASTER PLAN

GENERAL COMMENT

1. TGC and its partner, Primoris Corp., are working on a project to convert waste fats, oils and grease (FOG) to biogas. See p. 86 of Vol. 1 for a brief summary of this project. TGC will then blend the biogas with the SNG it manufactures from a refinery bi-product at its plant in Campbell Industrial Park. TGC plans to increase the biogas content of the mixture gradually with the goal of displacing 50% of fossil fuel-derived gas to its Oahu utility gas customers within five years. The technologies for the conversion and blending have been successfully bench tested and are expected to be ready to go into the pilot phase in the first half of 2010. The equipment for producing the biogas is being manufactured now. The conversion process is proprietary and will likely entail one or more patents. TGC still needs to do more experimentation and testing at the biogas production stage, the blending stage, the transportation stage, and test the burning compatibility with a variety of end use equipment. If the pilot plant is successful, TGC expects to be ready to progress into a demonstration-sized operation between 2010 and 2012. At that point TGC expects to be considering additional sources of biogas and/or renewable feedstocks.

It appears that many of the responses to TGC's comments on the preliminary draft assumed that the renewable biogases TGC was asking be included in the Bioenergy Master Plan referred to major projects for extraction of landfill gas, gas from MSW or WWTPs, and that this renewable biogas would be sold for purposes of electric generation rather than directly for end use. Hopefully this comment will help further explain the comments TGC is submitting below.

COMMENTS ON VOLUME 1

2. **Roadmap**, page iii, **Program Level Coordination**, item 2: This item indicates that a Bioenergy Technical Advisory Group will be established, which will include three representatives from utilities (as requested by TGC) to provide support to the bioenergy program being established by DBEDT. TGC nominates as its representative on that Technical Advisory Group Michael Quisenberry, its Analyst of Strategic Initiatives, 535-5998.

3. **Roadmap,** p. vi, **Industry Impacts,** item 1: This item provides, "Develop a methodology for evaluation of bioenergy projects based on the principles of life cycle assessment (including energy inputs vs. energy outputs and greenhouse gas balances) in consultation with relevant stakeholders."

On page viii, this same item is expanded or stated differently, to require the life cycle analysis (LCA) as a prerequisite to the use of state lands or state funding. Page viii also refers to "energy return on investment" determination. Consider making the

description of the prioritized action items more consistent as between the Roadmap table and the discussion paragraphs. (If changes are made, TGC prefers the version set forth in the Roadmap table.) See also comments 12-14 below concerning updating the report to mention the potential to use EPA's final Renewable Fuel Standards 2 (RFS2) life-cycle GHG analyses (which include both direct and indirect GHG emissions) for certain transportation fuels for this purpose and as groundwork to expedite the development of the Hawaii-specific LCA for other biofuels.[1] If possible, TGC would also like to see more discussion in either Vol. 1 or Vol. 2 concerning possible models for a Hawaii-specific energy ROI and energy balances, in an attempt to advance these critical precursors to implementation of the Master Plan.

4. **Roadmap,** p. vi, **Industry Impacts,** item 3: This item provides,
"Develop a certification program for biofuels to safeguard Hawaii's unique native eco-systems and culture, and support sustainable biofuels development."

See comment 14, below, concerning the possibility of developing either a screening mechanism or short-form, final certifications for (i) "prime mover," "shovel-ready" projects, (ii) smaller projects that can meet specified criteria to show that they will have minimal environmental impacts on land, water, cultural resources, and other critical state interests, and/or (iii) projects involving a waste feedstock that has already completed one "life cycle" and is beginning a second at the point of biofuel conversion. TGC is interested in seeing any recommendations that could improve the chances that such that certifications can be accomplished concurrently with permitting, and/or will be final certifications so that the investors in the project are not subjected to undue regulatory risk.

See also the duplicate of the Roadmap at pages 72-75 of Vol. 1 in which corresponding changes would also need to be made.

5. Section 2.2, **Distribution Infrastructure, Both Marine & Land,** p. 24:
"Gaseous biofuels are not addressed as biofuel candidates in regard to distribution system considerations. Gaseous biofuels, such as referred to as "biogas", are typically produced close to the point of demand, which would typically be biogas powered electricity or steam plants. Biogas is an established and important renewable energy source in many countries of the world and biogas could provide important renewable energy supplies to Hawaii."

Note that the author states that gaseous biofuels are not addressed, but in fact does add a section 4.1 to Report 2.2 of Vol.2 addressing distributed gaseous biofuels, and concluding that delivery of a biogas and SNG blend for direct consumption by multiple end use customers is not a commercial technology and is not feasible any time soon. (See comment 10, below.) Consider revising the quoted language as follows:
This report does not address infrastructure for distribution of gaseous biofuels, also referred to as "biogas," in depth, because gaseous biofuels are typically produced close to the point of demand

[1] The RFS2 Notice of Proposed Rulemaking appears at 74 Fed. Reg. 24904 (May 26, 2009). EPA is proposing that these standards go into effect 1/1/10, and says it will issue notice in the Federal Register by 11/30/09 setting the 2010 standards. 74 Fed. Reg. at 24915.

(e.g., for boiler fuel or other use in electric or steam plants). As a result, biogases do not generally raise major distribution infrastructure issues. Nevertheless, biogas is an established and important renewable energy source in many countries of the world, and biogas could provide important renewable energy supplies to Hawaii."

6. Section 2.5, **Permitting,** Recommendations, p. 35: TGC is supportive of the recommendations that would expedite permitting of biofuel projects to the 90-180 day range or extending the 18-month REFSP deadline for permitting of all renewable energy projects. To this end, TGC would support e-permitting and depositing of applicants' password-protected information in a central repository where all agencies that need to review it can draw from it. However, TGC does not want to be required to submit confidential information via an insecure site, where access to that information cannot be managed or controlled by TGC, as a pre-requisite to being eligible for expedited permitting. TGC anticipates that it and other entrepreneurial permit applicants may be developing proprietary processes that require confidential treatment. TGC is willing to participate in future discussions about how the details of the e-processing, on-line exchange of information and central repository will be managed to ensure that confidential data is not inadvertently disclosed to facilitators, consultants, or others who may not be bound by a confidentiality obligation, or otherwise "hacked."

7. Section 2.6, **Financial Incentives and Barriers and Other Funding,** pages 39-40, last 3 bullet points: These recommendations need to be updated to recognize (1) EPA's RFS2 rulemaking and its effects on RINs (see footnote 1), (2) the recommendations of the Act 234 Hawaii Greenhouse Gas Emissions Reduction Task Force (GHGERTF) in its forthcoming report to the Legislature to the effect that Hawaii should acquiesce to monitoring GHG output in the state pursuant to EPA's final rule on Mandatory Greenhouse Gas Reporting[2] rather than require its businesses to report to The Climate Registry, and (3) to acknowledge EPA's recent decision and actions to actively regulate GHG emissions under the Clean Air Act[3] and Amendments, including the imposition of new permitting restrictions and PSD requirements on stationary sources, tightening of CAFÉ standards for light duty transportation vehicles, etc. All of these recent EPA initiatives have the potential to facilitate Hawaii's own goals of energy security and independence and GHG reduction, but they are not tailored to Hawaii's particular circumstances and only address GHGs, not an energy balance, invasive species, or cultural issues, for example. Further analysis and recommendations need to be developed on whether and how best Hawaii can act to ensure that its own concerns are addressed promptly and within the context of changing federal regulation. See also comments 17 & 18 on Volume 2, below.

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[2] See Mandatory Reporting of Greenhouse Gases, 74 Fed. Reg. 56260 (Oct. 30, 2009). This rule differs from The Climate Registry in requiring only limited reporting of indirect GHG emissions, and therefore is somewhat less burdensome than the protocol offered by The Climate Registry.

[3] See Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 74 Fed. Reg. 55292 (Oct. 27, 2009); Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 18886 (April 24, 2009); Proposed Rulemaking to Establish Light-Duty Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 74 Fed. Reg. 49454 (Sept. 28, 2009).

8. Section 2.9, **Environmental Impacts**, Recommendations 2, 6 & 8, pages 46-47: The following language appears twice at the end of the first paragraph and beginning of the second—one sentence should be eliminated.

"The State should establish requirements for LCA based on Hawaii's specific environmental conditions, goals and needs."

TGC would like to see more concrete recommendations from the author for (1) an initial screening process to fast-track certain projects, such as those that use waste as a feedstock or those that can meet appropriate criteria to show that they will have minimal adverse consequences, or those that are small and pilot in nature, (2) how an LCA, especially a Hawaii-specific LCA per Recommendation 2, would be conducted or calculated, (3) what kind of information would have to be presented to receive a certification pursuant to Recommendation 8, and (4) we would like still to see a "short form" or "certificationEZ" recommendation available in appropriate circumstances. Such more concrete recommendations are needed especially if final permits, eligibility for subsidies, or other benefits are to be made contingent on a complete LCA and/or certification. More specifically, TGC does not know how to begin to perform an LCA or even trace the origins of the comingled FOG it plans to use (see Comment 1) in order to enable it to begin compiling the necessary information for certification of a project that is expected to be ready to go into service in 2010. We would greatly appreciate receiving the benefit of the author's insights in this regard. In addition, TGC is mindful of the GHGERTF's recommendation to impose a carbon tax on fossil fuels, at least until such time as Hawaii may be forced to follow Federal cap and trade laws. The Bioenergy Master Plan's permitting, LCA, and certification requirements could all present barriers to our ability to minimize the impact of any such carbon tax on our customers by displacing fossil fuel feedstock with biogas as early as possible. Delay could also be counterproductive to the State's overall goals. See also comment 12 under Vol. 2.

COMMENTS ON VOL. 2

9. **Report 2.2, Distribution Infrastructure**, Section 3.2, p. 16, 4th paragraph, last sentence: "These imports are received on Oahu and selected harbors on the neighbor islands (6)." Revise to read "These imports are received at selected harbors on the Neighbor Islands." The Gas Company is the only bulk importer of LPG into Hawaii, and we do not receive any imports of LPG on Oahu because of lack of the necessary pipeline infrastructure in Deep Draft Harbor. The graphic was corrected; now the text needs to be conformed to the corrected graphic.

10. New Section 4.1, pages 22-23: The new section states:

4.1 Exclusion of Distributed Gaseous Biofuels

The biofuel candidates that are discussed in this section represent only liquid biofuels, which will be distributed in Hawaii. Gaseous biofuels, "biogas", derived from organic material through different gasification processes, are not considered in this discussion. Non-inclusion of biogas in the discussion of candidate biofuels does not signify that biogas is not considered a viable and potentially important future renewable fuel for

Hawaii, in the contrary. At present, biogas is an important and established source of renewable energy in many parts of the world and the potential for biogas might be considerable for Hawaii. Typically biogas is consumed in steam or power conversion applications where the conversion plants are close to the biogas production facility. Biogas is, at the present time, not distributed. Biogas could be distributed through pipelines, in the same fashion as natural gas, but the technology to convey biogas in pipelines, either in dedicated pipelines or in some form of mixed or batched fashion with natural gas, is not on a commercial level.

In regard to Hawaii, biogas distribution might be restricted to places where there is a pipeline system in place that connects gas consumers to the source of gas production. On Oahu there is an existing considerable pipeline system that distributes synthetic natural gas. The synthetic gas is produced from petroleum feedstock at a gas facility in Campbell Park. The distribution of biogas along with synthetic gas seems not feasible anytime soon.

Neighboring islands are presently supplied with gas in the form of liquefied petroleum gas (LPG). The transport modes for biogas and LPG are fundamentally different. While LPG can be transported in liquefied form in pressurized transport vessels at ambient temperature, biogas could only be transported in highly pressurized transport vessels. Therefore it would be more feasible for biogas production facilities to be built close to the locations of gas consumption, thus biogas would not be distributed.

Gaseous fuel derived from organic matter is being considered in this study in conjunction with power plants using solid biofuel. In these facilities the organic matter is gasified and supplied to the power conversion plants as gaseous fuel. The gasification and power plant facilities are close together thus distribution systems are not required." (Emphasis added.)

See comment 1 concerning TGC's plans to blend biogas with SNG and use its existing transmission and distribution pipeline system to deliver the blended product to numerous end use customers. TGC expects to be ready to enter the pilot stage in 2010 and the demonstration stage between 2010 and 2012. TGC would appreciate it if the authors could elaborate on the somewhat conclusory underlined statements so that we can benefit from their experience. Are the only barriers the authors perceive economic? If not, what are the technological and physical barriers that the authors perceive? For example, are they concerned with microbiologically induced corrosion, precipitation, problems with compatibility of the biogas blend as it relates to compression, valves, or other equipment, problems with purity or energy content that might affect gas flame configuration or ash production, or why else have they stated that the project TGC is working on is " not feasible"? TGC is ready to discuss the details of its unique operations and biogas project with the authors further as needed. Finally, would it be possible for the authors to add a section to Report 2.2 that can then be included in Volume 1on biogas transportation and distribution to multiple end users, rather than assuming that the destination of the biogas is an electric generation plant? The section could briefly address any of the perceived economic, technological or physical challenges, if it is not too late to do so.

11.Report 2.5, **Permitting**, Section 5.2, Coordinating the Bioenergy Permitting Process, pp.80-81, a new paragraph states:

"In the current form of the REFSP, biogas facilities are not specifically recognized as renewable energy facilities. Stakeholders have pointed out that facilities which convert feedstock into gaseous fuels, referred to a biogas, should also qualify for permitting under the REFSP rules. Often biogas facilities provide gaseous fuel from renewable sources exclusively to power plants. In these cases the power rating of the power plant can be used to qualify the facility as a renewable energy facility for permitting under REFSP. There might be cases, however, when biogas is produced to provide renewable fuel for other applications than generating power. In such cases the threshold for REFSP eligibility would need to be also expressed in cubic feet of volume of biogas per time period (e.g. Mcf per year) or in terms of heat content (e.g. Mbtu), so that biogas facilities could use REFSP permitting."

The drafter of the report does not include biogas in the process diagram on page 83, nor do the recommendations on page 96 suggest that the legislature amend the REFSP explicitly to include biogas facilities or gaseous units of measure. Nor is there any recommendation to give a threshold levels for renewable biogas facilities for other applications eligible for REFSP. Yet it is these "other applications" that are the avenue being pursued by TGC (see comment 1). If a threshold for biogas facilities to be eligible for REFSP is necessary for symmetry in the statute, TGC recommends that the threshold range be set at 100-1,500 therms per hour (a range which would result in a reduction of up to 50% of fossil fuel consumption at our SNG facility which supplies SNG to Oahu utility customers).

12. Report 2.9, **Environmental Impacts**, p. iii and passim—"The State should establish requirements for LCA based on Hawaii's specific environmental conditions, goals and needs. The State should establish guidelines for LCA, including certification of LCA methodologies, and the minimum attainment of positive net energy and greenhouse gas balances. LCA should be used as an integral component in a biofuels certification process."

TGC notes that EPA is undertaking life-cycle analyses of GHGs generated by biofuels fuels that are used as transportation fuels for comparison to the GHGs from the corresponding fossil fuels in its NOPR for RFS2 (the second generation of renewable fuel standards). See Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, EPA-HQ-OAR-2005-0161; FRL-8903-1, RIN-2060-A081, 74 Fed. Reg. 24904 (May 26, 2009). The final rule will be codified at 40 CFR Part 80, new Subpart M (replacing Subpart K, which contains RFS1). The final rule is expected to be out by November 30, 2009, because the new standards are supposed to take effect on January 1, 2010. The proposal is to require that any biofuels from non-grandfathered facilities that are used to meet federal fuel standards for the renewable component of gasoline, diesel, marine, air, non-road engine fuel, etc., whether grown in the US or imported, yield less GHGs on a life cycle basis by 20%, ~40%, and 60%, depending on the category, than the corresponding fossil fuel. The rule will require certifications and offer a new type of RINs. EPA is required by statute (EISA) to take into account impacts on air and water quality, water availability, soil conservation, and biodiversity in crafting its RFS2. Hawaii is specifically mentioned in proposed 40 CFR Sec. 80.1406 as a state to which the renewable volume obligations of the rule apply. However, it is unclear whether the states are allowed to overlay their own criteria for sustainability,

invasive species protection, land use and water conservation, energy balance/ROI, cultural impacts, and the like over EPA's RFS2 GHG life cycle analyses, at least insofar as transportation fuels qualifying for RFS2 RINs are concerned. Moreover, the EPA LCAs will not apply to non-transportation fuels (such as SNG or biogases), and it is proposed not to apply to biofuels produced from FOG from facilities constructed before December 19, 2007. Therefore, it is unclear how the EPA's GHG LCAs can best be used to achieve the goals of the Bioenergy Master Plan in general, and TGC's proposed project in particular. TGC would appreciate it if the Master Plan could include any insights the author may have on these subjects.

13. Section 6.2, **Greenhouse Gas Reduction**, p. 7: "It is important to establish accounting methods that evaluate the greenhouse gas balances for individual biofuel value chains in Hawaii to understand if they will provide a net positive greenhouse gas balance. This evaluation should include analysis of the possible conversion to biofuels production of existing sugarcane lands, fallow prime agricultural lands, forested lands, lands currently in diversified agriculture, or those lands in cattle production."
See preceding comment re EPA's choices as to whether, for example, existing fallow prime agricultural lands, forested lands, pastures and "rangeland," can be used for the production of biofuels that will earn RINs for their inclusion in blended transportation fuels. As noted above, TGC would like to see the Bioenergy Master Plan comment on the extent to which EPA's RFS2 could be adapted for purposes of the recommended LCAs and certifications, with or without Hawaii-specific additions concerning invasive species, cultural impacts, or other targeting, etc.

14. Section 8, **Recommendations**, point 8, pages 20-21:
"Biofuel Certification Program – To safeguard Hawaii's unique native eco-systems and culture, and support sustainable biofuels development, the State should explore the possible development of a certification program for biofuels. Many localities are proposing that biofuels meet certain mandated targets or minimum goals to receive subsidies, permits, and government recognition. A certification program in Hawaii should include various sustainability requirements related to attaining specific net energy and greenhouse gas balance goals, ensuring protection against invasive species, establishing water, soil, and land conservation, protection of local food supplies and farming, protection against transnational environmental issues and indirect impacts to land use, and other social and cultural issues.

It should be noted that certification programs are difficult to employ and may, if too unwieldy or burdensome, constrain the development of the local biofuel industry in Hawaii. If employed, certification should be targeted at specific local problems and tailored to meet specific sustainability goals established by the Legislature.

Due to the complexity of the issues, the State should commission a separate study to examine biofuels certification for Hawaii. The study should include analysis and recommendations for sustainability requirements, implementation and timing guidelines, requirements for LCA and methodologies, and the specification of departmental permitting responsibilities. A central component of the study also

should be the analysis of the various certifying methods including government run certification programs, preliminary certification for "First-Movers", voluntary certification, and third-party certification. Optimally, certification of any sort should not add to the duration of the overall permitting process. Efforts should be made to coordinate existing permitting and disclosure processes and reduce or eliminate redundancies.

Optimally, a certification program should be established prior to the development of new subsidies for biofuels in Hawaii. However, due to the State's desire to encourage rapid development of bioenergy there may need to be some discussion about creating initial screening processes and preliminary certification to help first movers with "shovel-ready" projects or demonstration projects. If a "First-Movers Program" for preliminary certification was established, any participating programs should be required to complete a full and timely certification and LCA as part of their final permitting/compliance. Strict precautions would need to be taken in a preliminary certification process to safe-guard against invasive species and any other irreversible commitment of resources that may be proposed by a project under a "First-Movers Program". " [Emphasis added.]

TGC appreciates the author's thoughtful addressing its comments on the Preliminary Draft. However, TGC is concerned that the author is still saying that the certification program should be developed before final permits can be granted for biofuel projects, or new financial incentives and subsidies for biofuels are approved. In addition, the author is recommending that holders of preliminary certificates will have to go back and re-file a full LCA in order to receive a permit(s). This is akin to requiring a taxpayer who filed a 1040EZ to go back and file a full 1040 after the fact and defeats the purpose of the simplified certification process. To require the full LCA on top of the first mover or preliminary certification would also be unfair to project investors. That is, just as the state wants protection from too hasty a certification and commitment of public resources to any renewable energy project, it is not realistic to expect investors to undertake their own "irreversible commitment of resources" in reliance on a preliminary or temporary certification. Finally, if permitting will be delayed until a full LCA has been approved and final certification has been received, it is difficult to see how the project is advanced at all by the recommended screening or preliminary certification. TGC asks the author to reconsider the recommendation, and look at other ways a short form of LCA or certification EZ could be carved out for appropriate projects. These simpler analyses could be based not only on the "need for speed" in the case of the first mover projects, but also on the type and scope of the project, the project's probable impact on land and water resources and invasive species involvement, or possibly those involving as a feedstock waste that has already completed one life cycle. TGC has a pilot project that is consistent with the State's goals of energy independence and security, which project TGC expects to be ready to go in the first half of 2010. (See comments 1 & 4, above). Ideally, TGC would like to see Environmental Impact Report recommendations that include LCAs and certification requirements, but also provide an avenue for worthy projects to proceed on a timely basis pending development of new permitting, LCA and certification requirements that may take several years to develop. The proposal that the

state impose a carbon tax on fossil fuels in the near term, at least until federal cap & trade legislation is finalized, lends urgency to TGC's request.

15. Report 2.6, **Financial Incentives**, Executive Summary, page 5, and page 24:

"Investigate Renewable Identification Number (RIN) market opportunities stemming from the Federal Renewable Fuel Standard (RFS). At present, Hawai'i is opted-in to the Federal RFS. (Anon. 2008d) While further study is required, opportunities may exist to establish a complete, localized bioenergy value chain in Hawai'i's using the Federal RFS. One resource we suggest to investigate is the RINMARK exchange (http://www.rinxchange.com/)."

TGC notes that EPA expects to be coming out with a final rule on RFS2 on or about November 30, 2009, to take effect on 1/1/10. RINS issued under RFS1 are expected to have a very limited applicability after December 31, 2008, and RINS issued under RFS2 for transportation biofuels (gasoline, diesel, marine, air, non-road fuels, etc.) will have to have certifications based on lifecycle GHG analyses that demonstrate that the biofuels produce 20%, ~40%, or 60% fewer GHGs than do the comparable fossil fuels. See also comment 12, above.

16. Report 2.6, pp. 17-18:

"Renewable energy trading: Renewable Identification Numbers

The most relevant, concrete example of innovative markets adding value to biofuels comes through the Renewable Fuels Standard (RFS) created by the Energy Independence and Security Act of 2007 (EISA). EISA set mandated levels for 2008 through 2022 for various types of renewable fuel to be blended with diesel and gasoline. The ultimate per annum goal is thirty-five billion gallons ethanol and one billion gallons biodiesel. The U.S. Environmental Protection Agency (EPA) tracks and enforces this mandate through the use of Renewable Identification Numbers (RINs). RINs are issued at the point of production or import. (Wisner, 2009a) When a RIN-issued batch of ethanol is blended into gasoline, the blender turns the RIN into the EPA to demonstrate compliance. (Wisner, 2009a) If a blender has excess RINs, beyond what is required for the mandate, the excess can be sold to another blender to apply to the current year's mandate or banked for future use. (Wisner, 2009a)

RINs are currently traded on an internet-based exchange called RINMARK, operated by Renewable Trading Services, LLC, though not exclusively.

Ron Kotrba described in the Ethanol Producer Magazine (April, 2009) one way this system could channel investment to ethanol plants: (Kotrba, 2009)

According to Bill Day, corporate spokesman for Valero Energy Corp., the oil refiner's 2008 overall production averaged 1.19 million barrels per day of "gasoline and related blend stocks" equaling roughly 18.2 billion gallons a year. The U.S. EPA has declared that this year's RFS is 11.1 billion gallons, which equals 10.21 percent volume ethanol blend requirement for each of the obligated parties. Assuming Valero's 2009 gasoline production projections are similar to its 2008 production its share of the 10.21 percent would come to about 1.9 billion gallons of ethanol blending in 2009.

Valero could purchase renewable identification number (RIN) credits to satisfy its obligation. If the oil refiner were to only purchase RINs to satisfy its RFS obligation and blended zero ethanol into its supplies—an unrealistic scenario but interesting to entertain, nevertheless—figuring a historically high RIN credit price of 15 cents per credit, the oil refiner could pay $285 million in RIN credit accumulations to satisfy its obligation for 2009. Instead, Valero proposes to pay $280 million for capital assets that, year after year, will continue to help it internally meet obligations

under the RFS. It is also interesting to note that the five VeraSun plants in question have a cumulative nameplate capacity of 560 MMgy, which could satisfy between a quarter and a third of Valero's ethanol blending obligations for 2009. The five ethanol plants at $280 million with a 560 MMgy cumulative production capacity could amount to the oil company paying only 50 cents per installed gallon of production capacity.

Kotrba indicated the numerous idled U.S. ethanol plants, poor ethanol blend margins, and the 2008 year-end reporting deadline approaching quickly on Feb. 28, 2009, have together caused RIN prices to skyrocket. (Kotrba, 2009)

At present, Hawai'i is opted-in to the Federal RFS. (Anon. 2008d) While further study is required, opportunities may exist to establish a complete, localized bioenergy value chain in Hawai'i's using the Federal RFS. One resource we suggest to investigate is the RINMARK exchange (http://www.rinxchange.com/)."

This section should at least indicate that EPA is about to issue RFS2, which is explicitly applicable to Hawaii, and what its impact may be on the need for financial incentives for biofuels produced within the state to comply with the mandates renewable components for transportation fuel which lead to fewer GHGs on a life cycle basis. See footnote 1 and accompanying text, above.

17. Report 2-6, Pages 18-19:

"Act 234 (SLH 2007) commits the State to reduce GHGs to 1990 levels by the year 2020. Currently the State's GHG Emissions Reduction Task Force is working to provide an action plan that would include market-based mechanisms. In any policy involving biofuels, the HBMP should encourage careful measurement and monitoring of greenhouse gas emissions. As supported by the USDA, an approach might include GHG reporting through a registry, like The Climate Registry (TCR). TCR, of which Hawai'i is a founding member, is a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry. The Registry supports both voluntary and mandatory reporting programs and provides comprehensive, accurate data to reduce greenhouse gas emissions."

This paragraph needs to be updated. On October 9, 2009, EPA issued its final rule "Mandatory Reporting of Greenhouse Gases," EPA-HQ-OAR-2008-0508; FRL8963-5], RIN 2060-A089, 74 Fed. Reg. 56260. The GHG Emissions Reduction Task Force is recommending that reporting and monitoring of Hawaii GHGs take place pursuant to the Final Rule, rather than pursuant to The Climate Registry's protocols.

Because EPA only very recently began to regulate GHGs under the Clean Air Act and its amendments, numerous other important EPA initiatives are currently in progress to restrict GHG emissions, including a proposal to require permitting restrictions for GHG emitters under the Prevention of Significant Deterioration rules (see 74 Fed. Reg. 55292), proposed endangerment and cause or contribute findings for GHGs (see 74 Fed. Reg. 18886), proposed regulation of GHG emissions from light-duty vehicles and CAFÉ standards (see 74 Fed. Reg. 49454), etc. With EPA actively regulating GHGs whether federal cap and trade legislation is ultimately enacted or not, there arises a question as to whether Hawaii can or should apply its own GHG reduction scheme.

TGC would like to see the Bioenergy Master Plan updated to at least address the new elephant in the GHG room, EPA.

18. Report 2-6, Page 24: See comments 7 & 17, above. Reference to The Climate Registry should be deleted because the GHGERTF is now espousing monitoring of GHG emissions under the recently final EPA Rule instead of TCR.

19. Report 2.9, **Business Partnering**, chart, page 52: Previously TGC was unable to complete entries to be reflected in the business partnering database, but it is now prepared to do so. See Attachment 1

20. Report 2.8, **Economic Impacts,** pages 14-15: The author should consider addressing EPA's RFS2 proposed rule (see footnote 1) with respect to whether Hawaii ethanol can be produced from sugarcane in a manner that is 40-50% more GHG-efficient than gasoline or other products, and if not, whether there is sufficient land already dedicated to sugar cane production under the standards in the proposed rule to meet the calculated requirement that 91,500 acres in blocks of at least 20,000 contiguous acres would need to be available to satisfy the state's ethanol requirements. See footnote 1 and accompanying text, above. Or, add to the Information Needs section on pages 24-25, the need for an analysis of this issue under the final EPA RFS2 Rule that is expected by Nov. 30, 2009.

21. Section 7, **Greenhouse Gas Emissions Legislation**, pages 21-22: This section needs to be updated and clarified. Although the EPA NOPR and final rule excluded reporting of biogenic CO2 in the inventories of certain types of reporters, the final rule issued Oct. 30 (74 Fed Reg. 56260) does not treat all reporters in that way. Stationary sources that directly emit CO2 can exclude biogenic CO2e from their reports, but suppliers and importers of petroleum products must report on the basis of complete combustion, oxidation, or use of all products they deliver, regardless of whether the products are fully or partially biofuels. For example under Subpart NN, suppliers of natural gas, such as local distribution companies, must report 100% of the CO2 from the complete combustion of all their gas deliveries, without regard to whether the product delivered is partially or completely comprised of biomethane . See 74 Fed. Reg. at 56345. Likewise, under Subpart PP, suppliers of CO2 must report on 100% of the CO2 they capture for sale, regardless of whether all or a portion is biogenic in origin. 74 Fed. Reg. at 56349. In addition, calculation of GHG emissions for purposes of the PSD permitting requirements under the proposed Greenhouse Gas Tailoring Rule and in other contexts does not distinguish between the CO2e of biogenic vs. anthropogenic emissions—all are counted. See footnote 1 and accompanying text, above, and 74 Fed. Reg. 55292 at 55365 (proposed amendments to 40 CFR Section 71.2).

22. Section 8, Conclusions, *Regional Impacts*, page 23: "In the case of sugarcane, production is likely to occur on Maui and Kauai because there are still active sugarcane operations."
An update is needed for this section. Kauai's last sugar crop was harvested on Oct. 30, 2009, per the Star Bulletin.

Comment Schedule
Comments[2] received September and October 2009 on Draft Bioenergy Master Plan

ISSUE[1]: Water & Land (WL), Distribution Infrastructure (D), Labor (L), Technology (T), Permitting (P), Financial Incentives (F), Business Partnering (BP), Economic Impacts (Econ), Environmental Impacts (Env), Integration (I)
[2]Please refer to separate document received from sender

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Ewan	25	25	BP	By choosing a location, conversion technology/bioenergy output, and scale of the plant, the state would effectively be selecting an incentive that would benefit certain portions of the potential industry. While possible, and perhaps efficient in some respects, this will likely require overcoming the political issues inherent in this selectivity of support. Our recommendations are intended to support a broader range of potential partners. Furthermore, our research indicates greater relative private interest and traction in the conversion process especially in comparison to the growing process, thus we do not recommend incentives specific to the convertors (especially a certain conversion technology) but do have one recommendation to incentivize the growers. No changes made.	
Gas Co	42	54	BP	We believe biogas is already included in the understanding of bioenergy outputs. As our section is not restricted to liquid biofuel or biopower (electricity), no changes made, but clarification of bioenergy to include biogas can be made in the overall report.	I,T,BP
Gas Co	112	117	BP	We believe biogas is already included in the understanding of bioenergy outputs. As our section is not restricted to liquid biofuel or biopower (electricity), no changes made, but clarification of bioenergy to include biogas can be made in the overall report.	
Gas Co	137	139	BP	Addressed in other comments. No changes made.	I,BP
Gas Co	240	240	BP	Addressed in other comments. No changes made.	
Gas Co2	468	470	BP	Information from Attachment 1 was added.	
Ha	9	40	BP	These comments do not impact our section, no changes made. We do however, include multiple BP models that accommodate smaller growers through agricultural cooperatives and other means.	WL,D,L,T,P,F,BP,Econ,Env,I
HECO	16	16	BP	Incentives for First Movers are intended to apply to any partner (including landowners and processors) who implements in a relatively near time period, to be defined by legislation. The recommendation to support growers is based on our research indicating this area as a particular bottleneck in the value chain. Specific incentives (tax credits, etc.) are beyond the scope of the BP section. See Financial Incentives section. No changes made.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
HECO	24	24	BP	Incentives for First Movers are intended to apply to any partner (including landowners and processors) who implements in a relatively near time period, to be defined by legislation. The recommendation to support growers is based on our research indicating this area as a particular bottleneck in the value chain. Specific incentives (tax credits, etc.) are beyond the scope of the BP section. See Financial Incentives section. No changes made.	
Pac Biodiesel	12	14	BP	No specific impact on BP task document, which does contain references to differing biofuel types by name. No changes made.	
Pac Biodiesel	86	111	BP	Requested changes were made to the document.	
DOT	6	9	D	We will add text that the fuel storage facility is in Campbell Industrial Park: We recommend that we change text to “Aloha Petroleum, Ltd., a privately held oil marketer, has fuel storage terminals in Campbell Industrial Park on Oahu. There are transmission pipelines connecting the fuel terminal facility and the fuel loading dock in Kalaeloa Barbers Point Harbor.”	
DOT	11	12	D	We will change text from “fuel hatched” to "...fuel hatches on docks..."	
DOT	14	16	D	We will include the reference “energy corridor” in the text	
Ewan	15	15	D	Comments are addressed in the order as they appear: To 1 and 2) Details: The objective of the Distribution section of the masterplan is to address issues in a general framework and not go into details. The Distribution section addresses general categories of compatibilities issues of different fuels with existing fuel infrastructure. Such categories are biofuel miscibility in water, strong solvent characteristics and stress corrosion . To 3) The Distribution section points out that the scope of building new or modifying existing infrastructure depends on several conditions, which are partly interacting. The section does not offer a budget or timeframe for the new construction of modification of the bioenergy infrastructure, since the scope of the study did not include such elaboration. The Distribution section suggests that the required scope and type of biofuel infrastructure will be dependent, to a great extent, on the fact if future biofuels will be compatible with Hawaii’s legacy fuel systems. The scope and speed of implementing Hawaii’s future biofuel infrastructure will depend on conditions, such as; what type of biofuel we will use in Hawaii for different sectors; in what quantity will the different biofuel be used; will the biofuel distribution be primarily to point demand (small number of end users, such as power plants) or will biofuel be widely distributed to many end users, et cetera. To 4) The next steps in implementing Hawaii’s biofuel distribution infrastructure will be to determine the types and supply rates of biofuels and the resulting infrastructure needs. No change made.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Gas Co	77	78	D	The premise of the Distribution section is that gaseous biofuel (biogas) would be typically consumed at the point of gas production, such as in power conversion plant supplied by decentralized biogas facilities (e.g. gasification of solid bioenergy, use of biogas in steam boilers). These applications would be decentralized and would not need distribution infrastructure components, other then relatively short pipelines between the gas production storage to the steam/power conversion plant. The masterplan did not endeavor to investigate distribution via pipelines though it is recognized that biogas could be distributed via the same routes as conventional natural gas, or as in the case of Hawaii as Synthetic natural gas. Since the required technologies are not yet fully developed and tested, distributing upgraded biogas via the pipeline grid is not a common practice today. We agree that this could be an option in the future. Biogas would replace synthetic natural gas but would not replace liquified petroleum gas, since biogas is a non-condensible gas at ambient temperatures, unlike LPG. Therefore the interisland distribution of biogas would be different from present distribution of gas in form of LPG. We will add text in the Distribution section that will clarify that distributed biogas was not addressed in the distribution section but that distributed biogas could be a contributor, though possible a small one, to Hawaii's total energy system.	
Gas Co	159	161	D	We will correct text as suggested in comment	
Gas Co	163	174	D	We will add the comment that changes in the refineries will also affect LPG and naphtha supplies and not only liquid transportation fuel (gasoline, diesel, jet fuel, bunker fuel) and fuel for power generation (diesel, residual fuel) as well as “other oil fractions (e.g. asphalt).	
Gas Co	176	179	D	We will change Figure 6 and delete blue arrow No. 6 to Oahu.	
Gas Co	181	183	D	We will add text to indicate that gaseous infrastructure components are not included in the description of the basic fuel infrastructure options.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Gas Co	185	193	D	The effect of replacement of petroleum through bioenergy (as well as renewable energies) would have a considerable effect on the energy supply situation. The Distribution section did treat the effect on the refineries not as a primary issue but treated such implications under "other issues". A more in depth analysis of this issue would warrant a significant effort with multiple fuel supply scenarios. The output slate of the local refineries is not static but is also not overall "flexible; there is a limited flexibility of the refineries to adjust to different fuel product demand scenarios in Hawaii without the need to incur sizeable refinery revamping expenditures. If the local refineries cannot adjust their output slate to accommodate possible fuel replacements then supply of such undersupplied products have to be imported. The reference "selected fuels" was used in the text since interfuel replacements of petroleum fuel products would vary in scope and type depending on the different possible bioenergy scenarios. For example, if the power sector would convert from petroleum diesel and residual oil to biodiesel (or renewable diesel) and straight vegetable oil, respectively, then obviously much less diesel and residual oil would be used and these fractions would not be in demand. It is understood that a systematic treatment of the effects of biofuel (and renewable energies) on the refineries would require a more elaborate and in-depth discussion than the discussion about the topics in the Distribution section. No change made.	D,Econ
Gas Co	195	195	D	We think this is an important comment. We recognize though that a treatment of biogas as a fuel replacement for LPG and SNG was beyond what we understood as the scope of the bioenergy distribution infrastructure elaboration. The distribution section of the masterplan considers only liquid and solid biofuel for distribution. Gaseous biofuel are considered only in conjunction with consumptions of biogas close to the place on conversion, i.e. gasification solid biofuel as fuel for smaller power plants. Obviously, biogas cannot replace LPG due to the different transportation and storage methods. If biogas would be part of Hawaii's energy system it would have to be distributed through pipelines, either in dedicated pipeline or in pipelines along with synthetic gas (which is not a presently used operation). Since new constructions of long transmission pipeline require much higher expenditures than transport through trucks, upscaling and growing biogas as a significant distributed energy source in Hawaii would be a considerable challenge. In this sense liquid and solid biofuels are much easier to distribute. But in principle we agree with the comment that biogas could become a valuabe element of Hawaii's energy future, albeit more for distributed than centralized applications. Therefore in regard to bioenergy distribution infrastructure requirements, distributed biogas might remain a secondary fuel option for the planning horizon of the masterplan. We will change the text of the Distribution section in conjunction with responding to GasCo Comment line 181	
Gas Co2	77	96	D	Section 4.1 of the Distribution Infrastructure issue report has been revised.	
Gas Co2	170	176	D	Section 3.2 of the Distribution Infrastructure issue report has been revised.	
Gas Co2	178	226	D	Section 4.1 of the Distribution Infrastructure issue report has been revised.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Ha	9	40	D	The basic premise of the comment questions the soundness of using liquid biofuels. The statement about EROEI (energy return over energy invested) is an important consideration which should be addressed. The comment might be better answered by the technology section of the masterplan. No change made.	WL,D,L,T,P,F,BP,Econ,Env,I
NREL	117	117	D	In distribution section we stated that the trucks would be volume limited and not weight limited. No change made.	
NREL	178	181	D	We will change text in the executive summary to state that the trucks would be mostly volume-limited, e.g. the transport capacity of the trucks will be reached when their available volume is filled up, rather when their maximum weight is reached.	
NREL	182	184	D	We think our expression is correct since it defines “renewable diesel” as having the ASTM D975 designation. But we think that the recommended text is more precise. We will use the recommended text	
NREL	185	185	D	Revised in review draft. No change made.	
NREL	186	186	D	The referred table was in older draft; in the final draft table is more readable No change made.	
NREL	187	191	D	We only considered three classes of biofuel categories: (1) conventional: ethanol and biodiesel, (2) “advanced” with better compatibility characteristics to legacy fuel systems: butanol and renewable diesel and (3) straight vegetable oil SVO since it is an alternative fuel considered for power generation in Hawaii. We have stated in the text that we would not consider all evolving biofuels, since the types of biofuels considered in the Distribution section were chosen to discuss distribution infrastructure concerns and not to point out the entire potential of biofuels. We will add a passage at the top of Section 4.2 stating that there are more promising biofuels but that we have considered the biofuel in Table 2 to highlight infrastructure issues.	
NREL	192	192	D	Comment is referring to older draft, in final draft the word is correct. No change made.	
NREL	193	193	D	Will change to more or less	
NREL	194	197	D	Discussion of distribution issues of solid fuel was limited to the stated energy projects. The recommended technologies of making pellets etc. might be better discussed in the technology section. No change made.	
Tesoro	10	13	D	The discussion in the Distribution section addresses all possible distribution scenarios, including the possibility of export of refined fuel products. Therefore we identify all possible distribution and fuel transfer asset needs. Exporting petroleum fuels is one of the options. Tesoro apparently considers that the refineries might not continue to operate successfully if they have to export selective fuel fractions, which they cannot sell locally; yet, currently naphtha is exported in relative large volumes. We understand that the refinery issue could be a very political issue We will change the text of the Distribution section.	6/30/09 draft

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Tesoro	15	20	D	The question whether or not biofuel import infrastructure assets are required is not limited to the issue of whether it would be a good or bad investment. There are a number of reasons why biofuel import infrastructure might be required: (1) during a "transition period" when large users of biofuel cannot meet their demand from local biofuel production (which cannot add production capacity as fast as demand would require), (2) in the case if interruption or supply shortfalls of local biofuel production there must be a way to import biofuel volumes of a significantly large volume and with effective fuel facilities. Therefore it is also a matter of energy security to provide redundancies in fuel transfer and storage capacities. We will add a sentence in the executive summary that will address the need for biofuel transfer redundancy in harbors in case of supply shortfalls	6/30/09 draft
Tesoro	22	29	D	REVISION: We suggested two options regarding the impact of increased biofuels consumption and renewable energies on Hawaii's two refineries in order to identify consequences on Hawaii's existing fuel system from the fuel replacement of petroleum. As pointed out in the comment the operator of one the refineries anticipates that Option One, in which refinery throughputs are reduced as demand for conventional petroleum products declines, is the most likely alternative. As a consequence more petroleum would have to be imported in the form of refined products and not as crude oil that is refined to products in Hawaii. More imports of refined petroleum fuel would require the appropriate fuel transfer capabilities. The comment suggests that since fuel infrastructure would be available from existing underutilized offshore crude oil import terminals, there should be less need for new fuel infrastructure to accommodate increased product imports. Converting the existing fuel import infrastructure offshore of Oahu's South shore from mainly crude oil to refined products import might be technically feasible and cost effective. There are, however, other issues that might establish a need for additional fuel transfer and storage facilities in the commercial harbors. For example, new fuel companies might enter the market or it might be more cost effective to import refined fuel products directly to the neighboring islands rather than barging refined products from a fuel terminal in Oahu. Of interest would also be how a combined petroleum and biofuel transport scheme would affect the future cost and logistics of fuel supply to and distribution within the state. A more in depth analysis would be required to analyze a broad range of options. We will change the text of the Distribution section.	6/30/09 draft
Pac Biodiesel	12	14	D	Noted.	
Pac Biodiesel	16	18	D	We have already answered this comment	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Pac Biodiesel	20	22	D	Pac Biodiesel Comment 3: As pointed out in the report ethanol is an established biofuel, while bio-butanol and renewable diesel are not since they are "evolving biofuels" as stated in the report. The entire biofuel field is rapidly evolving and research organizations or fuel companies are developing various new "next generations" biofuels. The established fuels, such as ethanol and biodiesel, are not the ideal fuels in regard to distribution, because of compatibility problems with legacy (petroleum) fuel infrastructure and other physical properties. Certain evolving biofuels, such as bio-butanol or renewable, promise better compatibility characteristics and less fuel-handling difficulties than the established biofuels. The comment is right in suggesting that evolving biofuels have not been proven in wide ranges of application and that some of these fuels have not passed all required tests and have to received all permits that are required to qualify the fuel for general use. Yet, as we are looking to Hawaii bioenergy future, not only established but also evolving biofuels must be considered, and certain evolving fuels have much better handling and distribution characteristics than the established biofuels.	
Pac Biodiesel	24	26	D	Pac Biodiesel Comment 4: In the Distribution section straight vegetable oil (SVO) is treated as a possible biofuel category only as a fuel substitute for residual fuel or heavier fuel fractions in electricity generation. SVO as a biofuel is not considered as a generic transportation fuel, where SVO would be dispensed at gas stations. The use of SVO is only considered for point uses, e.g. for use in certain thermal power plants. Since it is assumed that the use of SVO would require only minor modifications of the existing fuel systems (which for instance HECO considers only minor), then these infrastructure modifications would not be considered a significant "distribution" problem. The few users of significant volumes of SVO would have to investigate compatibility of SVO with their existing fuel systems.	
Pac Biodiesel	28	30	D	Pac Biodiesel Comment 5: Transporting fuel-grade biofuels or higher blends of biofuel in petroleum fuel should use dedicated transport modes, such as tankers, which segregate these types of biofuels from neat petroleum fuels. With increasing volumes of biofuel used in Hawaii, it will be, at one time, more effective to transport biofuel with the same established and cost-effective transport modes which are applied for petroleum fuels. The most cost-effective transport mode for fuels is by pipeline. The applicability of conveying fuel-grade biofuels and petroleum fuels in the same existing pipelines depends on compatibility between biofuels and petroleum. While the conventional types of biofuels, such as ethanol and biodiesel show compatibility problems for fuel-grade biofuel or higher blend rations, lower blends, for example B2 blends (e.g. blend of 2% biodiesel and 98% petroleum) might be transported in existing pipelines without problem. The recommendations for future biofuel distribution infrastructure anticipate significantly larger use of biofuels in Hawaii than at the present. Therefore more biofuels will have to be transported in a future biofuel distribution system. Increased volumes of biofuels can only be achieved by transporting either higher blend ratios or higher volumes of fuel-grade biofuels.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Pac Biodiesel	43	44	D	Pac Biodiesel Comment 10: The comment is correct in pointing out that low blends of biodiesel have no or only limited compatibility problems in existing petroleum fuel distribution infrastructure. As pointed out in previous responses to Pac Biodiesel's comments, the Distribution section envisions significantly higher biofuel consumption rates in the future. Transporting more biofuels through future biofuel distribution systems will require either higher blend rations or higher volumes of fuel-grade biofuels. Therefore biofuels with low blending ratios, which might have no or limited compatibility problems, will not be used in the envisioned future.	
Pac Biodiesel	45	56	D	Pac Biodiesel Comment 11: As pointed out previously the Distribution section considers higher blends of biofuel or fuel-grade (neat) biofuels. Lower blends, which are used at the present, would increasingly be phased out under the anticipated future push of Hawaii towards more renewable energy and biofuel. While anticipating increased biofuel use in the future biofuel should be transported through a distribution system that can accommodate all used types of biofuels, not only selected biofuels. Petroleum fuels in the existing pipelines are typically transported "batchwise", this means different petroleum fuels are transported through the same pipelines in district product "batches". It would be normally cost-prohibitive to build pipelines dedicated to only one type of fuel. Therefore it is important to view multiple types of biofuels when considering fuel distribution compatibility. Ethanol and biofuel have different compatibility issues and it might not be possible to implement both biofuels in one mutual distribution component.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Pac Biodiesel	58	63	D	Pac Biodiesel Comment 12: The Distribution section characterizes the evolving biofuel "renewable diesel" as a fuel that should be able to meet all of the requirements of ASTM D975, Standard Specification for Diesel Fuel Oils. The comment is true that "renewable diesel" is not an established fuel yet and that fuels have to pass all required tests and received all permits to be marketed as fuel for general use. But this is not the point in the discussion of the Distribution report. Renewable diesel, also referred to as "renewable synthetic diesel",, represents a type of evolving biofuel, which has the distinct advantage over biodiesel (which is an approved fuel and whose product characteristics is defined by ASTM D6751) in that it should be fully compatible with petroleum distribution and infrastructure systems. We indicate "should" since this type of biofuel is still in the development phase and we are quoting fuel specifications of the companies or research organizations, which are developing the production technologies for "renewable diesel". Our recommendations consider renewable diesel as fully compatible with existing petroleum diesel and therefore renewable diesel should be suitable for implementation in the existing fuel supply at any blending ratio. Of course, these assumptions require that the reported characteristic of renewable diesel can be substantiated in larger "real-world" applications. But the outlook of future biofuels that are compatible with the existing infrastructure is very promising and it would warrant a closer look as to how these types of fuel could be integrated into Hawaii's existing fuel system. SVO has been identified by HECO as a possible fuel for power production. We are not advocating SVO as a fuel for wider applications. The implications of conveying SVO through the existing distribution system that serves the power plants needs to be assessed by the power plant operators. Again, we are not suggesting that SVO would be used in regular diesel engines.	
Pac Biodiesel	64	64	D	Pac Biodiesel Comment 13: The discussions and recommendations in the Distribution section do not consider "synthetic diesel", which we define as a conventional synthetic fuel from the conversion of fossil fuels (e.g. coal, natural gas). In our discussion we are considering "synthetic diesel" as distinct from "renewable diesel", where the latter represents a synthetic diesel from biomass. In the Distribution section only "renewable diesel" from biomass conversion is considered. Interfuel replacement options for renewable diesel would entail all applications where conventional petroleum diesel (lighter diesel fuel grades) would be replaced. Again, we have to stress that renewable diesel, at the present time, is an evolving biofuel which still has to pass all regulatory tests and has to obtain all permits in order to be a marketable fuel. Our discussion relies on the specifications of the companies and organizations, which are presently developing the fuel to commercial production levels. Proposed fuel replacement options for lighter fractions of petroleum diesel (e.g. diesel fuel #2) suggest biodiesel and renewable diesel.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Pac Biodiesel	66	67	D	Pac Biodiesel Comment 14: As discussed before, the Distribution section considers higher blends of biodiesel in petroleum fuel or fuel-grade (neat) biofuel. Lower blends of biofuel and petroleum are presently in commercial use and low blends of biofuels represent no or limited compatibility problems in existing fuel distribution infrastructure.	
Pac Biodiesel	68	70	D	Pac Biodiesel Comment 15: It is correct that it is technically possible to build or convert a pipeline for use with 100% biodiesel. However, it is questionable if pipelines would be built which were exclusively dedicated for 100% biodiesel transport. Since pipelines are very expensive to build and operate it is cost-effective to convey a range for fuel products through the same pipeline. The batchwise transport of petroleum products is an established pipeline operation. Under the most favorable fuel distribution scenario petroleum fuels and biofuels should be distributed through the same infrastructure; and this can only be achieved if there are no compatibility problems.	
Pac Biodiesel	71	73	D	Pac Biodiesel Comment 16: Our discussion addressed SVO solely as a biofuel to replace petroleum products in power generation. We have indicated that the operators of power plants in Hawaii consider the use of SVO in lieu of residual oil for thermal power plants. The power plant operators would have to ascertain that "dirty product" distribution infrastructure (e.g. which transports residual fuel or heavier petroleum fuel fractions) could safely convey SVO. Since SVO has similar viscosity related flow characteristics as heavier fractions of oil, applicable pipelines would already have components to accommodate the flow of more viscous fuels. Our discussion does not consider SVO in the wider distribution infrastructure, where SVO is used for regular transport applications.	
Ewan	26	26	Econ	This comment is too general to address. No action taken.	
Gas Co	185	193	Econ	For electricity, residual fuel oil and/or diesel. For transportation, gasoline. In relation to the substitution of gasoline with ethanol, potential impacts are discussed in Section 5.	D,Econ
Gas Co	242	245	Econ	Study of the economic impacts of biofuel scenarios (beyond ethanol) are identified as further "information needs." In particular, biofuel-to-electricity scenarios are identified for on-going study.	
Gas Co2	472	480	Econ	Conclusions section of report has been modified to address comment.	
Gas Co2	483	499	Econ	Section 7 has been revised.	
Gas Co2	501	506	Econ	Conclusions section of report has been modified to address comment.	
Ha	9	40	Econ	Although the cost analysis solely focuses on ethanol (and is thus not necessarily able to generalize to all fuel types) the assessment is consistent with this comment – it is not likely for small farmers to become major biofuel players due to the need for large tracts of land. The margins of profitability are slim (to none, depending on the support scenario) and thus achieving economies of scale will be important in creating a viable industry. It is feasible that there will be competition for alternative land uses including food crops and animal products. This concern is mentioned within the Executive Summary and the Conclusions. Further language was added to the conclusion: "Community suitability and assessment studies will be needed in order to determine region-specific impacts, including impacts to food production (including crops and livestock)."	WL,D,L,T,P,F,BP,Econ,Env,I

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
HCC	39	41	Econ	The productivity of land based on soil quality is an important inquiry – although outside the scope of this analysis. As a first step in understanding these environmental and economic impacts, a broader study on competing land uses (i.e. the opportunity cost of agricultural land) is needed. This has been identified as an "information need." In addition, further language was added to the conclusion: "Community suitability and assessment studies will be needed in order to determine region-specific impacts, including impacts to food production (including crops and livestock)."	WL,Econ, Env,I
HCC	54	58	Econ	See comment above.	WL,Econ, Env,I
HCC	75	84	Econ	See comment above.	Econ,I
HCC	94	97	Econ	This study specifically focused on quantifying the economic impacts of sugarcane-to-ethanol (primarily for data reasons). A study of the economic impacts of biofuel scenarios (beyond ethanol) are identified as further "information needs." In particular, biofuel-to-electricity scenarios are identified for on-going study.	Econ,T,En v
Tesoro	12	16	Econ	The language of the report has been changed to read: "the refineries receive $28 million per year from the federal government to support ethanol blending." And a footnote has been added that reads: "Although the federal government provides a subsidy for ethanol blending, it does not necessarily translate into profit. Specifically, stakeholder input suggested that the blending credit is passed on to ethanol producers."	
Tesoro	18	24	Econ	Similar to the above comment, the language of the report has been changed to read "receive" instead of "capture" and the same footnote has been added to this sentence.	
Tesoro	26	39	Econ	This is an excellent point and has been identified as a need for further analysis. In addition, the language within the report has been changed to read: "In an era of rising costs for light crude, however, refineries worldwide are faced with changing economic circumstances."	
HECO	18	18	Econ	This is an important comment and is identified as a need for further analysis: "Thus further study of biofuels for electricity generation and alternative liquid fuel products like biodiesel are needed to provide a more comprehensive view of the future of biofuels and their impacts to Hawaii's economy."	
Tesoro	110	113	Econ	See above.	6/30/09 draft
Tesoro	115	147	Econ	See above.	
Tesoro	149	151	Econ	There is a discussion of the displacement of petroleum products as well as global market forces that might change the profitability and circumstances of the refineries. Without further study it is difficult to explain what a "shutdown" scenario means for the State. The impacts to the refineries of moving to renewable energy sources is been identified as a need for further analysis.	
Pac Biodiesel	12	14	Econ	Yes, the report (which focuses on ethanol) differentiates between E10 and E85. See page 20, Considerations for End Use.	
Pac Biodiesel	80	81	Econ	Yes. Within Yanagida et al.'s analysis, they assume the use of cellulosic and their cost estimates are projected as such. See their report for further details.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Gas Co	35	40	Env	A comprehensive approach to LCA, including requirements for various levels of analysis, needs to be developed for the State's bioenergy program. This comprehensive approach will take time and additional resources to develop that are beyond the scope of this Master Plan. (Section updated.)	I, Env
Gas Co	130	135	Env	There are many different certification models that could be implemented. A comprehensive analysis of the varying certification methods and how they may be utilized in Hawaii is needed. Part of this analysis should include specification of the timing and departmental responsibilities. Optimally, certification of any sort should not add to the duration of the overall permitting process. Efforts should be made to coordinate existing permitting functions and reduce or eliminate any redundancy in the processes. (Section updated)	I,Env
Gas Co	148	150	Env	noted	I,Env
Gas Co	247	252	Env	Inclusion of a recommended LCA for biodiesel conversion for the final Master Plan is not be feasible given the time constraints and resources of the project.	
Gas Co	254	261	Env	A priority for the burgeoning bioenergy program in Hawaii should be the development of LCA and certification requirements/standards in consultation with stakeholders. There may need to be some discussion about creating initial screening processes to help first movers with "shovel-ready" projects or demonstration projects to move forward without undue delay. If a "first-movers program" for preliminary certification was established any participating programs would need to complete a full certification and LCA as part of their final permitting/compliance. Particular precaution would need to be made to safe-guard against invasive species and any other irreversible commitment of resources that may be proposed by a project under a "first-movers program". (Section updated.)	
Gas Co2	140	144	Env	Sentence deleted.	
Ha	9	40	Env	See above (Section updated)	WL,D,L,T,P,F,BP,Econ,Env,I
HCC	31	34	Env	(Section updated)	WL,Env
HCC	39	41	Env	covered in Env Imps section	WL,Econ,Env,I
HCC	49	51	Env	covered in Env Imps section	Env,I
HCC	52	52	Env	covered in Env Imps section	
HCC	54	58	Env	covered in Env Imps section	WL,Econ,Env,I
HCC	94	97	Env	covered in Env Imps section	Econ,T,Env
NREL	125	125	Env	Section updated	
NREL	126	127	Env	A comprehensive approach to LCA, including requirements for various levels of analysis, needs to be developed for the State's bioenergy program. This comprehensive approach will take time and additional resources to develop that are beyond the scope of this Master Plan. (Section updated)	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
NREL	128	132	Env	Indirect land use issues are covered in land use section. Further discussion to clarify added.	
HECO	20	20	Env	Section updated with some discussion of sustainability.	
Pac Biodiesel	12	14	Env	Noted	
Pac Biodiesel	83	85	Env	Change made.	
Ewan	24	24	F	Response: The reviewer is correct on all points, yet to disregard the funding source does not seem appropriate. Recommended action: Amend the sentence to read, "Act swiftly to capture funding made available through the American Recovery and Reinvestment Act of 2009, though recognize the funding would need to be balanced by sustained sources to carry the operation year after year."	
Ha	9	40	F	• Response to lines 9-21: Addressed in Findings section, page 20, second paragraph. Recommended action - no action. • Response lines 21-23: Beyond task 8 scope. Recommended action - no action • Response to lines 25-35: Energy return on investment (EROI) analyses can present biofuels as unattractive, having very low net energy yields (e.g. Hall et al. (2009) where corn ethanol EROI is less than 3:1). However, these metrics vary, especially when considering 2nd and 3rd generation sources. For example, Hammerschlag's 1990-2006 review (2006) presents that though corn ethanol yields an EROI of 0.84-1.65, cellulosic ethanol EROI's range from 4.40-6.61. Schemer et al. (2008) demonstrate switchgrass yields 500% more renewable energy than energy consumed in its production and has significant environment al benefits, as estimated by net GHG emissions as well as soil conservation benefits. HBMP should plan for the transition of higher yields of 2nd and 3rd generation biofuels. Recommended action –Input above comments in Findings section. • Response to lines 37-40: Addressed in: Findings section, page 19, paragraph 2; Recommendations section, page 23, 3rd full paragraph. Recommended action – no action	WL,D,L,T,P,F,BP,Econ,Env,I
HCC	99	101	F	Response: Addressed in life-cycle analysis recommendation in other task as well as our recommendation to "Facilitate the measurement and monitoring of greenhouse gas emissions." Recommended action – no action.	

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Simonpietri	7	36	F	• Response to lines 7-16: Agree. We reintroduced the mechanisms suggested by the Hawaii Energy Policy Forum in their final response to House Concurrent Resolution 195 (HCR 195). Cited in: Background section, page 11, top lines; Recommendations section, page 22, 4th recommendation; and Appendix G. Recommended action - none • Response to lines 17-21: Agree. Also supported by SunFuels Hawaii, LLC letter of June 8, 2009, cited in our report in Findings section, page 22, 1st full paragraph. Recommended action – Insert, "Establish a sub-committee of people with a mix of public and private experience raising capital for infrastructure and energy projects to put together the specific financial incentives to support HBMP. Sub-committee should at a bare minimum work with incentive concepts proposed by HEPF in their response to HCR 196 (Appendix G)," after recommendation 4. • Response to lines 22-36: Reasonable suggestions, but not for insertion. Recommended action - no action	F, I
Tesoro	87	90	F	Response: Agree. Recommended action – amend as suggested	6/30/09 draft
Tesoro	92	106	F	Response: Concern cannot be made any more explicit within Task 8. Recommended action – no action.	6/30/09 draft
Pac Biodiesel	12	14	F	Response: Checked for any misrepresentations due to the distinctions between fuel types. None found. Recommended action – no action	
Pac Biodiesel	78	79	F	Response: this was an error on our part. Recommended action – amend final paragraph to read as, "At present, Hawai'i is opted-in to the Federal RFS. While further study is required, opportunities may exist to establish a complete, localized bioenergy value chain in Hawai'i's using the Federal RFS. (Anon. 2008) One resource we suggest to investigate is the RINMARK exchange (http://www.rinxchange.com/)." Recommended action: Add to final recommendation list	
Ely	19	29	I	HECO's considerable role is acknowledged in references to its 10/08 Energy Agreement with the State, its planned biofuels facilities, and in the strategic partnership section (3.3). No Action.	
Ewan	1	1	I	Agree as to OHA. Will amend as suggested.	
Ewan	2	2	I	Good suggestion that should apply more broadly to renewable energy and energy efficiency projects. No action.	
Ewan	3	3	I	Program is intended to support and catalyze industry. Industry association may be an outcome. No action.	
Ewan	4	4	I	Funding is a requirement should recommendation result in legislative action. No action.	
Ewan	5	5	I	Additional mandates may result in increased importation of biofuels if there is insufficient local production. No action.	
Ewan	6	6	I	Agree, however, any diagram that accurately reflects the many factors that should be considered in a comprehensive bioenergy system, especially one that is evolving, will be difficult for general understanding. No action.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Ewan	27	27	I	Initially, program coordination supported by a technical advisory group recommended. This structure should be in place regardless of "authority" since any decisions must be based on technical merit. No action.	
Gas Co	4	20	I	The point made is well taken. While the project was required to meet the specifications of Act 253, it is not intended that any bioenergy product should be excluded from all consideration if not specifically mentioned. Report has been revised for clarification as appropriate.	
Gas Co	24	29	I	See above.	
Gas Co	31	33	I	See above.	
Gas Co	35	40	I	Addressed in Environmental Impacts recommendations.	I, Env
Gas Co	42	54	I	Revised as appropriate.	I,T,BP
Gas Co	56	63	I	Revised as appropriate.	I,T
Gas Co	65	71	I	Agree. Revised.	
Gas Co	73	75	I	Agree. Revised.	
Gas Co	119	120	I	Examples only. No action.	
Gas Co	122	128	I	Noted. No action.	
Gas Co	130	135	I	Addressed in Environmental Impacts recommendations.	I,Env
Gas Co	137	139	I	Noted. No action.	I,BP
Gas Co	141	143	I	Addressed in Environmental Impacts recommendations.	
Gas Co	145	146	I	Revised.	
Gas Co	148	150	I	Noted. No action.	I,Env
Gas Co	152	154	I	Noted. No action.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Gas Co2	8 32 39 58 113 146 253 287 301 372 387 433 464	28 37 56 74 130 165 285 299 370 385 431 462 466	I	Comments provide helpful update on the EPA's progress toward issuance of its regulations for the new renewable fuel standard (RFS2) required under the Energy Independence and Security Act of 2007 (EISA) including Lifecycle Analysis of Greenhouse Gas Emissions. At the date of this writing, the new RFS2 rules have not been issued. The update is included in the plan report as incoporated in this volume. Additionally, background is provided on the EPA's final rule on its Mandatory Greenhouse Gas Reporting. While the Financial Incentives Issue Report recommends the measurement and monitoring of greenhouse gas emissions, and an approach using The Climate Registry, it does not preclude use of reporting under the EPA's rule. No action. The commentor suggests more detailed information and recommendations with regard to life cycle analyses (LCA) and a certification program. The authors strongly recommend that stakeholders must be consulted in the development of these methodologies, a task that is outside the scope of this project. These stakeholders include federal and state government, community, and industry, among others. The objectives of life cycle analyses for Hawaii bioenergy projects, while similar, may not be identical to those considered for EPA RFS purposes, nor should Hawaii's bioenergy needs be evaluated based solely on national objectives. No action.	
Ha	9	40	I	Agree that more analysis is needed. Hawaii's is challenged by energy and food security issues, however, there are many resource, economic, and technical pathways that must be considered. Evolving technologies, such as EVs and conversion technologies may present new opportunities. No action.	WL,D,L,T,P,F,BP,Econ,Env,I
HCC	39	41	I	Noted. Bioenergy crop selection, cultivation practices, and value chain needs should be considered. Life cycle analyses are recommended. No action.	WL,Econ, Env,I
HCC	49	51	I	See Environmental Impacts section. No action.	Env,I
HCC	54	58	I	Agree. Such analyses should be conducted but require land, crop, and product specificity among other variables. No action.	WL,Econ, Env,I
HCC	63	63	I	Island by island factors – land types, labor, energy needs, transportation – should be considered in follow-on analyses. No action.	
HCC	65	66	I	Agree. Such analyses should be conducted but require land, crop, and product specificity among other variables. No action.	WL,I

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
HCC	68	69	I	Beyond the scope of this project. No action.	
HCC	71	73	I	Agree. Such analyses should be conducted but require land, crop, and product specificity among other variables. No action.	T,I
HCC	75	84	I	Agree. Such analyses should be conducted but require land, crop, and product specificity among other variables. No action.	Econ,I
HCC	86	88	I	Further analyses needed, beyond the scope of this project. No action.	
HFBF	100	282	I	Plan is responsive to Act 253 that supports the development of a bioenergy industry. Many factors must be and have been considered. It is clear that much more information is necessary for any assertion that any specific pathway is preferred. In fact, this plan recommends a mechanism and funding to ensure appropriate decisions to achieve state objectives. No action.	
HFBF	285	311	I	Agree that demonstration projects are important as reflected in plan recommendations. Due to the generally large costs and magnitude of bioenergy projects, partnerships, collaboration, and shared risk are necessary. Thus the recommendations for a facilitative body to act as a catalyst for project implementation, and necessary program funding, are critical.	
HFBF	313	349	I	As indicated in the draft excerpts cited, diversified agriculture is considered. Recommendations provided are intended to result in well-reasoned, well informed decisions for the benefit of the state as a whole. No action.	
LOL	74	80	I	Focus is on obtaining accurate information from which decisions can be made pertaining to water availability generally. No action.	I,WL
LOL	81	92	I	See Permitting response.	I,P
NREL	14	20	I	Will streamline where appropriate. The information included in the Executive Summary, pages i through x, provides the summary document requested. Due to stakeholder involvement, information is provided to ensure transparency of process.	
NREL	21	32	I	Answers to these questions require much more analysis than could be performed within time and funding constraints of project. The recommended Life Cycle Analyses, applied to various bioenergy value chains, would be most helpful in providing the types of information necessary to help answer the questions raised. No action.	
NREL	33	55	I	Although we agree that such information would be useful, the topic is beyond the scope of this project. Grid analyses are being conducted under the HCEI and this question might best be handled by including it under that task.	
NREL	60	64	I	Headings have been added for clarity.	
NREL	65	65	I	Correction made.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
NREL	70	77	I	Establishing a consistent policy for use of state lands does not prevent an entity from pursuing state leases under existing policy. The proposed action is a legislative approach and the timeframe is consistent with the legislative calendar. A more rapid response could be produced by direct intervention from the executive branch. Timeframe is considered practical in view of differing roles and responsibilities of agencies. No action.	
NREL	78	85	I	See Table 3, page 40 in Vol. I and response in Vol. II Issue Report 2.4 Technology.	
NREL	86	89	I	Estimate is based on salaries of $80,000/yr with a fringe rate of 40%.	
NREL	90	91	I	Timeframe is considered practical, however, lead agencies may work to implement policies sooner.	
NREL	92	96	I	Recommendation to provide for a bioenergy program and expert staff is responsive to this comment. No action.	
NREL	98	102	I	The excerpt cited in the comment is from the section titled “The Role of Bioenergy in Hawaii’s Energy Mix” that reviews only that topic. Other sections of the report make it clear that planning for a bioenergy industry must consider the wide range of stakeholders and competing interests, among other issues. No action.	
NREL	103	104	I	Figure added.	
NREL	105	107	I	To avoid redundancy, more detailed discussion is in Section 2.9, Environmental Impacts. No action.	
NREL	108	110	I	Agree. Final report will reflect changes.	
NREL	133	136	I	These are valid questions however there are multiple solutions based on a number of permutations of cropping and technology pathways shown in Figure 1 in Vol. II Issue Report 2.4 Technology. These types of analyses have been done in earlier documents see for example "Potential for Ethanol Production in Hawaii" available at http://hawaii.gov/dbedt/info/energy/publications/ethanol-hnei-06.pdf and "Biodiesel Crop Implementation in Hawaii" available at http://hawaii.gov/hdoa/Info/biodieselreportrevised.pdf. These reports follow the method outlined in the comment. The analysis presented in Vol. II Issue Report 2.1 Land and Water answers a slightly different question that is based on yield projections taking into account climate and soil resources. Given Hawaii's diverse array of soil and climate conditions, this approach was selected over assumptions of one yield value per crop applied to all agricultural lands as was done in the earlier reports cited above.	
NREL	137	142	I	The cited paragraph continues onto page 40 and provides additional reasons why the biodiesel values may be higher.	
NREL	143	146	I	The question relating to end product yields and resource use is one part of the informational whole needed for decision making. The resource aspects are best addressed through life cycle analysis. For Hawaii, issues of scale may be more important drivers than product yield per ton of feedstock.	
NREL	147	148	I	Redundancies have been removed where possible.	
NREL	149	150	I	Corrected.	
NREL	155	158	I	Due to diverse stakeholder involvement, differing subject matter, and multiple authors in project team, latitude is allowed to promote transparency. No action.	

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NREL	159	160	I	For transparency, the table includes all recommendations, grouped by area of concern. The related issue is referenced should the reader choose to refer back to the relevant report. Priority recommendations are highlighted.	
NREL	161	162	I	Deleted.	
NREL	163	164	I	No action.	
NREL	165	166	I	No action.	
NREL	167	167	I	Comment incomplete. No action.	
Simonpietri	7	36	I	See response in Financial Incentives area above.	F, I
Simonpietri	37	51	I	Agree bioenergy projects should be economically competitive. Seed crop analysis was beyond the scope of the project, however, such analysis should be considered under the life cycle analysis recommendation. No action.	
Simonpietri	51	58	I	Overall goal of the roadmap is to support the development of the bioenergy industry to assist with the state's transition to energy self-sufficiency. Appropriate development of a bioenergy industry should be consistent with other state objectives including economic development and resource management. No action.	
Simonpietri	59	61	I	It is not clear toward which section of the document this comment is addressed. A bioenergy technical advisory group and community-based bioenergy forums are identified in the draft. The former will include key stakeholder representatives and as proposed will provide advice to the bioenergy program staff. The advisory role is clear but it is not clear how the suggested stronger roles might be enacted. Establishment of the program and the bioenergy technical advisory group would come through legislative action where the role of advisory group can be clearly defined.	
Simonpietri	64	64	I	No action.	
Simonpietri	66	66	I	Recommendations have been numbered.	
SunFuels	103	107	I	We appreciate these thoughts. This plan effort focuses on aspects as specified in the legislation. To arrive at the conclusions suggested by the commenter will require more analysis and information than is currently available.	
SunFuels	109	120	I	This effort should not be compared to the IEA report due to differing mandates, conditions, and audiences. No action.	
SunFuels	122	127	I	Input from hundreds of stakeholders, including the groups suggested, was requested and, when provided, was included in this document. No action.	
HECO	4	5	I	"Sustainability" would be an inherent concept in the life cycle analysis. No action.	
HECO	6	9	I	Agree. Revision made.	
HECO	10	11	I	Agree. Revision made.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
HECO	12	12	I	The first bullet list at the top of page x includes the text shown below. All of the bullets describe projects that relate to biofuels with multiple uses and these are identified in keeping with the value chain approach. Electrical generation is identified as being one of the possible end uses for the biofuel product in the first three bullets. The demonstration project related to biofuel storage would have direct relevancy to power generation applications. • oil crop production, harvesting, and oil extraction from the crop product with multiple uses for the oil such as ... direct firing of the vegetable oil; • pyrolysis of biomass to produce a bio-oil that can be transported and ... used in direct fired power generation applications; • gasification or reforming of biomass to produce a syngas for use in the production of renewable electricity ...; • controlled storage of biofuels with monitoring of product quality over time to assess product life and testing to determine potential impacts of quality deterioration on end use. No action taken.	
HECO	13	13	I	Agree. Revision made.	
HECO	14	15	I	Financial Incentives recommendations have been revised. No action.	
HECO	26	32	I	The text has been added as requested.	
HECO	33	34	I	The first bullet list at the top of page x includes the text shown below. All of the bullets describe projects that relate to biofuels with multiple uses and these are identified in keeping with the value chain approach. Electrical generation is identified as being one of the possible end uses for the biofuel product in the first three bullets. The demonstration project related to biofuel storage would have direct relevancy to power generation applications. • oil crop production, harvesting, and oil extraction from the crop product with multiple uses for the oil such as ... direct firing of the vegetable oil; • pyrolysis of biomass to produce a bio-oil that can be transported and ... used in direct fired power generation applications; • gasification or reforming of biomass to produce a syngas for use in the production of renewable electricity ...; • controlled storage of biofuels with monitoring of product quality over time to assess product life and testing to determine potential impacts of quality deterioration on end use. No action taken.	
HECO	10	13	I	No action. State funding subject to current and future legislative and Administrative support.	
HECO	14	17	I	For consideration. Subject to time constraints.	
HECO	18	22	I	No action. Other comments indicate text is already too lengthy	
HECO	23	25	I	Link to website added.	
HECO	26	27	I	Links to HCEI and Energy Agreement websites added.	

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HECO	28	30	I	Will review formatting for readability.	
HECO	31	33	I	Questions are reflected in revised Exec Summary. Annual update is ideal but not provided for legislatively or programmatically.	
HECO	34	35	I	No action.	
HECO	38	41	I	Recommendation only. Legislative and Administrative support needed.	
HECO	42	43	I	Same as above. DBEDT Energy Office has responsibility but lacks resources.	
HECO	44	45	I	Potentially as low as no-cost, subject to State boards of Land and Natural Resources and Agriculture statutory requirements and determination.	
HECO	46	48	I	2009 "barrel tax" legislation is an excellent example. Lead is as recommended in Plan - the Bioenergy Program with support from partnerships and advisory group. Without a "champion", industry advocates must work together.	
HECO	49	51	I	Recommended Program term through 2020. Need funding mechanism or taxpayer commitment.	
HECO	52	55	I	2011 is a practical date in light of legislation and release of funds. Of course there are other avenues to more rapidly develop this capability. An endowed chair funded by the private sector is a way for industry to support faculty development and selection at research institutions.	
HECO	56	58	I	Successful partnerships will benefit all partners. Many of the initial partnerships will be formed around demonstration projects that typically receive government funding as a means of reducing risk. This is an incentive. Experience and information are gained by conducting demonstration projects. This is a reward.	
HECO	59	61	I	Ideally, demonstration projects would already have started. Funding continues to be problematic. An alternative way of asking this question is whether decisions should be made without demonstrations projects? Initial decision making is necessary to identify appropriate demonstration projects but the outcome of the demonstration should provide a go/no-go decision point.	
HECO	62	64	I	Implementation is subject to the establishment and funding of a program to coordinate and carry out the recommendations. No action.	
HECO	65	67	I	Sentence builds on discussion in previous section. No action.	
HECO	68	72	I	No action. Report addresses the challenges – environmental, resource, economic, etc. The ethanol mandate guaranteed a market but did nothing to reduce risks at other points along the value chain or to insure that locally produced ethanol could be competitive with imported fuels.	
HECO	73	74	I	Link provided to Energy Agreement.	
HECO	75	77	I	Survey results are on-line. May and Sept. 2008 events were for outreach/education.	
HECO	78	79	I	Recommendations are from issue reports that include stakeholder input. No action.	
HECO	80	81	I	Corrected.	
HECO	82	85	I	Questions and brief discussion added to Exec Summary.	
HECO	86	88	I	Added.	
Pac Biodiesel	12	14	I	Noted.	
Pac Biodiesel	32	33	I	Noted.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Pac Biodiesel	34	35	I	Revised in Appendix 1.	
Pac Biodiesel	37	38	I	Noted.	
Ewan	16	16	L	This is precisely the reason why we recommend supporting the upper end of the labor market.	
Ewan	17	17	L	The basic point is that Hawaii must consider whether it has a comparative advantage in things like land area for growing raw materials, and the more labor intensive parts. These two factors are relatively high in HI. The cost-of-living analysis points out that labor intensive work may not be sustainable in HI. The issue of "the point being energy independence" is an indeal objective, but whatever the makeup of the strategy for such independence needs to be sustainable. Energy independence is not the same thing as biofuels.	
Ewan	18	18	L	As with one of the other comments on policy, this paragraph is meant to state that the safest way to support the labor market for biofuels is to focus on a broader green jobs agenda. The industry is so new and unclear, that one cannot get more specific than stating that it is a potentially important part of the skills development in environmental/green technologies.	
Ewan	19	19	L	Yes, there may be an oil collapse. Not sure how this is directly related to the livable wage issue.	
Ewan	20	20	L	This is more technical terminology to say that deliberate targeting and development of a core group of employees is likely to be more sustainable and stable than one that passively waits for workers to fill available jobs (especially since other jobs will be alternatives, given HI's low unemployment rates)	
Ewan	21	21	L	That is one way to save on labor costs, but what the sentence reads is that workers perform low wage tasks outside of HI (eg harvesting crops), not bringing them to harvest crops in HI. Maybe it should be clearer that this also means that the crops come from somewhere else (also conserving land for other useses).	
Ewan	22	22	L	Yes, this may be the case. If we are making investments counting on sharp oil increases, then the whole analysis will change, I think.	
Ewan	23	23	L	True, an example would help. Basically, the argument is that any legislation and financial support would package together a program on biofuels, with one on solar maybe, one on LEED certification,etc…	
Ha	9	40	L	These are good comments, but I'm not sure how they relate directly to the labor issues. The issue of labor as a major cost of ag production seems to be the issue, but with a large scale agriculture – which he seems to think most relevant, mechanization already has been done.	WL,D,L,T,P,F,BP,Econ,Env,I
NREL	66	69	L	The basic argument is that support for the lower end of the labor market is a social service effort rather than an effort to build a sustainable industry. Not a bad thing to do, but an ongoing subsidy, as stated.	
NREL	199	199	L	Table 7 is about unemployment rates… ?	
WF Dev Con	11	22	L	Yes, on the calculation error, which also makes the change rate -14.2%. This doesn't change the argument. All the other things are true but also don't change the argument, I think. The citation should be changed.	
Tesoro	33	36	L	Yes, they can be partners, and could be listed under Private Sector examples if it is politically important to include them explicitly. We just went with what came from the report.	6/30/09 draft

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Tesoro	38	52	L	I suspect that the comments are probably correct, and important. I am not sure what they have to do with labor, other than the fact that the cost-effectiveness of other refineries probably have a labor component. The competitiveness issue is the major challenge of doing biofuels in Hawaii- whether it is for export HI consumption. I am not sure it belongs just in the labor report.	6/30/09 draft
Hildebrand	12	22	L		No response received.
Hildebrand	24	26	L		
Hildebrand	28	29	L		
Pac Biodiesel	12	14	L		
Gas Co	101	110	P	We concur with the comment. We will point out in the text that stakeholders have voiced the issue and that broaden the definition of renewable facilities to include an energy content equivalent (e.g. MMBtu). Biogas facilities can produce gas for power generation, heat production and possibly transportation. – Change made	
Gas Co	130	135	P	We will add to the text of the section the comment of stakeholders which calls for making all renewable facilities (those facilities that require permitting in the first place) eligible to acquire permits under the REFSP. Change made	
Gas Co	223	226	P	We concur with the comment: No change	
Gas Co	228	233	P	The older statutes did not go as far as the REFSP. Newer legislative actions have implemented concrete time frames and have defined specific roles and process ownerships in permitting. No change	
Gas Co	235	238	P	The proposed online information system would have security measures (i.e. password protected sections of the online project space) in place that safeguards confidential information. - No change	
Gas Co2	99	111	P	No action taken	
Gas Co2	229	251	P	No action taken	
Ha	9	40	P	The “Permitting” section is concerned with increasing the efficiency of the permitting processes for renewable energy projects. - No change	WL,D,L,T,P,F,BP,Econ,Env,I

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
LOL	81	92	P	The report does not advocate situations where required and important permitting processes are "circumvented" in order to avoid scrutiny of the project's compliance with Federal, State or County statutes. The objective of the section about "Permitting" is to investigate opportunities to make the permitting process more effective and not to advocate doing away with permits. As has been shown, effective permitting processes do typically increase the level of interactions of all stakeholders, including businesses, the permitting agencies, community groups and the general community. Effective permitting processes, as envisioned in this report add transparency, they do not endeavor to cloud the permitting process in order to exclude due public review from the process. The referred to "Self certification" processes could be a means to avoid lengthy permitting for low level and low risk permit actions, where the award of a permit does not include substantive reviews. For example, online expert systems can be programmed to give a permit seeking individual expeditious feedback to permit applications and could involve an agency expert in cases where permit applications need human interactions. Such permitting would be of course not suitable for the bulk part of permits, such as comprehensive air and water permits. In summary, the section about "Permitting" endeavors to improve the efficiency of the permitting process, it does not advocate decreasing necessary thorough scrutiny of projects to identify significant impacts. Permits are and must remain measures to ensure that projects are not endangering our community and Hawaii's natural resources and beauty by exposure to significant impacts. As discussed in the framework of this masterplan, efficient permitting should help Hawaii to reach its goals of transitioning to clean energy, which will be an important part of Hawaii's drive towards sustainability. - No change	I,P

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LOL	100	109	P	The State is committed to a fundamental transformation towards clean energy. A brisk pace will be required to realize the envisioned changes in the energy system. Previous changes in energy systems were much slower as compared to the pace that energy systems will change to meet future goals. The issue is not whether a project should be "rammed through", since a project might cause significant impacts due to higher emissions or dangers of more fuel spills, to name a few examples of fuel related impacts. Hawaii is moving to clean energy and needs to improve the efficiency of reaching the goal within a short timeframe. The expeditious realization of clean energy projects requires permitting that is inclusive and transparent since the realization of projects needs the buy-in of Hawaii's people. In the executive summary of the permitting section we state that "Current plans to drastically slash Hawaii's oil dependencies have introduced a high level of commitment to transform the state's energy supply towards clean energy forms and scaling back the use of petroleum.". "The IEA's Executive Summary of the World Energy Outlook 2008 starts with the stark observation that "The world's energy system is at a crossroads. Current global trends in energy supply and consumption are patently unsustainable — environmentally, economically, socially. But that can — and must — be altered; there's still time to change the road we're on. ". There is an urgent need to act to change the energy system in Hawaii, which requires resolve and high commitment. The planned changes in permitting are part of the commitment to realize the implementation of renewable energies in Hawaii in an expeditious way. But the Permitting section of the masterplan also points out changes in permitting must be balanced with the need to protect the environment and the community from significant impacts, therefore urgent actions in the energy field should not shortcut a thorough review of all the possible impacts. Our section states that "Government permitting agencies are faced with the challenge of balancing requests for expedited permitting for important energy projects with their responsibility to protect the public and environment from potential adverse impacts. On one hand, the permitting agencies have the obligation to thoroughly scrutinize the projects and ensure safeguards so that the project has no adverse environmental and social impacts. On the other hand, the duration of the permitting process should not cause failure of renewable and environmentally beneficial energy projects that support a sustainable life style in Hawaii. We feel that our section has addressed the concerns of the commentor. No change.	
LOL	111	117	P	The text of the report will be changed from "..While the business community recognizes the great opportunities for investment in renewable energy projects in the state, they should be able to concentrate on entrepreneurial skills to overcome possible business challenges rather than spending financial and human resources as well as much time to acquire the necessary permits to satisfy many regulatory requirements…" to "While the business community recognizes the great opportunities for investment in renewable energy projects in the state, they should be able to concentrate on entrepreneurial skills to overcome the many business challenges that endanger successful completion of renewable energy projects and they should not have to spend avoidable efforts and resources to cope with unnecessarily complex and inefficient permitting processes...".	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
LOL	119	122	P	The text passage refers to the outcome of permitting. The validity of the text can only be seen in the context of the Section 2. sustainable life style in Hawaii. We feel that our section has addressed the concerns of the commentor. No change.	
LOL	124	132	P	Certain bioenergy installations are energy facilities that require "due protection"; e.g. an appropriately formulated protection plan, against acts of terrorism, as called for in the provision of the agencies referred to in the text. This does not mean that "energy crops" have to have a high level of protection, but certainly certain bioenergy conversion faculties or fuel transfer or storage facilities. Depending on the situation and type of fuel, biofuel spills are currently categorized not different as a petroleum spill. A highly flammable renewable fuel can be as good as target as a petroleum facility. In cases where the applicable regulatory provisions call for heightened post 9-11 protection the bioenergy facility has to be secured, in a similar fashion as important power plants or oil assets. No change.	
LOL	134	138	P	The enforceable maximum time periods given in the applicable Hawaii statutes are quite ample to process the permitting application. The new permitting procedures put the burden on the permitting agencies to complete the permit review and process in a maximum time frame or, if the agency does not comply, award the permit by default. This measure is not prescribing an unreasonably short time frame during which the permitting agency must carry out due diligence permitting in order to comply with its obligation to protect the community and environment against unreasonable impacts. In seeking to realize a clean energy project in Hawaii businesses and investors have committed valuable resources and should have some form of assurances that their permit application comes to a conclusion within a certain time frame and is not "open ended". It should be noted that the maximum enforceable time frame is in the order of one and one half years; ample time for well-organized agencies to address all issues. - No change.	
NREL	123	123	P	No action.	
NREL	151	154	P	The Permitting section proposes improvements of the permitting process along the line of the suggested "one stop shop" in the comment. Section 6 of the Permitting section describes a permitting process that would include the role of "Permit Facilitator", who might be either an internal state or government consultant or a private consultant hired by the owner. This Permit Facilitator would carry out project management functions and this role would be distinct from the role of the "Renewable Energy Facilitator" as defined in Section 201N-3, HRS. The proposed streamlining of the permitting process would also entail some web-based information exchange and online project management functions, such as a proposed central project information pool (refer to Figures 7 though 9 in the Permitting section).	
Pac Biodiesel	12	14	P	Noted	
Gas Co	42	54	T	No action taken in Vol. II, Issue Report 2.4 Technology	I,T,BP
Gas Co	56	63	T	No action taken in Vol. II, Issue Report 2.4 Technology	I,T
Gas Co	81	92	T	Recommendations 3, 5, and 6 identified in Vol. II, Issue Report 2.4 Technology address technology generically and the addition of biogas production technology elsewhere in Section 2.4 thus includes it in the recommendations	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
Gas Co	94	99	T	Anaerobic digestion and cracking of fat, oil, and grease have been added to Tables E.1 and 24 in Vol. II, Issue Report 2.4 Technology and in corresponding sections in Vol. I	
Gas Co	197	204	T	The following sentence has been added in Vol. II, Issue Report 2.4 Technology, pg 25: "Revitalization of Hawaii's livestock industry would improve co-product economics and food security as well as acting to increase availability of animal byproducts such as fats, oils, and grease."	
Gas Co	206	219	T	No action taken in Vol. II, Issue Report 2.4 Technology	
Gas Co	221	221	T	Anaerobic digestion and cracking of fat, oil, and grease have been added to Tables E.1 and 24 in Vol. II, Issue Report 2.4 Technology and in corresponding sections in Vol. I	
Ha	9	40	T	The first recommendation in Section 7 of Vol. II, Issue Report 2.4 Technology has been edited to read, "The State should continue a bioenergy technology assessment activity that can provide updated information on the status of bioenergy conversion pathways and estimates of energy return on investment (EROI) for candidate bioenergy value chain components."	WL,D,L,T,P,F,BP,Econ,Env,I
HCC	71	73	T	The first recommendation in Section 7 of Vol. II, Issue Report 2.4 Technology has been edited to read, "The State should continue a bioenergy technology assessment activity that can provide updated information on the status of bioenergy conversion pathways and estimates of energy return on investment (EROI) for candidate bioenergy value chain components."	T,I
HCC	94	97	T	The first recommendation in Section 7 of Vol. II, Issue Report 2.4 Technology suggests that the State continue to fund an ongoing technology assessment effort. As in the current effort, where cost data are available they are included in the assessment. No action taken in Vol. II, Issue Report 2.4 Technology	Econ,T,Env
NREL	119	122	T	Gasification for power has been subdivided to include combined cycle, internal combustion engines, and steam based power.	
NREL	203	208	T	Gasification for power has been subdivided to include combined cycle, internal combustion engines, and steam based power.	

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NREL	209	211	T	The following text has been added to the first paragraph of Section 1.0 Introduction of Vol. II, Issue Report 2.4 Technology: "The bioenergy potential of urban residue streams (municipal solid waste, municipal waste water, solid waste in place in land fills) and residues from current agricultural activities is available from past analysis (Turn, et al., 2002) and from other projects currently funded by the Department of Business, Economic Development & Tourism. This technology section treats the lesser explored bioenergy production systems presented in Figure 1. " The following text has been added to the first paragraph of Section 4.0 Crop Production Technology of Vol. II, Issue Report 2.4 Technology: "Candidates for biomass feedstock production include a wide variety of crops that produce starch, sugar, fiber, or oil. The reduced list of crops described below includes sugarcane, banagrass, Eucalyptus, Leuceana, oil palm, Jatropha, and microalgae. While not exhaustive, this selection represents larger classes of crops that may be suitable for Hawaii and their associated technology challenges. Down selection was done based on one of the following criteria: (a) citation in the scientific literature, (b) grown in Hawaii, (c) tropical crop suitable for Hawaii's environment, (d) limited risk of invasiveness."	
NREL	212	212	T	The first paragraph of Section 5. Bioenergy Conversion Technologies in Vol. II, Issue Report 2.4 Technology has been edited to read: "This section provides a description of bioenergy conversion technologies and includes information on their resource requirements, yields, and potential impacts."	
NREL	213	215	T	No action taken.	
NREL	216	217	T	Section 5. Bioenergy Conversion Technologies in Vol. II, Issue Report 2.4 Technology has been edited to read, "DDG/DDGS or wet cake is the major co-product of dry-grind ethanol plants and has largely been sold as livestock feed. More recently, these materials have also been pelletized or briquetted for energy products."	
NREL	218	218	T	Pictures have been reorganized in document.	
NREL	219	219	T	No action taken.	

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NREL	221	223	T	The following text was added to Section 5.4 Pyrolysis in Vol. II, Issue Report 2.4 Technology: "Orenda, a division of Magellen Aerospace, is offering combustion turbine units fired on bio-oils. An Orenda representative, Ron Tingle, visited the state seeking opportunities for a biomass fueled installation (Tingle, 2005). In preparing this report, Mr. Tingle was contacted for an update on Orenda's activities. Orenda has teamed with Dynamotive to develop an energy project located at a hardwood floor manufacturing facility near Toronto. The facility will convert 100 ton per day of wood waste to produce 70 tons of bio-oil, 10 tons of char, and 10 tons of permanent gases. The unit is nearly ready to commission, and in full operation will produce 2.5 MW of electricity from Orenda's OGTS2500 combustion turbine and supply 12,000 tons of process steam per hour. The total project cost is estimated at $10.7 million for engineering design, equipment supply, construction, and commissioning. Mr. Tingle also mentioned that he has been in contact with another pyrolysis unit developer that is working on a smaller portable unit that can be used in forest thinning operations. The bio-oil could then be transported to a centrally-located, power plant. The Orenda combustion turbine unit can also be relocated within the constraints imposed by grid access for power distribution and access to required operating utilities. Although not proven technology, this portable pyrolysis unit could be considered for use in alien species eradication efforts. " and "Byproduct char produced by pyrolysis can be burned as an energy source to provide necessary process heat. Recent interest has developed around the use of carbonized biomass as a soil amendment to improve soil quality and as a means of carbon sequestration."	
NREL	224	226	T	Recovery and utilization of low grade heat from biomass power plants can improve overall fuel efficiency. Opportunities that can be economically exploited often depend on co-locating heat demands with power generating stations. Sugar factories in Hawaii have long cogenerated electricity, motive power, and process heat.	
NREL	227	227	T	Figure 9 in Section 5.5 Gasification in Vol. II, Issue Report 2.4 Technology: has been reformatted to improve clarity.	
NREL	228	228	T	The following text has been added to Section 5.5.1 Gasification for Power Generation in Vol. II, Issue Report 2.4 Technology: "An alternative approach to generating power with product gas is to remove the combustion turbine from the system and directly fire the product gas in a boiler to generate steam. This approach is commercial, see for example http://www.primenergy.com/Gasification_idx.htm."	
NREL	230	230	T	The sentence in Section 6. Technology Development Status in Vol. II, Issue Report 2.4 Technology has been edited to read: "Biofuels Digest recently published a listing of top 50 companies in the bioenergy field (Lane, 2008)."	
NREL	231	231	T	Gasification for power has been subdivided to include combined cycle, internal combustion engines, and steam based power.	
SunFuels	67	71	T	No action taken.	
SunFuels	73	80	T	No action taken.	

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Tesoro	41	44	T	Figure 1 in Vol II Issue Report 2.4 Technology has been updated.	
HECO	22	22	T	Recommendation 6 in Section 7 of Vol II Issue Report 2.4 has been edited to read: "Technology Hawaii should establish a bioenergy/biofuel development fund to support research, and technology development and demonstration where the University of Hawaii, other research organizations, and Hawaii-based industries should be encouraged to jointly participate."	
Tesoro	56	69	T	Figure 1 in Vol II Issue Report 2.4 Technology has been updated. "Section 5.7.2 Green Diesel (renewable diesel via hydrotreating vegetable oil)" has been added to Vol II Issue Report 2.4 Technology.	6/30/09 draft
Tesoro	71	73	T	No action taken, a source was cited for the information presented.	6/30/09 draft
Tesoro	75	78	T	The following sentence has been added to Section 5.3 Biochemical Conversion of Lignocellulose Feedstocks into Ethanol: "Lignin may also be burned in a boiler for the production steam to satisfy factory power and process energy requirements."	6/30/09 draft
Tesoro	80	80	T	No action taken.	6/30/09 draft
Pac Biodiesel	12	14	T	No action taken.	
Pac Biodiesel	75	76	T	This comment refers to a section of Vol. II Issue Report 2.4 Technology that summarizes input received at the April 10, 2009 stakeholder meeting. While the comment is acknowledged, no modification has been made to the stakeholder input which is believed to have been accurately recorded.	
				Overall response from Water and Land team: The revised report has substantial changes/revisions in addition to those suggested by stakeholders/reviewers. Major change is that the citation to 2007 Agricultural Water Use Development Plan (i.e., AWUDP, 2008) was replaced with Natural Resources and Environmental Management technical report (NREM, 2008). Based on NREM (2008), few tables were converted to figures and vice versa; twenty-one tables were altered/redesigned. (Tables 35, 36, 39, and 40 were converted to Figures 97, 98, 99, and 100. Figures 3, 4, 17, 18, 19, 20, 21, 64, 90, and 91 were converted to Tables 3, 4, 15, 16, 17, 18, 19, 24, 35, and 36, respectively.).	
CWRM	7	16	WL	We had consulted Commission on Water Resource Management documents (CWRM, 2003 & 2005) during early preparation of this report. No further action was taken during this revision.	
CWRM	18	26	WL	Recommendation section of the revised report already suggests testing water-harvesting technologies.	
CWRM	28	30	WL	The information was added to the report.	
CWRM	32	35	WL	DOA commented on the report and their comments were addressed accordingly.	
DOA	29	40	WL	Suggestions for ways to increase and protect water resources in Hawaii have been made in Recommendation section.	
DOA	42	52	WL	Corrected.	
DOA	53	55	WL	Information was added in the Recommendation section.	

COMMENT [2]	REF LINE# start	REF LINE# end	ISSUE[1]	ISSUE AREA RESPONSES & RECOMMENDATIONS FOR DISPOSITION	NOTES
DOA	57	58	WL	Table 9 and 7 were corrected accordingly.	
DOA	60	61	WL	Information in Table 10 was corrected accordingly.	
DOA	63	69	WL	Correction was made accordingly in Table 2.	
DOA	71	73	WL	No action was taken.	
DOA	75	77	WL	No action was taken.	
DOA	78	81	WL	Acreages classified as Agriculture for Oahu were corrected.	
DOA	83	87	WL	Corrected.	
DOA	89	90	WL	Correction was made accordingly in Table 32.	
DOA	95	98	WL	Text was added in Recommendation section accordingly.	
DOA	99	100	WL	Information in Table 16 was corrected.	
DOA	101	102	WL	No action was taken.	
DOA	104	105	WL	Corrected.	
DOA	107	110	WL	The comment was addressed accordingly.	
Ewan	7	7	WL	Efforts were made to take care of this comment.	
Ewan	8	8	WL	Text was revised accordingly.	
Ewan	9	9	WL	Data in Table 1 was distributed in Tables 1 and 2.	
Ewan	10	10	WL	No action was taken.	
Ewan	11	11	WL	No action was taken.	
Ewan	12	12	WL	No action was taken.	
Ewan	13	13	WL	The text was revised.	
Ewan	14	14	WL	No action was taken.	
Ha	9	40	WL	Comment on line 19-23. It is difficult to predict what type of organization will produce feedstock. An alternative to large, industrial type is a cooperative. That has the potential for small landowners to produce feedstock. No action was taken. Comment on line 25-35. The energy ratio of gasoline is 0.85, corn is 1.5, and sugarcane is 6 to 8. Lignocellulosic ethanol may be higher than sugarcane. Biofuels are a viable alternative if an energy ratio of 3 is used as a criterion. No action was taken. Comment on line 37-40. Renewable electricity is a form of energy, but not the only one. Energy density is an important factor that needs to be considered regarding forms of energy. Liquid fuels have much higher energy density than batteries. This is the major reason liquid fuels are used on aircraft and ships. Until electric aircraft and commercial ships are developed, liquid fuels have a role in the energy mix. No action.	WL,D,L,T,P,F,BP,Econ,Env,I
HCC	28	29	WL	Concern was added in Recommendations.	
HCC	31	34	WL	Suggestion was added in Recommendations.	WL,Env
HCC	36	37	WL	There are points added in Recommendations section that address the concern for more study on the water and land constraints.	

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HCC	39	41	WL	This is addressed in the Recommendations section.	WL,Econ, Env,I
HCC	54	58	WL	Suggestion was added in Recommendations.	WL,Econ, Env,I
HCC	59	61	WL	The land capability classifications in the report consider many factors including mechanized planting and harvesting. Amounts of biofuel that could be produced from feedstock where estimates could be made are mentioned in the report.	
HCC	65	66	WL	Concern was added in Recommendations.	WL,I
LOL	74	80	WL	No action was taken.	I,WL
NREL	111	114	WL	Defined ALISH as it appeared the first time.	
NREL	115	115	WL	Comment was addressed accordingly.	
NREL	116	116	WL	Data in Table 1 was distributed in Tables 1 and 2.	
HFBF2	30	85	WL	See introductory paragraph for response to the reviewers' comments.	
HFBF3	na	na	WL	Correction made.	
Pac Biodiesel	12	14	WL	Noted.	
Pac Biodiesel	40	41	WL	Change made.	