



76 North King Street, Suite 203  
Honolulu, Hawai'i 96817  
Phone: 533-3454; [henry.lifeoftheland@gmail.com](mailto:henry.lifeoftheland@gmail.com)

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Hawai'i Public Utilities Commission  
Kekuanao'a Building, First Floor  
465 South King Street  
Honolulu, Hawaii 96813

re: August 2, 2011 Public Hearing for AKP Biodiesel Supply Contract (Docket No. 2011-0005)

**Aloha Commissioners,**

**The Aina Koa Pono (AKP) project requires an environmental assessment as per Hawai'i Revised Statutes (HRS) §343-5 which states in part:** Except as otherwise provided, an environmental assessment shall be required for actions that: ...(9) Propose any ...(D) **Oil refinery**"<sup>1</sup>

**Clearly AKP is processing crude oil into refined products:** "AKP will produce biodiesel, biogasoline and electric energy from biomass in a **biorefinery** project to be located on the island of Hawai'i in the Ka'u District."<sup>2</sup>

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<sup>1</sup> HRS §343-5(a)(9)(D)

<sup>2</sup> HECO Application p.6

## HECO's Application

Section C (Due Diligence) of the Biodiesel Supply Contract states:

"In addition to internal review by Hawaiian Electric and HELCO personnel, Hawaiian Electric contracted with Det Norske Veritas ("DNV") to conduct an independent third party due diligence review of AKP's proposal for the Island of Hawai'i. DNV's report is being provided as Exhibit G. AKP contracted Herty Advanced Materials Development Center ("Herty"), to conduct independent due diligence for submittal to the potential financiers of their Project. ... The Herty report is being provided as Exhibit H. Both of these reports recognize the risks and challenges of bringing a nascent technology to commercial scale."<sup>3</sup>

Section D (Key Provisions) of the Biodiesel Supply Contract states: "Life Cycle Assessment: Within two (2) months from the Execution Date, AKP will provide HELCO with a Life Cycle Assessment of the environmental impact of their Project plan performed by an independent third party using an industry-accepted model. The Life Cycle Assessment results must show that AKP's Project achieves at least a fifty percent (50%) favorable reduction in greenhouse gases over the petroleum diesel currently used by HELCO."<sup>4</sup>

## Det Norske Veritas ("DNV")<sup>5</sup>

Aina Koa Pono (Big Island) Biofuels Proposal Assessment (28 December, 2010)  
(Revision No: 04)

"The DNV evaluation team evaluated the local biodiesel production proposal submitted by AKP according to 6 main criteria: ...Environmental and Social Impacts"<sup>6</sup>

"Social and Environmental Impact: According to DNV, all the statements in this proposal are of a general and "positive" nature however there is no documentation that any quality management systems are in place. **Data and documentation is also missing regarding 1) whether stakeholder engagements are in place, 2) whether there are plans for environmental improvements, and 3) whether the team has a true understanding of farming the feedstock.**

The team claims to have a high level of community support and is confident they will be providing several hundred high-paying job opportunities. The team also claims they will be retaining employees already working on the land in addition to sponsoring local events and implementing community projects and funding developments to improve infrastructure.

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<sup>3</sup> HECO Application, p.39

<sup>4</sup> HECO Application, p. 46

<sup>5</sup> HECO Application, Exhibit G

<sup>6</sup> DNV p.2; HECO Application pdf p.187

However, **there is no supporting documentation to this effect.**

Finally, **the proposal does not present an appropriate methodology for assessing the LCA and/or GHG footprint of the project.** AKP used an inappropriate scope, designed for a different process/project-type. AKP used the GREET model, but assumptions and calculations input into the model are not transparent and **the result ("100% reduction in CO2") is questionable.**<sup>7</sup>

"Issues Log: In accordance with DNV's understanding of the overall objective set out by HECO, the following issues have been flagged for further review. ...

Issue 3: Social and Environmental Impact.

**Finding:** Regarding the environmental and social impact of the proposed project, **DNV was unable to conduct a detailed assessment.** The risk assessor noted a strong concern with the submittal of Life Cycle Assessment data which pertained to a project unlike that of the one proposed by AKP.

**Status:** **The assessor requested additional details** on results of baseline surveys and details of an LCA which uses assumptions appropriate for AKP's project type.<sup>8</sup>

### **Exhibit H: Herty Report**

Phase 1: Assessment of Bionic Microfuel Technology (November 9, 2010)

"Aina Koa Pono LLC ("AKP") is considering an investment in Bionic Fuel Technology's ("BFT") microwave liquefaction technology and desires to obtain additional information on the BFT process technology to produce a synthetic diesel and biochar. AKP desires an objective assessment of technology and key contributors to pro-forma business plan. The role of HERTY is to review data provided by BFT, comment on the current state of development of the BFT Technology and, on a high level, compare the BFT technology to other currently available biomass to gasification and biomass to liquids technologies."<sup>9</sup>

"Environmental Emissions: **Herty was not provided with data to assess environmental emissions.**"<sup>10</sup>

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<sup>7</sup> DNV p.9; HECO Application pdf p.194

<sup>8</sup> DNV p.10; HECO Application pdf p.195

<sup>9</sup> Herty Report p.4; HECO Application, pdf p.201

<sup>10</sup> Herty Report p.32; HECO Application, pdf p.229

## **The AKP Team**

According to the AKP website, the Aina Koa Pono's Team includes: (1) MELE Associates, Inc.; (2) AECOM; (3) North Shore Consultants; (4) Bionics Fuel Technologies AG (BFT) which "will assist 'Āina Koa Pono with biorefinery operations and provide its patented technology;" (5) "Eichleay which will "design and build the biorefineries in Hawai'i;" (6) ThermoChem Recovery International, Inc. (TRI) which will "provide their patented steam reforming technology;" and (7) TekGar which will provide the "underlying technology ...called thermo catalytic depolymerization. ...[which] has only recently become commercially viable when bionics made a critical breakthrough by employing pulsed microwaves as the primary source of reaction energy in combination with a zeolite catalyst."

Perhaps confusing is the fact that various members of the AKP team appear to contradict each other.

Dr. Doug Van Thorre, Executive Vice President and Chief Technology Officer of AKP Team member TekGar LLC submitted written testimony to the Commission on August 2, 2011: "It has come to my attention that there is much confusion with regards to the technology, which we have developed. **Our design is not** a biomass combustion or **pyrolysis process**. TekGar's process is based on the fact that microwaves can be used in conjunction with a catalyst, to depolymerize long chain hydrocarbons into shorter chain hydrocarbons in the diesel range."

The Bionic Group (in Germany represented by BFT Bionic Fuel Technologies AG) "has further developed a process for the catalytic depolymerization of hydrocarbons. ... Bionic calls this improved process microwave depolymerization (MWDP). In fact MWDP is **a combination of two proven basic processes**: (1) thermo catalytic depolymerization and (2) **microwave pyrolysis**. Through the integrated parallel application of both technologies surprising product yields and qualities could be achieved, which are not possible with any one of the two individually."<sup>11</sup>

The TekGar LLC website states that the "benefits of our process include the following: produces a fully competitive high quality diesel [at a] cost per gallon of diesel produced between \$0.52 and \$0.58 US\$ without government subsidies."<sup>12</sup>

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<sup>11</sup> <http://bionic-world.de/en/technology/>

<sup>12</sup> <http://www.tekgar.com/>

The TekGar LLC website also alleges that states that "the use of pulsed microwave [] is an exceptionally environmentally friendly method to heat the reaction mass in a homogeneous way. The hybrid design of the energy supply uses the available heat from the included combined heat and power (CHP) system to preheat the feedstock and the radiation power of the microwaves for the short term heating up to reaction temperature. []

The long life magnetrons are maintenance-free over their complete life span of more than 10,000 hours." (One year = 8,700 hours) "Their replacement is very cost-efficient and required only approx. every 18 months. Against wide spread belief energy application by microwave radiation has a very high degree of efficiency. Because of the predetermined bundling of the radiation power industrial microwave applications are not comparable with units known from household use. The reactor is equipped with a complete **electromagnetic shielding** and avoids, through an additional housing of the whole unit, any **hazardous microwave leakage** or scattered radiation."<sup>13</sup>

### **Eichleay Report**

On April 7, 2011, HECO filed the Eichleay Engineers Inc.'s "Life Cycle Assessment" (Eichleay Report) with the Commission.

The Eichleay Report is not dated.

The only reference to the Herty Report was in the list of references found on the last page of the report.

The highly critical Det Norske Veritas ("DNV") was not cited and did not even make the reference page. As noted above, for this application DNV stated that the use of "the GREET model [] is questionable."<sup>14</sup>

There was no analysis of the shortcomings listed in the Herty and DNV reports.

The Eichleay Report does not fulfill the due diligence requirements of Section C of the Biodiesel Supply Contract which states: "to conduct an independent third party

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<sup>13</sup> <http://www.tekgar.com/process.php>

<sup>14</sup> DNV p.9; HECO Application pdf p.194

due diligence review of AKP's proposal" since Eichleay Engineers Inc. is a member of the AKP team.<sup>15</sup>

"Limitations: The following are a list of limitations that reduce the accuracy of the GREET model for the selected process.

5. Available data on the specific GREET pathway selected are very limited.

According to Argonne, the default data in GREET are based on two previous reports and no research has been done to validate these simulation values. ...

7. GREET has been acknowledged as being not conducive to customization by user experts.

8. CO<sub>2</sub> absorption by planted feedstock cannot be quantified due to complexity and time required to derive empirical data via research, so estimation of carbon absorption of plants will be utilized for calculations."<sup>16</sup>

Parameters: In order to reasonably simulate realistic emission values of a bio-refinery production plant, the specific equipment that will be constructed for the plant must be input into the GREET model. However, customization of the GREET model for new technology is not feasible without additional analysis and manipulation of the model primary parameters, so the majority of the inputs were left as default values for a biomass to Fischer-Tropsch diesel (FTD) model, which closely resembles the microwave depolymerization technology applied behind this project. It should be noted that GREET does not have the flexibility to adjust technology options if is not already built into the model."<sup>17</sup>

"The increase in emissions in the GREET bio-refinery model are most likely due to the limitations in the GREET model which is based on a gasification process. However, when the emission results from the feedstock production process is considered, GREET demonstrates that there is a significant "credit" due to the fact that in the bio-refining process, the feedstock is a crop that absorbs CO<sub>2</sub> while growing. This CO<sub>2</sub> credit is a factor of 3-12 times the emission quantity from the fuel production. The results indicate that all CO<sub>2</sub> and GHG generated are completely offset by CO<sub>2</sub> credits derived from biomass growth."<sup>18</sup>

The vast majority of CO<sub>2</sub> in the atmosphere-vegetation-soil system is found in the soil, but the GREET Model assumes that plant does not uptake the CO<sub>2</sub> from soil, only from the air. Thus, according to the model, CO<sub>2</sub> released into the air came from the air.

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<sup>15</sup> <http://www.ainakoaponono.com/about-team.html>

<sup>16</sup> HECO Filing dated April 7, Exhibit A, Eichleay Report, p.10

<sup>17</sup> HECO Filing dated April 7, Exhibit A, Eichleay Report, p.11

<sup>18</sup> HECO Filing dated April 7, Exhibit A, Eichleay Report, p.17

"The following are a list of key assumptions made while running the GREET model for the selected pathways. ...Carbon in the feedstock is completely from atmospheric CO<sub>2</sub>. This mass balance of carbon shows that all carbon-containing emissions that result from biomass processing must have come from the plant, which in turn, must have come from the atmosphere."<sup>19</sup>

Nitrogen fertilizers are a major source of greenhouse gases in agricultural operations. "Agricultural inputs ...contains default values for fertilizer use, farming energy use, and N<sub>2</sub>O emissions from biomass and fertilizers. All default values were left for agricultural assumptions."<sup>20</sup>

### **Environmental Impacts**

"Hawaiian Electric developed its Environmental Policy for the Hawaiian Electric Company's Procurement of Biodiesel from Palm Oil and Locally-grown Feedstock ("Hawaiian Electric-NRDC Policy"). The policy was developed in conjunction with the Natural Resources Defense Council ("NRDC")."<sup>21</sup>

NRDC Report: "We find no reason to assume that other vegetable oils will necessarily be a more sustainable choice, since cultivation of other oil feedstocks can also result in significant environmental harm."<sup>22</sup>

AKP has not identified the specific crops they will rely on. This is important because the growing and harvesting of different crops have different environmental impacts.

"Hawai'i Agriculture Research Center ("HARC") will be utilized in varietal testing of the possible feedstock for the AKP Project, including sweet sorghum and other perennial crops, as well as the refinement of farming methodologies for growing AKP's feedstock. Since the TekGar technology has flexibility in accepting a variety of feedstock, AKP can supplement the sweet sorghum production with other biomass resources including eucalyptus trees, other forage crops and agricultural wastes already available on AKP's leased land. AKP plans on using lands formerly used for commercial-scale agricultural with proven commercial crop production methods."<sup>23</sup>

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<sup>19</sup> HECO Filing dated April 7, Exhibit A, Eichleay Report, p.9

<sup>20</sup> HECO Filing dated April 7, Exhibit A, Eichleay Report, p.11

<sup>21</sup> HECO Application p.26

<sup>22</sup> NRDC Report p.2; HECO Application, pdf p.153

<sup>23</sup> HECO Application, p.38

## **Energy Industry Information Reporting Act (HRS 486J)**

"Biofuels' means liquid or gaseous fuels produced from organic sources such as biomass crops, agricultural residues, and oil crops, such as palm oil, canola oil, soybean oil, waste cooking oil, grease, and food wastes, animal residues and wastes, and sewage and landfill wastes. ...

'Refinery' means any industrial plant, regardless of capacity, processing crude oil feedstock and manufacturing oil products."<sup>24</sup>

### **Summary**

Building a refinery triggers the Hawai`i environmental review law (HRS 343).

AKP proposes the first commercial test of a variety of patented new technologies including industrial-scale pulsed microwave pyrolysis.

Analyzing the potential environmental and cultural impacts is the reason HRS 343 was enacted in the first place.

Mahalo,

Henry Curtis  
Executive Director

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<sup>24</sup> [http://www.capitol.hawaii.gov/hrscurrent/Vol11\\_Ch0476-0490/HRS0486J/HRS\\_0486J-0001.htm](http://www.capitol.hawaii.gov/hrscurrent/Vol11_Ch0476-0490/HRS0486J/HRS_0486J-0001.htm)