



AINA KOA PONO



## **Bio-Fuel Initiatives- Hawaii**

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**HEPF Briefing**

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# Introduction

- 85% plus of Hawaii's energy is from imported fuel
  - Geothermal, Wind and solar are partial solutions
- Hawaii's Businesses are very vulnerable to energy price fluctuations
  - Witness the current recession caused by Oil price spikes in 2008
  - Global Demand will increase prices further. Oil prices have increased by \$20 per barrel in the last 3 months.
- Hawaii's Infrastructure is based on liquid fuels
  - Power Production
  - Transportation
- \$2.50 of every dollar for fossil fuel goes out of the State
  - Equates to \$5 Billion per year
- The State's policy is to convert into Sustainable Energy (Governor's New Day Program)

# Biofuel Prospects

Hawaii can meet its RPS standards and biofuels can assist to get this done.

To accomplish this, we need the following to happen:

- Need Administration's commitment to developing incentives such as tax credits to ensure that biofuel projects can be financed and built.
- Demand needs to be created for biofuels in transportation through legislation requiring a 10 – 15% biofuel requirement for transportation fuels
- Electric utilities must be allowed to pass through the higher cost of biofuels to their customers
- Fallow land must be made available for production of feedstock from state owned as well as private landholdings
- PUC and CA approval needs to be fast tracked for electricity production
- Environmental permitting must be fast tracked to enable construction of plants quickly within regulations and the law
- Need long term offtake agreements (20 years) to be able to finance projects

## Biofuel Technologies Available

There are three basic technologies which can be used to produce biofuels;

- Transesterification of waste oils, palm and jatropha oil, and fats
- Gasification of biofeedstock followed by Fischer Tropsch processing of the syngas to liquid fuels
- Microwave Depolymerization of biofeedstock to liquid fuels and biochar

## The Aina Koa Pono Solution

- Possible to convert biomass into oil using process called Thermal Depolymerization where long chain hydrocarbons can be reduced to shorter chain hydrocarbons in the gasoline, jet fuel, and diesel fuel range
- Using catalysts it is called Thermo Catalytic Depolymerization (TCDP), a process that has been successfully used since the early 1940's to improve the yield of oil refineries
- AKP has combined TCDP with the independent cracking and depolymerization abilities of certain high frequency microwaves and a huge leap forward known as Microwave Depolymerization or MWDP
- As a result we have developed highly efficient and economical MWDP plants for the synthetic production of clean liquid fuel products from biomass and waste which can now be used in today's engines without any modifications

## Raw Products....

Raw Products After MWDP Processing



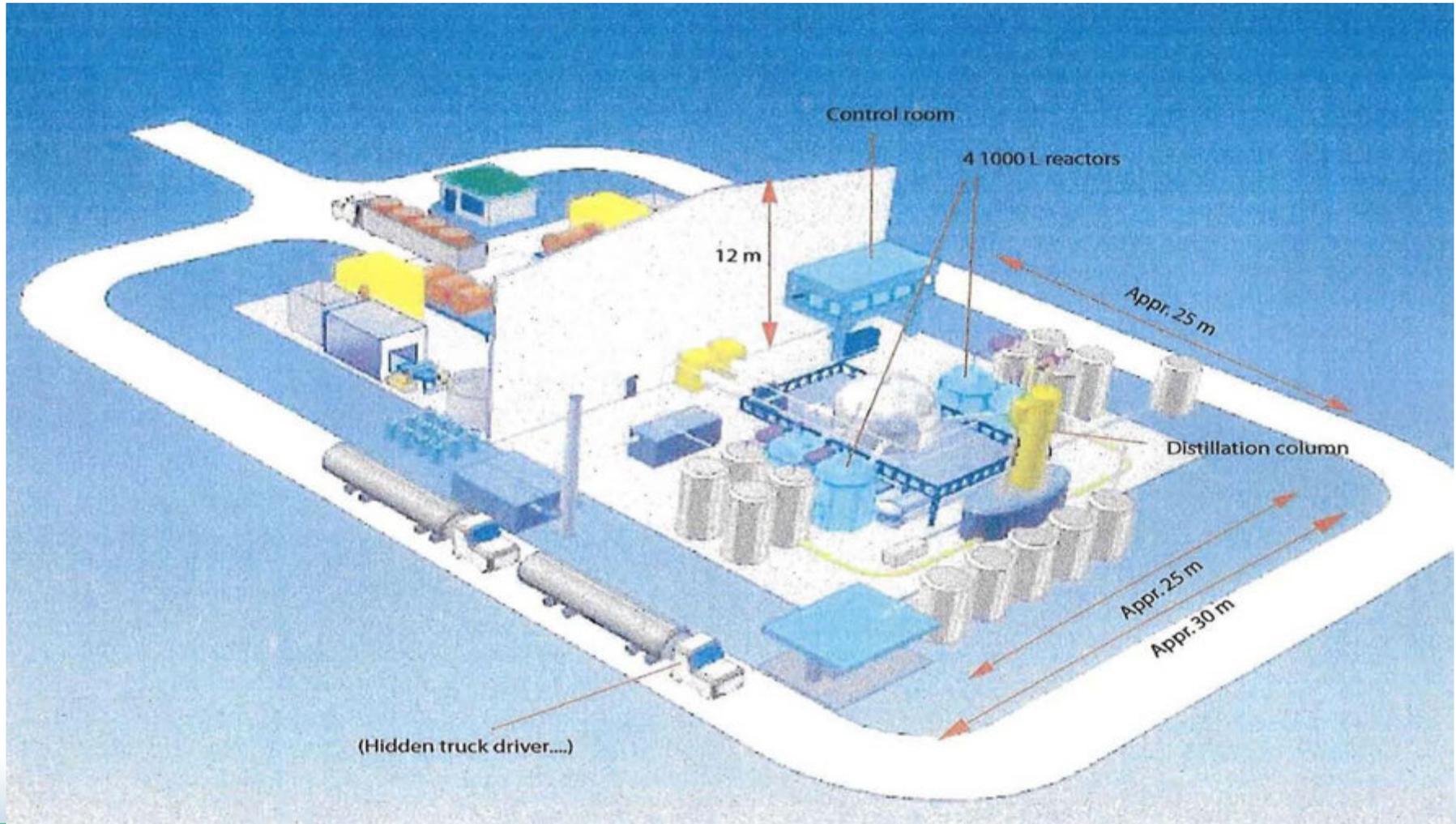
Biogasoil



Biochar

(a processing plant generates no further residues except water, emissions are limited to exhaust gas from CHP)

## Microfuel Plan Model - 300 dtpd plant



## Feedstock

AKP has tested various feedstock for use in our Ka'u plant:

- a. Eucalyptus
- b. Bana Grass
- c. Christmas Berry
- d. Sugar Cane Bagasse
- e. Sweet Sorghum

Each produced different quantity and quality of liquid fuels.

We will initially be using existing landcover for our production and then converting to eucalyptus and perennial grasses for long term production

We will be working with HARC to develop optimum feedstock for our biorefinery

Our tests have indicated that depending on the feedstock used we get the following outputs per ton of feedstock

- 30 to 35% oils and phenols ( approximately 80 gallons per dry ton of biomass)
- 10 to 20% non condensable gases
- 30 to 50% biochar (600 to 1000 lbs per ton of biomass)

## HAWAII Potential Projects:

- Ka'u - 900DTPD plant – 12,800 acres under lease – eucalyptus and Grass – 24,000,000 MGY
- Oahu/Kalaheo – 600DTPD Plant – Construction and Demolition lumber – 16,000,000MGY
- Maui – 900-3300 DTPD Plant – up to 30,000 acres proposed – Perennial grass – 8,000,000 to 72,000,000 MGY
- Kauai – 900 DTPD plant – woody biomass and perennial grass - 24,000,000 MGY
- Total jobs potential – 3,000,000 construction labor hours over 5 years and 2000 permanent jobs for 20 to 30 years
- \$2,000,000,000 project costs

## Advantages of Technology

- High production and thermal efficiency (80 gallons per ton of biomass - 2,400-3,000 gallons per acre)
- Multiple Process Trains— therefore minimal down time – easier maintenance scheduling
- Modular – applicable to smaller land areas or small developments easily scaled up – in modules of 300 DTPD(8 MGY) – can go as small as 75 DTPD (2 MGY )
- Multiple Products – synthetic diesel, aviation fuel, gasoline
- One step process – smaller industrial site
- 30 month development schedule without Char boiler
- Quality of diesel produced – 140,000 BTU/gallon

## CONCLUSION

- We have a number of potential projects underway starting with Ka'u project
- Meets the requirements of the HCEI and will help HECO/KIUC meet their renewable energy commitments
- There is enough fallow land in Hawaii for energy independence for electricity and transportation fuels except jet fuel
- Biochar produced can also boost agricultural productivity
- Biofuel characteristics identical to existing infrastructure so no need for expensive infrastructure development , is a “drop in” substitute fuel.
- Local biofuel industry will provide price stabilization and Hawaii will not be vulnerable to world affairs or markets.
- Will keep dollars for fuel in Hawaii, \$5B per year at \$100/barrel
- Will create substantial jobs in construction and agriculture sectors as well as for plant operations
- Will assist in boosting State's economy and eliminating budget deficits
- Need Administration and legislative support for financial incentives and demand creation to induce equity investment in the projects