

ClearFuels Technology Inc

Sustainable Thermochemical Conversion for Production of BioFuels

Kickoff Meeting-Hawaii BioEnergy Master Plan
May 2008



Biofuels conversion technologies

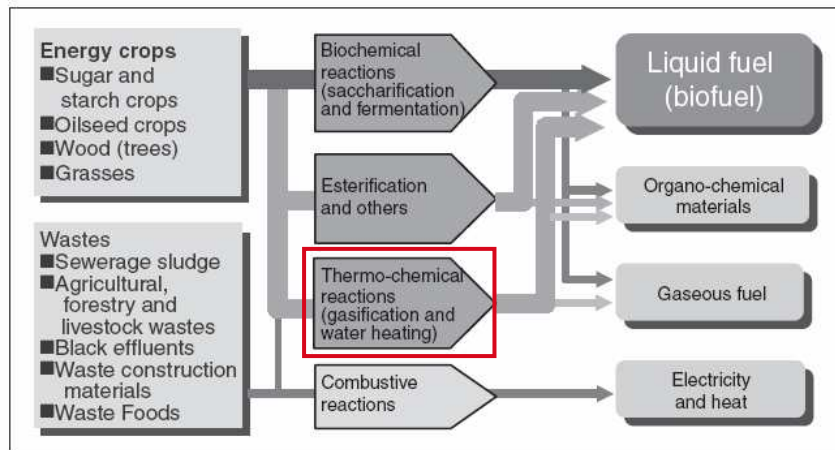


Figure 2 : Raw materials and use for biomass-related technologies

Prepared by the STFC based on Reference^[6]

From Science and Technology Trends



Biofuels thermochemical conversion technologies

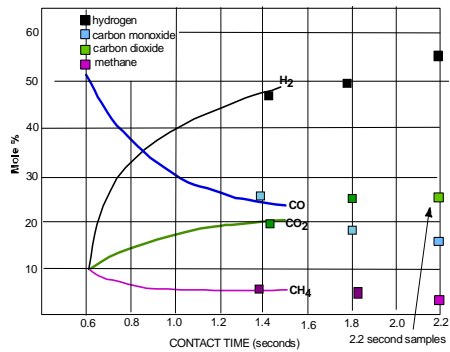
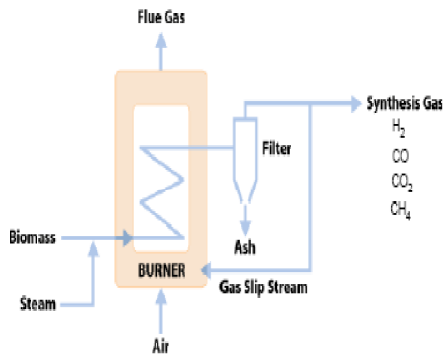
Technologies Examined – Thermochemical Processes

- ▶ Pyrolysis/Steam Reforming – no air or oxygen
- ▶ Gasification – with air or oxygen
- ▶ High Temperature Gasification >3500 F with air or oxygen
- ▶ Thermal Pyrolysis – no oxygen or air
- ▶ Thermal Oxidation – combustion at or near stoichiometry
- ▶ Integrated Thermochemical Conversion/Oxidation)
- ▶ 13 Developers Examined



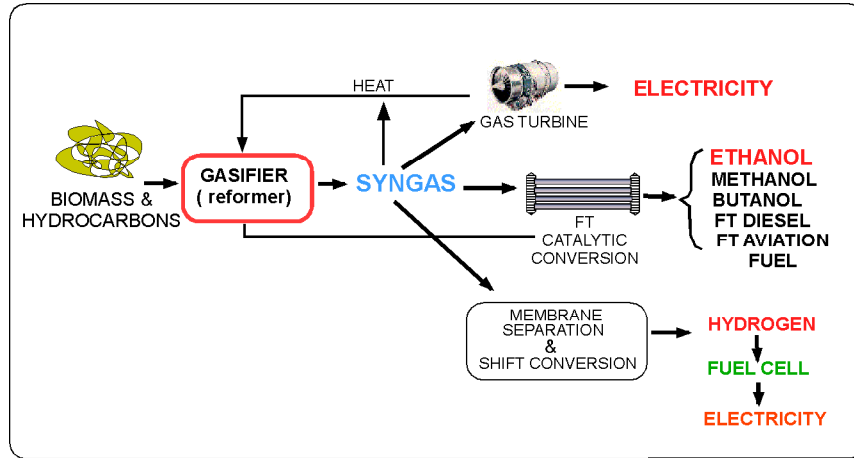
CLEARFUELS CONVERSION TECHNOLOGY : Steam Reformer

- * Can use wide variation of cellulosic feedstocks
- * Controllable H:CO syngas ratio output
- * Very low tar syngas
- * Can produce multiple renewable energy products





CLEARFUELS CONVERSION TECHNOLOGIES : Options



CLEARFUELS CONVERSION TECHNOLOGIES : Projected commercial conversion rates and relative values

Value per dry ton Biomass

<u>Product</u>	<u>Amount</u>	<u>Price</u>	<u>Value</u>
Cellulosic ethanol (gal)	120	\$2.40	\$288.00
hydrogen (lbs)	147	\$1.14	\$167.58
power (kWhrs)	1244	\$0.16	\$199.04
Renewable diesel + kWhrs (gal)*	60	\$3.00	\$180.00

*plus 8kwhrs/gal power for export



BUSINESS: ClearFuels Technology Inc

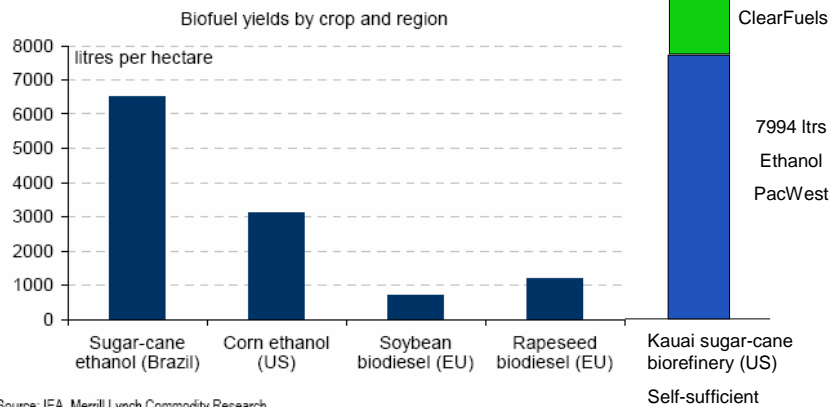
ClearFuels business is to develop, commercialize and operate sustainable biorefineries using cellulosic biomass to produce syngas, power, cellulosic ethanol, renewable diesel and other energy products for sale at competitive costs.

- Novel proprietary reformer design allows for control of syngas to produce multiple renewable energy products
- Cellulosic biomass as feedstock; No food vs fuel issues
- Cellulosic byproducts of sugarmills and sawmills; No new energy crop land use issues
- Produce own power and syngas from biomass; Net zero or net negative CO₂ emissions at high energy conversion ratios
- Co-location at sugar mills and sawmills; low feedstock transportation costs, integration for lower capital costs



Biofuels Integrated Biorefinery potential net yield comparison with existing technologies

Chart 31: Biodiesel is a particularly land-intensive product when compared with corn or sugar-cane ethanol





THANK YOU

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