HARC

CROPS TO FUEL

- BIOFUELS– ENERGY CROPS

BIODIESEL

soybean, canola, cotton seed, sun flower
peanuts, corn, jatropha, caster bean, algae

palm, kukui, coconut, neem, avocado

vegetable oil + fiber

ETHANOL

corn, sorghum, sugarcane, grass hybrids

sugar, starch, fiber (lignocellulose)

ADVANCED FUELS (jet fuel)

JATROPHA

- Small tree -Hedge
- Harvest like coffee, mac nuts?
- Erosion control
- 1 fruiting cycle per yr up to 3 possible-water
- Ok in drought, slope, high Temp, ~pH
- 2 to 3 years to production
- Breeding,agronomic?

LIGNOCELLULOSE sources

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terawatts

World demand 15

Biomass 9(92)

Wind 20(190)

Hydroelectric 1.6(4.7)

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LAND

San Jose, CA—46,000 hectares

Solar	7,500
Biom	270,000
Wind	53,000
Coal	3,800
Hydro	1,300
Nuclear	4,200

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ENVIRONMENTAL

CO_2 output: Kilowatt-hour (liters)

Solar	26	Coal	530
Biomass	21	Nat. Gas	330
Wind	6.7	Oil	500
Hydro	11	Nuclear	17

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WATER

1 Kilowatt-hour (liters)

Solar(PV)	0
Solar(thermal)	3.2
Biomass	360
Wind	0
Hydro	17
Geothermal	5.3
Coal	1.9
Nat. Gas	0.6
Oil	1.6
Nuclear	2.6

TRADE OFFS

LAND USE
ENVIRONMENT
WATER
COMMUNITY TOLERANCE
ECONOMICS