



BIOENERGY OPPORTUNITIES AT GAY & ROBINSON



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President, Gay & Robinson, Inc.

Alan Kennett & Gay & Robinson



- President and CEO of Gay & Robinson, Inc.
- Gay & Robinson, Inc. is 7,500 acre sugar cane plantation and sugar mill located on the island of Kauai, Hawaii
- G&R is one of only two remaining sugar operations in Hawaii, the other is HC&S on Maui.
- G&R currently produces approximately 50,000 tons of raw sugar per annum.
- Highest yielding sugar plantation in sugar per acre, over 7 tons per acre per year
- Sugar production shipped to C&H refinery in Crockett, CA for refining.

Hawaiian Sugar Cane



State Policy Support



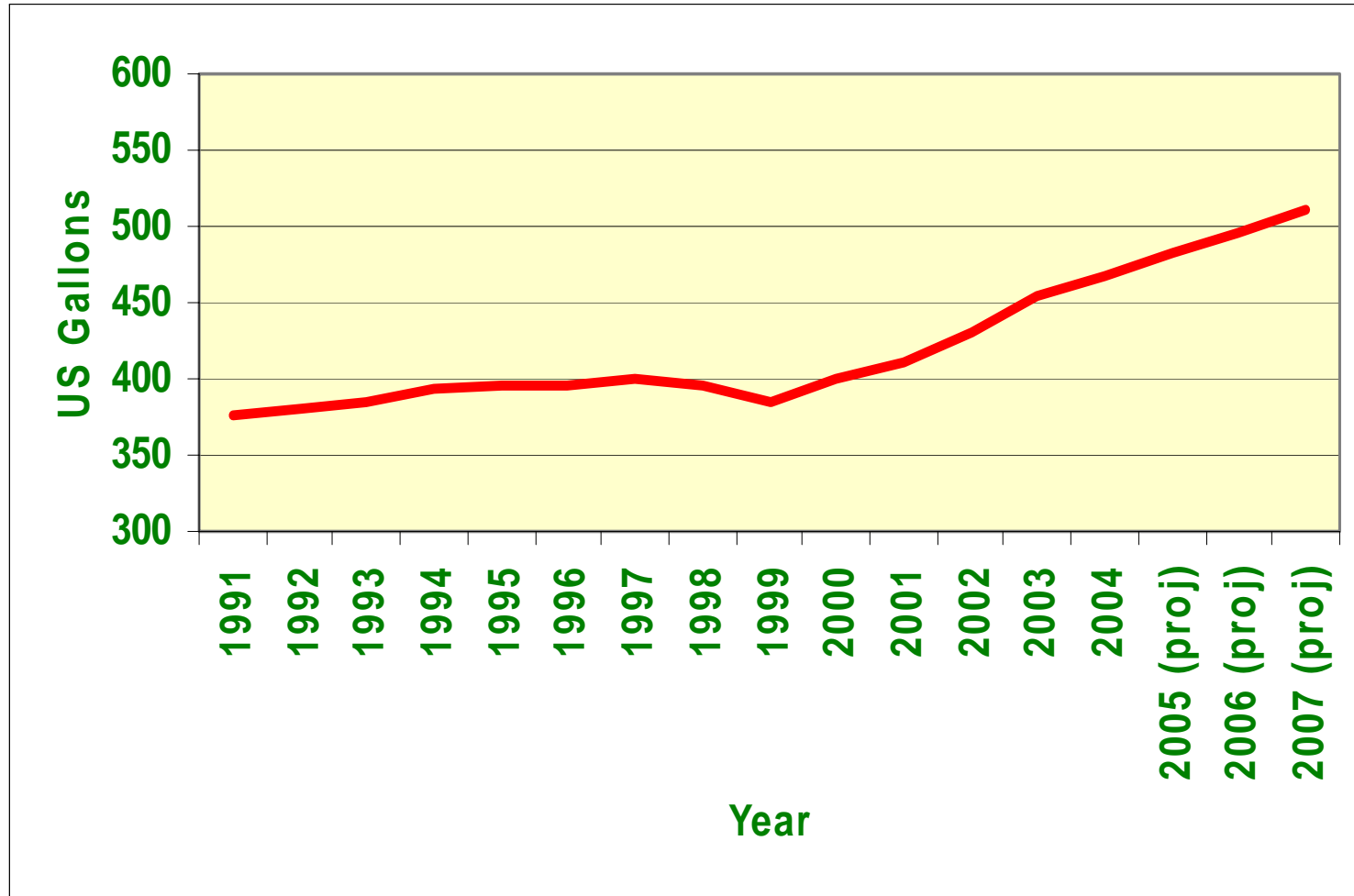
- State Ethanol Blending Mandate – 10% ethanol as of April 2, 2006
- State Refundable Ethanol Production Investment Tax Credit
 - \$0.30 per gallon of capacity, 8 years, up to 15 MM GPY (\$36 MM)
- Renewable Portfolio Standard requiring “green” energy
- Reduced motor fuel taxes for ethanol and biodiesel
- Price Preference for biodiesel in State contracts (\$0.05)

Ethanol & Hawaii

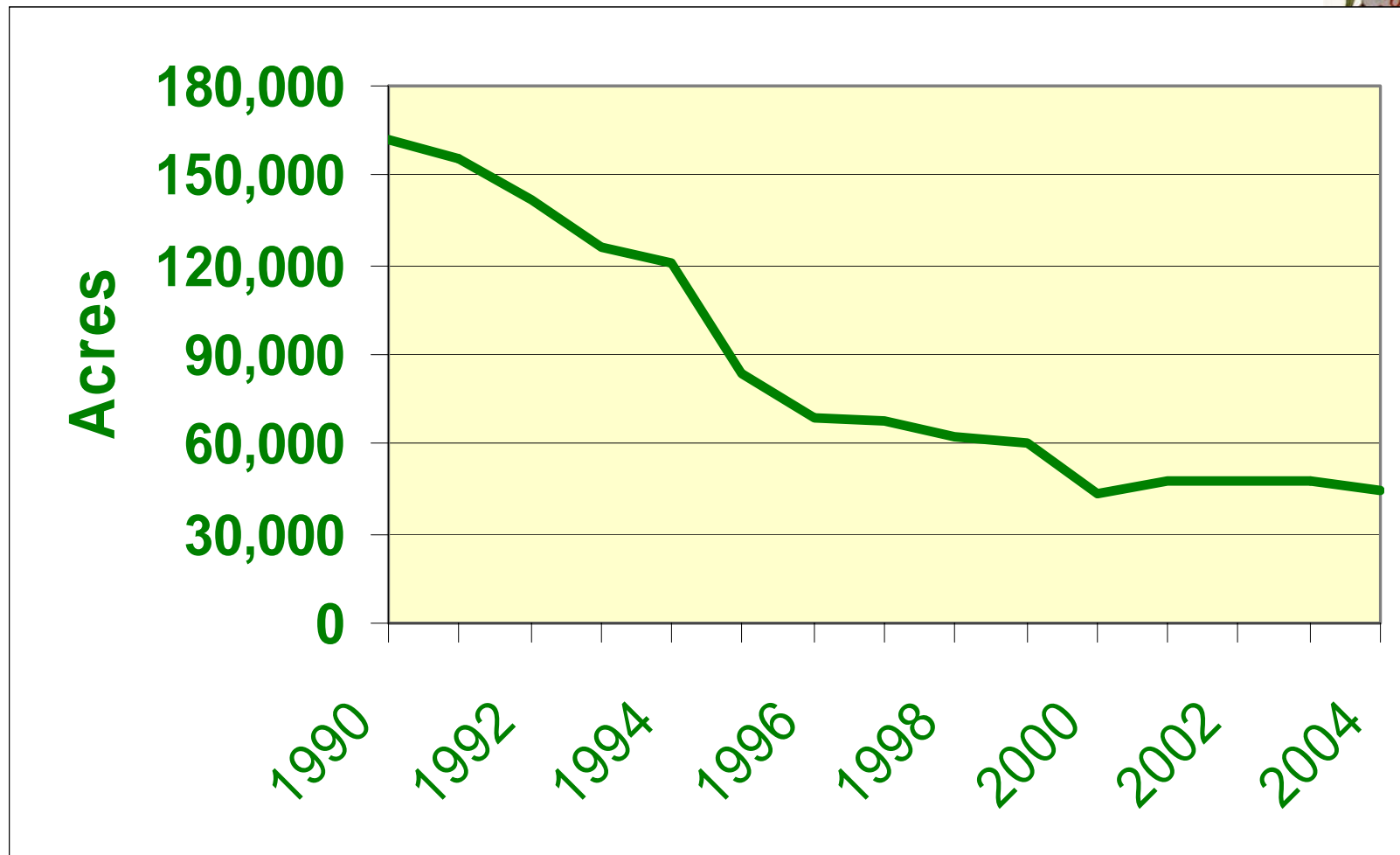


- Importation of all Transportation Fuels
 - 450+ MM GPY Gasoline
 - \$1+ Billion per annum flowing out of Hawaii from gasoline alone.
- Highest Gasoline Prices in US
 - \$0.25 - \$0.35 per gallon above US West Coast
- Declining Agricultural Sector (Sugar)
 - Good Potential for Ethanol Production
- Government Policy since early 1990's has been to promote renewable energy sources and to lessen dependence on imported petroleum.

Gasoline Consumption



Decline in Sugar Cane Lands



Federal Policy Support



- \$0.10 per gallon Small Producer Tax Credit
- Renewable Fuel Standard – 7.5 billion gallons by 2012
- Open & Closed Loop biomass to energy tax credits
 - \$0.019 per kWh if crop dedicated to energy production
- Sucrose to Ethanol Incentives in Energy Bill
 - Grant Program for sugarcane to ethanol
 - Awaiting appropriations
 - Loan Guarantees for sugarcane to ethanol production
 - Awaiting governing regulations
- Potential additional incentives as part of next Farm Bill
- Government mandate to purchase biofuels, if available

Location Benefits



- Local ethanol enjoys \$0.15 - \$0.25 per gallon freight advantage over imported ethanol (varies by island).

Opposite is the case for sugar:

- Hawaii sugar producers incur \$0.0125 per lb. discount off #14 contract price (location discount).
- Freight and handling to CA cost \$0.025 per lb.
- Total impact is discount of \$0.0375 per lb. meaning a #14 contract price of \$0.2125 per lb. will yield only \$0.175 per lb. to Hawaii producer.

Operational Advantages



- Sugar cane to ethanol requires less steam and electricity than sugar production
- Excess energy can be converted to electricity and sold to utility
 - Highest electricity rates in US
- Sugar cane to ethanol will enable cane trash to be utilized for additional energy production, reducing cane burning

Conversions



- 14 lbs. of sugar = 1 gallon of ethanol
- 1 short ton of sugar = 142.9 gallons of ethanol
- 1 ton molasses @ 50% fermentable sugars = 71 gallons ethanol
- 1 ton of bagasse = 1 barrel of oil (equivalent energy)
- 1 ton coal = 3.4 tons bagasse (equivalent energy)

Sugar vs. Ethanol Revenue



- Current Sugar
 - 7 tons sugar per acre @ \$0.175 per lb. = \$2,450 per acre
 - Molasses @ \$76 per ton = \$258 per acre
 - Total revenue \$2,708 per acre
- Current Ethanol (traditional fermentation technology)
 - 7 tons sugar & molasses equivalent to 1,100 gallons ethanol
 - 1,100 gallons ethanol @ \$2.70 per gallon = \$2,970 per acre
 - Additional electricity production = \$295 per acre
 - Federal tax credit (\$0.10 per gallon) = \$110 per acre
 - Total revenue \$3,375 per acre

Ethanol creates floor value for sugar as energy, that is increasing in value

Kauai Project Summary



- Invest in efficiency improvements in mill & ag operations
- Expand sugar cane cultivation (G&R, Kekaha, adjacent farms)
- Install new sugar processing equipment (natural & white sugar)
- Modify boiler
- Install new TG for energy production
- Construct Ethanol plant(s) – 15 MM GPY & 12 MM GPY
- Install new boiler
- Integrate Pearson Technology

Total Project Budget \$90 - \$100 million

New Technology Application



- G&R is working with Clear Fuels Hawaii to convert sugar cane bagasse (the fibrous residue after squeezing the juice from the cane, currently burned in furnace type boilers for steam) to ethanol.
- Applying the patented Pearson Technology
 - Gasification of the bagasse to syngas
 - Catalytic reaction converts syngas to ethanol
 - Expect process guarantees from major engineering firm in 2007 (pilot plant in Mississippi successfully operated)
- After successful installation of Pearson Technology opportunity may exist for G&R to switch to coal for steam & electricity production and convert bagasse to ethanol for automotive and power production.

Demo Plant – 50 BDT per Day

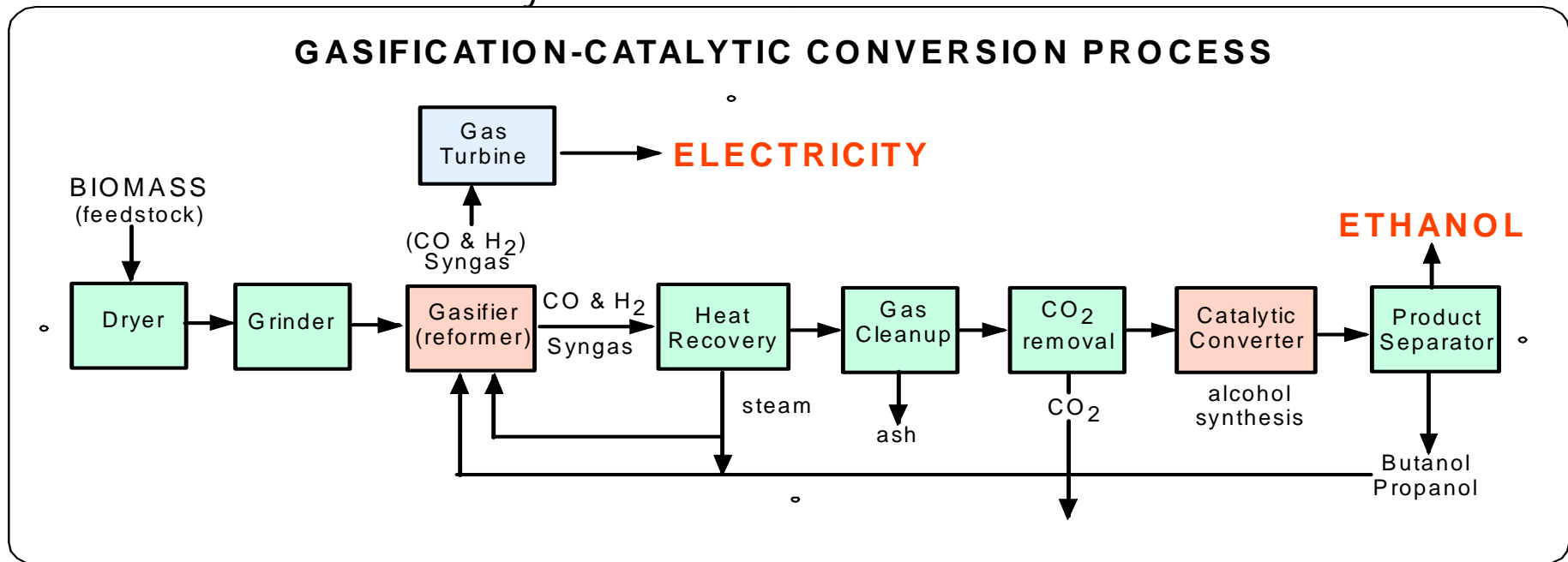


Pearson Technology



The PTI technology consists of three primary processes:

- ***Biomass preparation:*** drying and grinding of biomass for the gasifier
- ***Gasification/reformation:*** biomass feedstock is gasified by steam reformation. The PTI process allows tight control of resultant syngas mixture.
- ***Gas-to-Liquids Conversion:*** syngas (CO and H₂ mix) is transformed, via a series of catalyzed reactions into ethanol.



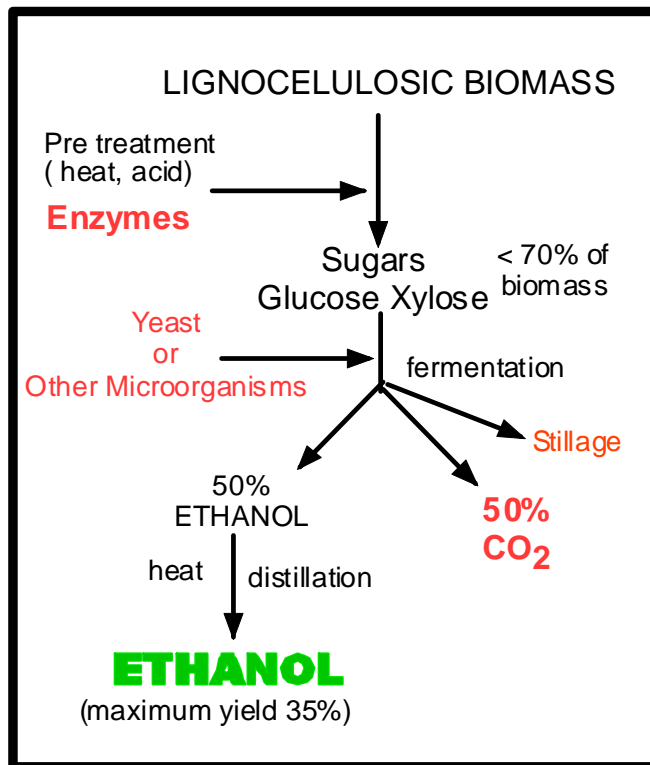
G&R Surplus Bagasse



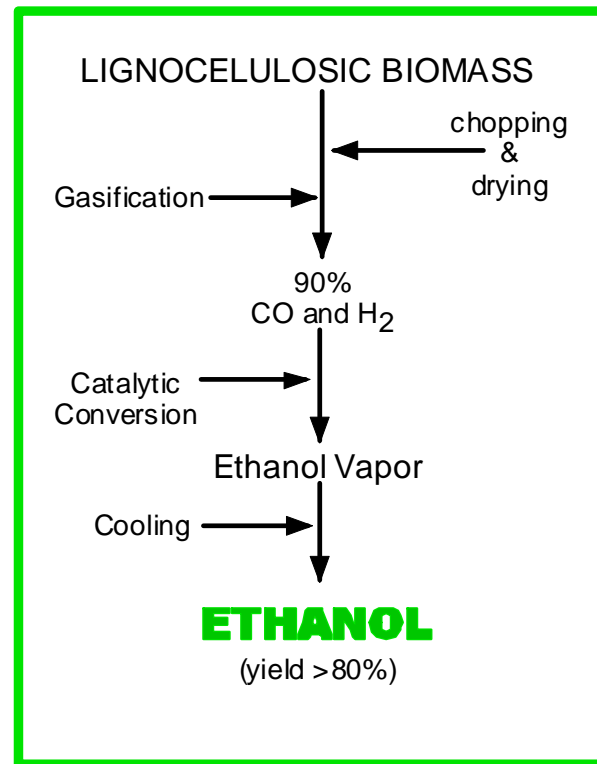
Cellulosic Ethanol



SACCHARIFICATION - FERMENTATION TECHNOLOGY



GASIFICATION - CATALYTIC CONVERSION TECHNOLOGY



Revenue Comparison w/ Pearson



- Maintain 1,100 gallons per acre from juice = \$2,970 per acre
- Convert 15 tons bagasse per acre
 - 50% moisture, yields 7.5 bone dry tons
 - Yield of 125 gallons per bone dry ton = 937.50 gallons per acre
 - 937.50 gallons per acre @ \$2.70 per gallon = \$2,531 per acre
- Convert field trash (leaves, tops, etc.) – equivalent to 15.2 tons bagasse
 - 50% moisture, yields 7.6 bone dry tons
 - Yield of 125 gallons per bone dry ton = 950 gallons per acre
 - 950 gallons per acre @ \$2.70 per gallon = \$2,565 per acre
- Total Revenue per acre = \$8,066

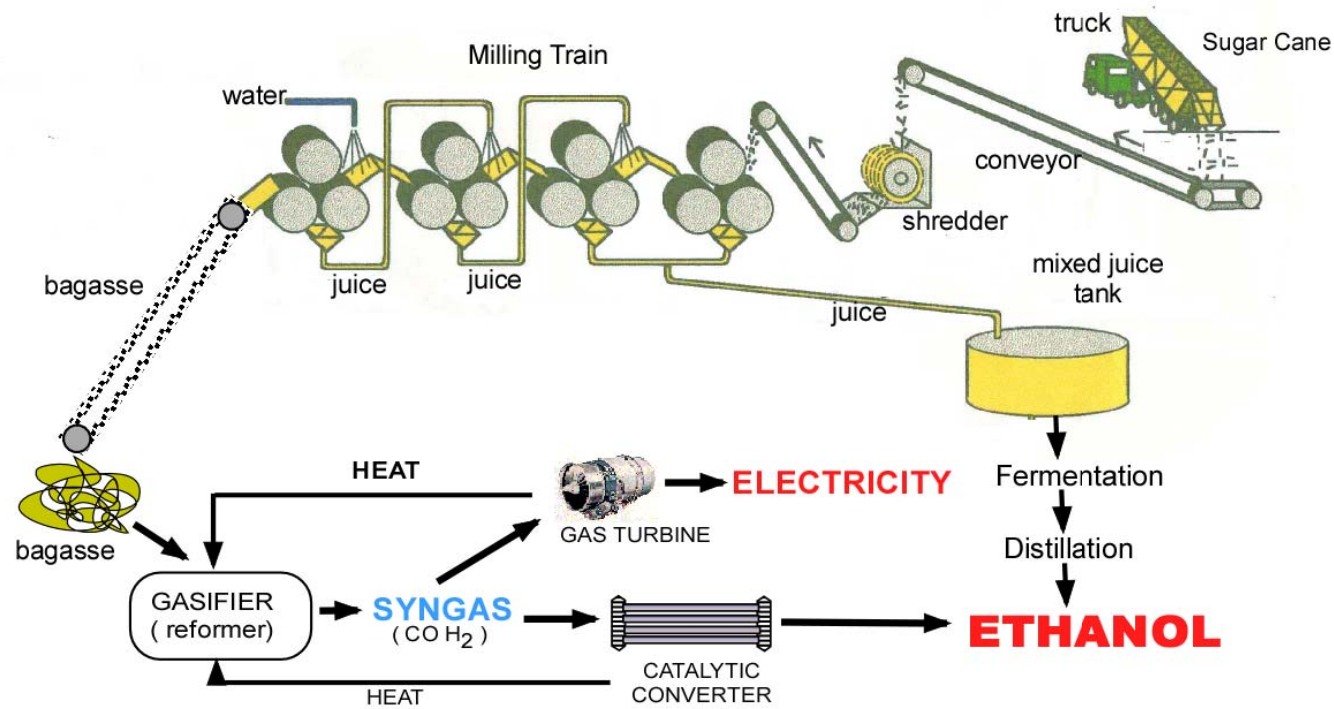
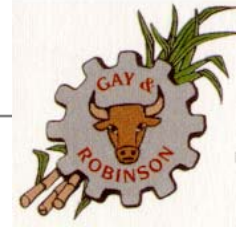
Offsets Against Revenue



- Purchased coal, 4.4 tons to offset 15 tons bagasse per acre
 - \$85 per ton = \$374 per acre
- Cost of harvesting cane trash, estimate \$20 per ton
 - \$20 x 15.2 tons per acre = \$304 per acre
- Estimate total offsets @ \$678 per acre
- Total revenue of \$8,066 against offset of \$678 per acre
- Net revenue of \$7,388 per acre, compared to \$2,708 as sugar and \$3,375 as ethanol with traditional technology

Very exciting prospects with the new technology

Integrated Sugar to Ethanol / Energy



Conclusions



- Sugar cane to Ethanol increasingly viable and economically attractive, particularly with Hawaiian energy economics
- New technology application will, if successful, significantly increase returns from sugar cane.
- Potential to revitalize sugar cane production
- Energy and sugar economics increasingly inter-related
- Potential for all Hawaii raw sugar excepting value-added sugar to convert to ethanol, reducing domestic sugar production, in part offsetting increased imports.