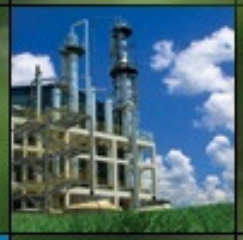
Project Case Study: San Carlos Bioenergy

Ethanol and Cogeneration Plant, Negros, Philippines

SAN CARLOS BIOENERGY, INC.



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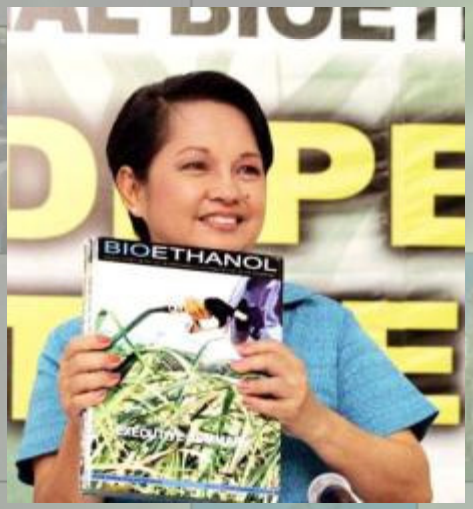
PHILIPPINES POLICY CONTEXT:

THE BIOFUELS LAW OF 2006 (RA 9367)

- 5% ethanol blending (by volume in 2009); ~230 mil L
- 10% ethanol blending by 2020
- Income tax holiday incentives put in place to encourage the development of the country's biofuels industry.



May 2005: President Arroyo launches the Philippine Bioethanol Program in San Carlos City

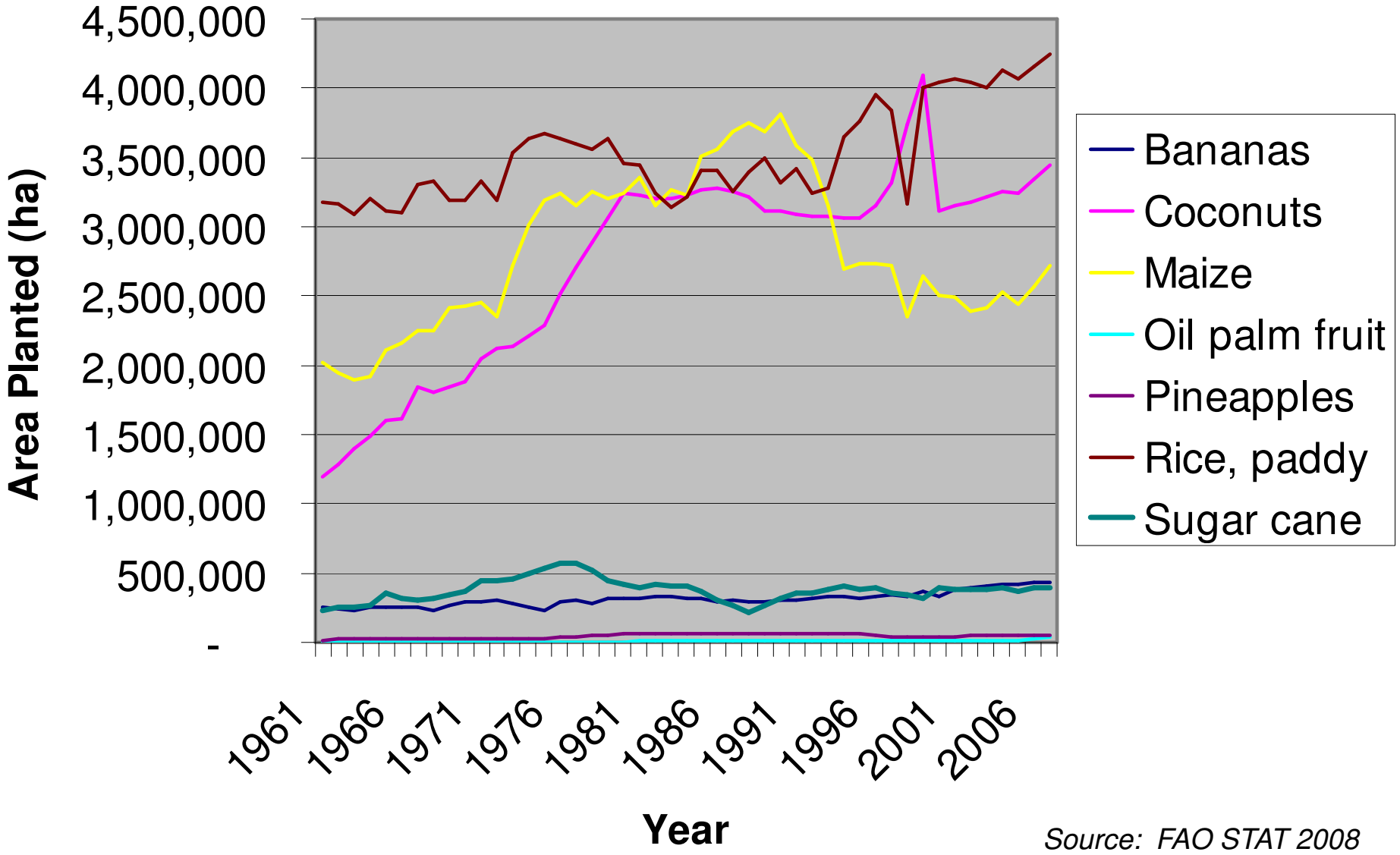
RENEWABLE ENERGY

- 2001 gov't demand forecasts indicate the Philippines needs a total capacity addition of ~10 GW by 2010; the Central Visayas islands (including Negros) account for 1,010 MW.
- Renewable Energy Bill is expected to be passed by the legislature to further support cogeneration
- 60% energy independence goal by 2020

San Carlos Bioenergy Inc. (SCBI)

- the first integrated fuel ethanol production and power generation plant in the Philippines;
- 9,000 ha of prime sugar land (yields to 100 MT/ha); cane transported 80km b/c lack of mill in area (1907 plant closed);
- under construction; ethanol deliveries to commence in Q1 2009.


SCBI
San Carlos
1
© 2008 Europa Technologies
Map Data © 2008 AND
Santo Niño
2.16 mi
Pointer 10°30'28.66" N 123°25'32.16" E elev 34 ft Streaming
Philippines
Quezon City
Manila
Google



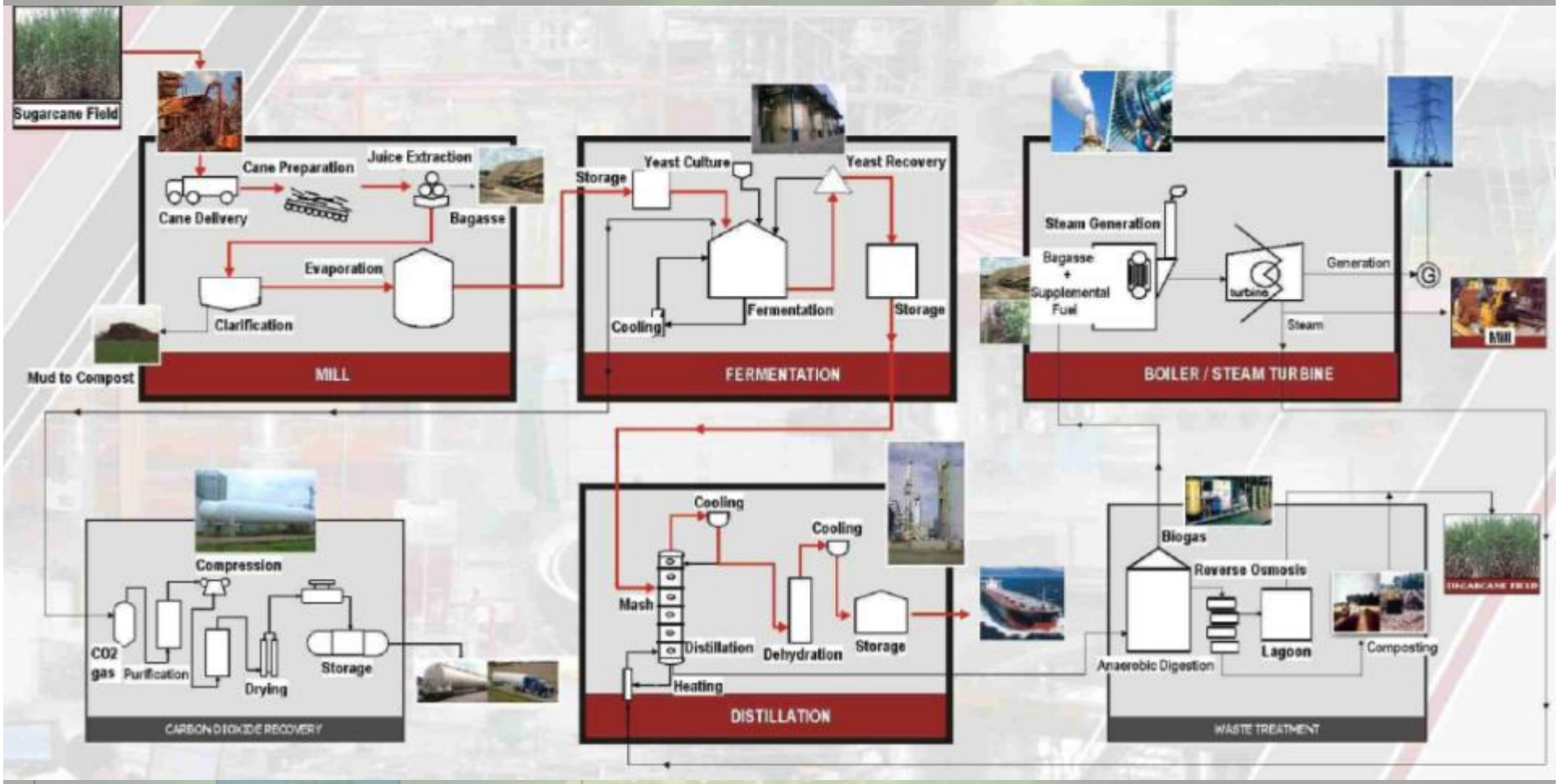
Philippines sugar cane: 400k ha in 2007 (vs. 573k ha peak in 1977)

SAN CARLOS BIOENERGY, INC.

Project Components

- Cane mill with crushing capacity of 1,600 tons/day
- Fuel ethanol distillery producing 125,000 liters per day of ethanol
  - 35 mil L / yr = 10% of the 2009 5% ethanol blending mandate demand
- Cogeneration plant with a capacity of 8.2 MW (2 - 4 MW to grid)
  - Bagasse and agroforestry biomass (partnered with GENESYS NGO)
- Carbon dioxide recovery plant
  - (~50 tons/day)
- Anaerobic digestion plant
  - (~22,260 m^3/day)
- Integrated waste water treatment plant w/ zero discharge goal

SAN CARLOS BIOENERGY, INC.



$69.5 mil = estimated total project cost

Supplemental Boiler Fuel from ***Agroforestry***

Species	Site Requirements	Species	Site Requirements
Azadirachta indica **(Neem)**	**Altitude:0 - 1500** **pH: 6.2 – 7.0** **Mean annual rainfall: 400 – 1200** **Soil: sandy, clay** **Drought: tolerant** **Density: 0.5 – 0.78**	***Gliricidia sepium (Kakawate)***	**Altitude: 0 – 1600** **pH : 4.5 – 6.2** **Mean annual rainfall: 800 – 2300** **Soil: all types** **Drought : 4-6 months** **Density: 0.5 – 0.8**
Calliandra calothyrsus	**Altitude: 250 – 1800** **pH: slightly acidic** **Mean annual rainfall: 700 – 4000** **Soil: light textured** **Drought: 3 – 6 months** **Density: 0.51 –0.78**	***Gmelina arborea***	**Altitude (masl): 0 –800** **pH level: all level** **Mean annual rainfall: 750 – 4500mm** **Soil: clay, loam, sandy** **Drought resistance: less 7 months** **Density: 0.5- 0.56 g/cm^3**
Eucalyptus camaldulensis	**Altitude: 0 – 1500** **pH: tolerant to acidic soil** **Mean annual rainfall: 250 – 2500** **Soil: deep, silty or loam soil** **Drought: less than 5 months** **Density: 0.9 - 0.98**	***Leucaena leucocephala var. K636 (Ipil-ipil)***	**Altitude: 0 – 1500** **pH: neutral to basic** **Mean annual rainfall: 650 – 3000** **Soil: deep, well drained, neutral to calcareous soils** **Drought: tolerant** **Density: 0.45 – 0.84**

Other potential species: ***Acacia auriculiformis***, ***Melia dubia*** **(Bagalunga),** ***Cassia siamea***, ***Leucaena collinsii***, ***Parkia roxburghii***, ***Senna spectabilis***; ***Cassia javanica*** **(Robles)**

Gmelina arborea (Gmelina)


6 months after cutting


6 months after cutting

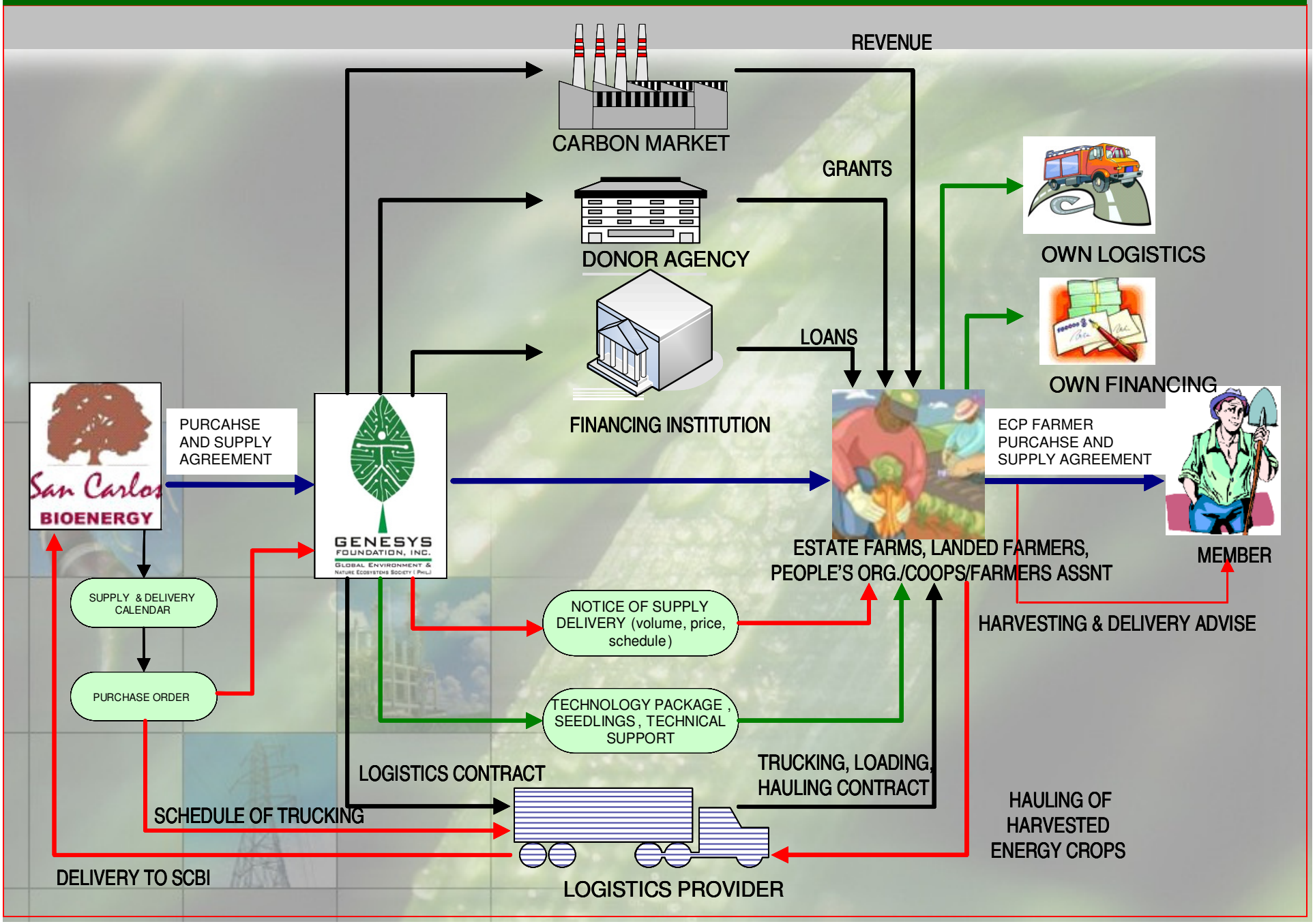

Uncut at 1.5 years


Uncut at 1.5 years

June 2006

January 2007

COMMERCIAL AND SUPPLY CHAIN FRAMEWORK



GHG QUESTIONS:

Will sustainable boiler fuel biomass from agroforestry reforestation give a net LUC GHG benefit, as claimed?

SCBI plant is sized for existing cane land (since 1907), so there should be no direct LUC impacts from cane… But how should we model indirect impacts?

CASE STUDY METHODOLOGY:

Life-cycle GHG analysis of all energy and water use (based on EBAMM and GREET), including agricultural inputs, processing, and transporation.

Monitoring of direct LUC GHG from agroforestry / reforestation using Winrock International and CDM methodologies.

Quantification of indirect LUC using ???? model…

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