Sustainability Certification of Feedstocks – RSB's Global Perspective

From macauba in Brazil, jatropha in Mexico, pongomia in Paraguay, carinata in Canada, and camelina and perennial grasses in the US

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The New Oilseeds

Looking beyond soy and canola

Camelina sativa

- Rotational Oil Seed Crop for Fallow Land
- High Oil Content
- High Omega3 Animal Feed
- Low Input Requirements
- Low Moisture
- Less than 100 day crop
  - Full Regulatory Approval:
    EPA, CARB, FDA, & USDA
- No ILUC (as modeled by EPA and CARB)
- Uses Existing Farm Equip.

Sustainable Oils

Carinata

- Tolerance for heat, drought, and disease allows for cropping on land which is typically left fallow – ie: does not displace food production;
- Carinata oil is suited specifically for the aviation sector, a growing contributor of GHG emissions.

Pongamia

- ✓ 8 times more vegetable oil than soy (400 gal. vs 50 gal)
- ✓ 2 times more protein animal feed per acre than soy (2 tons vs. 1 ton)
- ✓ One-tenth the water and chemicals of soy
- ✓ Nitrogen fixing
- ✓ One hectare of Pongamia plantation sequesters approximately 2.5 MTs of CO_2
- ✓ Of which 1.5 MTs are re-emitted by Pongamia biodiesel
- ✓ Resulting in a NET CO_2 sequestration potential of 1 MT of CO_2 per hectare

Jatropha

- Grows on poor, rocky soil
- Drought resistant
- Can be used as a living fence, or in a plantation model
- Opportunities for both manual harvest (rural development) and mechanization

Macauba palm tree (*Acrocomia sp*)

- Native palm tree of South America ("cerrado region") with fruits with 20-30% oil content
- **Rural development**
  Fruit collection provides family farmers and women in rural areas extra income
- **Food security**
  Macauba has natural occurrence in patches of natural vegetation, in degraded areas or can grow naturally in pasturelands or associated to food crops. No land use change is expected.
- **GHG emissions**
  Fruits obtained from extrativism can produce oil with very low GHG emission (no input is required for production in natural areas);
- **Biodiversity Benefits**
  As a native tree, the sustainable management of macauba contributes to ecosystem restoration and conservation of natural vegetation in "cerrado" areas, as an alternative to the conventional oil crops.

SOLARIS "SEED TOBACCO"

- **GMO free energy tobacco patented plant**
  Sunchem is a research & development company developiong next generation energy crops
- **No nicotine biofuels (animal feed, biomass for energy**
  The Solaris variety does not contain nicotine and is characterized by low leaf and high seed production; the separation and pressing of seed generates oil for biofuels, press cake for animal feed and biomass for energy generation
- **Low carbon footprint**
  As a result of multiple annual harvests and high yields per hectare, Solaris Seed Tobacco has a very low carbon footprint

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Biomass for Power and Cellulosic Feedstock

Gliricidia Sepium

- Used as a **live fence** in the dry zone of Sri Lanka and **to prevent soil erosion** in the tea plantations and wet zone of the country.
- Grown in 3 rows in which the first row is used as firewood, and the 2nd and 3rd can be sold.
- **Provides organic fertilizer, a natural insect repellent, and also feed for animals.**
- Nitrogen fixing
- Can be cut back to crop height year after year with no adverse effects

Switchgrass

- Native
- Perennial
- No need for fertilization
- Great for soil erosion, water quality, wildlife and carbon sequestration
- Can be easily converted back to row crops if need be.
- Annual crop
- Geographically suitable to most of the US
- Little to no management required after establishment
- 3-7 tons per acre depending on region of US and variety of Switchgrass used.

Giant Miscanthus

- **High yield**
  - 10-20 tons/acre!
- **Low input**
  - Nutrients sent from the stems to the rhizomes underground in the fall and reused in spring for rapid growth
- **Perennial**
  - Limited soil disturbance allows soil carbon to build

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Industrial Wastes

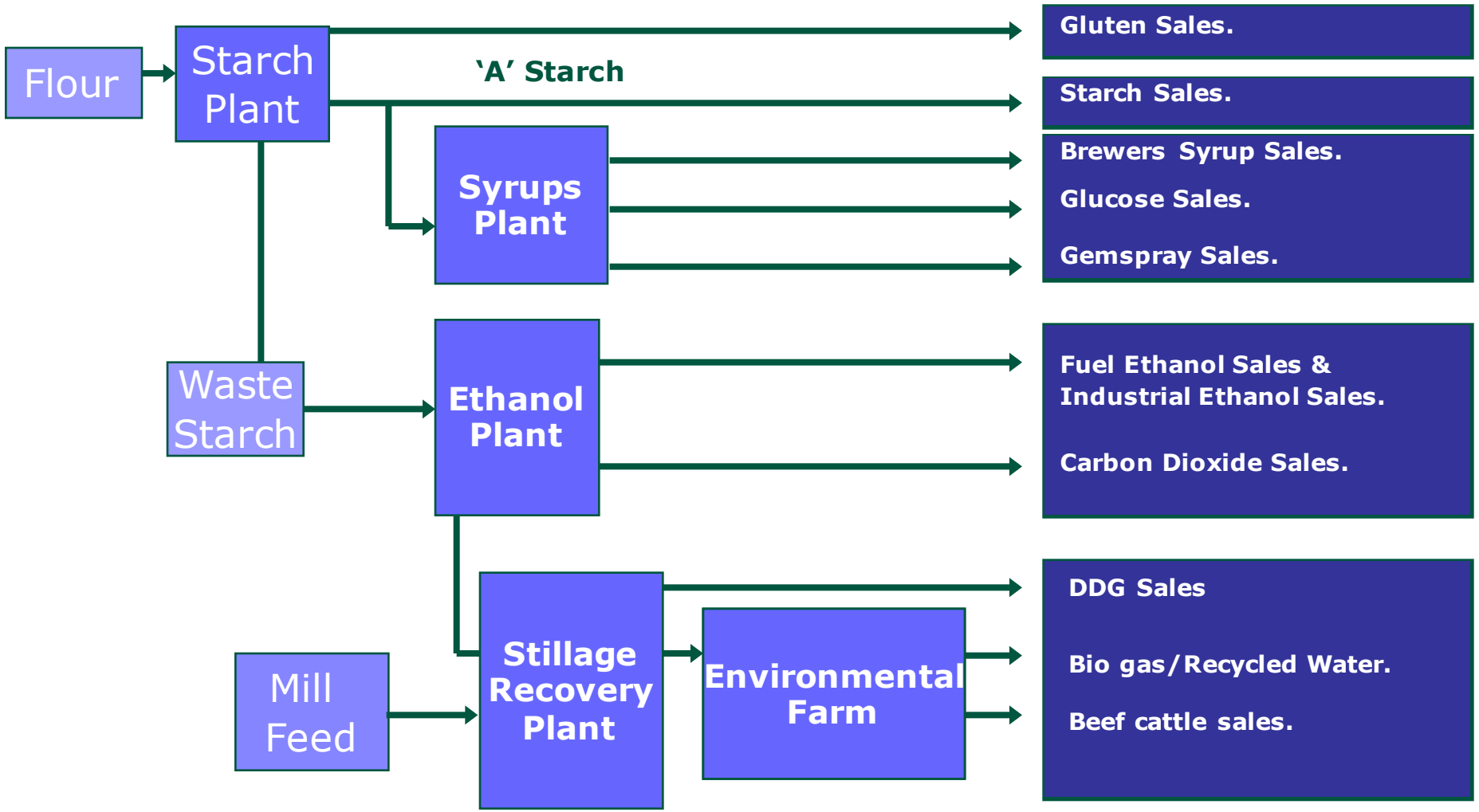
Starchy Wastewater

- High value protein (gluten) & high grades of 'A' starch from Industrial Grade Flour separated for specialty food applications
- Low grades of waste starch converted into high value end product (ethanol)
- Remaining protein, fiber & other non-fermentable products recovered and sold for animal feed products
- Residual solids in waste water stream recovered as Biogas from Waste Water Treatment Plant
- Water re-use at Factory and residual water irrigated on Environmental Farm for pasture growth and beef cattle sales

MANILDRA GROUP OF COMPANIES

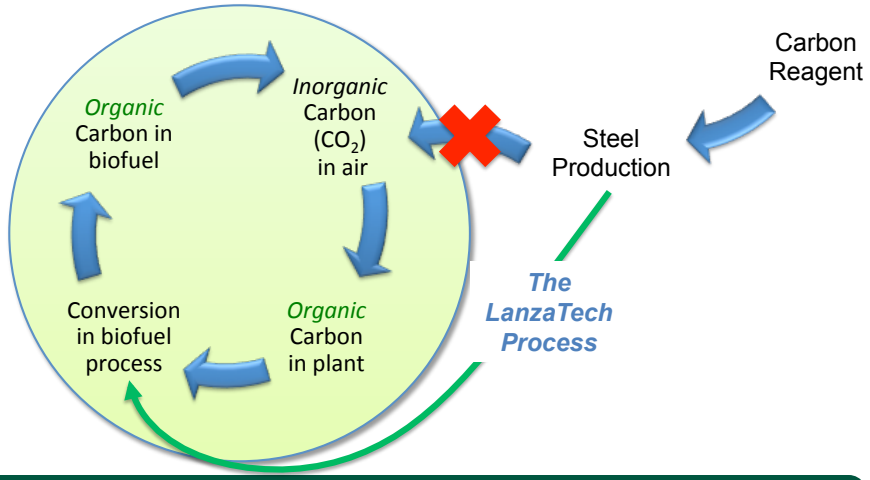
Value Added Products - Assisting the Environment

Nowra Plant Process



Industrial Waste gases

- No Land Use Change nor Indirect Land Use Change
- No interference in the food value chain
- Naturally occurring microbe biodegrades industrial waste*
- True waste; unavoidable residue of industrial production**
- Third party LCA demonstrate GHG reduction >75%***
- Carbon reduction through re-usage of carbon
- Abundantly available



THANK YOU!

Roundtable on Sustainable Biomaterials

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