Producing Food, Feed and Energy Sustainably: The Brazilian Experience

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Barcelona, Casa Llotja de Mar
30 May 2008
+50% of Brazilian car fuel and +3% electricity comes from renewable sugarcane

Sugarcane 16%

Other Renewables 3.0%

Petroleum and Derivatives 36.7%

Natural Gas 9.6%

Coal 6.0%

Uranium 1.6%

Hydroelectricity 14.7%

Other Biomass 12.4%

+50% of Brazilian car fuel and +3% electricity comes from renewable sugarcane
In 2007, ethanol production and use in Brazil reduced emissions of CHG by about 25.8 million tonnes of CO2 equivalent.
SUPERIOR ENERGY BALANCE

The energy balance of Brazilian ethanol is 4.5 times better than that of ethanol produced from sugar beet or wheat, and almost seven times better than ethanol produced from corn.

**Energy Balance**

Data represent the amount of energy contained in ethanol per unit of fossil fuel input.

- **Sugarcane**: 9.3
- **Wheat**: 2.0
- **Sugar beets**: 2.0
- **Corn**: 1.4

**Note**: estimated data

**Source**: World Watch Institute (2006) and Macedo et al. (2008).

**Data compiled** by Icone and Unica
HIGH PRODUCTION YIELDS

Sources: IEA – International Energy Agency (2005), MTEC and UNICA.
Elaboration: UNICA
BREAKDOWN OF SUGARCANE’S ENERGY

1/3 Juice

1/3 Bagasse

276 kg/t 50% humidity

165 kg/t 15% humidity

1/3 Straw

Hydrolysis

Sugar

Ethanol

Bioelectricity

Molasses

Energy equivalent of 1 tonne of sugarcane = 1.2 oil barrel

Source: UNICA
BRAZILIAN SUGARCANE INDUSTRY (ESTIMATED REVENUE BREAKDOWN)

Note: 2006/2007 → real values; 2015/2016 → the percentage of the 2015-2016 projection were calculated using as a base the potential for production and exports, considering the constant prices of 2006.
# LAND USE IN BRAZIL

<table>
<thead>
<tr>
<th></th>
<th>Millions of hectares (2007)</th>
<th>% total land</th>
<th>% arable land</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BRAZIL</strong></td>
<td>851</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL ARABLE LAND</strong></td>
<td>354.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Total Crop Land</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soybean</td>
<td>20.6</td>
<td>2.4%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Corn</td>
<td>14.0</td>
<td>1.6%</td>
<td>3.9%</td>
</tr>
<tr>
<td><strong>Sugarcane</strong></td>
<td>7.8</td>
<td>0.9%</td>
<td>2.2%</td>
</tr>
<tr>
<td><strong>Sugarcane for ethanol</strong></td>
<td>3.4</td>
<td>0.4%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Orange</td>
<td>0.9</td>
<td>0.1%</td>
<td>0.3%</td>
</tr>
<tr>
<td>2. Pastures</td>
<td>172.3</td>
<td>20%</td>
<td>49%</td>
</tr>
<tr>
<td>3. Available area</td>
<td>105.8</td>
<td>12%</td>
<td>30%</td>
</tr>
<tr>
<td>Total arable land – (crop land + pastures)</td>
<td>105.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: IBGE. Elaboration: UNICA.
Grains* in Brazil: harvested area and production

Production of food doubled in the last decade mainly due to yield gains.

Area

Production of grains

Source: IBGE (2007)
Notes: 2008: estimated data.*Grains include rice, corn, wheat, soybeans and beans.
BRAZIL: GROWTH OF AGRICULTURAL PRODUCTION IN THE LAST 25 YEARS

- Annual growth rate of livestock: 6.08% a.a.
- Annual growth rate of grains: 3.84% a.a.

Source: IBGE.
Note: “Grains” include rice, corn, soybean, bean and coffee. “Livestock” include beef, chicken meat and pork.
Sugarcane in Brazil: harvested area, ethanol and sugar production

While sugarcane area increased 85% since 90/91, ethanol has increased 130% and sugar around 350%

Sources: IBGE (2007) and UNICA.
Elaboration: UNICA.
Note: * estimated
World harvested area used in ethanol production is estimated at 15 million hectares.

According to FAO, the total harvested area is about 1.4 billion hectares.

This amount do not include the pasture areas, which in Brazil is more than 170 million hectares.

Note: “Others” include the harvested area for the remaining crops like fruits, fibers, nuts, pulses, roots and tubers, spices and other vegetables.
Main conclusions

1. Food price increases result from a broad combination of short term and long term factors. Many of them have been pointed out in the recent report by DEFRA and are not related with biofuels production.

2. 50% of gasoline consumption is being replaced by ethanol (in volume) produced on 1% of the Brazilian arable land, while food production in the country has doubled in the last decade; there is no competition between biofuels and food production in the country;

3. Biofuels represent an opportunity for developing countries: land, water, sunlight, temperature, labor, potential genetic improvements (corn/wheat vs. sugarcane), incorporation of new technologies (crop rotation, agriculture-livestock integration, no-till).

4. A sharp decrease and/or elimination of tariff and non-tariff barriers from developed countries would allow real opportunities for developing countries to produce 6 Fs - Food, Feed, Fibers, Fruits, (planted) Forests and Fuel - in a much more economically, environmentally and socially sustainable way.