The Context

The EU is about to take very important decisions on its biofuels policy:
- Food crops (oilseeds, starch rich and sugar) => conventional, high-ILUC risks
- Non food crops => advanced, low-ILUC risks
- What about food crops with low-ILUC risks? Shouldn't their production be stimulated?

Models have been improving and results are converging:
- Sugarcane ethanol ILUC
  - 1 ha expansion => 0.2 to 0.24 ha ILUC
  - ILUC ha / 1000 liters of ethanol => 0.23 to 0.38
  - ILUC factors: 4 to 13 gCO2/MJ
- Although there still are major technical issues to be tackled
  - Even with the improvements, are they representing the reality with a minimum level of confidence => ILUC is a reality but it magnitude is still not known
The Context

- A very conservative approach for some feedstocks was taken

<table>
<thead>
<tr>
<th>Feedstock</th>
<th>ILUC emissions gCO2/MJ (IFPRI, 2011)</th>
<th>Direct emissions savings gCO2/MJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugarcane (IFPRI)</td>
<td>13</td>
<td>-70</td>
</tr>
<tr>
<td>Sugarcane (JRC)</td>
<td>7.7 – 20.3</td>
<td>-70</td>
</tr>
</tbody>
</table>


- EPA: 4.1 gCO2/MJ => sugarcane ethanol is advanced
- CARB: 71% reduction LUC in hectares => 13.3 gCO2/MJ

My objective

Make you understand, based on evidences, that
- Sugarcane ethanol produced in Brazil is a low-ILUC feedstock, it is energy efficient and it also uses residues
- Being a food crop as well as a low-ILUC risk crop, there should be an intermediary category between conventional and advanced biofuels
- Wishful thinking?

Evidences are based on the following topics
- Intensification and efficiency gains in the Brazilian agriculture
- Land use changes caused by the expansion of sugarcane ethanol
- Integrated production systems
  - With annual crops: area under renovation
  - In the processing: high level of utilization of the sugarcane energy content
- No impact on food prices
  - Sugar has supported ethanol expansion
  - Cane expansion, for ethanol or for sugar, is competing with low productivity pastures. In sugarcane expansion regions, cattle is facing a cane-induced intensification
Evidence 1. Intensification and efficiency gains in the Brazilian agriculture

- Brazil has a unique combination of:
  - Availability of land for sugarcane not occupied with native vegetation => pastures
  - Large amount of protected native vegetation
  - Agricultural sector with high productivity levels
  - Strong conservation laws based on “control-command” enforcement

- Name a country: I bet you can list other countries with this combination
  - One factor, at least, is always missing
Accumulated Deforestation (1,000 hectares)

Source: LAPIG/UFG, PRODES/INPE, SOS Mata Atlântica, MMA
Evidence 1. Intensification and efficiency gains in the Brazilian agriculture

- The expansion of biofuels in Brazil is not undermining the expansion of food, feed and fiber crops
- Brazilian agriculture is intensifying more and more: productivity of pastures is growing, double cropping systems are expanding and energy yields in sugarcane production is growing => less land extensification
- Sugarcane expansion promotes food production in the areas under renovation
- Yields in new areas are very similar to those in consolidated areas, particularly for annual crops
- Indirect effects caused by the expansion of biofuels in Brazil must occur predominantly within Brazil and the most important effect is the intensification of cattle raising, which minimizes ILUC effects
- Carbon stocks in pasturelands in Brazil are very similar or even lower than in areas under sugarcane cultivation
Simultaneous expansion of ethanol and major crops

Sources: CONAB; IBGE; ABRAF; UNICA
Productivity Growth (TFP)

TFP (total factor productivity): represents resources efficiency (labor, capital and land). Higher TFP, higher production efficiency.

Source: Alston, J.M., B.A. Babcock, and P.G. Pardey eds (2010). The Shifting Patterns of Agricultural Productivity Worldwide,.CARD-MATRIC Electronic Book, Center for Agricultural and Rural Development. The Midwest Agribusiness Trade Research and Information Center, Iowa State University, Ames, Iowa,.Available at: www.matric.iastate.edu/shifting_patterns
Grains and Sugarcane: Yield Improvement

Sources: CONAB; UNICA; IBGE: ICONE.
Livestock yield and pasture area

Sources: IBGE, UFMG, INPE, BIGMA Consulting, ICONE
Indirect effects caused by the expansion of biofuels in Brazil should occur predominantly within Brazil.

Harvested Area: Absolute Variation from 2004-06 to 2010-12

Source: USDA – PSD; WITS/COMTRADE.
Evidence 2. Direct Land Use Change: induces pasture intensification and increases food production

- Regardless the land availability, sugarcane expansion dynamic has been pasture-based.
- Each hectare of cane can bring together 1/6 hectare of food production (intercropping).

**Expansion (2005-09): 3.2 million ha**


Area under renovation should grant to cane an avoided-ILUC credit.
Evidence 3. Cane ethanol: no competition with food, either sugar or other crops

Argument on sugar:
- Sugar market has supported ethanol expansion in Brazil
- Without sugar, ethanol would not be produced competitively
- If the supply of sugarcane is short, adjustments in the demand occur in the ethanol market rather than in the sugar market
- Sugar and ethanol share industrial and logistics costs: cane transportation, crushing and juice treatment and concentration
- Synergies, such as the cogeneration system: due to the large capacity on sugarcane crushing, boilers also need to have large capacity to process the bagasse

Argument on no land competition:
- Expansion over pastures, pastures is intensifying
- Cane area under renovation
Evidence 3. Cane ethanol: no competition with food, either sugar or other crops

- Sugar prices have been higher than ethanol prices
- Sugar has been more profitable than ethanol
- Sugar prices were lower than ethanol only when sugar world market had a surplus
Evidence 3. Cane ethanol: no competition with food, either sugar or other crops

- If the market is short in sugarcane, adjustments take place in the ethanol demand
- Hydrous demand drops
- If cane is expanding, ethanol supply grow without jeopardizing sugar production
Conclusion: why cane ethanol is a low-ILUC biofuel?

High risk assumption

Highest yield (MJ/ha)

Direct displacement

Intensification capacity (pastures and double cropping)

Impact on food prices

Intercropping

Residue use

What risk?
Thank you

amnassar@iconebrasil.org.br

www.iconebrasil.org.br