Biofuels perspectives in Guyana
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• ECLAC’s study in Guyana
Impacts of oil imports

- In 2005, more than **220 M US$** (i.e. **29%** of county’s imports) have been spent for purchasing oil derivatives.

- In the last 4 years, this number grew **100%**, with significant impacts on national economy

- In 2005, gasoline imports represented **7%** of GNP of Guyana

- National gasoline consumption: **115.900 M** litres
OIL DERIVATIVE IMPORTS IN GUYANA

The graph shows the trend of oil derivative imports in Guyana from 1997 to 2005. The x-axis represents the years, while the y-axis shows the value in US dollars. The line graph is divided into two parts: one indicating the value in US dollars and the other showing the percentage of total imports. The value line increases steadily from 1997 to 2005, while the percentage line also shows a steady increase, reaching a peak of around 30% by 2005.
Sugar Industry in Guyana

PROs

• **15%** of GNP and **40%** of national agriculture production
• **50,000** hectares under production
• **20,000** direct jobs
• **75.8** tons cane/hectare (yearly average productivity)
• **90%** of sugar is exported (60% to the European Union)

CONs

• **210,000** of the 300,000 tons of exported sugar, are sold under Special Preferential Sugar agreements with US and EU
• In 2009, SPS & EU *preferential price quotas = 0*, with relevant impact on profitability

Need for entering in a “market & efficiency philosophy”
Guysuco’s strategic plan

- Extend sugar cane plantation of 50%
- Produce refined sugar
- Introduce ethanol production
- Increase electricity production with bagasse (cogeneration)

On the other hand:

- World Bank did not approve a loan for restructuring the industry (2001)
- A recent study proposed closing 4 of the 8 Guysuco cane central factories (9000 jobs in Demerara)
Assessing ethanol potential

**TARGET:** to substitute **10%** of national consumed gasoline with (bio)ethanol

11.5 M litres of ethanol are needed

- From the exhausted molasses of 1 ton of sugar cane, **8.8 lts** of ethanol can be produced

- Considering a national, average production of **3.5 M** tons of sugar cane, **30.8 M** litres of ethanol from molasses can be produced (almost 3 times more than required)

National bioethanol requirement could be met **without expanding current cultivated area !!**
Assessing ethanol costs

Considering an average price (2005) of 83 US$/tons for the molasses and an average productivity of 260 lts of ethanol per ton of molasses, the cost of producing 1 lt of ethanol would be close to 0.392 US$/lt.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>ESTIMATED COSTS (US$/lt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molasse</td>
<td>0.321</td>
</tr>
<tr>
<td>Energy</td>
<td>0.018</td>
</tr>
<tr>
<td>Chemical products</td>
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<tr>
<td>Wages</td>
<td>0.009</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0.008</td>
</tr>
<tr>
<td>Other costs</td>
<td>0.005</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>0.392</strong></td>
</tr>
</tbody>
</table>

The same exercise yields an average cost of 0.408 US$/lt of ethanol produced directly from sugar cane juice.
Assessing ethanol competitiveness

Given that 1 lt of ethanol requires 1.67 kg of sucrose for being produced, an **Indifference Price for Ethanol** (IPE) can be related to the price of sugar:

\[
IPE \text{ (US$/lt)} = 1.67 \times P_{\text{sugar}}
\]

The same way:

\[
IPE \text{ (US$/lt)} = 2.98 \times P_{\text{molasse}}
\]

FOB sugar price in “**preferential/quota**” markets:
- 0.37 - 0.56 US/kg \[\Rightarrow\] 0.62 < IPE < 0.93 US/lt

FOB sugar price in “**open**” markets:
- 0.13 - 0.40 US/kg \[\Rightarrow\] 0.22 < IPE < 0.67 US/lt

**FOB molasse** price in the Caribbean:
- 60 - 120 US tonn \[\Rightarrow\] 0.18 < IPE < 0.36 US$/lt
Under the existing condition, in Guyana is more attractive to produce gasoline from molasse than directly from sugar cane (which would mean reduce the production of sugar....)
Assessing ethanol economics

• To produce the required 11.5 M litres of ethanol, a 65,000 litres/day distillery would be sufficient (under a 180 days/year operation scheme)

• Related investment would be close to 6.5 M US$

• Average price of gasoline of 0.463 US$/litre
  Average ethanol-from-molasses cost at 0.392 US$/litre

• If you sell 11.5 M lt ethanol at the same price of gasoline, the net(*) estimated earning would be close to 800,000 US$/year

• Under these conditions, payback period for the distillery would be something more than 1 year

(*) a detailed analysis of the “overall” national earning should be performed
Ethanol & Kyoto protocol

- For every litre of a 10% ethanol/gasoline blend, 0.40 kg of CO$_2$ are not emitted to the atmosphere.

- If we substitute 11.5 millions litres of gasoline with ethanol, a significant 4600 tons of CO$_2$ per year (i.e. 4600 Certified Emission Reductions) could be “traded” under the Clean Development Mechanism of the Kyoto Protocol.

- At a very conservative price of 5 US$/tons CO$_2$, 23,000 US$ could be added to the national cash flow as a net, positive income....
Other bioenergy options: **RICE**

- Rice production in 2004: **500,000** tons
- Rice exports: **70%** of the national production
- Rice waste (husks) availability: **110,000 tons/year**
- Energy content of the rice waste: **36,400 teps**
  \[=11\% \text{ diesel consumption in Guyana}\]

The biofuel produced from rice husks could be easily used for producing electricity in (small ?) cogeneration plants, possibly linked to the rice facilities.
Other bioenergy options: **WOOD**

- Wood production in 2005: **1,350,000** m³
- **30%** of the processed wood is waste (**sawdust**)
- Energy content of sawdust: **1.55 M** teps
  
  (300% diesel consumption in Guyana)

The biofuel produced from sawdust could be easily used for producing electricity in (small ?) **cogeneration plants**, possibly linked to the wood facilities.
Final considerations

- Guyana currently counts on **excellent conditions** (both internal and external) for producing bioethanol from sugar cane (mainly form exhausted molasses)

- The proposed distillery would create a significant volume of new **jobs** (between 300 and 900, depending on the applied scenario)

- Penetration of ethanol would yield country benefits, both at **economic** (savings on imports, carbon credits, etc..) and **environmental** (lower hydrocarbon consumption) level

- It is of paramount importance the creation of a “**ad-hoc**” **managing entity** (a Biofuel Executive Commission ??) , in charge of coordinating the process related to the **sustainable** production and use of biofuels in the country.
Final considerations

Among others tasks, this hypothetical entity should:

• **Harmonize** entrepreneurial with governmental interest

• Design a plan (time, resources, responsibilities, tec..) for **progressive introduction** of ethanol

• Establish fuel specifications and logistics **standards**

• Design “ad-hoc” programmes for the information of the **society** and “in-country” **technological** development

• Propose new form of **financing** for supporting the sugar cane industry’s modernization & transformation