STUDY TOUR FOR CAPACITY BUILDING

BIOENERGY WEEK

18-23 March 2013

Brasília, Brazil

DEVELOPMENT OF BIOENERGY IN ARGENTINA: ECONOMIC ASPECTS
Summary

- Biofuels development in Argentina
- Economic Pillars - Indicators
- Indicators: 19 – Productivity, 21 - Training and re-qualification of the workforce, 23 - Infrastructure and logistics for distribution of bioenergy, 24 - Capacity and flexibility of bioenergy use,
- Indicator 22 - Energy diversity
- PROBIOMASA Program
PROMOTION OF RENEWABLE ENERGY


- Mandatory use 5% bioethanol and 7% biodiesel
- Definition of domestic prices for biofuels
- Quality standards

* Law 26.093 extends benefits to sugar plants, sugarcane and ethanol producers
BIOFUELS DEVELOPMENT IN ARGENTINA

Total production capacity: 3.0 million tons
Total Investments: US$ 900 million

Argentine Biodiesel Markets
- in thousand tons -

40% = Domestic market, 60% export market

1st exporter worldwide

Department of Energy and CARBIO
### BIOFUELS DEVELOPMENT IN ARGENTINA

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline consumption (k m$^3$)</td>
<td>7.500</td>
<td>7.900</td>
<td>8.200</td>
<td>8.500</td>
</tr>
<tr>
<td>Annual production of ethanol (k m³)</td>
<td>252</td>
<td>500</td>
<td>900</td>
<td>1.200</td>
</tr>
<tr>
<td>Percentage of bioethanol in gasoline</td>
<td>3%</td>
<td>6%</td>
<td>11%</td>
<td>14%</td>
</tr>
</tbody>
</table>

**2015 PROJECTION**

*Represents 13% of 2012 total corn production*
### THEMES

GBEP considers the following themes relevant, and these guided the development of indicators under this pillar:
- Resource availability and use efficiencies in bioenergy production, conversion, distribution and end-use
- Economic development
- Economic viability and competitiveness of bioenergy
- Access to technology and technological capabilities
- Energy security/Diversification of sources and supply
- Energy security/Infrastructure and logistics for distribution and use

<table>
<thead>
<tr>
<th>INDICATOR NAME</th>
<th>INDICATOR DESCRIPTION</th>
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</table>
| 7. Productivity                     | • Productivity of bioenergy feedstocks by feedstock or by farm/plantation  
• Processing efficiencies by technology and feedstock  
• Amount of bioenergy end product by mass, volume or energy content per hectare per year  
• Production cost per unit of bioenergy                                                                 |
| 18. Net energy balance               | Energy ratio of the bioenergy value chain with comparison with other energy sources, including energy ratios of feedstock production, processing of feedstock into bioenergy, bioenergy use; and/or lifecycle analysis |
| 19. Gross value added                | Gross value added per unit of bioenergy produced and as a percentage of gross domestic product         |
| 20. Change in the consumption of fossil fuels and traditional use of biomass | • Substitution of fossil fuels with domestic bioenergy measured by energy content and in annual savings of convertible currency from reduced purchases of fossil fuels  
• Substitution of traditional use of biomass with modern domestic bioenergy measured by energy content |
| 21. Training and re-qualification of the workforce | Percentage of trained workers in the bioenergy sector out of total bioenergy workforce, and percentage of re-qualified workers out of the total number of jobs lost in the bioenergy sector |
| 22. Energy diversity                | Change in diversity of total primary energy supply due to bioenergy                                      |
| 23. Infrastructure and logistics for distribution of bioenergy | Number and capacity of routes for critical distribution systems, along with an assessment of the proportion of the bioenergy associated with each |
| 24. Capacity and flexibility of use of bioenergy | • Ratio of capacity for using bioenergy compared with actual use for each significant utilization route  
• Ratio of flexible capacity which can use either bioenergy or other fuel sources to total capacity |
17. Productivity

The introduction of new technologies such as, no tillage, precision agriculture, and efficient use of modern farm machinery

Feedstock production

Based on these specialized agricultural practices, Argentina has been able to increase its agricultural productivity while minimizing the overall environmental impact.
Average production of soybean (2009-2013) = 50 million tons

Production and implanted area of soybean in Argentina
- in million tons and in million hectares -

Soybean

5 times

3 times

17. Productivity

Production
Implanted area
17. Productivity

Soybean yield (1970-2012)
- in ton ha\(^{-1}\) -

Soybean

35%
Adding value to raw material

Soybean oil

In the last ten years the yield of vegetable oil by ton of soybean has increased in 10%

Soybean oil production
- in million tons -

96% biodiesel

6.5 times
### 17. Productivity

**Production cost per unit of biodiesel**

<table>
<thead>
<tr>
<th>Concept</th>
<th>US$/ton Biodiesel</th>
<th>Participation in total costs (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable oil cost (includes freight)/ton</td>
<td>786</td>
<td>81%</td>
</tr>
<tr>
<td>Methanol cost</td>
<td>60</td>
<td>6%</td>
</tr>
<tr>
<td>Other inputs</td>
<td>15</td>
<td>2%</td>
</tr>
<tr>
<td>Personnel cost</td>
<td>40</td>
<td>4%</td>
</tr>
<tr>
<td>Amortization</td>
<td>30</td>
<td>3%</td>
</tr>
<tr>
<td>Glicerine sale (125 kg/tn de biodiesel)</td>
<td>31</td>
<td>3%</td>
</tr>
<tr>
<td>Administration and comercialization costs</td>
<td>24</td>
<td>2%</td>
</tr>
<tr>
<td>Financial costs</td>
<td>16</td>
<td>2%</td>
</tr>
<tr>
<td>Profits (12% of investment capital)</td>
<td>30</td>
<td>3%</td>
</tr>
<tr>
<td><strong>FINAL COST (US$/ton Biod.)</strong></td>
<td><strong>971</strong></td>
<td><strong>100,0%</strong></td>
</tr>
</tbody>
</table>
BIOFUELS DEVELOPMENT IN ARGENTINA

Argentine Biodiesel Markets
- in thousand tons -

40% = Domestic market, 60% export market

Value Added

Department of Energy and CARBIO
21. Training and re-qualification of the workforce

• Argentina has a long tradition as a major agricultural producer.
• Implementation and update of modern technologies.
• High efficiency in transformation process of raw material.
23. Infrastructure and logistics for distribution of bioenergy
23. Infrastructure and logistics for distribution of bioenergy

Map of routes and rail transport in Argentina
24. Capacity and flexibility of use of bioenergy

- Diesel oil = 51%
- Biodiesel = 7%
- NGC = 11%
- Gasoline + Bioethanol = 31%
- Gasoline = 28%
- Bioethanol = 3%

CONTRIBUTION OF BIOFUELS IN LIQUID FUELS (2012)
Contribution of biofuels in Argentina energy sources

- Natural Gas: 49.8%
- Oil: 37.3%
- Biofuel: 2.3%
- Other: 0.4%
- Carbon: 1.2%
- Wood: 1.9%
- Nuclear: 2.8%
- Hydro: 4.3%
The **main objective** of this program is to promote the development of bioenergy at the regional and national level, in order to supply clean, reliable and competitive energy.
Specific objectives

• Diversify the sources of energy

Biomass Consumption: 2000 Ktep

3% of National Energy Balance

3 years

Biomass Consumption: 6000 Ktep

10% of National Energy Balance

• To create new opportunities for the agricultural and forestry sectors
• To add value and boost regional economies
• To promote regional development through the creation of new energy companies
• To contribute to and support climate change mitigation
Expected results

✓ Increase the consumption of biomass by at least 12 million tons per year,

✓ Substitute importation of fossil fuels, by approximately US$ 2,000 million per year,

✓ Create a significant number of new jobs,

✓ Attract new investments amounting to an estimated US$ 750 million for the generation of 200 Mw$_{\text{thermal}}$ and 200 Mw$_{\text{electric}}$
Expected results

✓ Improve greater energy access to rural and marginal areas,
✓ Reduce greenhouse gas emissions,
✓ Diminish soil and water pollution.
Thank you for your attention

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