
International Conference and Policy Debate on 'Bioenergy Sustainability Schemes - An African Perspective'

**Session 3: Resources, opportunities and impacts for
bioenergy development**



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Arnaldo Walter
NIPE-FEM / UNICAMP
awalter@fem.unicamp.br





Summary

- ◆ Bioenergy: positive and negative (potential) impacts.
- ◆ Benefits of biofuels to developing countries.
- ◆ Which are the driving-forces?
- ◆ Does biofuels production can foster socio-economic development in less developing countries? (small- x large-scale production; focus on domestic market or exports; biodiesel x ethanol).
- ◆ The Brazilian experience.
- ◆ Challenges for LDCs.
- ◆ Conclusions.



Bioenergy: positive and negative aspects

- ◆ Arguments in favour of the use of biomass: (i) security of energy supply, (ii) diversification of energy sources, (iii) low-carbon emissions, (iv) an alternative market for agricultural products, and (v) rehabilitation of degraded lands.
- ◆ Arguments against the use of biomass: (i) possible negative social impacts (e.g., wealth concentration), (ii) negative environmental implications (e.g., inadequate GHG balances, erosion, water consumption and water contamination), (iii) land competition (e.g., "fuel versus food" debate).



Benefits of biofuels to developing countries (1)

- ◆ Many developing countries in the tropics have comparative advantages for producing biofuels (land availability, adequate weather conditions, and a sufficient workforce).
- ◆ Biofuels production offers a high potential to create jobs, especially in rural areas .
- ◆ Biofuels use can bring the combined benefit of enhancing energy security and reducing high foreign currency outlay.



Benefits of biofuels to developing countries (2)

- ◆ Blending gasoline with ethanol offers the benefits of phasing out lead.
- ◆ Automotive use of ethanol also reduces emissions of particulate matter, carbon monoxide, and toxics, and causes less ozone formation. These advantages are even more relevant when the existing fleet is relatively old.
- ◆ Large-scale use of biofuels is one of the main strategies for reducing greenhouse gas (GHG) emissions.



Driving forces for LDCs

- ◆ Why a LDC should be engaged on biofuels production?
 - Macro-economic targets: (i) reduction of oil dependency, (ii) savings of foreign currency.
 - Socio-economic targets: jobs creation and economic development, but biofuels are better option than food production?
 - Local x global environmental priorities: local benefits should be the priority but there is no long-term future for biofuels with poor GHG balance.



Biofuels production in LDCs (1)

- ◆ Small-scale x large-scale production:
 - cost's reduction due to scale-effects;
 - fuel's quality (specification) is crucial;
 - technology development/improvement is easier with large-scale production (?);
 - logistics is an essential aspect as well (also due to GHG emissions in transport).
- ◆ Large-scale production induces wealth concentration.
- ◆ Perhaps the best solution would be large-scale production based on small producers. Is this possible?



Biofuels production in LDCs (2)

- ◆ Domestic market x exports:
 - the first step should be the production for the domestic market; but how large should be this market?
- ◆ Biodiesel x ethanol:
 - LDCs are more dependent on diesel than on gasoline;
 - biodiesel, in general: more expensive, lower productivities, worse energy balance, but easier to be blended;
 - does it make sense the production of ethanol for exports in order to import diesel oil?



Brazilian experience

- ◆ Since 1975 with large-scale production of ethanol (24 GI by 2008) and since 2005 with biodiesel production (1 GI required in 2008).
- ◆ Ethanol: previous experience and main focus on reducing oil dependence (also the support to sugarcane sector).
- ◆ Biodiesel: no specific previous experience and main focus on socio-economic targets (support to poorest people).
- ◆ In both cases, in practice, dominance of agro-business sector (sugarcane and soy-beans).



Particularities of Brazilian case

- ◆ Adequate conditions (weather, land availability, working force).
- ◆ Existence of previous know-how (sugarcane) and well-established agro-business.
- ◆ The size of the domestic markets (18 GJ of ethanol in 2007, and possibly 50 GJ by 2020; 1 GJ of biodiesel in 2008 for B2/B3).
- ◆ Land availability: only 1% of arable lands is used for sugarcane production (ethanol); land available for agriculture expansion is 2 times higher than lands currently occupied with crops (90 Mha + 60 Mha).



Brazilian case: some results

- ◆ Reduction of oil dependency: in the beginning, due to displacement of gasoline (currently due to the enlargement of oil production).
- ◆ "Reduction" of foreign debt: in the beginning, due to the reduction of oil imports.
- ◆ Stabilization of the sugarcane sector.
- ◆ Costs' reduction due to technology development and scale-effects.
- ◆ Creation of about 1 million direct jobs (but most of them on harvest).
- ◆ The same results above presented (ethanol) should not be reached with biodiesel production.

Socio-economic benefits

Parameter	SP – with mills	SP – without mills
# cities	96	499
Population (x 1,000)	2.4-500	2.4-500
R\$/people/month	308.7 ± 72.7	272.7 ± 85.2
Gini index	0.519 ± 0.046	0.528 ± 0.046
Wealth 20% poorest (%)	3.97 ± 0.84	3.61 ± 1.04
Electrification (%)	99.63 ± 0.76	98.76 ± 2.68
HDI	0.797 ± 0.026	0.777 ± 0.034

Socio-economic benefits

Parameter	SP – with sugarcane*	SP – without sugarcane
# of cities	181*	415
Population (x 1,000)	2.4-500	2.4-500
R\$/people/month	300.5 ± 69.8	268.3 ± 88.2
Gini index	0.516 ± 0.045	0.532 ± 0.046
Wealth 20% poorest (%)	4.00 ± 0.85	3.45 ± 1.06
Electrification (%)	99.63 ± 0.65	98.58 ± 2.90
HDI	0.793 ± 0.025	0.774 ± 0.035

* production ≈ 90% of total

Socio-economic benefits

Parameter	AL – with sugarcane*	AL – without sugarcane
# of cities	30*	48
Population (x 1,000)	7-63	7-63
R\$/people/month	79.5 ± 18.3	67.9 ± 20.4
Gini index	0.573 ± 0.045	0.635 ± 0.064
Wealth 20% poorest (%)	1.82 ± 0.64	0.83 ± 0.97
Electrification (%)	87.30 ± 7.58	78.57 ± 13.21
HDI	0.589 ± 0.043	0.570 ± 0.042

* production \approx 90% of total



Challenges for LDCs (1)

- ◆ Biofuels industry should be well planned (e.g., raw-materials production, creation of conversion capacity and market development almost at the same time).
- ◆ The required confidence of all stakeholders.
- ◆ Infrastructure is required (e.g., logistics is crucial).
- ◆ Investment capacity.
- ◆ Fuel quality.
- ◆ For middle- to large-scale production, biofuels industry should be an energy industry, not a food industry.



Challenges for LDCs (2)

- ◆ Biofuels production should not jeopardize food supply.
- ◆ Biofuels production should not jeopardize the environment.
- ◆ Biofuels should bring GHG benefits regarding fossil fuels.
- ◆ Biofuels production should not induce wealth concentration (is it possible to produce in large-scale based on small producers?)
- ◆ Biofuels production in LDCs should be focused on local socio-economic development. LDCs should not exclusively supply developed countries with biomass/biofuels.



Conclusions

- ◆ In LDCs biofuels production could bring different benefits.
- ◆ Planning is crucial (along all supply chain).
- ◆ Targets should be well defined.
- ◆ There are risks, but there are also opportunities.
- ◆ International cooperation is crucial: (i) cooperation on technology and know-how transfer; (ii) product standardization and production certification should not impose barriers to LDCs; (iii) developed countries should open their markets to LDCs' production.
- ◆ Biofuels is not a panacea, but part of the solution.



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- ◆ Thanks for your attention!

- ◆ awalter@fem.unicamp.br