Roundtable The Global Bioenergy Partnership: working in synergy with ongoing international initiatives and processes



The Brazilian Experience on Biofuels

Prof Suani Coelho

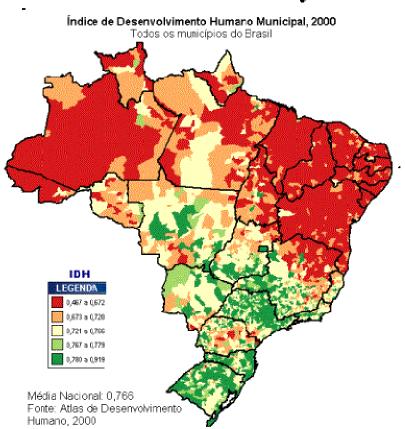
Prof J. Goldemberg

São Paulo State Secretariat for the Environment

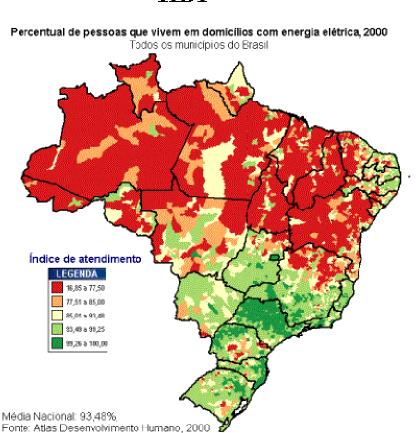
Montreal, December 9th, 2005

Energy Access x HDI

Access to Electricity



HDI



"Status" of world renewable electricity generation in 2004

	Operating capacity (GW)	Capacity factor percent	Investment costs (US\$/kW)	Current energy cost (c/kWh)	Main countries	Grid connected
Wind	47	20 - 40	1,000 - 1400	0.004 - 0.06	Spain, Germany, US, UK, Japan, Netherlands and China	92%
PV	1	06 - 20	3,000	0.03 - 0.4	Germany, Japan, Spain and US (California, Arizona, New Jersey)	88%
Geothermal	13	45 - 90	800 - 3,000	2 - 10	France, Ireland, Indonesia, Kenya, Philippines, Russia and US	-
Biomass	40	25 - 80	500 - 6000	4 -12	US, China, India and Brazil	-
Solar thermal	0.4	20 - 35	2500 - 6000	12	US and Spain	-
Large hydropower	800	35 - 60	500 - 4500	2 -10	Mainly in industrialized countries	-
Small hydropower	25	20 - 90	700 - 8000	2 -12	Mainly in industrialized countries	-
Fossil	2280	52	-	-	All over the world	-
Nuclear	369	78	-	-	Mainly in industrialized countries	-

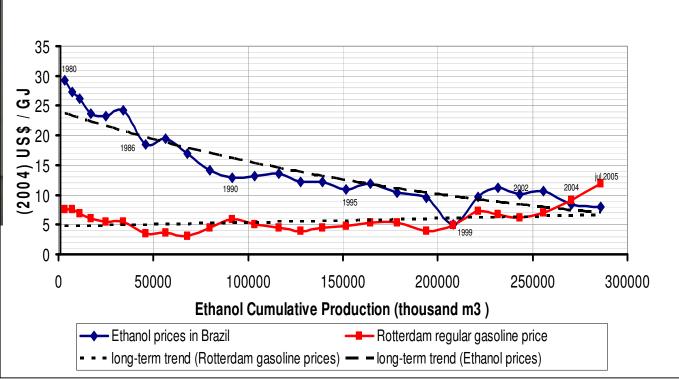
Source: WEA (2004), updated with BIREC (2005)

Biofuels

- Energy generation (electricity and heat):
 - Agro industry residues
 - Sugarcane bagasse
 - Wood residues
 - Animal residues → biogas
- Biofuels for transportation (commercially available technologies)
 - Ethanol (sugarcane, corn, cassava, ...)
 - Brazil: ethanol production from sugarcane: 16 billion liters; 2.5 billion liters exported
 - Biodiesel (castor oil, palm oil, jatropha, ...)

Biofuels for transportation Brazilian Sugarcane ethanol "learning curve" (economically competitive with gasoline) 1975-2005



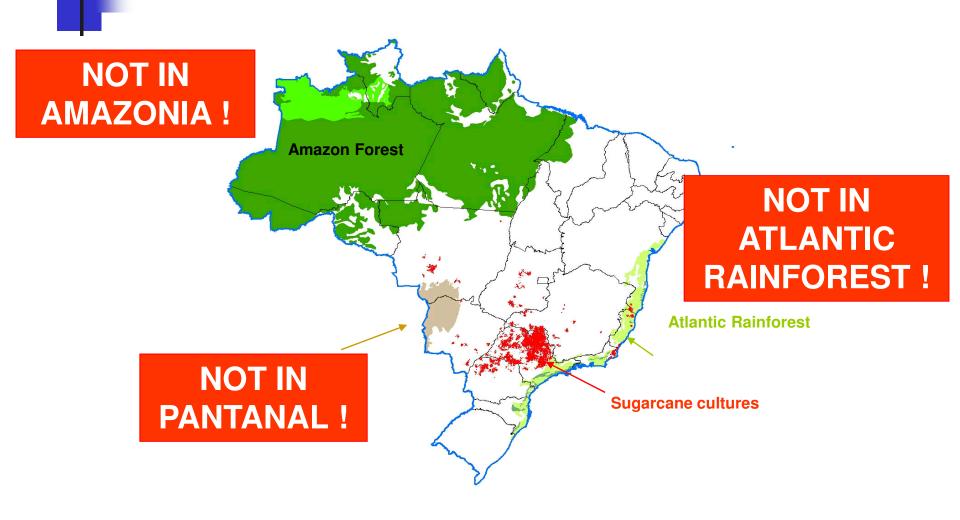


Source: Goldemberg et al, 2003

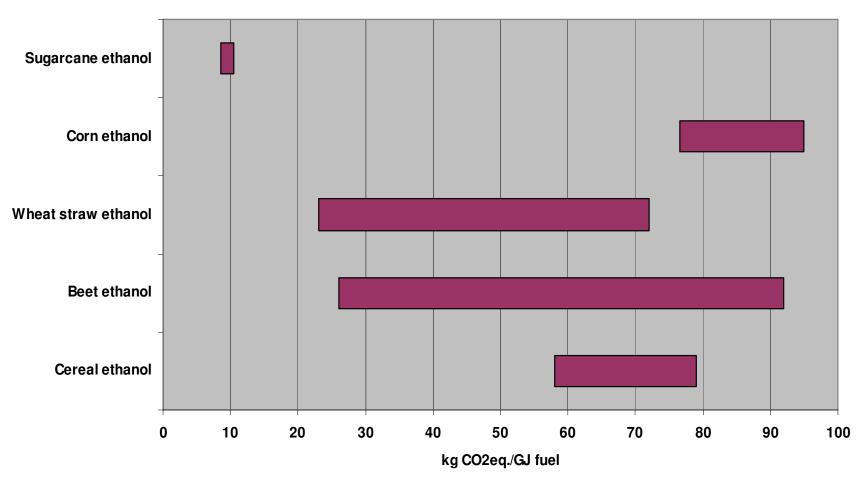
Sustainable Sugarcane Ethanol Production in Brazil / São Paulo

- Environmental legislation improved and enforced (State of São Paulo - 60% of all Brazilian sugarcane mills);
 - Land use severely controlled: preserving riparian forests and other natural ecosystems and forbidding deforestation;
 - Harvest burning practices being phased-out, through a strict legal enforcement;
 - Industrial sugarcane and ethanol plants with atmospheric emissions controlled;
 - Forbidden the discharge of pollutant effluents (stillage): replaced by controlled ferti-irrigation practices (São Paulo Environmental Agency -CETESB);
- Low water consumption:
 - Almost 100% sugarcane plantations non-irrigated in Brazil.
 - Reduction on the amount of water used: from 5 m3/tc (1990) to 1.83 m3/tc (2004) → High-level of water reutilization in the mills (92%).





GHG emissions from different sources of ethanol



Sources: Macedo et. alii, 2004, UK DTI, 2003 and USDA, 2004

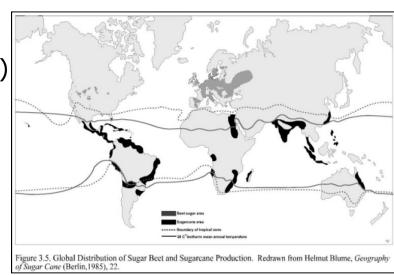


Perspectives for Developing Countries

- CDM opportunities
- Production of biofuels for local consumption
 - job creation (rural areas)
 - industrial development
 - use of degraded lands
 - reduction on oil imports
- Biofuels exports for developed countries (Kyoto Protocol targets)
 - increase on revenues for developing countries

Suggestions for replication in other developing countries

- First phase: Macroeconomic feasibility analysis
 - Evaluation of the best crops / agricultural production costs
 - Countries already producing sugarcane and sugar potential candidates to alcohol production from sugarcane
 - Industrial production costs ?
 - CDM PROJECTS
- First phase: Special Policies
 - Legislation establishing mandatory
 blend of ethanol to gasoline 5 to 10% (in vol)
 - Taxes Policy
 - Subsidies for a pre-determinate
 Period (IF NECESSARY)
 - Differential taxes for biofuels production and use
- Second phase: Biofuels export
 - Candidate countries (?) competitive production costs





Prof. Suani Coelho

Head of CENBIO (Brazilian Reference Center on Biomass – University of São Paulo)

Deputy Secretary
São Paulo State Secretariat for the Environment

sma.suani_coelho@cetesb.sp.gov.br