The Global Energy Challenges

Copenhagen, 13 January 2006

Development and Climate Change Option for New Regime Directions

Centro Clima

CENTRO DE ESTUDOS INTEGRADOS SOBRE MEIO AMBIENTE E MUDANÇAS CLIMÁTICAS

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Phase I Energy Issues

- GHG Emissions Mitigation as a Co-Benefit of the Ethanol Program;
- The role of biodiesel in providing clean fuel for trucks and buses and power generation in remote areas

Ethanol Program

- largest commercial application of biomass for energy production and use in the world;
- Successfully showed technical feasibility of large-scale sugarcane ethanol production and use to fuel car engines;
- 2 million cars running on ethanol (peak of 4.4 million in 1993) + flex-fuel cars => 4.6 billion liters/year + 6.4 billion liters/year for gasohol (25% anhydrous ethanol + 75% gasoline);

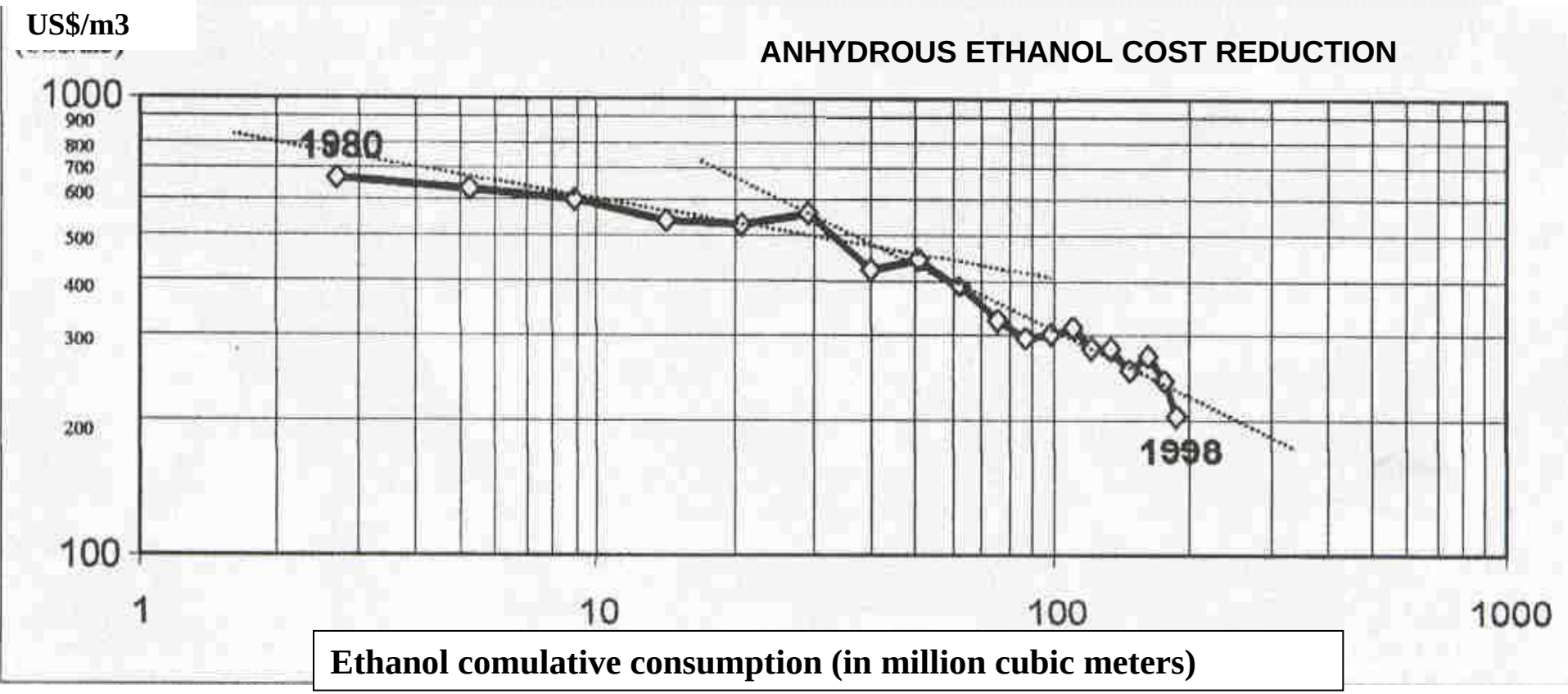
Ethanol Program

- Sugar cane bagasse use as an industrial fuel and for power generation has been growing;
- Surplus of electricity to be injected in the grid;
- Foreign exchange savings;
- 720,000 direct jobs and more than 200,000 indirect jobs in rural areas;

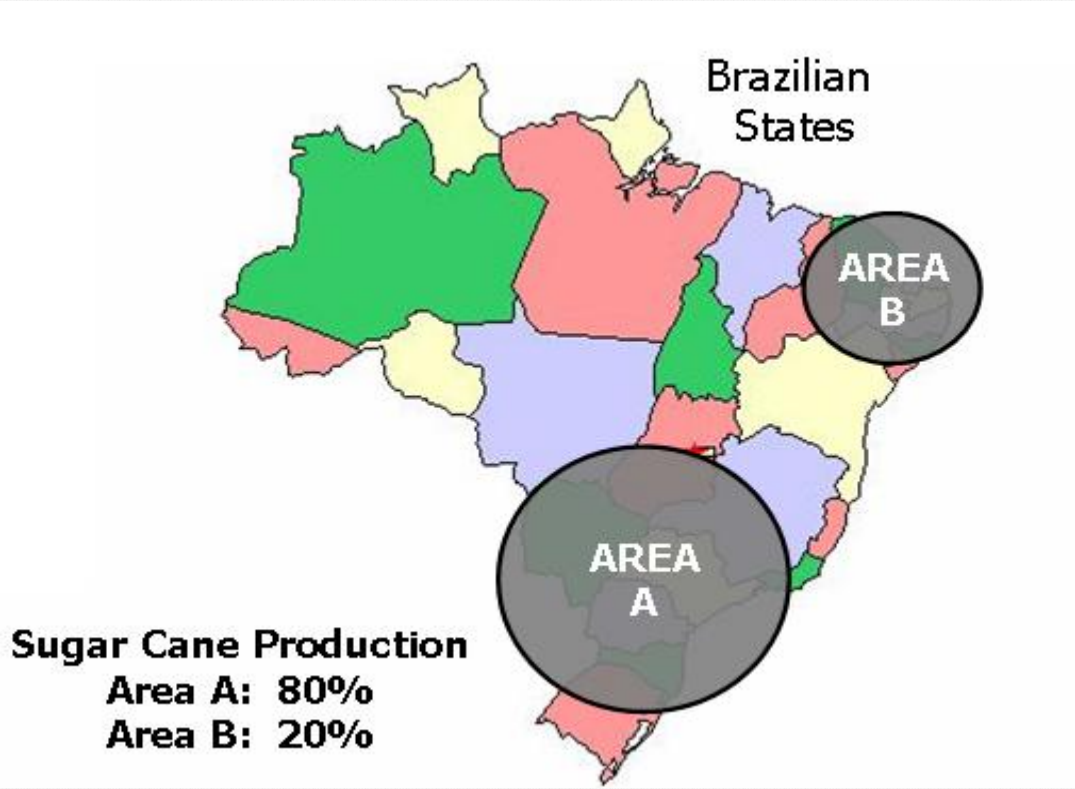
Ethanol Program

- Curbing the increase of local air pollution;
- Mitigation: 6 to 10 million tons of carbon/year since 1980;

Productivity gains in ethanol production

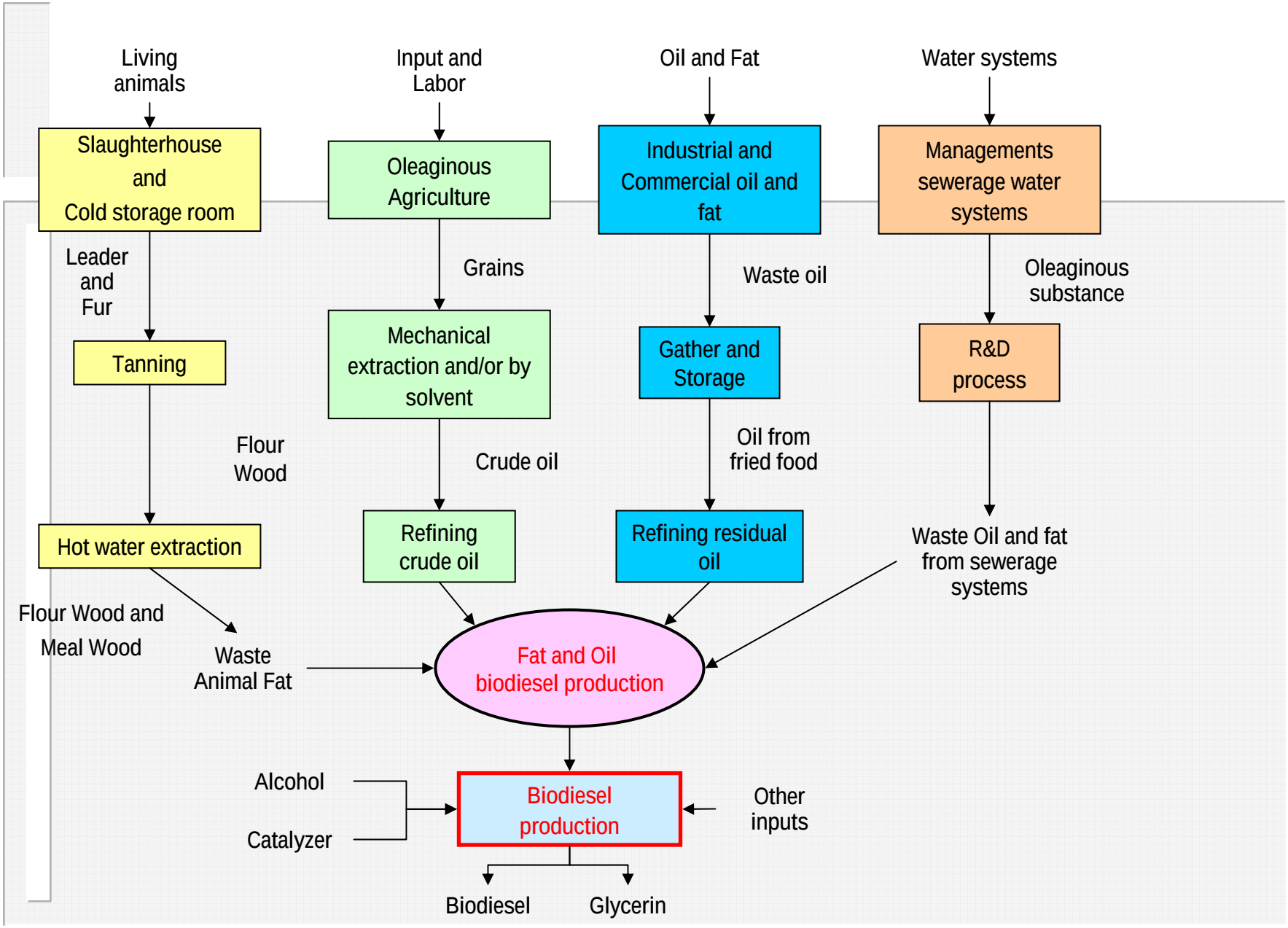


Sugarcane Production Regions

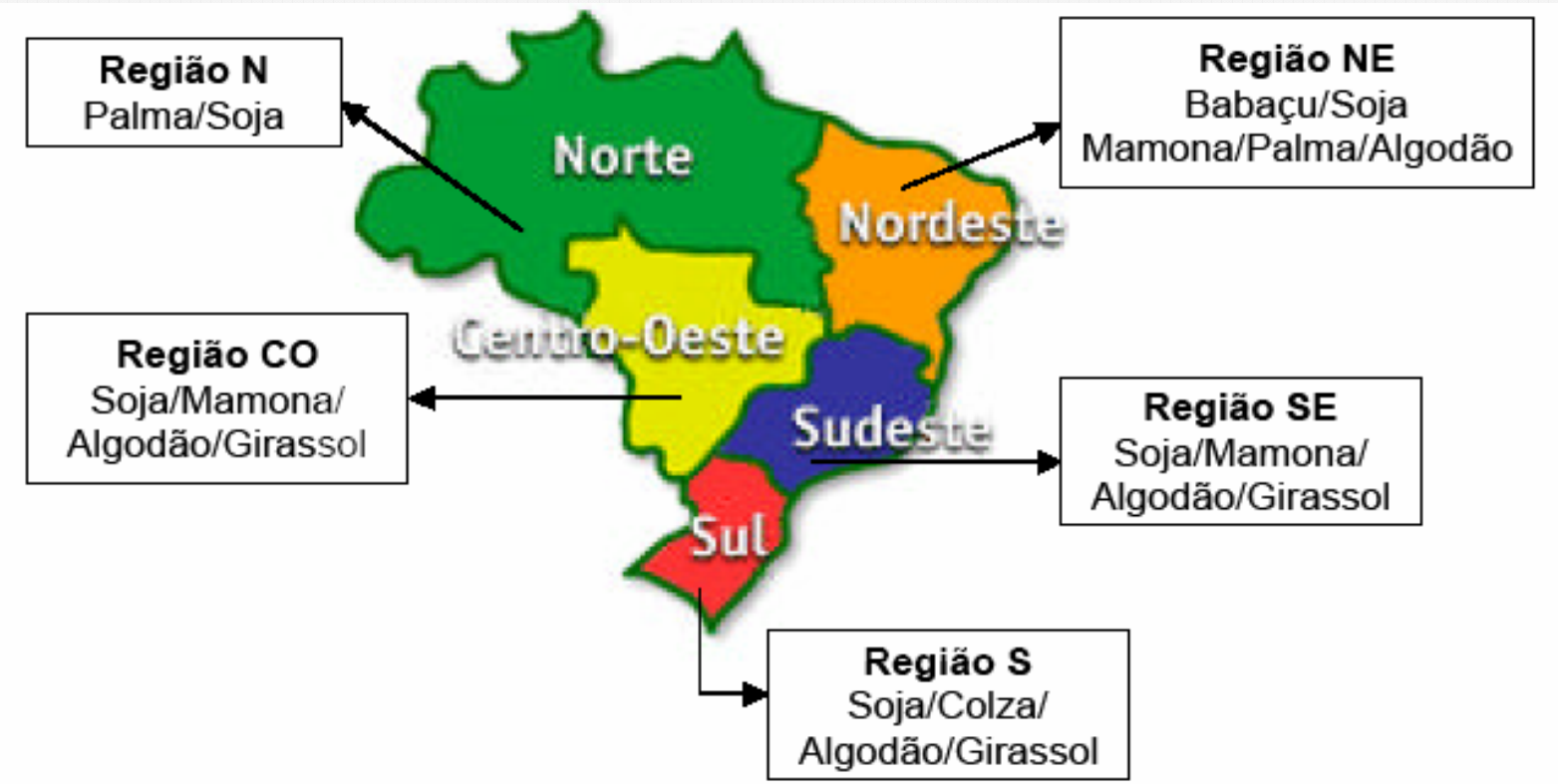


Phase 2 Case Studies
Modern Biofuels for Transport and Power Generation

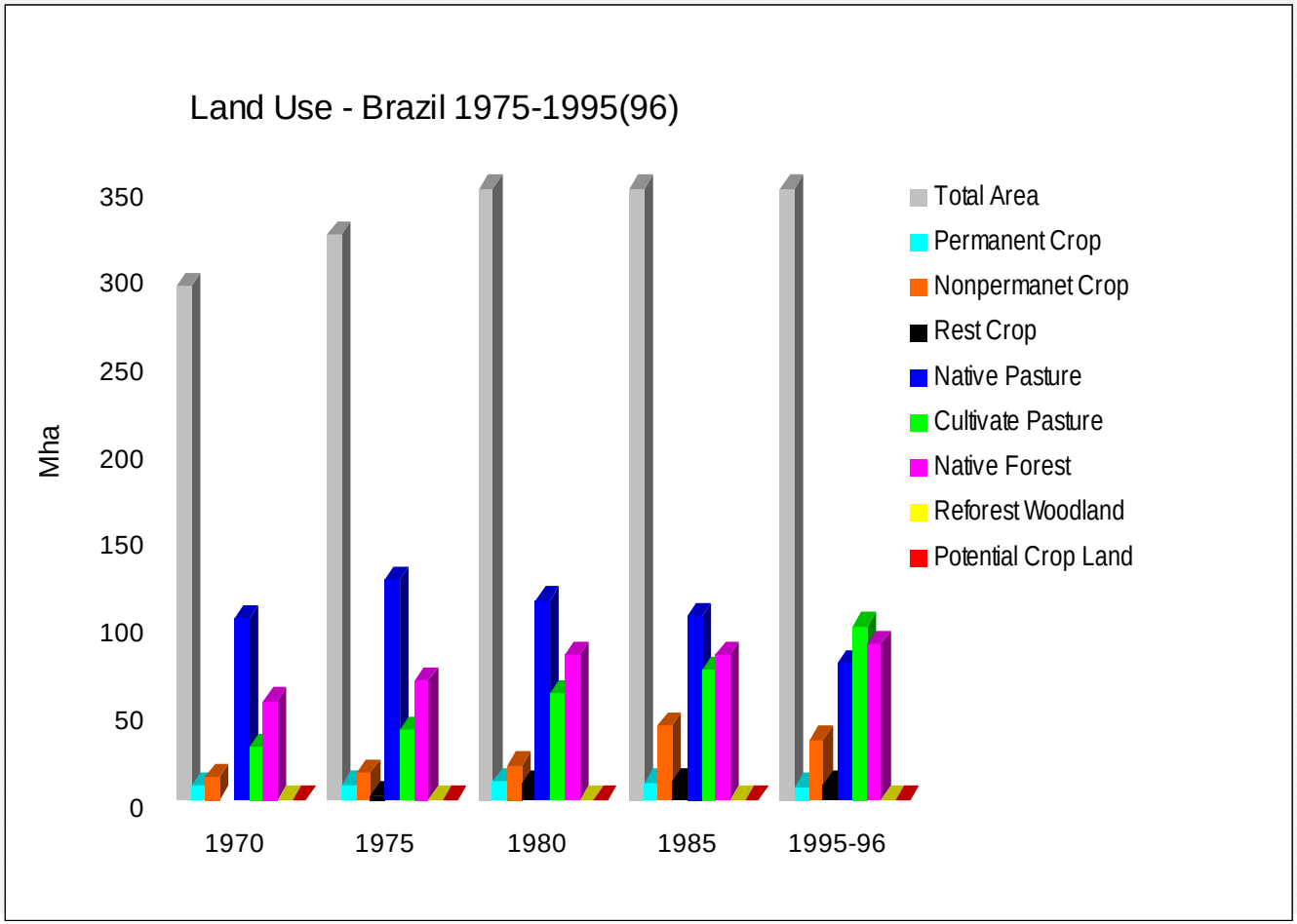
- The expansion of the Ethanol Program: contribution to sustainable development and GHG Emissions Mitigation (pros and cons; policy tools to maximize social and environmental benefits)
- The introduction of biodiesel as a transport fuel and for decentralised power generation (access to electricity)


Living animals
Input and Labor
Oil and Fat
Water systems
Slaughterhouse and Cold storage room
Oleaginous Agriculture
Industrial and Commercial oil and fat
Managements sewerage water systems
Leader and Fur
Grains
Waste oil
Oleaginous substance
Tanning
Mechanical extraction and/or by solvent
Gather and Storage
R&D process
Flour Wood
Crude oil
Oil from fried food
Hot water extraction
Refining crude oil
Refining residual oil
Waste Oil and fat from sewerage systems
Flour Wood and Meal Wood
Waste Animal Fat
Fat and Oil biodiesel production
Alcohol
Catalyzer
Biodiesel production
Other inputs
Biodiesel
Glycerin

Feedstocks for Biodiesel Production



Land Availability



BRAZILIAN BIODIESEL PROGRAM

- The recently launched Brazilian Biodiesel Program allows for using several different vegetal oils as raw materials (castor bean, soybean, oil palm, sunflower and others) for biodiesel production.
- The initial target is for 2% of biodiesel in the blend with regular diesel oil in 2006.
- Policy support: financial support, credit and R&D promotion to increase the efficiency and productivity of the biodiesel production.

DIESEL X BIODIESEL EMISSIONS

- **Diesel - 2.70 kg CO_2/l**
- **Methyl esther (biodiesel) – 0.3 kg CO_2/l**
- **Ethyl esther (biodiesel) – nearly zero or 0.05 kg CO_2/l (process uses renewable ethanol from sugarcane)**

Emission Reductions	
CO_2	78 – 100%
CO	50%
Sulphur	98%
Particulate matter	50%
Aromatics	30%

Renewables and Universal Access to electricity

- Recent regulations require utilities to ensure electricity supply to all households of the country up to 2015;
- This “demand pull” provides a good opportunity for decentralized power generation from renewables to complement conventional options to achieve this goal (grid extension and diesel generators);

Renewables and Universal Access to electricity

- Renewable energy development = more sustainable patterns of energy supply = environmental, social and economic co-benefits;
- Use of renewables could also help to accelerate the achievement of targets to ensure full coverage of electricity needs of low-income populations living in remote locations;

Renewables and Universal Access to electricity

- Tapping renewables potential => an appropriate regulatory framework must be established, allowing for capacity building and appropriate incentives to motivate action by different stakeholders
- Clean Development Mechanism is also a potential tool;

CONCLUSIONS

Development first and climate change benefits will follow!

- Creation of jobs and income for family agriculture in rural areas;
- Reduction of regional inequalities;
- Promotion of crop diversification;
- Increase of the access of family farmers to electricity;

Adaptation to climate change

- Use of renewable biodiesel as a substitute for diesel oil in vehicles and off-grid power generation;
- Decrease of CO_2 emissions;
- Reduction of diesel oil imports ;

Mitigation