



Bioenergy in FAO Focus on: Development and Environment

**International Conference on Bioenergy and Liquid Biofuel
Development and Utilization**

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Bioenergy resources

Wood

Energy crops (sugar, sorghum, rapeseed, vegetable oils, etc.)

Charcoal

Agro-residues

Black Liquor

Animal residues and by-products (manure, slaughterhouse residues)

Forest residues

Fast growing grasses

Bioenergy forms

Liquids

Ethanol

Methanol

Biodiesel

Vegetable oils

Solids

Charcoal

Briquettes

Gaseous

Hydrogen

Methane

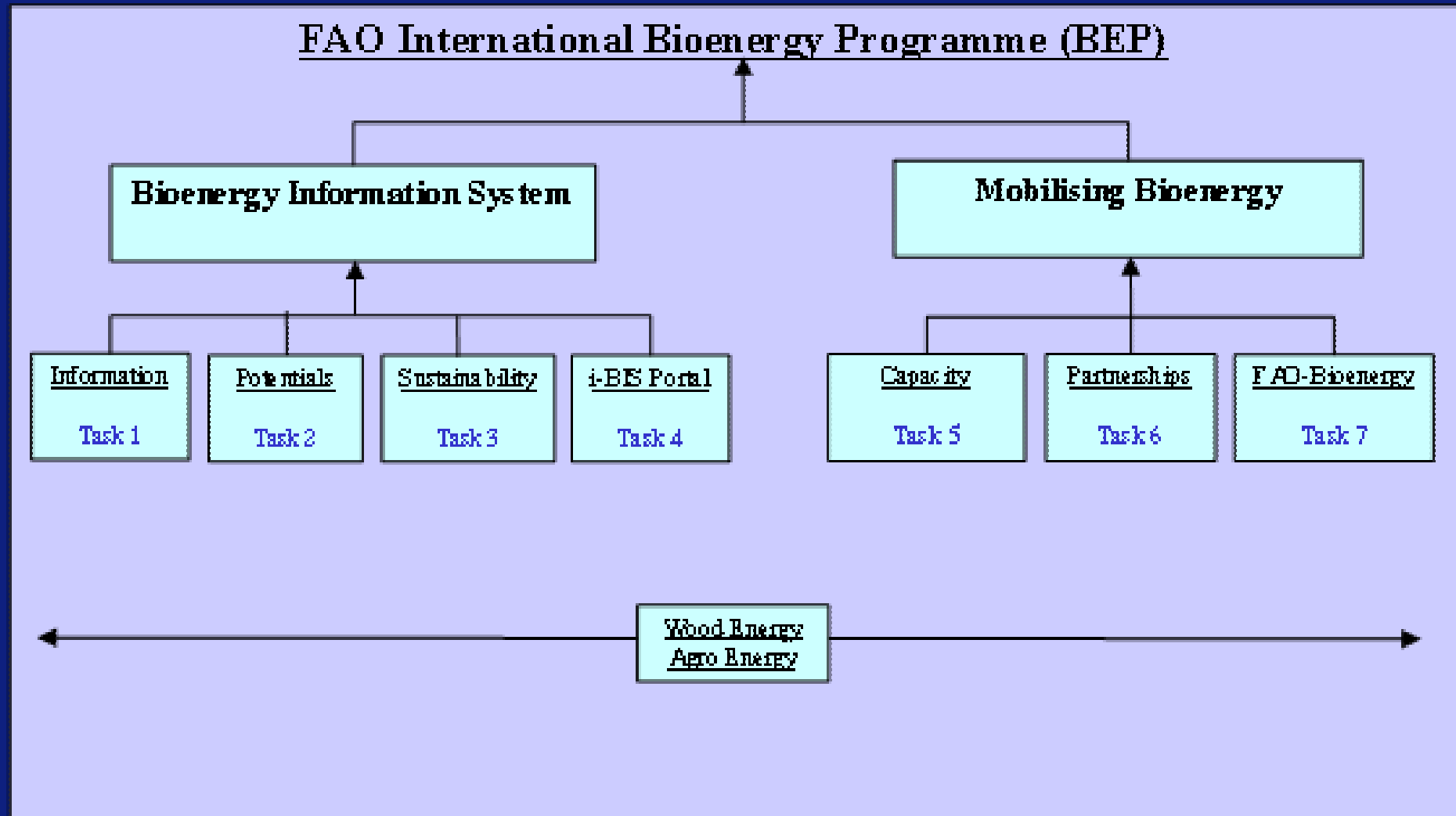


Bioenergy use: 50 EJ/a of 406 EJ/a total energy consumption (1997)

- Use of biomass fuels in 13 countries of different economic, climatic, and demographic conditions (1980s)

Country	Total energy consump. [PJ]	Bio-energy consump. [PJ]	Share of bio-energy [%]	Population density [cap/km ²]	Total energy per cap. [GJ/cap]	Bioenergy per capita [GJ/cap]
Austria	1,053	100	9.5	94.3	137	13.0
Germany	15,012	84	0.6	230.8	189	1.1
Japan	17,390	6	0.0	331.9	141	0.0
Poland	3,595	40	1.1	126.5	94	1.0
Sweden	1,971	230	11.7	21.1	230	26.8
USA	84,321	3,482	4.1	28.1	337	13.9
Brazil	5,155	1,604	31.1	18.5	35	10.8
China	36,632	9,287	25.4	129.2	32	8.1
Egypt	1,502	380	25.3	56.3	29	7.2
India	16,554	8,543	51.6	301.6	20	10.1
Malaysia	1,488	663	44.6	58.6	83	37.1
Tanzania	954	925	97.0	32.5	37	35.6
Zaire	435	362	83.2	18.2	12	9.7

FAO Biomass Energy Programme Schematic



OBJECTIVES

- Enhance rural development and food security
- Integration of bioenergy into the forestry and agricultural sectors
- Promotion of the potential of bioenergy in the energy market
- Promotion of bioenergy in climate change mitigation
- Promotion of sustainable management of bioenergy resources, conversion and use
- Promote benefits of energy trade to rural producers

INTEGRATION OF AGRO-ENERGY INTO THE AGRICULTURAL SECTOR

- Developing tools and methodologies for the rapid field assessment of agro-energy potential**
- Integration of energy issues into agricultural policies, plans and programmes**
- Undertaking capacity building, training and dissemination of information**
- Involving the farmer in the decision-making process**

The background of the slide is a dense, light-colored image of wood chips or mulch, which are small, irregular pieces of wood. The chips are scattered across the entire frame, creating a textured, natural-looking background. The text is overlaid on this background in a dark green color.

PROMOTE THE POTENTIAL OF AGRO ENERGY FOR THE ENERGY MARKET

- **Integration of agro energy into the national energy policies and balances**
- **More equal market for conventional and renewable energies**
- **Regulation of the energy market**
- **Stimulate r&d investments on new technologies**

FOOD SECURITY AND RURAL DEVELOPMENT

- Stimulating the double role of agriculture as an energy user and an energy producer**
- Promoting the generation of employment and rural infrastructure through the implementation of agro energy projects**

CLIMATE CHANGE MITIGATION

- **Promoting the substitution of fossil fuels**
- **Assessing the potential of different agro energy systems for GHG reduction**
- **Mobilizing available mechanisms (CDM, GEF) for agro energy technological development and application**
- **Providing assistance for the implementation of the Kyoto Protocol**

Carbon reduction, substitution and conservation in Agriculture

Agricultural practices

Carbon reduction
Water management
Chemical inputs reduction
Agronomic research - new species
Carbon sequestration
Carbon conservation

Bioenergy

Carbon substitution
Biofuels
Electricity
Residue management
Biogas

Some examples

Agricultural activities to reduce GHG emissions	
	Improved manure management
	Reduced enteric fermentation
	Improved/reduced chemical agri-inputs use (fertilizers, pesticides, herbicides, etc.)
	Reduced machinery use (and/or lower fossil fuel intensity of conservation agriculture practices)
	Agronomic planning (selection of seeds and species with low chemical agri-inputs demand and water requirements)
	Energy from dedicated crops
	Energy from agricultural residues, animal waste, and other on-farm organic waste
	CA water management (water saving from improved water retention, reduced evaporation, ecc.)
	Improved irrigation techniques/technologies (i.e. drip and sprayer irrigation)
	Improved water management in rice cultivation

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Example: Conservation Agriculture: Carbon Reduction Potential

Reduced land preparation

Reduced agri-chemical inputs

No-tillage practices & direct planting

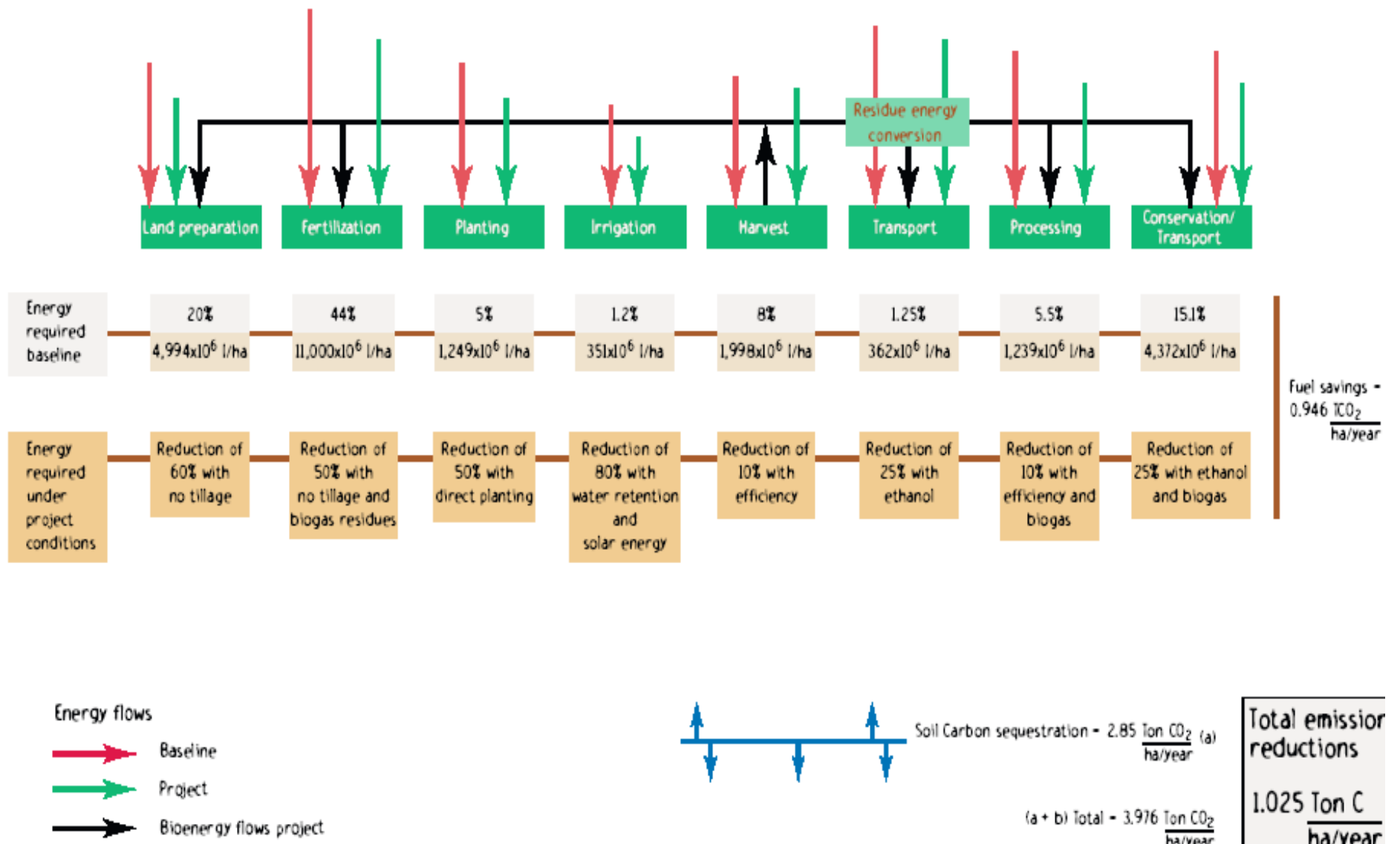
Improved water retention

Decreased water, top soil & nutrient losses

All lead to **HIGH Emissions Reductions**

Energy and biomass flows: renewable energy and conservation agriculture

An overall perspective



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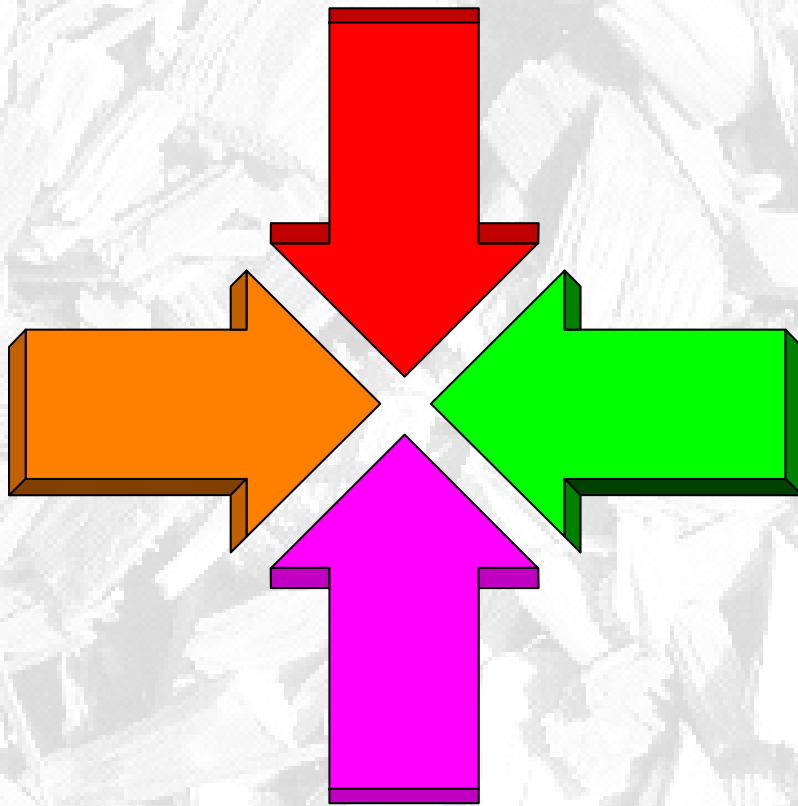
Bioenergy main Benefits

Promotes employment and rural infrastructure

Stimulates the double role of agriculture and forestry:
energy users and energy producers

Reduces Carbon emissions

Bioenergy and agriculture- points of convergence

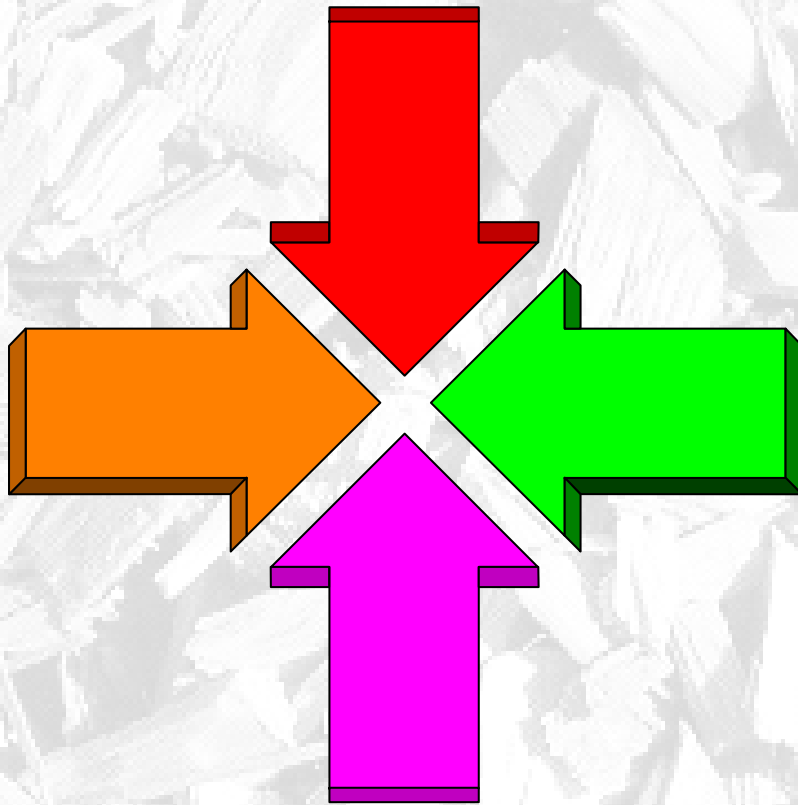


The Society

- new employment opportunities;
- rural emigration halted;
- higher quality of life;
- enhanced education and health;



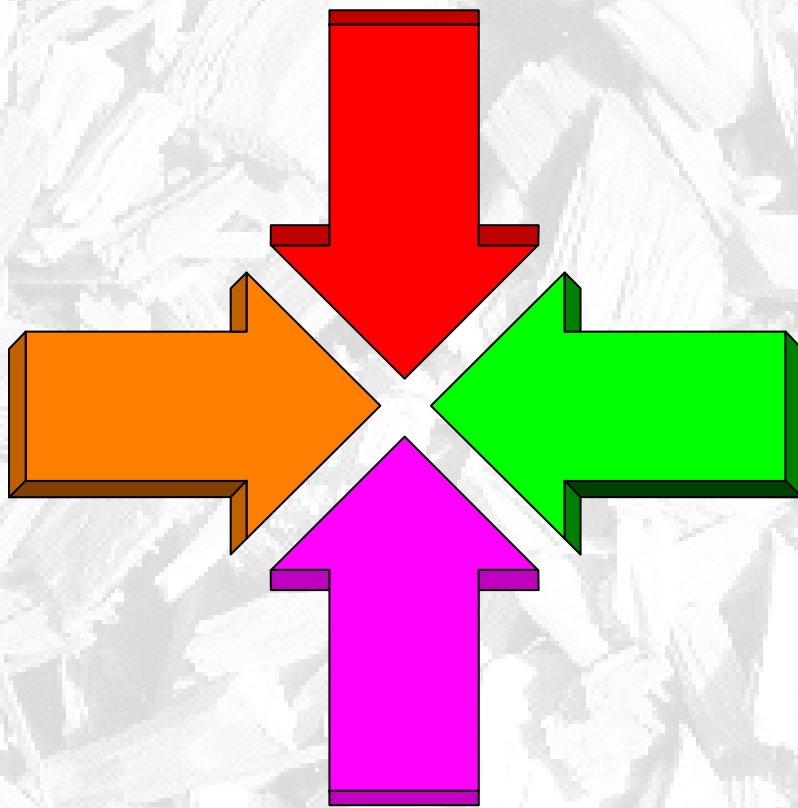
Bioenergy and agriculture points of convergence



The Environment

- contribute to global environment and carbon substitution: Kyoto Protocol;
- cleaner and more sustainable transport;
- cleaner and more sustainable industry;

Bioenergy and agriculture points of convergence



The Economy

-  new markets;
-  rural economy mobilized;
-  industrial evolution;
-  enhanced infrastructure



The background of the slide is a dense, textured pattern of light-colored wood chips or mulch. The chips are irregular in shape and size, creating a complex, organic-looking surface. The overall tone is a pale, natural wood color.

CONSTRAINTS

Land use conflicts (food production, landscape)

Environmental impacts of large monocultural plantations

Low energy conversion efficiency

High costs due to market distorsion

Selected activities – 2002/4

■ Studies and data

- Wood energy in all regions
- Bioenergy potential assessment
- Bioenergy information system (decision making)
- Databases
- Links with climate change (mitigation and adaptation)
- CDM Methodologies for Agriculture

Selected activities – 2002/4

■ Projects

- Energy strategies - Niger, Mali
- Wood energy - Mexico, Cuba, Slovenia
- GEF GHG/emission reduction. - Asia, Brazil, Ethiopia
- Ethanol - Nigeria; Biodiesel - Ukraine
- Special Programme for Food Security

Selected activities – 2002/4

■ Partnerships

→ UN Energy

→ IEA

→ GEF

→ UNFCCC and IPCC

→ Universities - SAU, IC, UU, UNAM

→ Associations - ISES, ANES, ITEBE



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