European Biomass Industry Association

“Opportunities to promote biofuels production in Central and Eastern Europe – EUBIA experience and perspective”

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EUBIA

Opportunities and challenges for a sustainable development of bioenergy
Bucarest Romexpo Exhibitional Center, 22 April 2008

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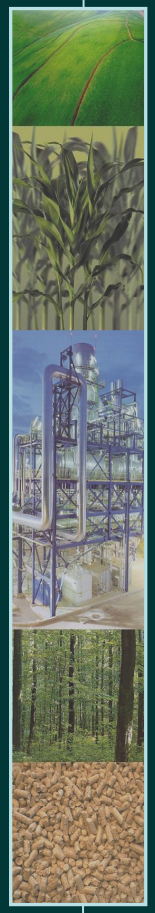
GENERAL INTRODUCTION TO EUBIA



- EUBIA was established in 1996 as an international non profit association in Brussels, Belgium.

- EUBIA groups together **industry, knowledge** and **research centers**, all of them active in the field of biomass.

- Our main **objectives** are to **promote** the use of biomass as a renewable energy source, to **support** the European biomass industries at all levels, to **develop** innovative bioenergy concepts, and to **foster** international co-operation within the bioenergy field**.**

▶ CONCEPT DEVELOPER

- EUBIA **promotes bioenergy activities** at small, medium and large scale in collaboration with the relevant stakeholders (Industries, local and national authorities, biomass providers, financing institutions, etc).

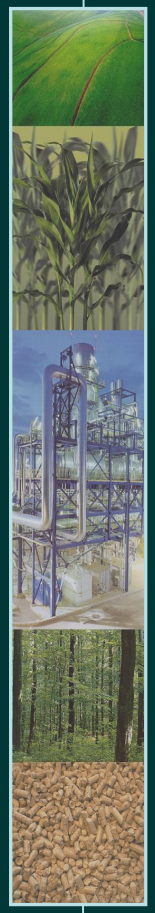
- In particular, we contribute to **identify attractive economic opportunities**, to **promote modern concepts**, commercial technologies and biomass resources supply able to penetrate large energy industrial markets.

- EUBIA has a strategic position within the European Institutions and is an important partner in the EU bioenergy research project which represent the major economical support.

- EUBIA is member of the GBEP Global Bioenergy Partnership steering committee.

RESTMAC

Creating Markets for Renewable Energy Technologies – EU RES technology marketing campaign



- Integration of sectoral actions into one technology marketing campaign
- Targeted actions in selected Renewable Energy Technologies
- Renewable electricity technologies:
- Renewable heating and cooling technologies:
- Production and distribution of liquid and gaseous biofuels:
- Development of sectoral information tools for identified key-technologies in the different RES sectors
- Targeted actions in selected geographical areas
- Organisation of a closing conference

The renewable energy sectors to be marketed include:

- PV (photovoltaic)
- SHP (Small Hydro Power)
- Biomass
- Geothermal
- Solar Thermal
- Wind Power

For more information : www.eubia.org

SIXTH FRAMEWORK PROGRAMME

“Opportunities to promote biofuels production in Central and Eastern Europe – EUBIA experience and perspective”

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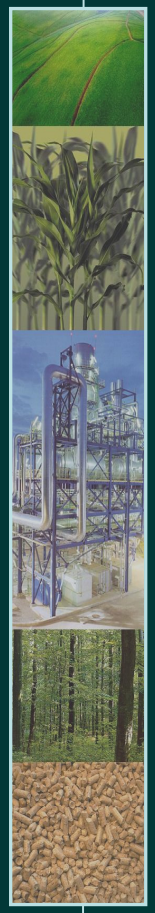


1. General overview in Central and Eastern European countries
   - Greenhouse Gas emission,
   - Energy consumption
   - RES consumption
   - Biomass potential
   - Solid and Liquid biofuels environmental compatibility production

2. Future activities of interest for Solid Biofuels
   - production and consumption
   - Market opportunities : Agropellets, co-firing

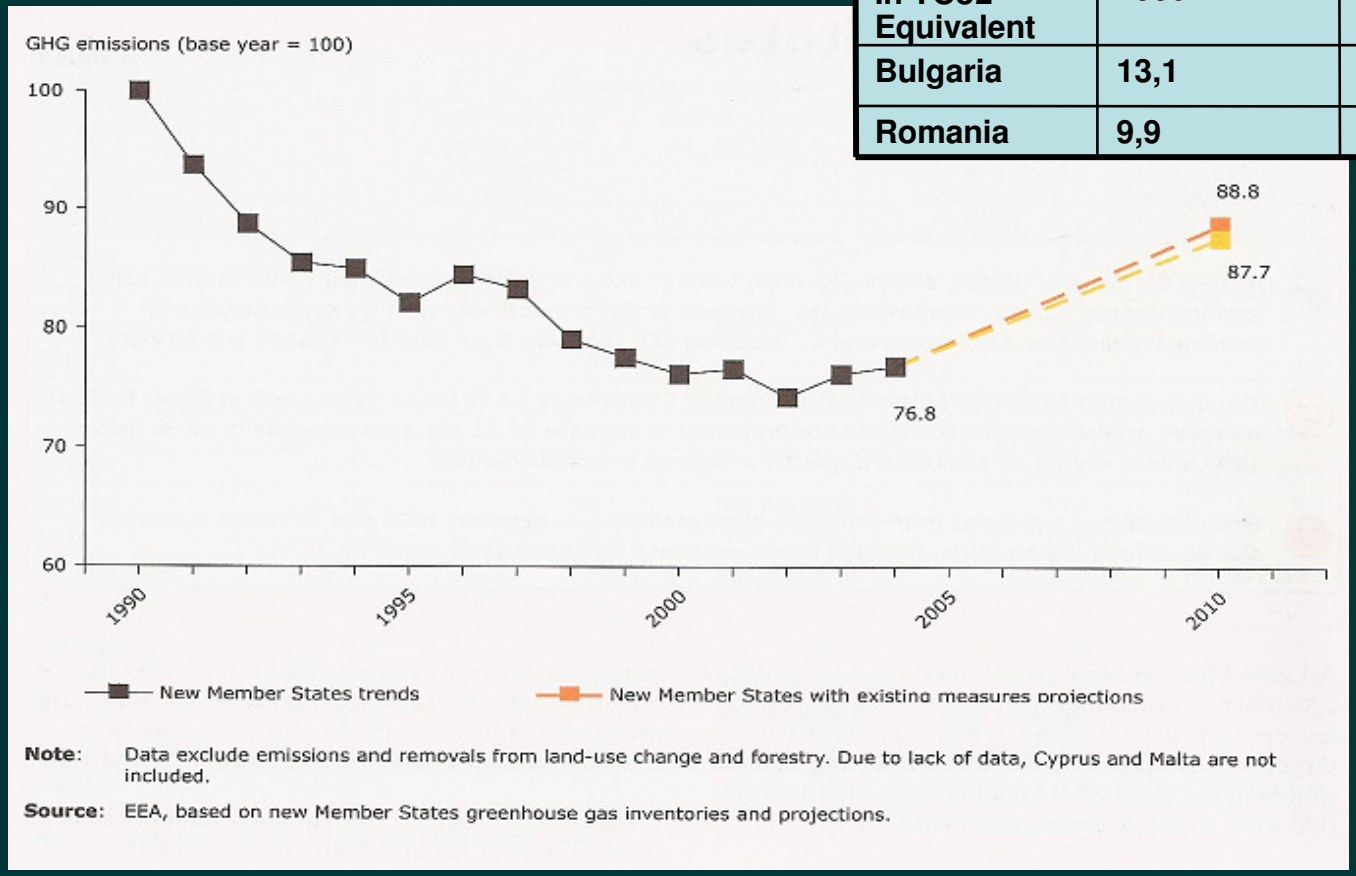
3. Future activities of interest for Liquid Biofuels
   - production in EU
   - Market opportunities : Sweet-Sorghum Biorefineries

4. Conclusions

General overview

1. Greenhouse gas emissions in new member States Actual and projected GHG emissions aggregated for eight new Member States*

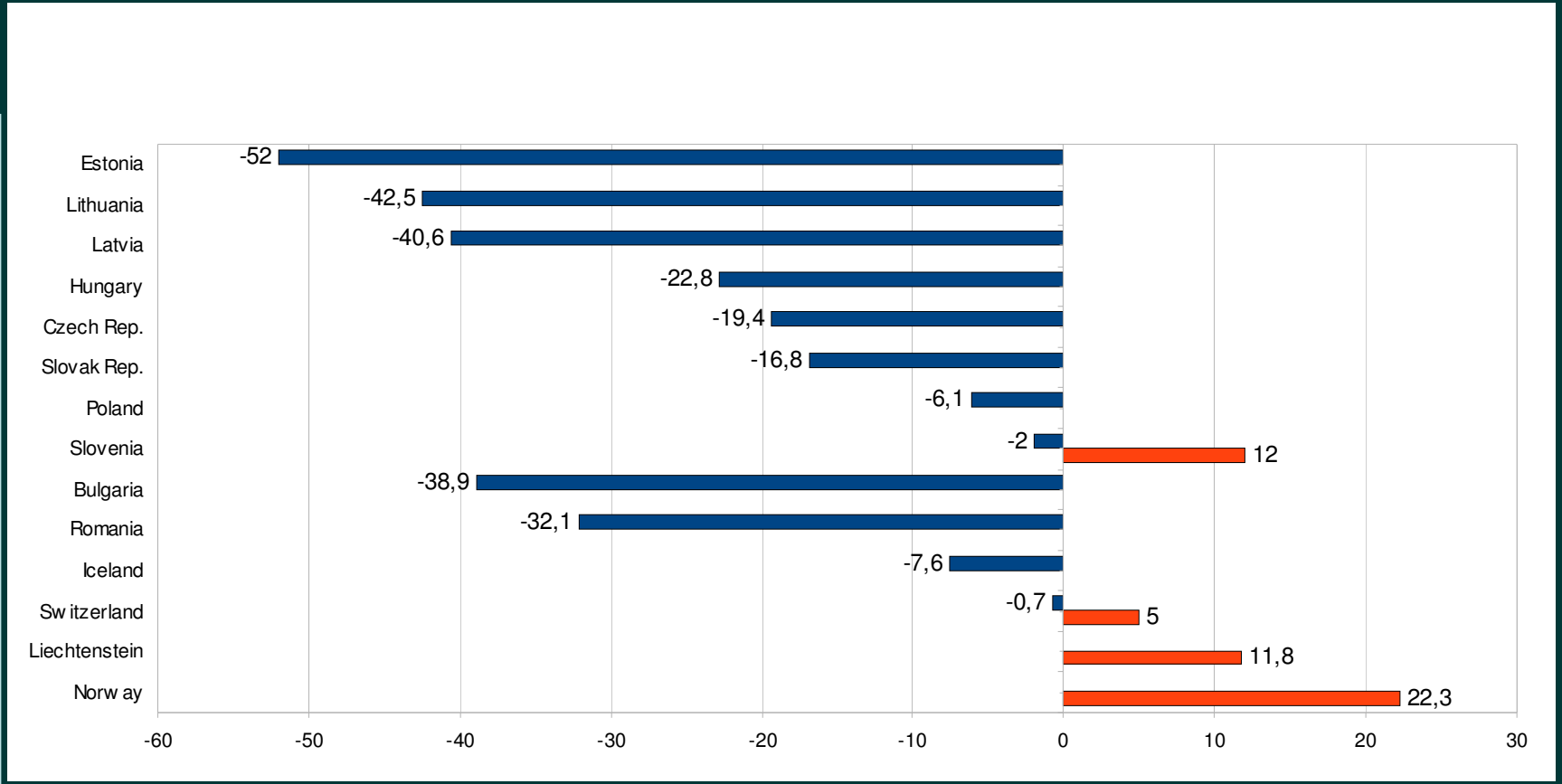
In TCo2 Equivalent	1990	2004
Bulgaria	13,1	8,6
Romania	9,9	7,2



Source : EEA, based on New Member States projections

*New members states 2006 : Lithuania, Latvia, Estonia, Hunagry, Poland, Slovak Republic, Czech Republic, Slovenia

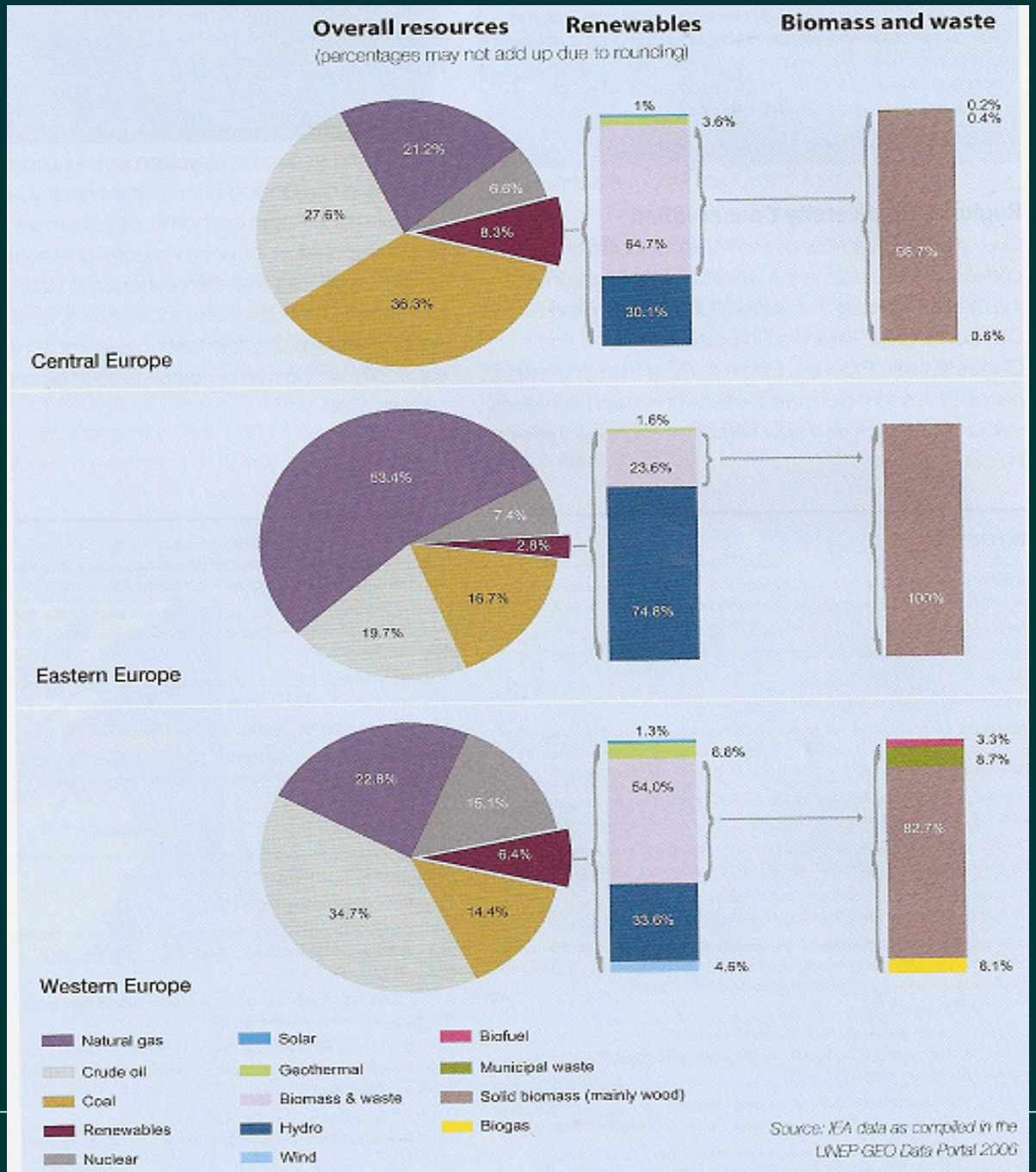
Relative gaps (over-delivery or shortfall) between projections and targets for 2010 for new Eastern and central Europe countries



Over-delivery (-) or shortfall (+) of respective emission target in percentage points relative to base-year emissions

Source : EEA, based on New Member States projections

2. Energy consumption in Europe



Over 85 % of the energy consumed in Central Europe comes from fossil fuels

90 % of the energy consumed in Eastern Europe comes from fossil fuels

Around 80 % of the energy consumed in European Union comes from fossil fuels

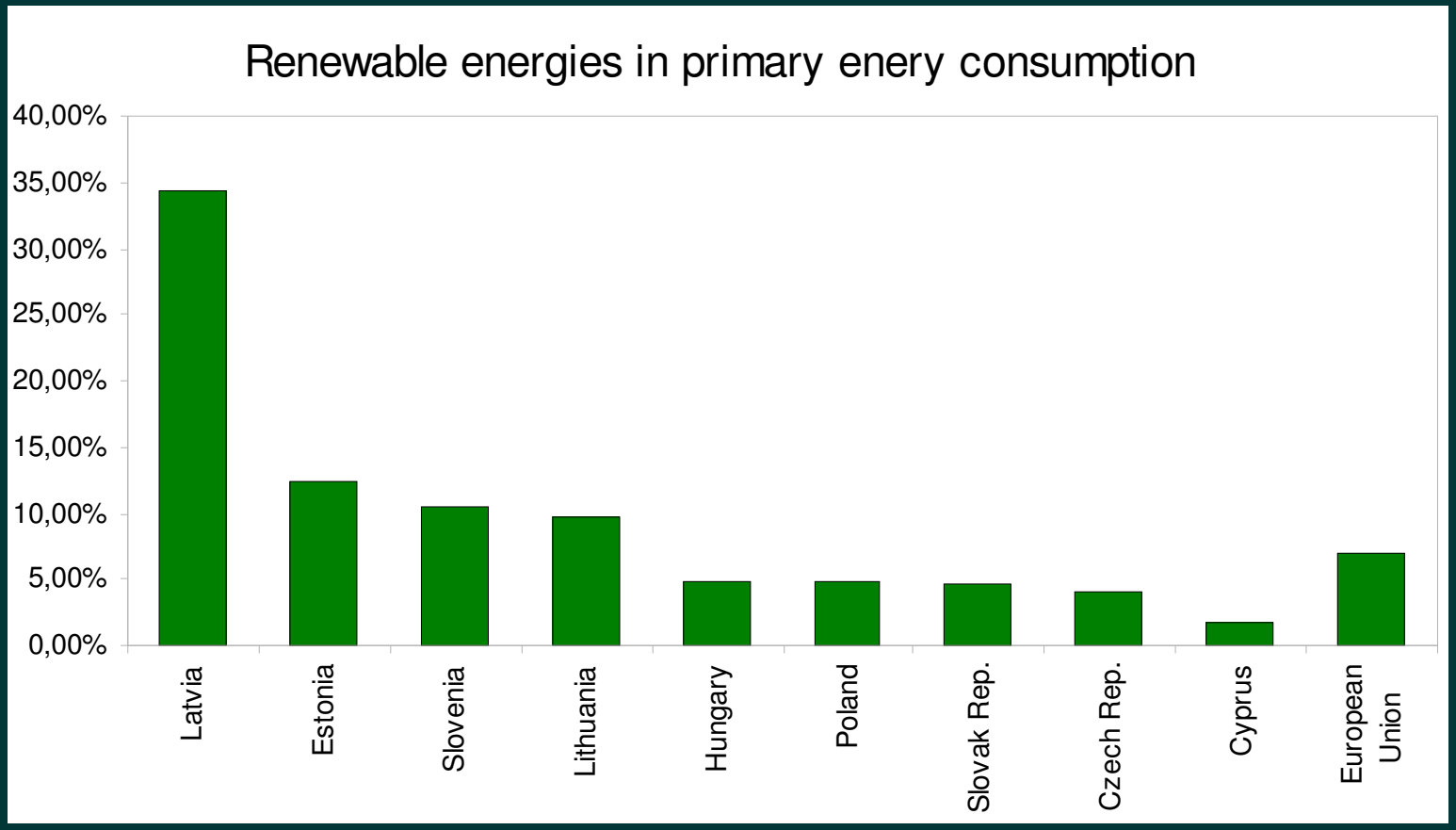
3. Renewable Energy Sources Consumption

Gross inland consumption RES per member state and contribution of biomass in 2004 (Mtoe)

	Gross inland consumption Mtoe.	Renewables Mtoe	Biomass Mtoe	Share of RES of GIC (%)	Share of Biomass related to GIC (%).
Cyprus	2,5	0,09	0,005	3,6	0,2
Czech Republic	43,6	1,36	1,19	3,12	2,72
Hungary	26,2	0,97	0,86	3,7	3,28
Latvia	4,6	1,65	1,37	35,86	29,78
Lithuania	9,2	0,73	0,69	7,93	7,5
Poland	92,5	4,32	4,12	4,67	4,45
Romania	-	-	-	-	-
Slovak Rep.	18,6	0,74	0,38	3,97	2,04
Slovenia	7,1	0,82	0,47	11,54	6,61
EU 25	1747,2	109,53	72,274	6,26	4,13

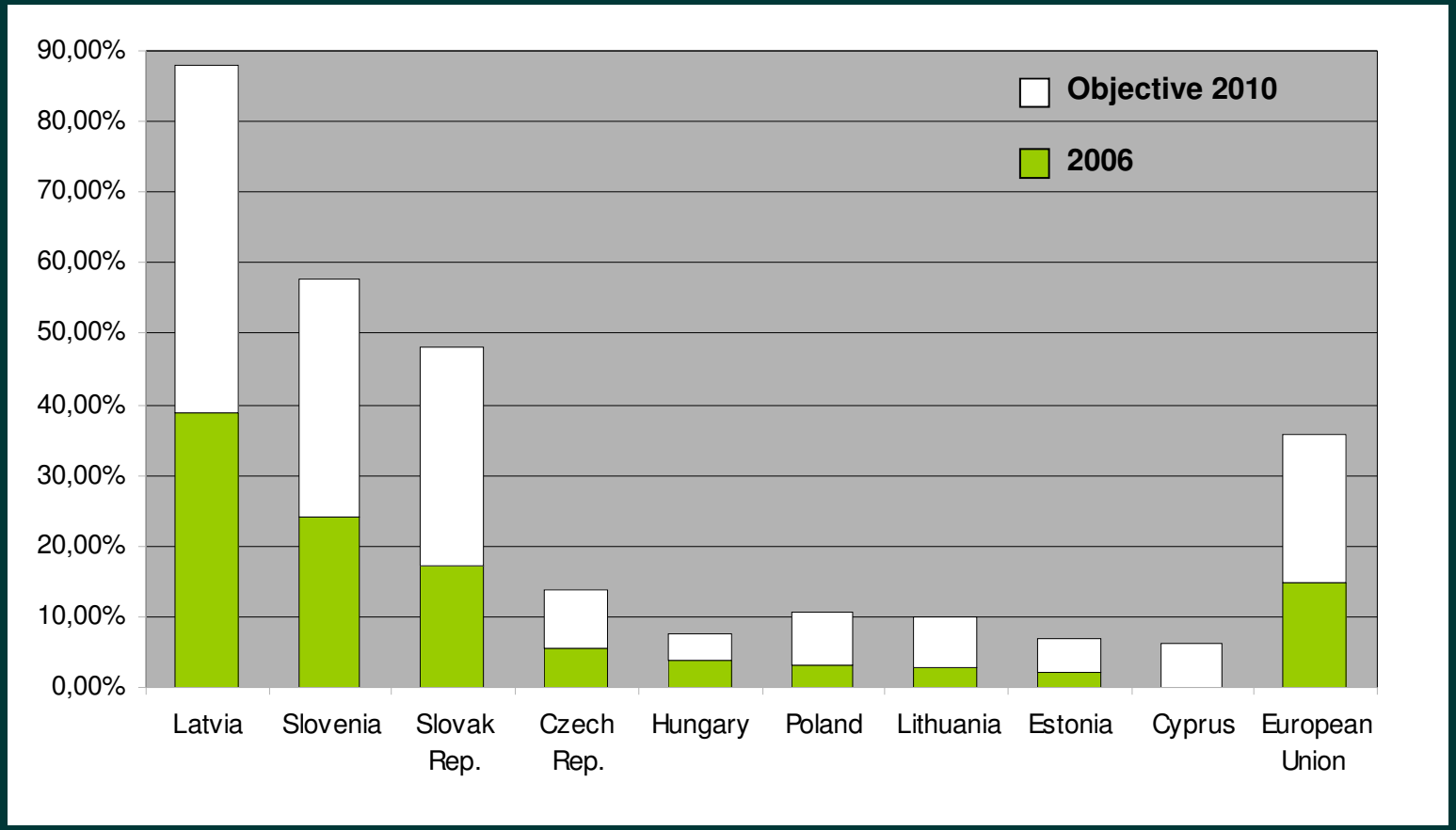
Source : Eurostat – Statistical pocket book 2006, EU commission

Share of Renewable energies in primary energy consumption of EU countries (2006 in %)



Source : EurObserv'ER 2007

Share of Renewable energies in and in gross electricity consumption of EU countries (2006 in %)



Source : EurObserv'ER 2007

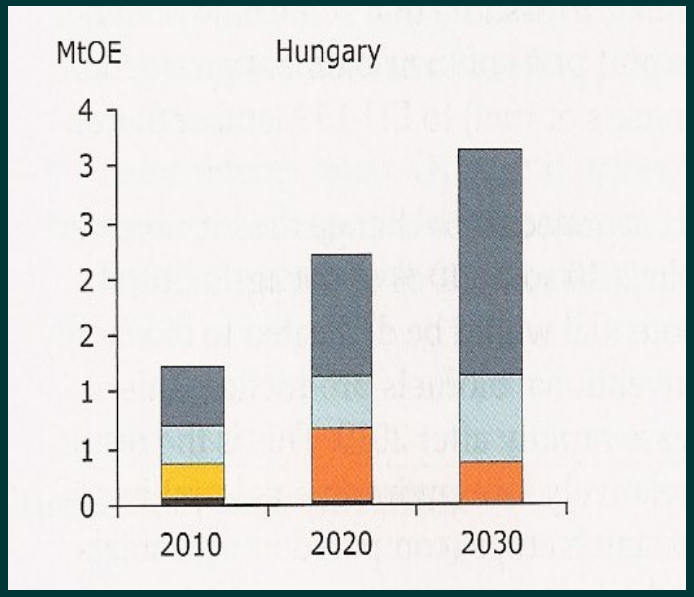
4. Biomass Potential

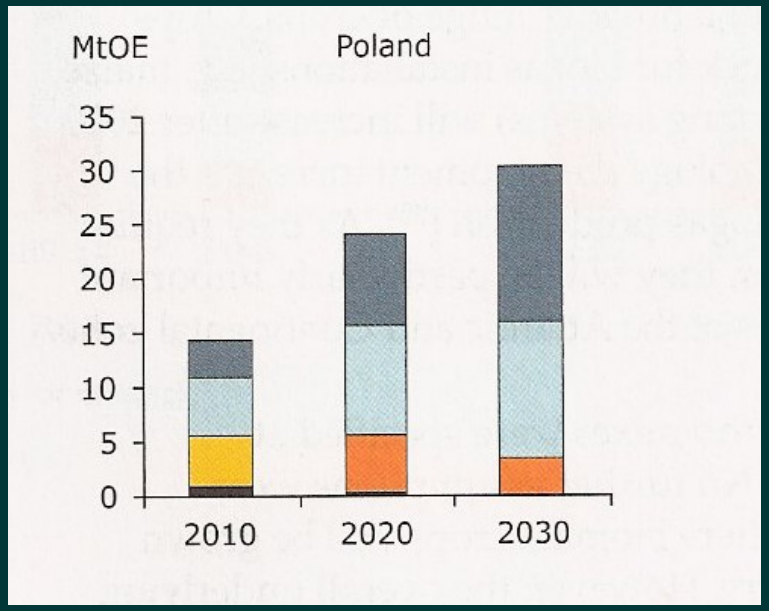
Comparison between current biomass use and potential for 2010 in the EU 25 in MtOE

	Biomass Potential*	Biomass Use*
Czech Republic	3,8	1,19
Estonia	1,5	0,6
Hungary	3,6	0,86
Latvia	1,3	1,37
Lithuania	4,1	0,69
Poland	23,8	4,12
Slovak Rep.	2,2	0,38
Slovenia	1,8	0,47
Total EU25	187,95	72,27

Source : Eurostat – Statistical pocket book 2006, EU Commission

5. Solid and Liquid biofuels environemental compatibility production





- Short rotation forestry and perennial grasses
- Crops for biogas
- Crops for ligno-cellulosic ethanol
- Crops for ethanol
- Oil crops

Source : EEA, how much bioenergy can europe produce

Future Activities of interest for Solid biofuels

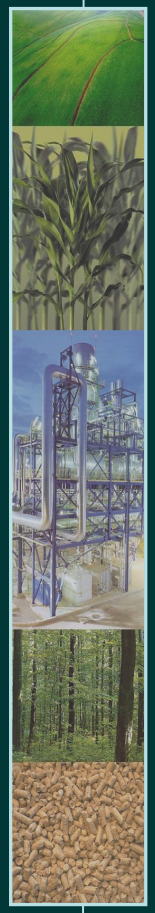
1. production and consumption

Primary energy production of solid biomass in 2005 and 2006 (in TWh)

	2005	2006
Poland	4,180	4,299
Latvia	1,987	1,987
Czech Rep.	1,460	1,568
Hungary	1,003	1,058
Lithuania	0,722	0,722
Estonia	0,706	0,706
Slovenia	0,469	0,449
Total EU 25	59,289	62,413

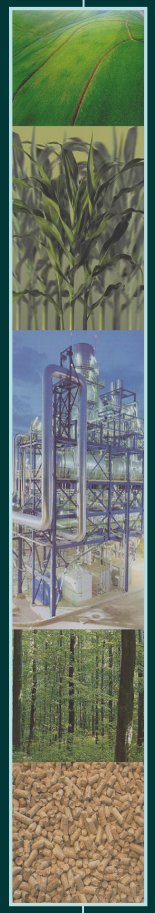
Source : EurObserv'ER 2007

2. Market opportunities



- Stabilisation of humid biomass for large scale-supply and trading
- Co-firing (coal-biomass) in large Power-plants by agro-pellets

a) Stabilisation & Refining of Humid Biomasses or mixtures for Large-Scale supply

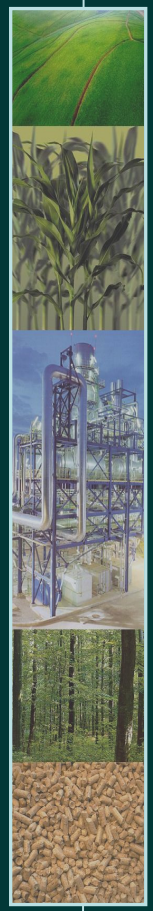


- Fresh biomass is submitted to biological degradation with emission of GHG.

- For large-scale supply all year around biomass should be dried & densified into AGRO-PELLETS (Bulk density:~ 0.7t/m^3) energy consumption 10% of the pellets output corresponding to about ½ of traditional pelletisation technologies needs.

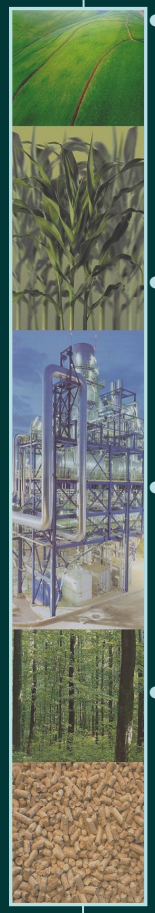
New technology for production of Agro-pellets

from humid biomass or mixtures (mechanical drying & compacting) in view of large-scale supply to the utilisation plants



Typical examples of Agro-pellets

b) Biomass (Agro Pellets) – Coal Cofiring.



- Coal, the most polluting fuel, still will provide a large contribution (most for power) to the total world energy needs (2.6 billion Toe in 2010 – 3 billion Toe in 2020) with a typical emission of 3.3 Kg CO_2 /Kg coal;
- Cofiring biomass with coal is an efficient economic way to produce bio-power and mitigate the CO_2 emissions.
- Use of Agro-Pellets (moisture ≤ 10%) makes now possible a co-firing level of 20% (energy inputs) in all existing power plant technologies;
- The Cofiring potential is huge: EU contribution: 50,000MWe –world: 160,000 MWe (50-160 nuclear power plants).

Large Co-firing Power Plant 4,000 MWe (UK)

Economics and biomass availability limits at present full exploitation of its cofiring potential

Future Activities of interest for Liquid biofuels

1. production in European Union in 2005-2006 (in toe)

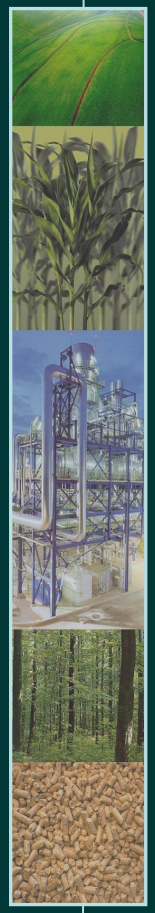
	Bioethanol		Biodiesel	
	2005	2006	2005	2006
Poland	100	116	51	96
Slovak. Rep.	78	82	-	-
Lithuania	7	10	6	14
Slovenia	8	11	-	-
Latvia	5	7	10	9
Czech Rep.	133	107	-	12
Bulgaria	-	4	-	-
Romania	-	10	-	-
Hungary	-	-	28	27
Total EU 27	3184	4890	727	1246

Source : Biofuels barometer

2. Market opportunities

- **Commercial bio-ethanol production from Sweet Sorghum**
  Benefits of integrated processing (biorefineries) for centralised & decentralised production

Why Sweet Sorghum?

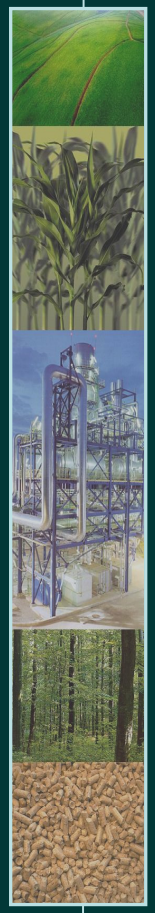


NOTE

Sweet-Sorghum is not a food crop but a multi-functional (energy) crop, thus not a competitor crop for the food market!

- It grows in low-quality soil with lower water imputs (1/3 of sugar-cane).
- Low energy, chemical inputs; ~ 0.5 TOE
- Respect of biodiversity in large plantations (wide range of varieties);
- Soil erosion loss (on marginal erodible sites) ~10 t/ha/y, within the tolerance level (11 t/ha/y);
- Biofertiliser production (compost) from Sweet Sorghum residues can improves the sustainability of cropping;

High level of competitiveness of Sweet-Sorghum

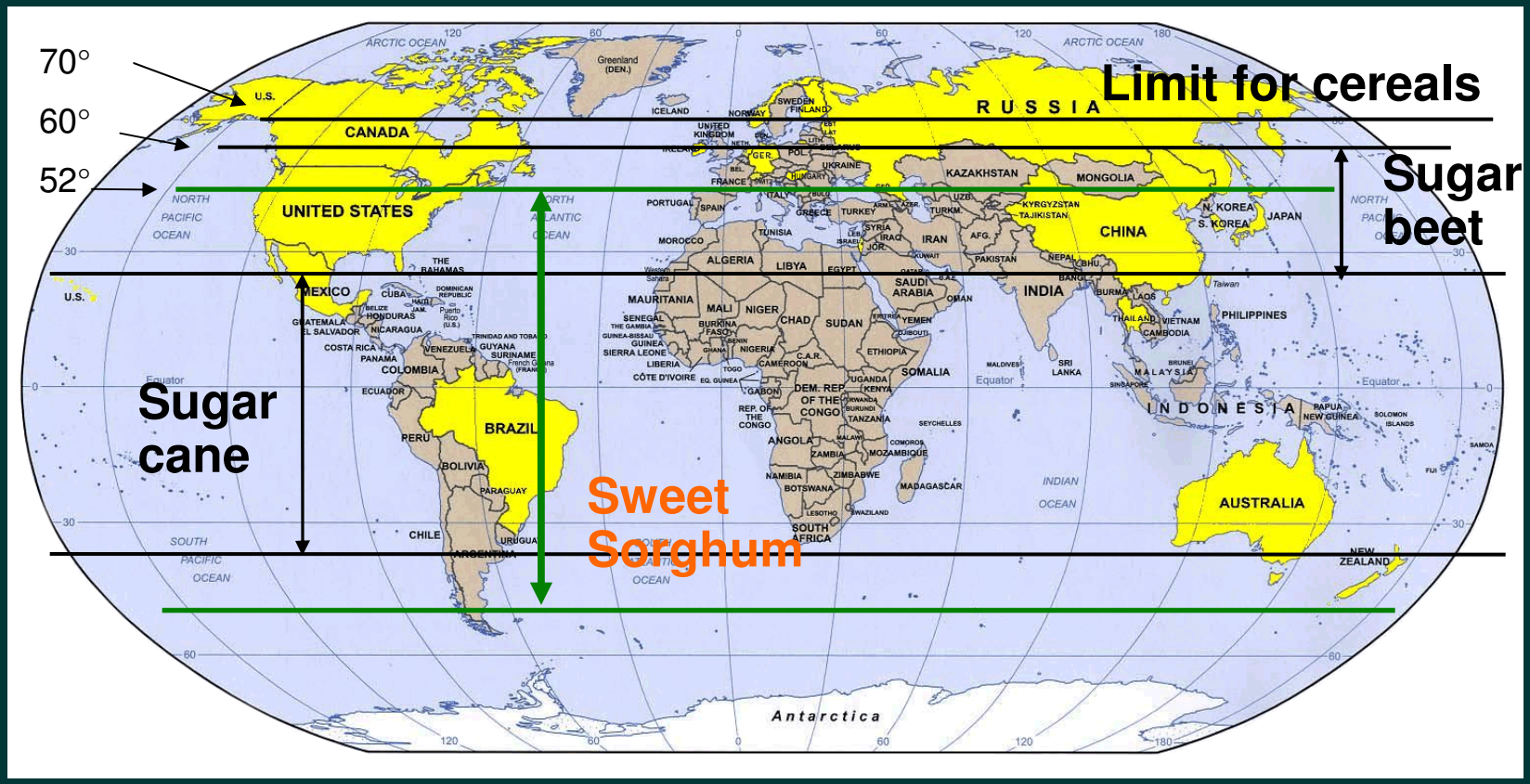


- For its high productivity (~100 fresh ton/ ha) **sugars and lignocellulosic residues are available at low cost** (i.e. sugars ~50€/ton; residues: ~20€/ton) making possible a viable Co-production of bioethanol and bioelectricity.

- Optimized S-S. Biorefineries present a high Energy Ratio (outputs/Inputs) ~5-7 is therefore very efficient for atmospheric CO_2 absorption and susceptible (in future) of **substantial Carbon Credits benefits (saving up to 30 tCO_2/ha).**

Vast Areas (agricultural, marginal, semi-arid lands)

are available on all continents for S.S. plantation.

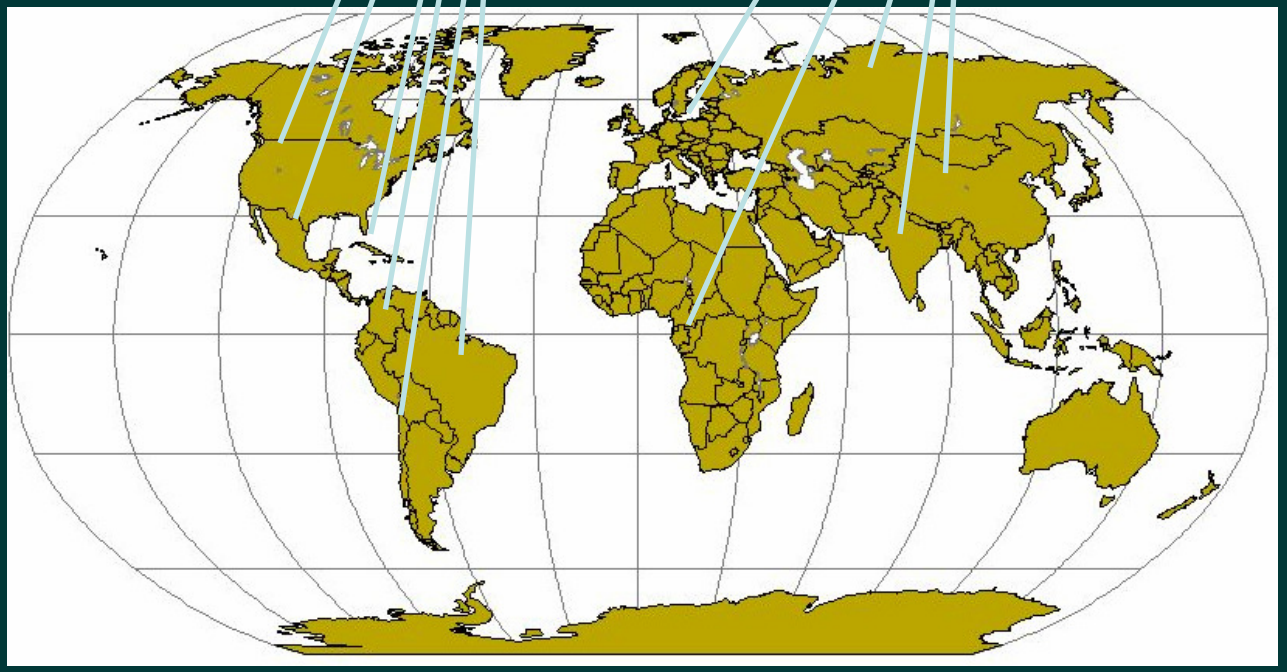


AREAS WHERE SWEET-SORGHUM COULD BECOME AN INSTRUMENT OF DEVELOPMENT.

Internation Cooperation Promoted by EUBIA on Biorefineries

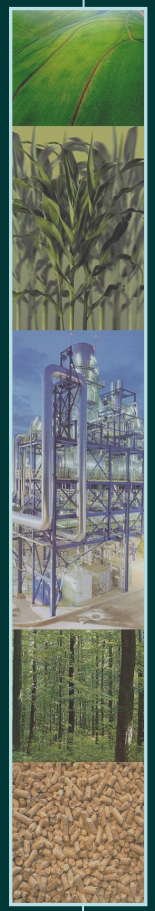
Expressions of Interest and Cooperation promoted by EUBIA:

- USA
- Mexico
- Caribbean (Haiti – S. Domingo)
- Columbia
- Chile
- Brazil
- Uruguay
- South Europe : Portugal – Sicily – Greece
- East Europe : Romania
- Africa : Gabon
- Russian Federation
- India
- China
- Pakistan
- Philippines



Commercial sweet-sorghum biorefineries for centralized/decentralized Coproduction of bioethanol, power and DDGs

Concept of Sweet Sorghum Biorefinery



BIOETHANOL

POWER

PLANTATION

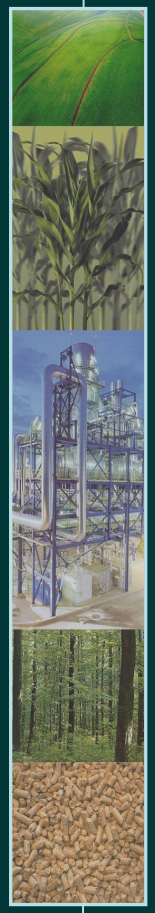
COGENERATION PLANT

DDG

Pictures : EUBIA, Bioethanol plant, Cogeneration plant, Pelletisation unit, D.D.G.s unit.

Which size of Sweet Sorghum Biorefinery

to be economically viable in the E.U. ?



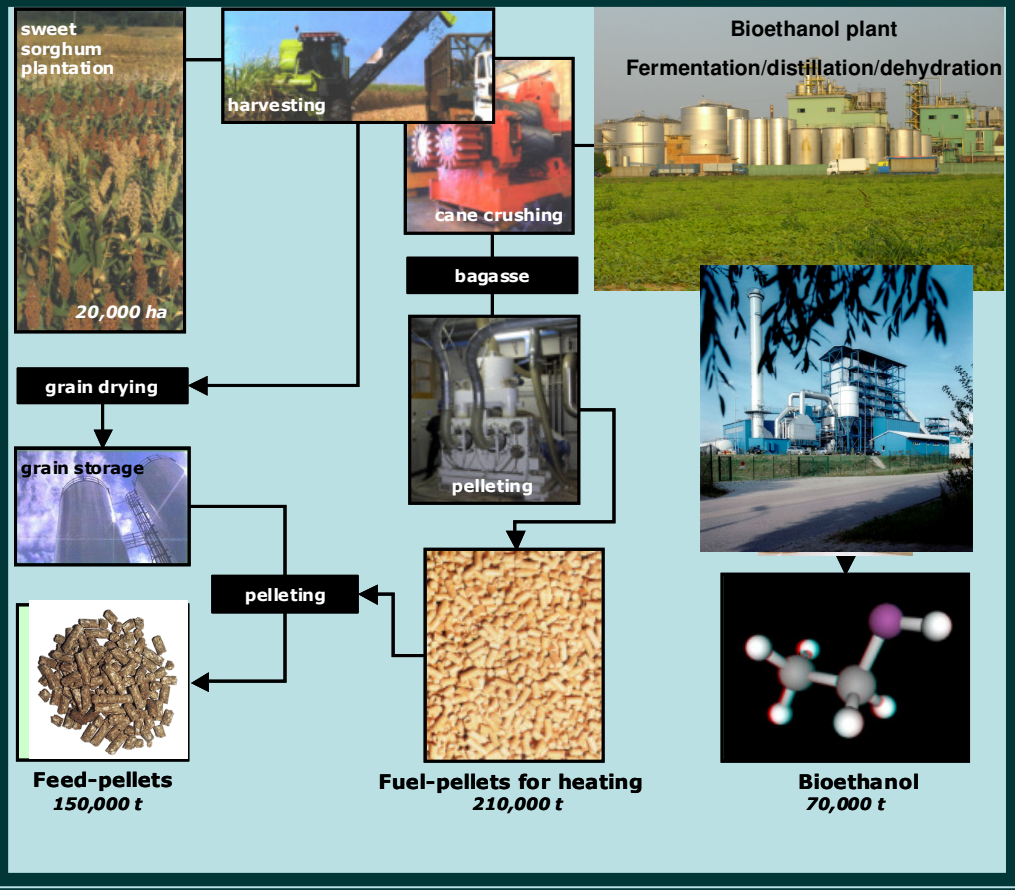
- Minimum plantations size (Decentralised production):
  - 1000 ha/2000 ha.
  - Bioethanol capacity (microdistillery): 6,000/12,000 m^3/ y
  - Power Capacity: 3.3/6.6 MWe.

- Large plantations size (Centralised production) :
  - 10,000 - 50,000 ha (or more)
  - Bioethanol capacity 60,000 - 300,000 m^3/ y
  - Power Capacity: 45MWe – 225MWe

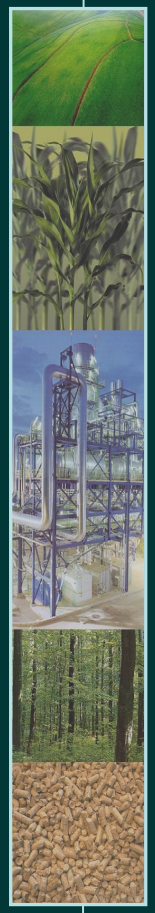
Concept of sweet-sorghum Biorefinery

Integrated Bio-energy Complex:

Utilizing all crop components to obtain several products (animal feed, power, agro-pellets and bioethanol), keeping the priority product "bioethanol" at the minimum cost.



Why a target figure of 250 €/ton for the bioethanol-cost is possible?



- Considering that sugar could be available at 50€/t-lignocellulosic residues at ~20€/d.t.

- Assuming that 60% of the ETOH production cost is due to the feedstock (sugar cost), the anticipated cost for bioethanol from Sweet-sorghum is:

$$\frac{50\ €/t}{0.6 * 0.96_1 * 0.93_2 * 0.5_3 * 0.95_4} = 200\ €/t\ ETOH$$

1: Sugar extraction efficiency
2. Fermentation efficiency
3. ETOH/sugar conversion
4: Industrial efficiency

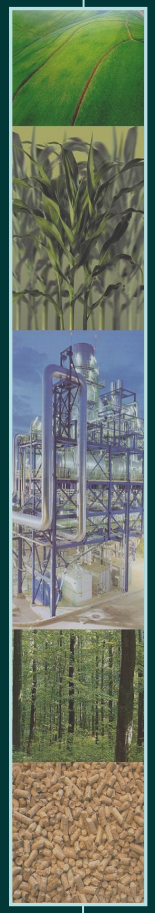
<u>Conservative figure: 250 €/ m3</u>

The anticipated cost of bioethanol for the first Biorefinery in Portugal is around 200€/**m³**

Experimental trials (Sweet-Sorghum)
Southern Italy 2007

In sub-tropical/tropical areas, the best combination for coproduction is sugarcane/sweet sorghum (11 months of operation for ETOH)

Conclusion



- High potentialities of Biomass Use in Eastern and Central European countries changing the actual use of biomass for bioenergy production and exploiting marginal lands and new areas available because not adapted for food production.

- Co-firing biomass (Agri-pellets) in coal power plant can be carried out now at high level (20% energy) and present high CO2 benefits and higher efficiency for bioelectricity production.

- Sweet sorghum appears to be a promising viable multifunctional crop for massive production (centralised & decentralised) of Bioethanol & Power.

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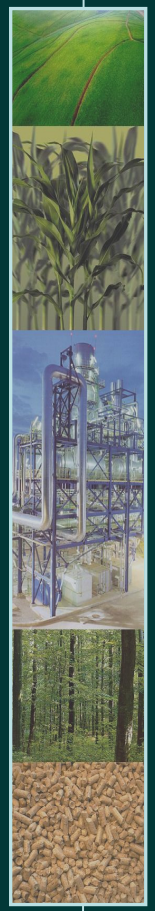

3rd may 2008

Biomass Industry Day

On the occasion of
the 16th European Biomass
Conference and Exhibition

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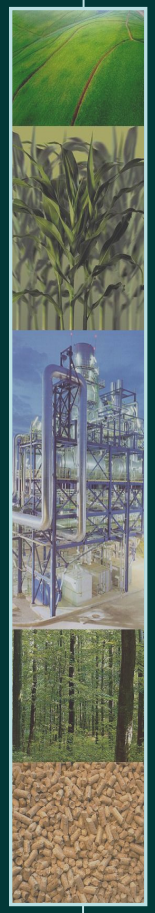

Thank you for your attention.

For more information,

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