



## *Bioenergy use in Poland - today and tomorrow*

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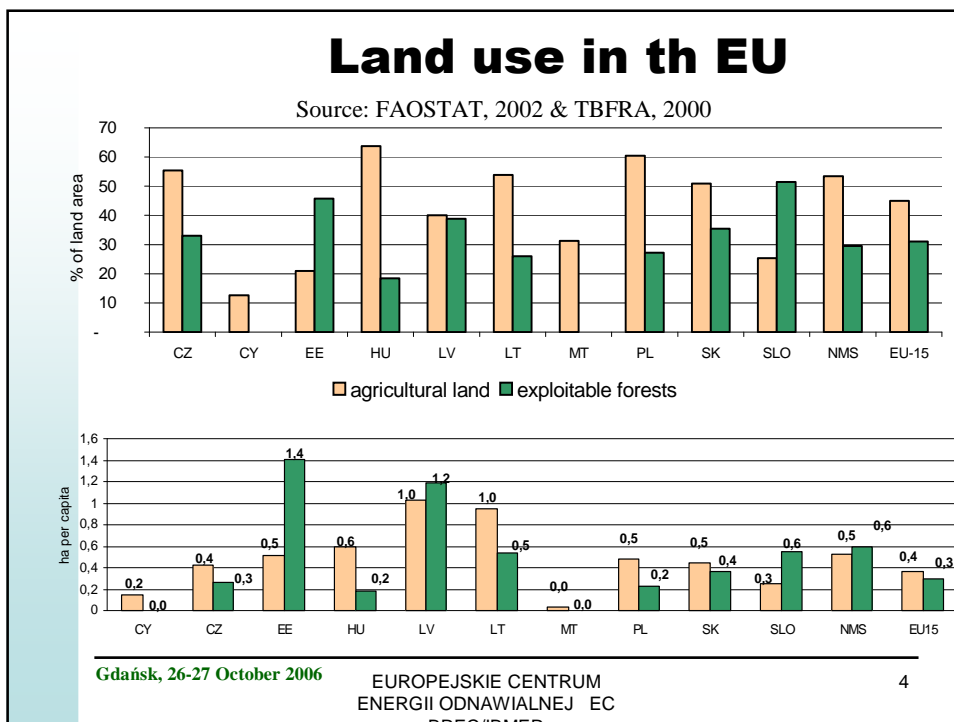
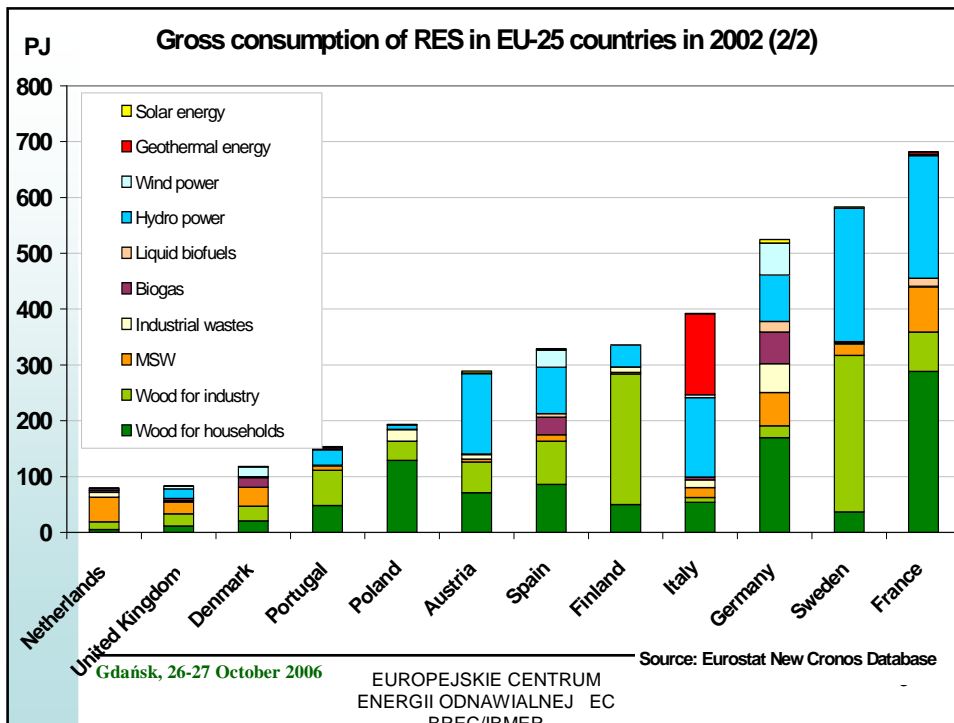
## EU targets for renewable energy

Sector	% of EU energy use	Targets for renewables	Currently
Gross energy consumption		12 % by 2010	6%
Electricity	45 %	21 % by 2010	about 14 %
Heating	30%	No specific target	
Transport fuels	25%	5.75 % by 2010	1.4 %

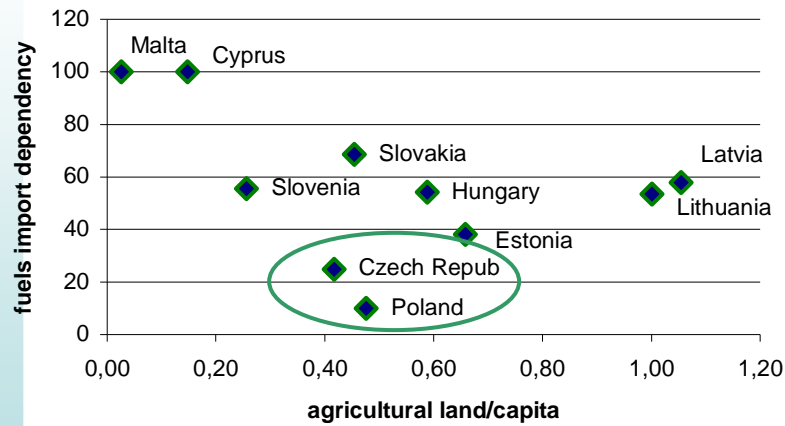
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# Opportunities for energy crops in Poland and NMS



Source: FAO 2002; D. Reiche 2003

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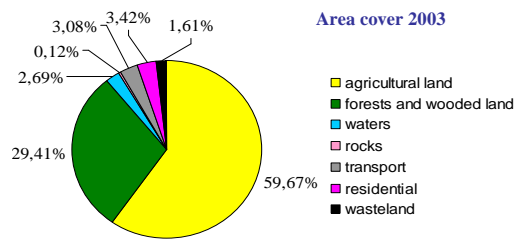
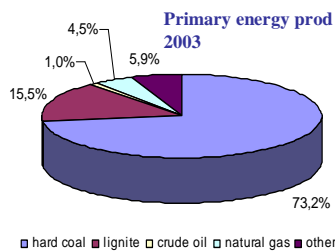
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## GENERAL INFO

- Poland – country in Central Europe
- 312.680 km<sup>2</sup> area; 38,7 mln people
- Forests - 28,1 % Poland, i.e. 8.8 mln ha.
- Agricultural lands – ca. 60% of the Poland.
- Growing consumption of electricity and transport fuels.



89% of land potentially suitable for forestry and agro biomass production for energy purposes



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## POLICY PRIORITIES & RES

- Climate change
  - Kyoto Protocol ratified in 2002 : 6% emission reduction within 2008-2012 comparing to 1990,
  - c.75 mln tonnes of CO2 surplus to be traded annually
- Energy policy:
  - Renewable energy: 7,5% in 2010 and 14% in 2020 in primary energy balance
  - Renewable electricity: 7,5% in electricity consumption in 2010
  - Energy efficiency improvement
  - Liquid biofuels: 5,75% for 2010 (the directive 2003/30/EC)
- Agriculture policy:
  - Regional development ???

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**EFFECT: triple increase of bioenergy use till 2010 ???**

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## Increase of Bioenergy Capacity in period

1999-2002

Capacity increase in wood-fired installations for residential consumers and in industry is unknown.

Type of installation	Capacity in MW in 1999	Capacity in MW in 2002	Capacity increase in MW	Growth rate in %/year
Wood-fired heating plants	350	450	100	8.7
Straw-fired heating plants	13	92	79	92.0
Biomass-fired boilers	7	23	16	48.7
Municipal biogas plants	38.9	61.5	22.6	16.5
Landfill gas plants	9	15.4	6.4	19.6

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## Market: bioenergy development short and medium opportunities

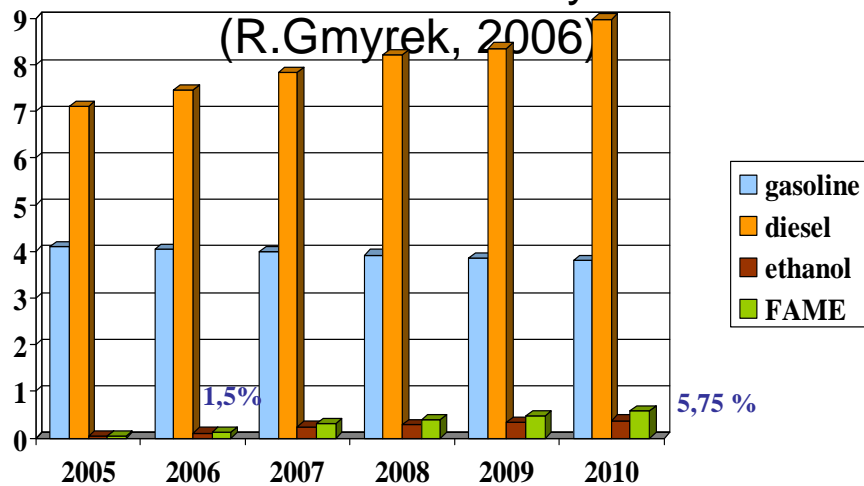
- ❑ CO-FIRING (biomass+coal), large power plants, industry
- ❑ BIOMASS DISTRICT HEATING (municipalities)
- ❑ CHP (small and medium scale, industry, municipalities)
- ❑ TRANSPORT (biodiesel, bioethanol)
  - Problem: development of solid biofuels market*
- ❑ BIOGAS (from agriculture)
- ❑ BIOMASS GASIFICATION
  - Problem: market maturity of technologies*

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## Forecast of fuels and biocomponents consumption in Poland in mln tons/year



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## Biodiesel

### Demo projects

- EPAL – first Polish agrorefinery was built in 1995, financed by Polish Committee for Scientific Research (KBN) and coordinated by IBMER
- Wroclaw, Kielce – tests of RME in buses, financed by KBN
- E25 (10% of bioethanol) was used in bus in Starogard town
- „Local & Innovative Biodiesel” – ALTENER project (Austria, Greece, Poland, Lithuania, Slovakia) – promotion of 100 % FAME in fleets

### First commercial FAME plant in Trzebinia:

- Opened in Dec. '2004 in Rafineria Trzebinia (PKN Orlen Group),
- German technology
- Capacity 100.000 t RME/year, possibilities for increase up to 150.000. t RME/year.



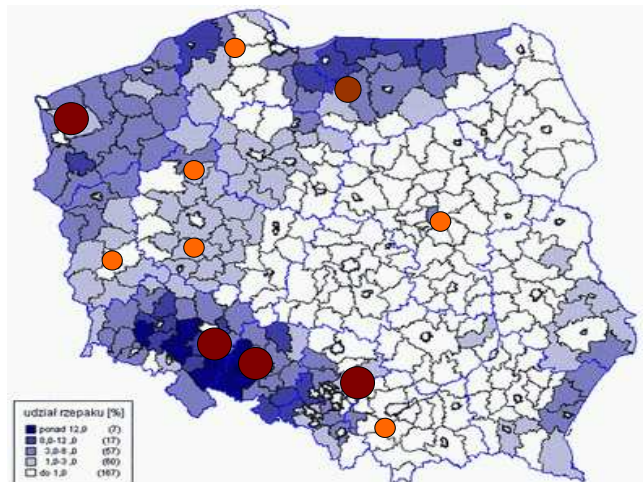
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## Spatial distribution of biodiesel production in Poland

*Distribution of rape seed production (IUNG, 2002) and some of RME production plants (erection planned for 2007-2008)*



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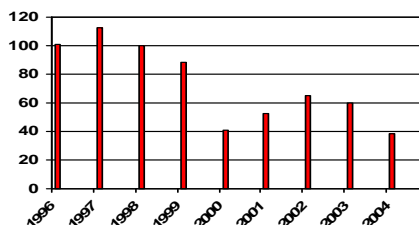
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# Bioethanol

- Bioethanol is used as biocomponent for gasoline from 1993
- In 2002 – 1,5% bioethanol share in gasoline market
- 18 producers of dehydrated bioethanol
- Bioethanol: ca. 100 agricultural distilleries,
- ETBE ca. 100 000 t/a PKN ORLEN

Production of bioethanol



Early 90-s ITN (Institute of Petroleum Technology)

lead gasoline with bioethanol (5%)-- financed by refinery industry and distilleries; implemented by refineries

1996 – 1998 ITN and CLN

unleaded gasoline and U95 containing 5% bioethanol – financed by refinery industry; implemented by refineries

2000 - 2002 CLN

10% bioethanol + diesel fuel; city buses – financed by distilleries

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## NATIONAL TECHNOLOGY PLATFORM FOR BIOFUELS AND BIOCOMPONENTS

- Started on 16 March 2006 – signed agreement
- 16 members - main actors in biofuel sector
- CLN – coordinator
- A.Kulczycki, CLN director – member of Steering Committee of European Biofuel Platform

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## Production of RES-E in '2004

Source	Capacity MWe	Electricity production GWh	Share in total energy production, %
Biomass	150-200 (EC BREC)	768	25,0
Biogas	23	82	2,7
Wind	68	142	4,6
SHP <10MW	261	890	29,0
HP >10MW	715	1191	38,8
<b>Total</b>	<b>~1250</b>	<b>3074</b>	<b>100,0</b>

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sources: ARE S.A., GUS, EC BREK

## Installed capacity of concession RES, 31.04.2006 (URE)

RES type	Total installed capacity [MW]	Number of installations
Biomass	189.790	7
Biogas	31.982	67
Wind	94.815*	68
Hydro	1002.460	673
Co-firing	-	16
<b>Total</b>	<b>1319.037</b>	<b>831</b>

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## RES-E Market- role of biomass co-firing

- Accession Treaty—an indicative RES-E goal for Poland ‘2010 - **7.5%**
- Governmental assumption: **4% of green electricity from biomass co-firing** (??) in coal power plants in 2010 – equivalent of some 8-10 million tons (10-12 million m<sup>3</sup>) of fuel
- The present logging of wood - 2.5 million m<sup>3</sup>, **missing** – **9-10 million m<sup>3</sup>** should therefore come mostly **from energy crops** (ca. 300 thousand hectares) or be imported
- Resulting competitions and conflicts of interests:
  - land** competition (food-energy),
  - biofuels **import-export** competition,
  - competition for current limited biomass** resources for green heat & green & liquid biofuels production,
  - sustainability** of agriculture &energy?

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## PERSPECTIVES FOR DIFFERENT BIOMASS RESOURCES

- Forestry resources limited
- Wood industry by-products utilized, no surplus
- Great potential for energy crops:
  - Large production potential of agriculture
  - Structural changes & CAP reform- increase of set-aside land
  - Need for alternative production in agriculture



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## OPPORTUNITIES FOR ENERGY CROPS in Poland

- ❑ 2,3 mln ha of fallow and set-aside land in 2002 (13,6% of agricultural land), increase from 1,6 mln in 1996
- ❑ Arable land 0,37 ha per capita 0,18 ha in EU-15
- ❑ Cereals production 0,23 ha per capita 0,10 ha in EU-15
- ❑ Cereals yields 3,1 t/ha 5,5 t/ha in EU-15
- ❑ Extensive type of agricultural production, possible increase in land productivity
- ❑ Current surplus of agricultural production, decrease in farmers incomes
- ❑ Strong agriculture and agro-industry lobby, sugar market reform (December 2005)

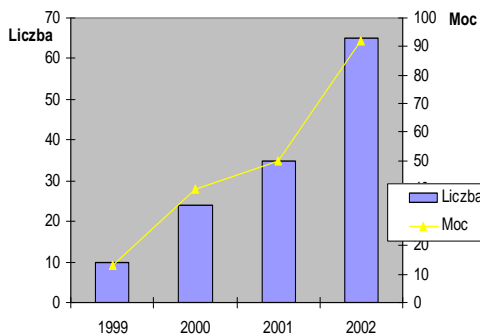
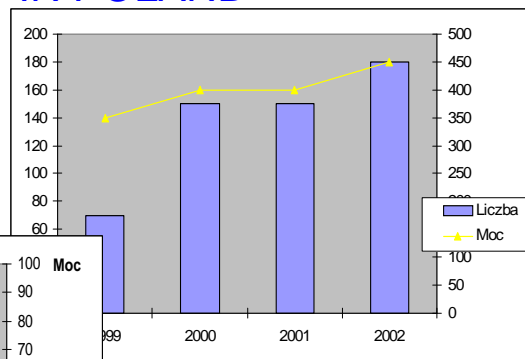
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## BIOMASS DISTRICT HEATING PLANTS IN POLAND

Straw DHP  
>5MW



Waste wood DHP  
>5MW

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## BIOENERGY DISTRICT HEATING

15 MWt DHP in Czarna Białostocka, 2001

Fuel: wood chips/waste, 20.000 t/year

Technology: FEROLLI (IT)

Project costs: 12,3 mln PLN

Financing: grants 55%, loans 29%, own 16%



7 MWt DHP Lubań , 1998 – 2001

Fuel: cereal and rape straw, 7.000 t/year

Technology: AGROENEREGTYKA (PL)

Project costs: 6,4 mln PLN

Financing: grants 43%, loans 19%, own 38%

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## Development of solid biofuels market

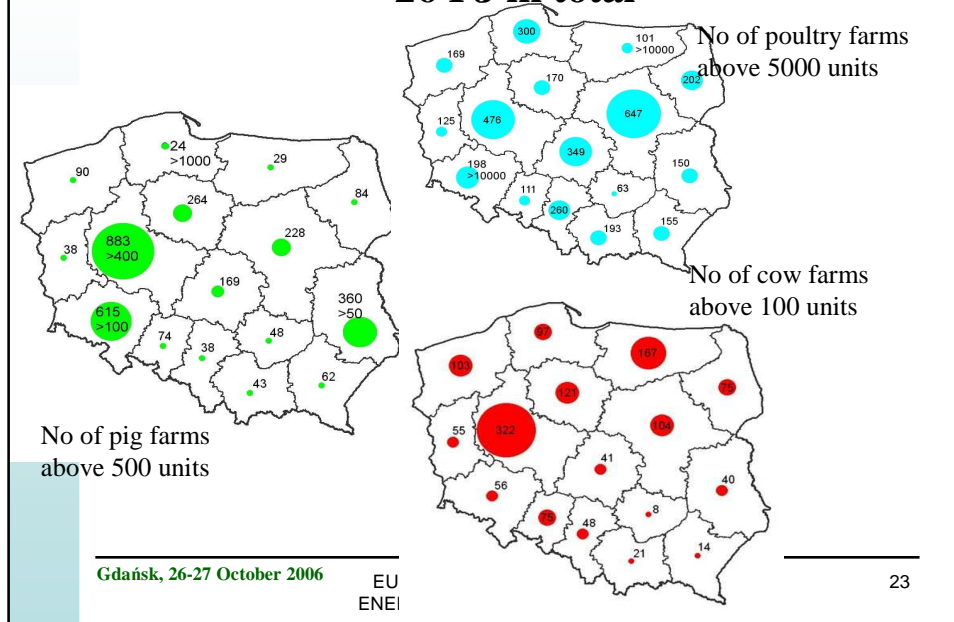
- Production of 600 ktons of pellets (36 producers)
- Production of 140 ktons briquettes (30 producers)
- More than 75% is exported to Sweden, Denmark and Germany (some to Norway)
- National standard for wood chips (classes, size, mineral impurities)
- CEN-TC 335 activities: translation of 1st standard „Solid biofuels - Terminology...” in cooperation with National Standardisation Committee – PKN/KT-144 (KT-144 is Working Group for solid-biofuels established in 2003)
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## Agricultural biogas technical potential; 26 PJ in total



## WEAKNESS OF BIOENERGY IN POLAND

### STRENGTH

- Potential bio-resources availability
- Surplus of agricultural production - opportunities for energy crops
- Attractive short term options for heat and CHP production: biomass co-firing
- Better and better policy and legal framework driven by the EU regulations
- Strong agriculture and agro-industry lobby

### WEAKNESS

- Still unstable legal framework and taxation;
- Infant bio-energy industry and little capacity for experiences with more advanced technologies (for bio-electricity and biofuels);
- Overcapacity in power systems;

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## Summary

- In Poland renewable resources are sufficient (large in the scale of EU-25).
- Political goals are ambitious but a gap between political and legal documents exists (implementation programmes missing).
- The pace of development of the sector is slower than expected.
- Support systems are incoherent and unstable.
- In RES, *big* does not always mean *better* or *cheaper*. In the sector, it is not the economy of scale but rather a mass production effect which works (dispersed resources and sustainable development).
- There is a need of **good demonstration projects** at local level, there is a place for co-operation with neighbouring countries as well as technology and know-how transfer.

**THANK YOU FOR YOUR  
ATTENTION**

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