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Regional Mobilizing of Sustainable Waste-to-Energy Production

Baltic Sea Region Programme 2007-2013

Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument)

DOLNY ŚLĄSK

Politechnika Wrocławska

Current status of waste-to-energy in Lower Silesia

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Content of the presentation

- Characteristics of the region
- Current waste management
- Waste-to-energy sources
- Potential of energy generation from waste

Lower Silesia – one of REMOWE regions

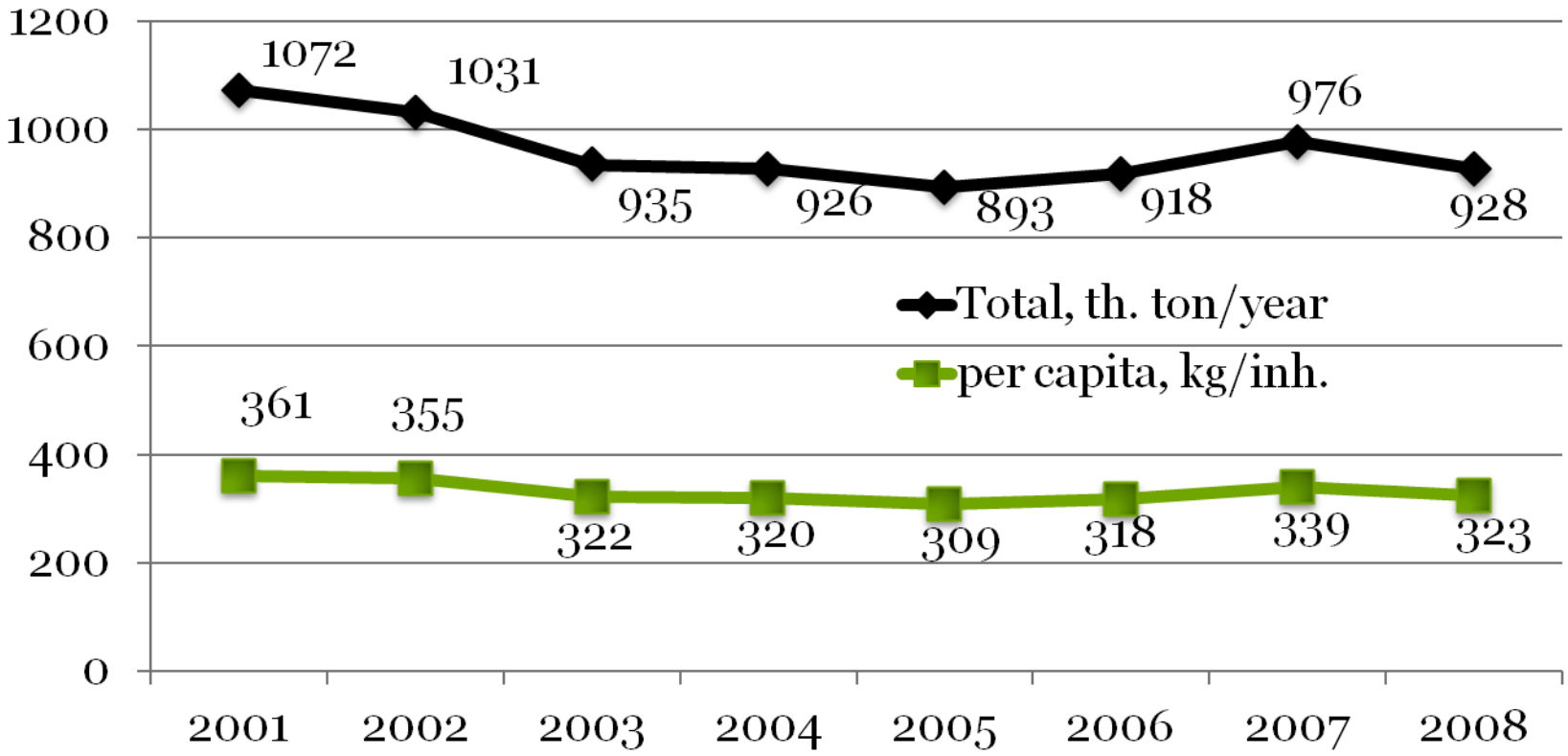
- 29 counties
- 169 communes

- Present population
  - 2,8 mio. inhabitants
  - 70,6% in cities

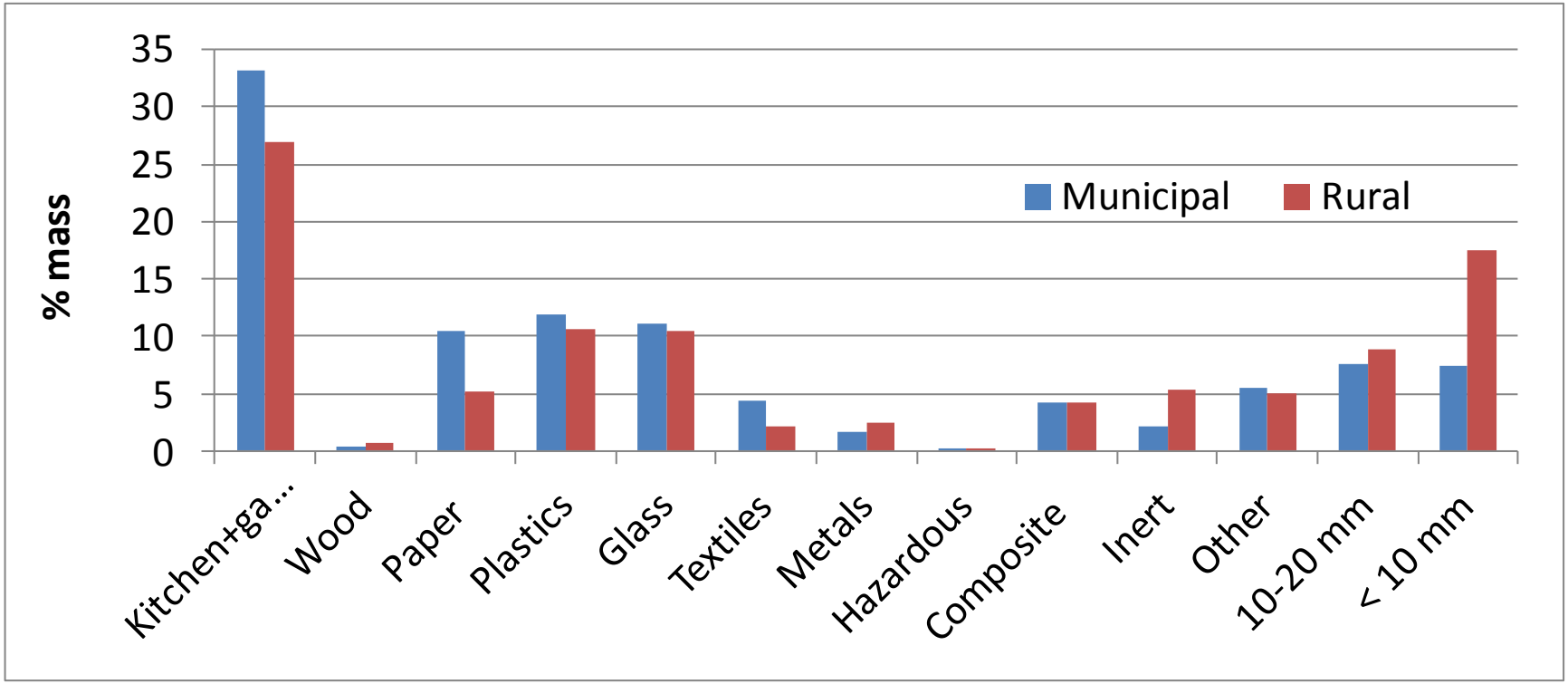
Types of waste and biomass for energy recovery

- Municipal Solid Waste (MSW)
- Municipal wastewater sludges
- Waste from industry
- Vegetable biomass from agriculture and forestry
- Animal feaces

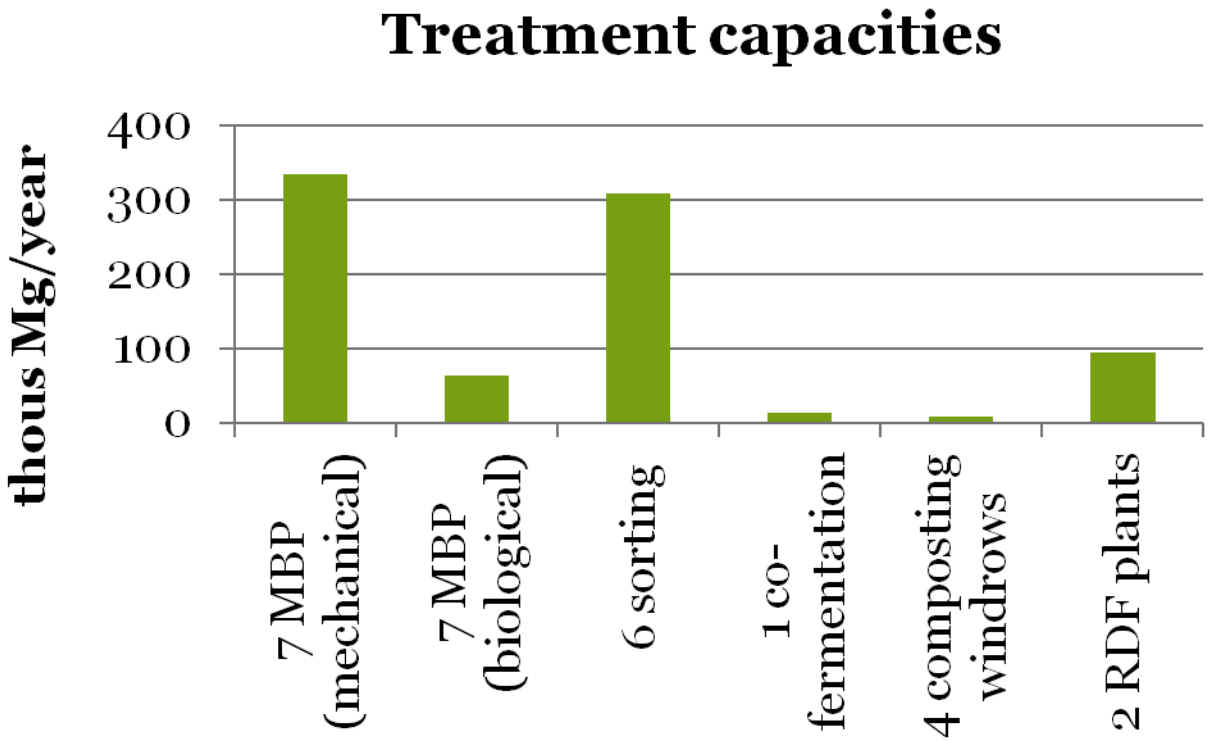
Collection of municipal waste



Material composition of municipal waste



Existing installations for MSW treatment (generation over 900 thous ton/year)



too low capacities of existing installations for mechanical and biological waste treatment

Legal requirements of waste management

FRAMEWORK DIRECTIVE

– 50% RECYCLING in 2020

- **PAPER**
- **Plastics**
- **GLASS**
- **METALS**

Act on keeping tidiness in municipalities (2011r.)

AS ABOVE + BIOWASTE, COMPOSITES

Act on WASTE

– Permissible levels of biodegradables landfilling

Referred to generated in 1995

- **75% in 2010**
- **50% in 2013**
- **35% in 2020**

CRITERIA and PROCEDURES FOR ACCEPTANCE OF WASTE IN LANDFILLS,

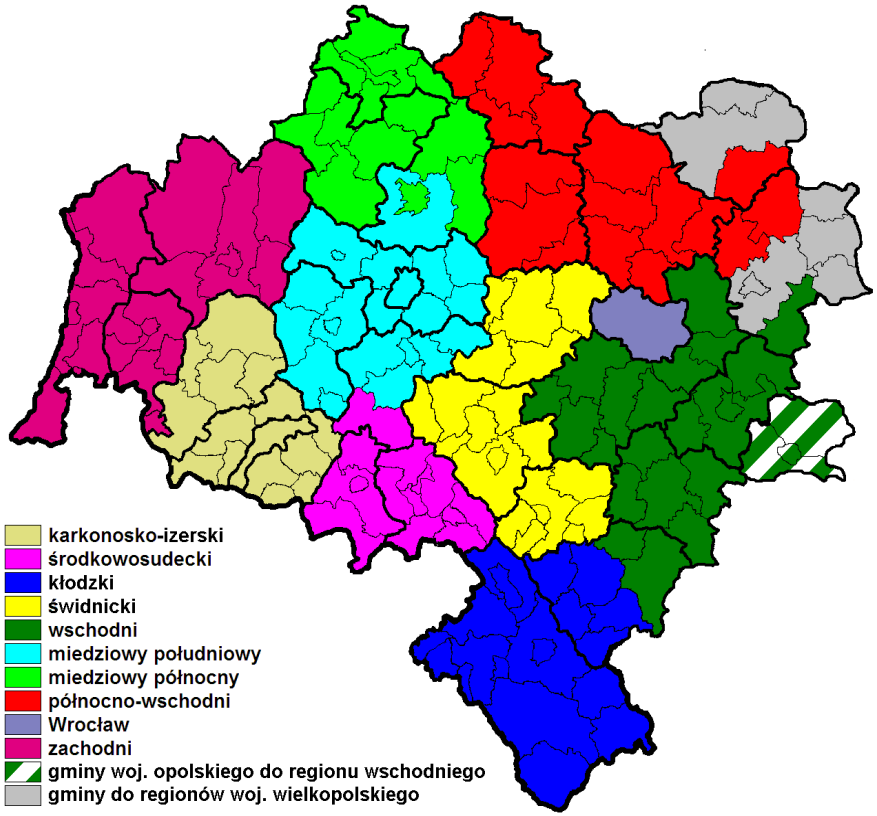
From 2013 r.:
Total organic carbon (TOC): 5%
Ignition loss: 8%
Heat of combustion >6000 MJ/kg dm

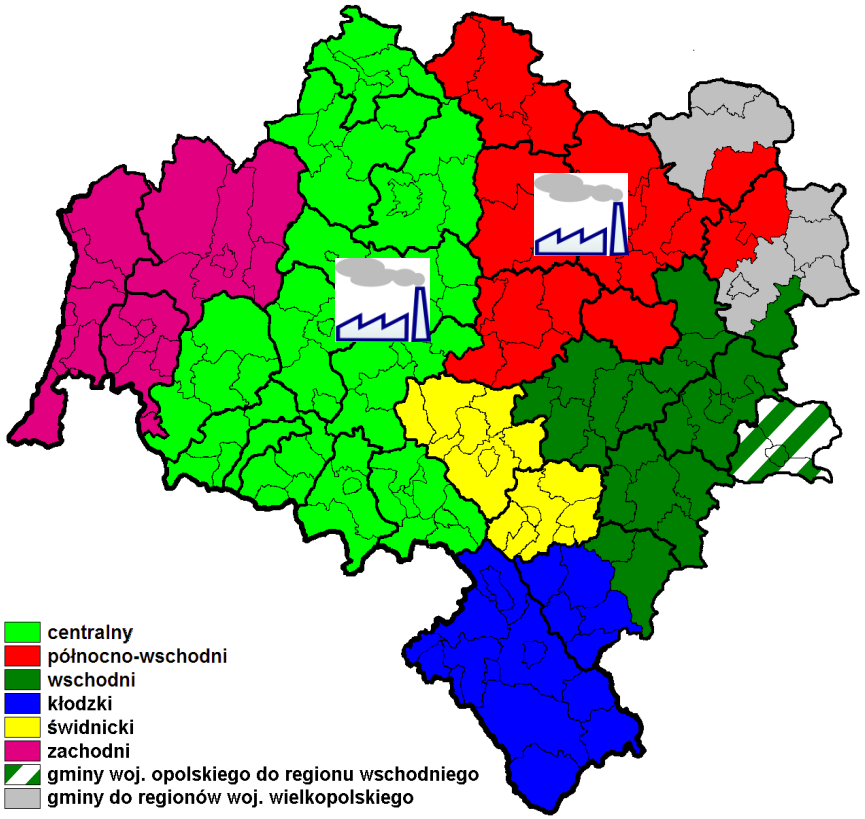
Regional system – variant solution 1 & 2

10 waste management regions,
only MBP,

6 waste management regions,
2 Incinerators, MBP

max. 20 landfills





Source:ZWD 2008

New projects under construction, planning or applying for EU co-financing (Cohasion Fund)

- **Waste Treatment Facility Gać** – extention of existing sorting plant by dry anaerobic digestion of organic fraction of mixed MSW,
- **System Eko-Sudety Sanikom Lubawka** – sorting and aerobic biological stabilization of organic fraction of MSW,
- Other installations

Total energy potential of municipal waste in Lower Silesia:

1 460 GWh/rok

Municipal wastewater sludges

Biomass source	Quantity	
	GWh/year	ton dm/year
Potential energy recovery through digestion	130	37 000

Lower Silesia	number of WWTP
total number of WWTP	203
- Biogas generation, heat & power generation	7
- Biogas generation, only heat generation	4
- Biogas generation, no biogas capture	10

- 4 installations for sludge drying (2 under operation and 2 under construction)

Waste from industry

Two main groups

- Biodegradable waste for anaerobic treatment and biogas generation

- Biodegradable and flammable waste for production of substitute fuels or for direct incineration with energy recovery.

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Biodegradable waste

- Mainly from food industry,
- Typically high content of organic matter, high water content and liquid or semi-liquid consistency,
- Possible co-digestion with biomass from agriculture and animal feaces in agricultural biogas plants,
- 2 biogas installations in food industry (potato chips), heat recovery from biogas for own purposes.

Total energy potential: 68 GWh/rok

Waste for production of substitute fuels

Two main groups of waste

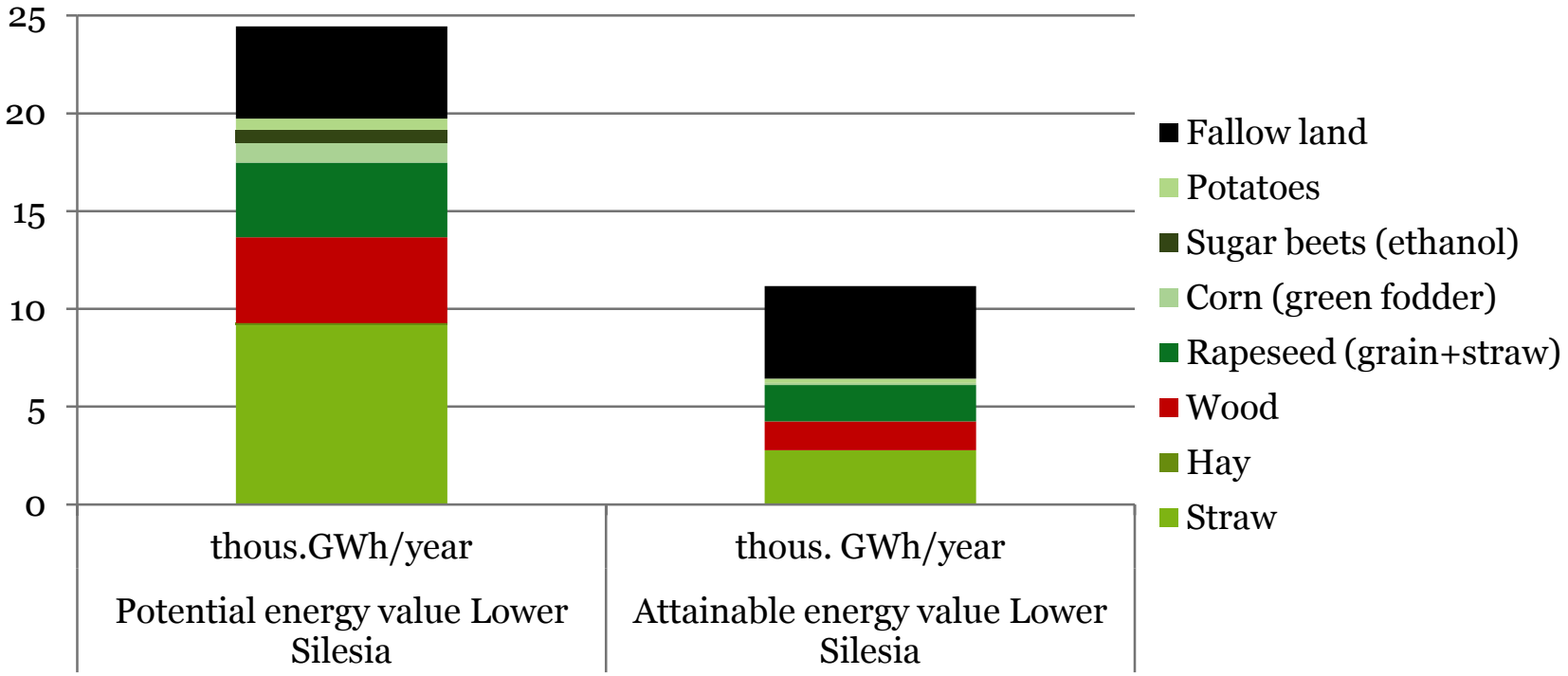
- Non-hazardous
- Hazardous

Important part of Polish waste management due to the lack of incineration capacities:

- ca. 36% of substitution of heat energy from fossil fuels by substitute fuels in the Polish cement industry.
- ca. 751 th. ton substitute fuels burnt in 2009 in cement plants, mainly RDF (19 12 10), used tyres, plastics, wood.

Total energy potential: 1 GWh/rok

Potential of vegetable biomass from agriculture and forestry in Lower Silesia



Source: DCZT 2006

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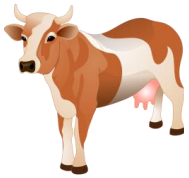
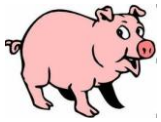
Potential of animal feaces

Relatively low and dispersed animal production, small farms,



- only ca. 100 farms with >50 cows, total population of cows – ca. 106 th.,

- ca. 200 chicken coops with > 10.000 chickens, total poultry – ca. 6 mio.



- pigs – 308 th.

- Total potential of biogas from anaerobic digestion of feaces amounts to ca. 117 mln m^3/year,

Usable energy value (ca. 20%) – 456 GWh/year

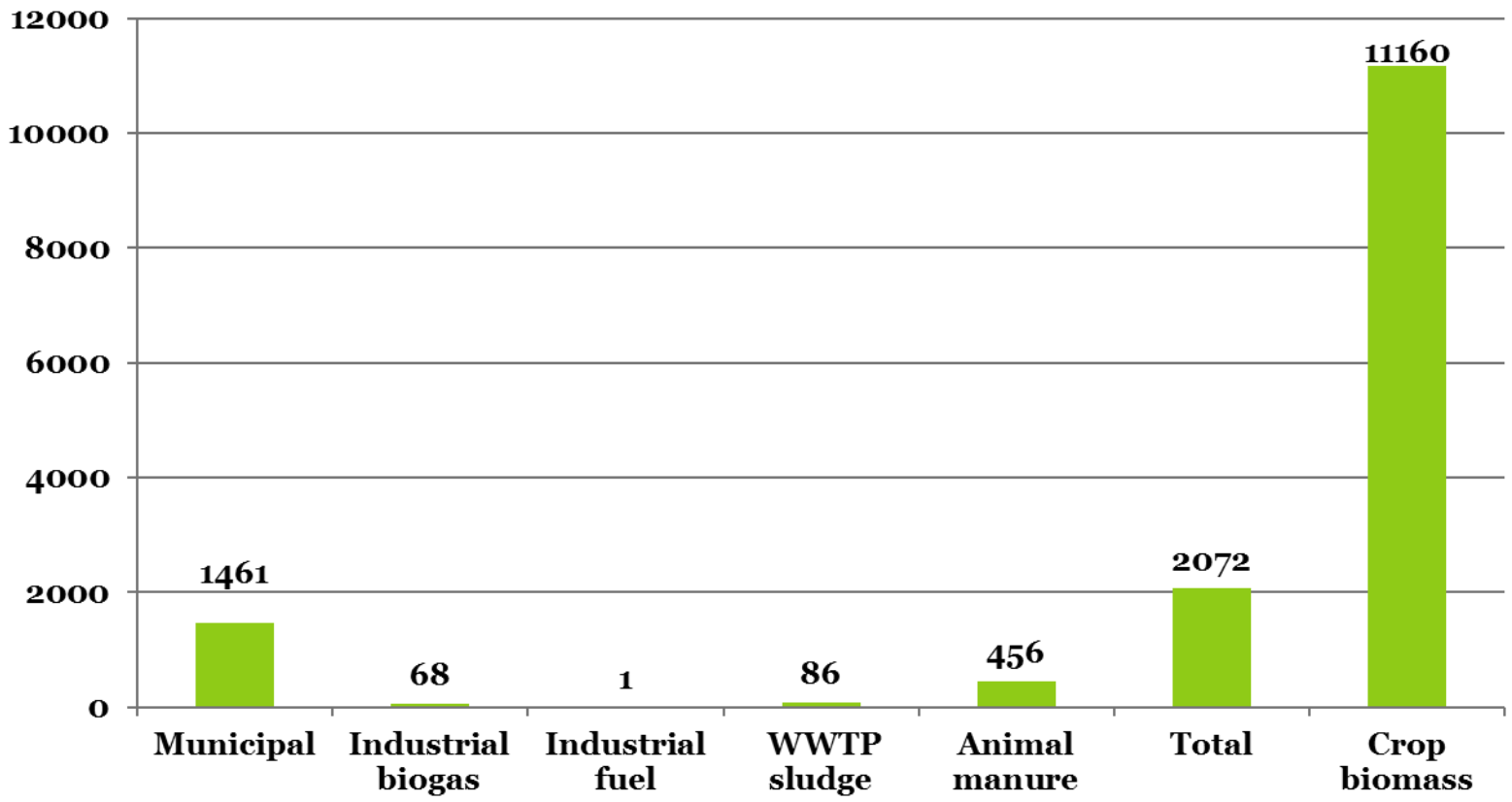
Agricultural biogas plants

- First plant under operation in Lower Silesia: (Świdnica) using corn sillage

- Two under construction (Żórawina and Gorzesław) for mixture of pig feaces (solid and liquid manure) and vegetable biomass (corn),

  + 2 existing biogas plants in food industry

Total energy potential, GWh/year



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Instead of a summary – Innovation process

http://apps.savonia.fi/Projects/Remowe/

- Scenario I Decentralised mechanical-biological treatment plants of municipal waste (short term scenario until 2020)
- Scenario II Thermal treatment of waste (long-term horizon)
- Scenario III Recovery of biogas from other biodegradable wastes (short-term and long-term)
- Scenario IV Recovery of biogas from the fermentation chambers of municipal sewage sludge (short-term horizon)
- Scenario V Decentralised waste biomass-fired power plants, co-incineration of waste (short and long-term horizon)
- Any other ideas