Biogas from organic waste

In Poland

Pierre Haider
Polish Biogas Association - PBA

Polish Biogas Association – PBA

- Founded in 2007
- Located in Bytów, Pomorskie
- Targets and activities:
  - support establishment of biogas market in Poland
  - support activities of stakeholders in biogas sector
  - support foreign actors in Polish market
  - create transparent information flow
  - create platform of know-how and science
  - develop quality standards
  - education
  - EU training projects
  - develop biogas competence centre including installation for demonstration and education

European Biogas Association – EBA

- Founded in 2009 – Brussels, Belgium
- The following non-profit organizations are members of EBA:

  * ADBA - The Anaerobic Digestion and Biogas Association (UK)
  * ATEE Club Biogaz (France)
  * Austrian Compost & Biogas Association (AG Kompost & Biogas, Austria)
  * Czech Biogas Association (Česká bioplynová asociace, Czech Republic)
  * Eden - Energie Développement Environnement (France)
  * Estonian Biogas Association (Eesti Biogaasi Assotsiatsioon MTÜ)
  * German Biogas Association (Fachverband Biogas, Germany)
  * German Society for sustainable Biogas and Bioenergy Utilisation (FNBB, Germany)
  * Hungarian Biogas Association (Magyar Biogáz Egyesület, Hungary)
  * Italian Biogas Association (Consorzio Italiano Biogas, Italy)
  * Latvian Biogas Association (Latvijas bigazes asociacija, Latvia)
  * Lithuanian Biogas Association (Bioduju Asociacija, Lithuania)
  * Luxembourger Biogas Association (Biogasvereenegung, Luxembourg)
  * Méthéor – Association pour la Méthanisation Écologique des déchets (France)
  * Polish Biogas Association (Polskie Stowarzyszenie Biogazu, Poland)
  * Romanian Biogas Association (Asociatia Romana Pentru Biogaz, Romania)
  * Spanish Biogas Association (Asociación Española de Biogás, Spain)
  * Swedish Biogas Association (Svenska Biogasföreningen, Sweden)
  * Swiss Biogas Forum (Biogas Forum Schweiz, Switzerland)
  * UK Renewable Energy Association – Biogas Group (UK)

Biogas from organic waste in Poland

- Potential and perspectives in Poland from Polish point of view
- Definition of term **Biogas Plant**

Biogas from organic waste in Poland

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➢ Installation for anaerobic digestion of all kind of organic matters to produce biogas for energetic use.

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1. Sewage Plant

2. Landfill Installation

3. “Agricultural” Biogas Plant

Biogas from organic waste in Poland

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➢ Installation for anaerobic digestion of all kind of organic matters to produce biogas for energetic use.

1. Sewage Plant

46 installations

2. Landfill Installation

73 installations

3. “Agricultural” Biogas Plant

12 installations

Biogas from organic waste in Poland

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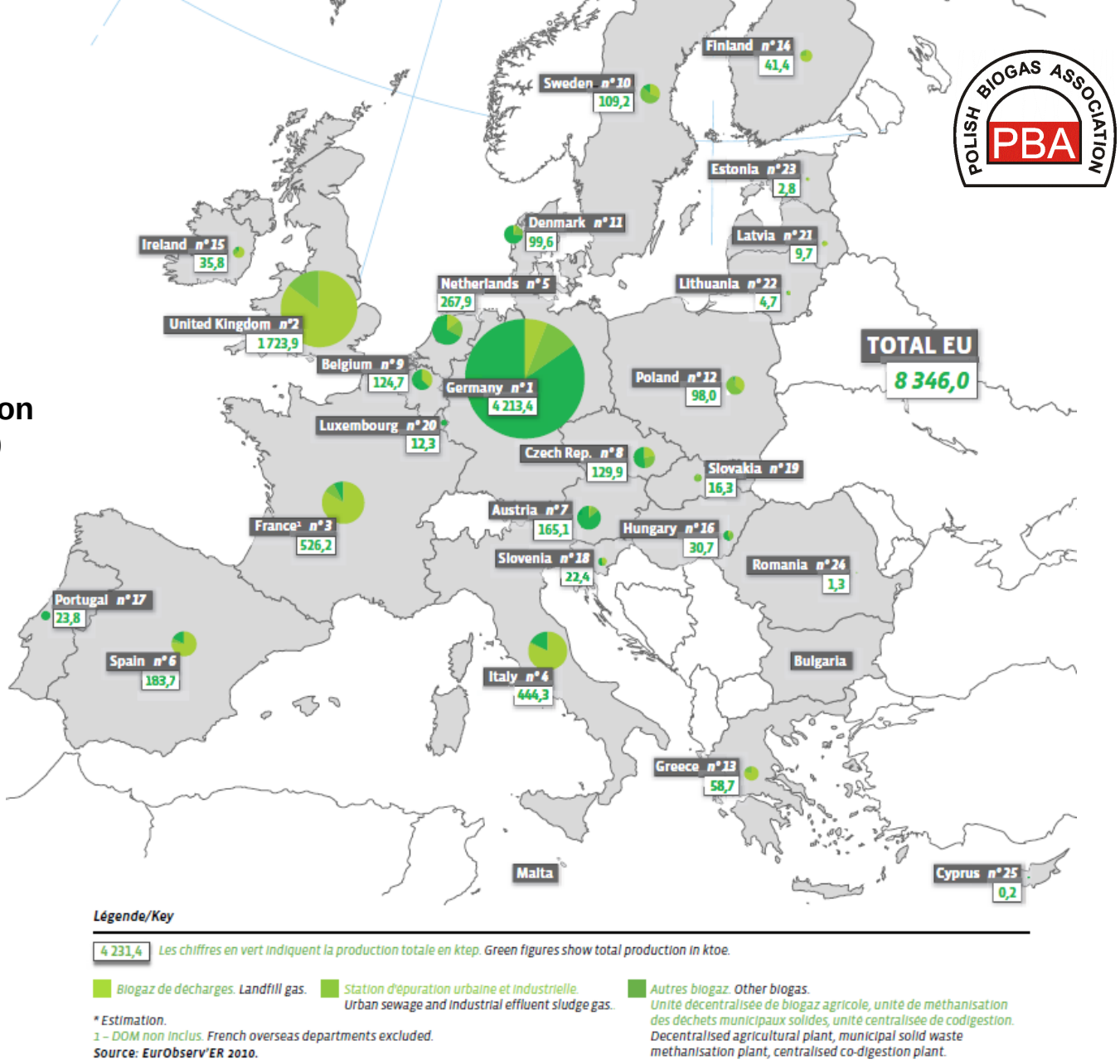
➢ Installation for anaerobic digestion of all kind of organic matters to produce biogas for energetic use.

3. “Agricultural” Biogas Plant

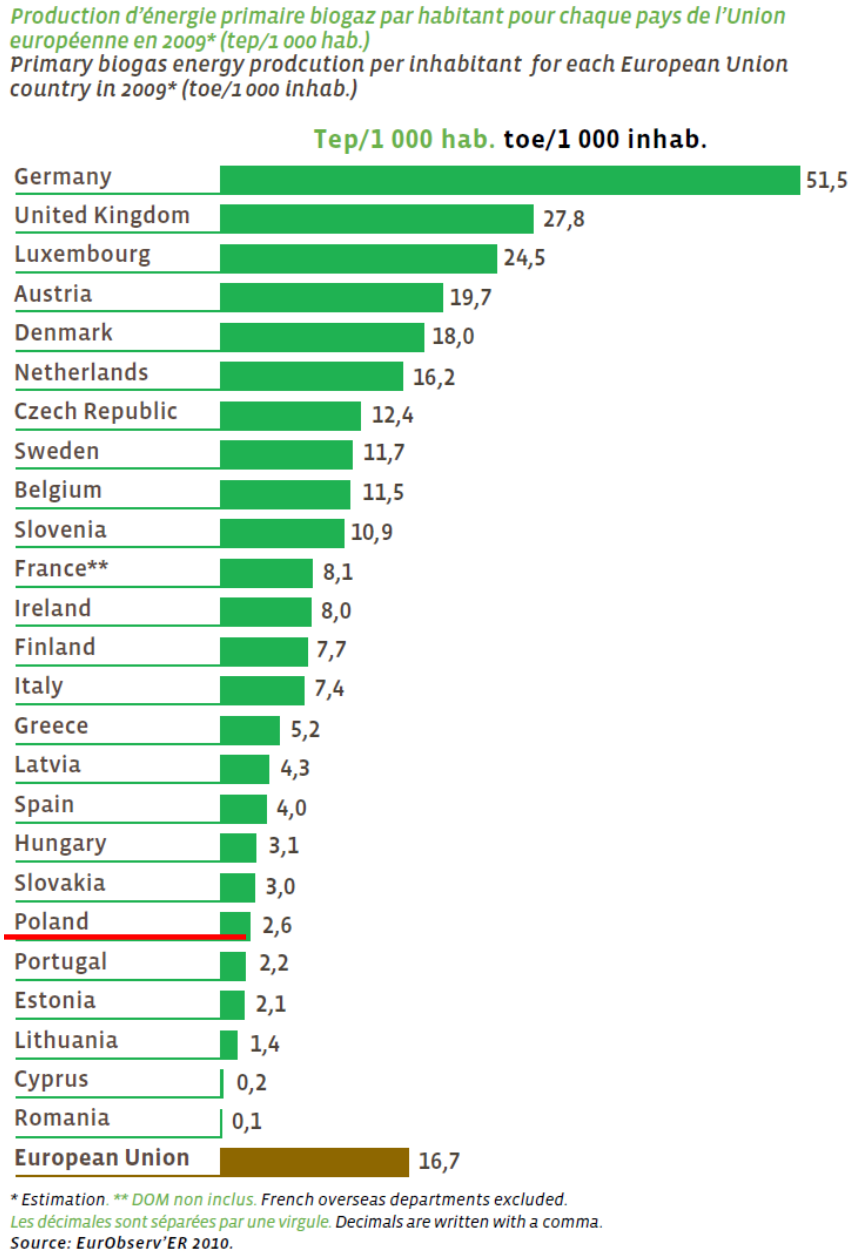
- Substrates:
  - energetic plants
  - agricultural products (grain, beets, straw)
  - agricultural waste and manure (pig, cow, poultry)
  - organic waste:
    - ➢ *industrial origin (slaughterhouse, dairy industry, fish waste, food industry, alcohol production*
    - ➢ *municipal organic waste*
    - ➢ *other organic waste (restaurants, supermarkets)*

Primary Energy Production of Biogas in Europe 2009



Source: http://www.eurobserv-er.org

Primary Energy Production of Biogas per 1000 habitants in Europe 2009



Source: http://www.eurobserv-er.org

Potential of Polish Biogas Market

- Comparison to Germany as a reference (worldwide leader in Biogas Application):

  without landfill and sewage

	GERMANY	POLAND
Inhabitants in Mio.	**82,1**	**38,1**
Surface in km²	**357.100**	**312.700**
Arable Land in Mio. ha	**11,9**	**10,7**
Theoretical potential from plants in MW	**22.500**	**20.200**
Theoretical potential from org. waste in MW	**1.750**	**1.375**
Installed Power in MW (2010)	**2.300**	**< 10**

AEBIOM
EUROPEAN BIOMASS ASSOCIATION

EBA
European Biogas Association

POLISH BIOGAS ASSOCIATION
PBA

Annex 2 : Biogas potential (source : AEBIOM Biogas Roadmap, www.aebiom.org)

Origin(according to template for National Renewable Energy Action Plans)	Potential Billion m³ Biomethane	2020		
		Assumed percentage of use until 2020	Primary energy Billion m³ Biomethane	Primary energy Mtoe
Agriculture	**58,9**	**62%**	**36,4**	**31,3**
Agricultural crops directly provided for energy generation (5% of arable land; calculation in annex)	27,2	100%	27,2	23,4
Agricultural by-products / processed residues	31,7	28%	9,2	7,9
straw	10,0	5%	0,5	0,4
Manure	20,5	35%	7,2	6,0
rest (landscape management)	1,2	40%	0,5	0,4
Waste	**19,0**	**50%**	**9,5**	**8,2**
Biodegradable fraction of municipal solid waste including biowaste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants) and landfill gas	10,0	40%	4,0	3,4
Biodegradable fraction of industrial waste (including paper, cardboard, pallets)	3,0	50%	1,5	1,3
Sewage sludge	6,0	66%	4,0	3,4
Total	**77,9**	**59%**	**45,9**	**39,5**

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Annex 3 : Calculation of Biogas potential from energy crops and manure for 2020 (FAOSTAT 2009, AEBIOM calculations)

Country	Arable land	Biogas potential from crops*	Total manure	Biogas potential from manure**	Total biogas potential
		5% land; yield 15t/ha	Cattle and pigs	35% manure used	5% land & 35% manure
unit	1000 ha	Mtoe	Mt	Mtoe	Mtoe
Austria	1382	0,30	34,0	0,13	**0,43**
Belgium	840	0,18	48,6	0,19	**0,37**
Bulgaria	3086	0,66	10,7	0,04	**0,71**
Cyprus	115	0,02	1,7	0,01	**0,03**
Czech Republic	3032	0,65	24,6	0,10	**0,75**
Denmark	2306	0,50	47,2	0,18	**0,68**
Estonia	598	0,13	4,1	0,02	**0,14**
Finland	2253	0,49	15,7	0,06	**0,55**
France	18433	3,97	299,1	1,16	**5,13**
Germany	11877	2,56	225,8	0,88	**3,43**
Greece	2548	0,55	10,5	0,04	**0,59**
Hungary	4592	0,99	17,2	0,07	**1,06**
Ireland	1060	0,23	97,2	0,38	**0,61**
Italy	7171	1,55	102,9	0,40	**1,94**
Latvia	1188	0,26	6,1	0,02	**0,28**
Lithuania	1835	0,40	13,9	0,05	**0,45**
Luxembourg	61	0,01	2,9	0,01	**0,02**
Malta	8	0,00	0,4	0,00	**0,00**
Netherlands	1059	0,23	73,7	0,29	**0,51**
Poland	12502	2,69	113,4	0,44	**3,13**
Portugal	1083	0,23	24,0	0,09	**0,33**
Romania	8553	1,84	53,8	0,21	**2,05**
Slovakia	1377	0,30	9,2	0,04	**0,33**
Slovenia	177	0,04	7,4	0,03	**0,07**
Spain	12700	2,74	138,6	0,54	**3,27**
Sweden	2643	0,57	25,0	0,10	**0,67**
United Kingdom	6085	1,31	149,3	0,58	**1,89**
EU 27	**108564**	**23,39**	**1556,9**	**6,04**	**29,43**

*see calculation example in the annex
Approximately 5 Mio ha land in Europe

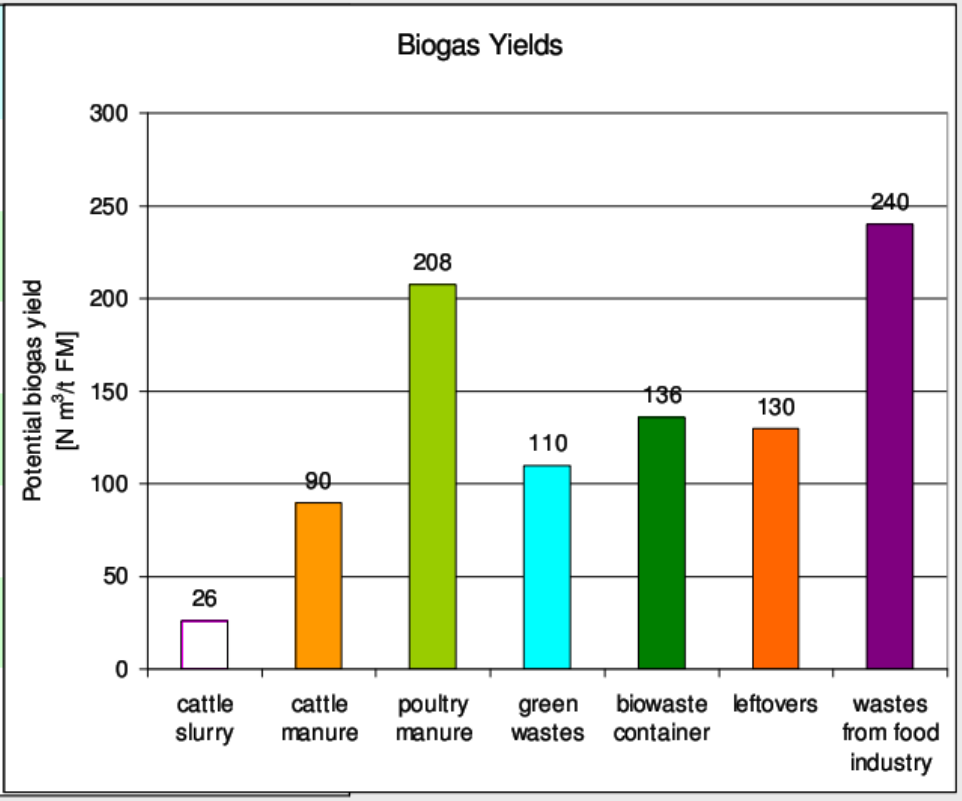
**Assumed methane content in biogas 65%; assumed yield of 20 m^3 biogas per ton of manure

NREAP Poland 2020

According to EU Directive 2009/28/EC

Biogas yields

Substrate
Cattle slurry
Cattle manure
Poultry manure (dry)
Green waste
Biowastes container
Leftovers
Wastes from food industry



Biogas from organic waste in Poland

Waste creates Biogas

- The biogas **potential** in Eastern Europe is estimated very high – especially in the **waste sector**
- Waste is a **serious problem** in many countries

food waste (expired, catering, etc.)

food waste delivery

Municipal Solid Waste (MSW)

Use of Organic Waste

(Municipal Solid Waste, Catering & Food Waste)

Landfill

- Reduction necessary to comply with Directive 2006/12/EC
- Landfill gas could be energetically used, but energy output is low
- No use of nutrients is possible

Incineration Plant

+ Energetic use
- "waste heat" is often un-used
- No use of nutrients is possible
- High investment costs and other barriers for new plants
- Long transport ways due to centralised plants

Household Composting

+ Common practice in many cases
+ High-value end-product: closed nutrient cycle
+ No sophisticated logistics needed
- No energetic output
- Not all waste is suitable for private composts
- Not possible in urban areas

Industrial Composting

+ Common practice in many cases
+ High-value end-product: closed nutrient cycle
- No energetic output

Anaerobic Digestion

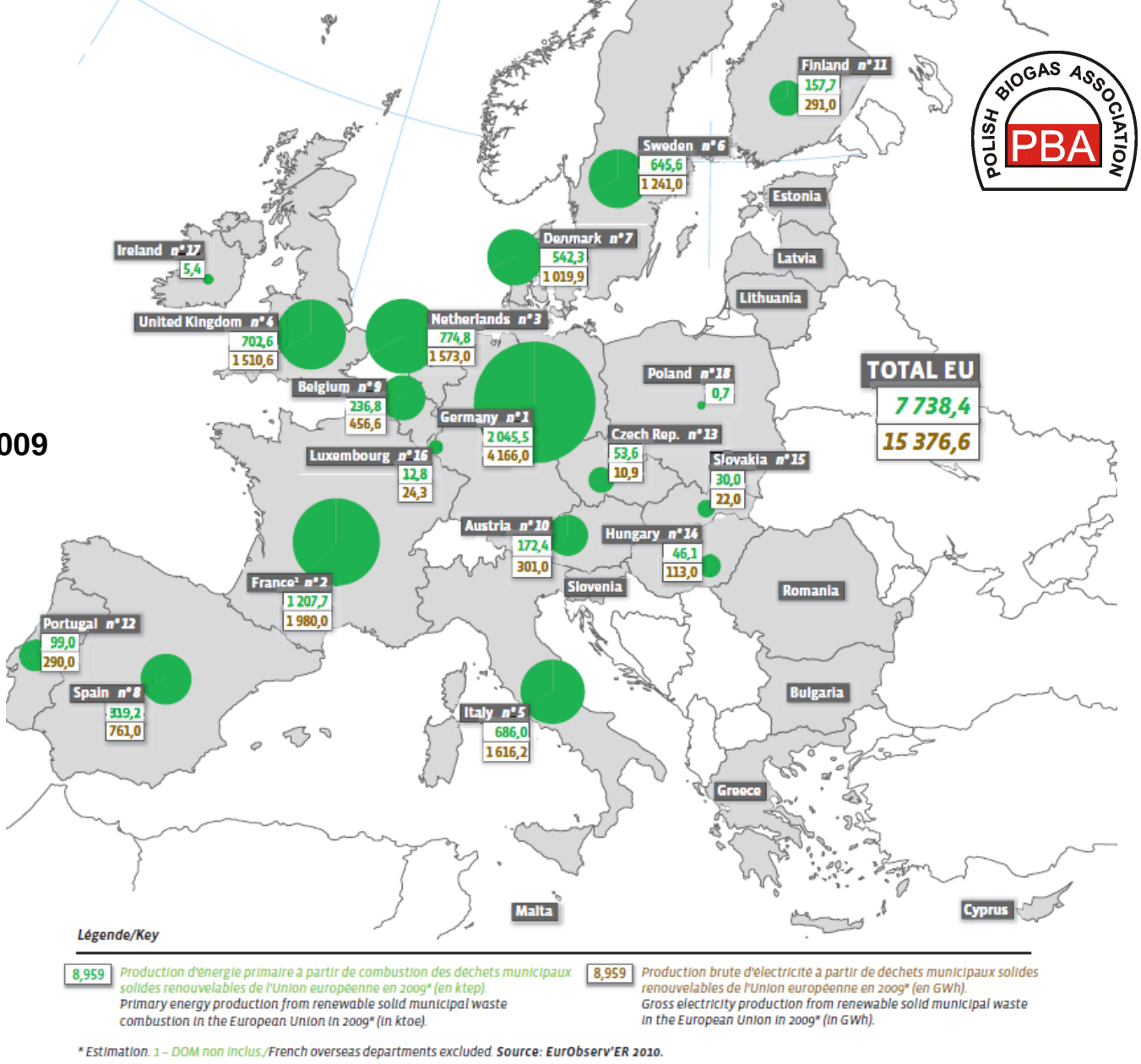
+ High energetic output

+ High-value end-product: closed nutrient cycle

→ Still needs non-technical support

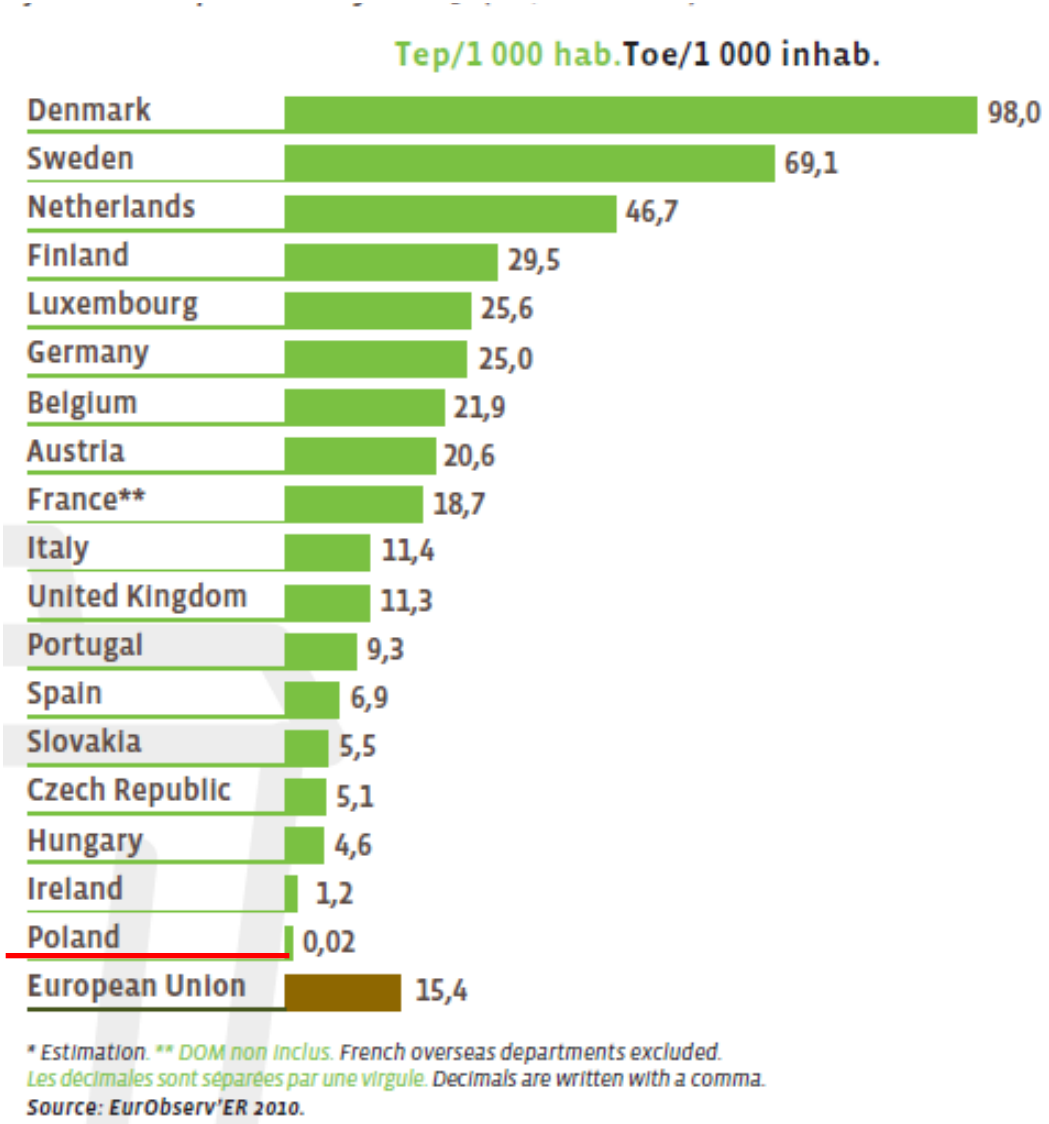
Source: BiG>East Biogas for Eastern Europe

Energy Production from Municipal Solid Waste 2009



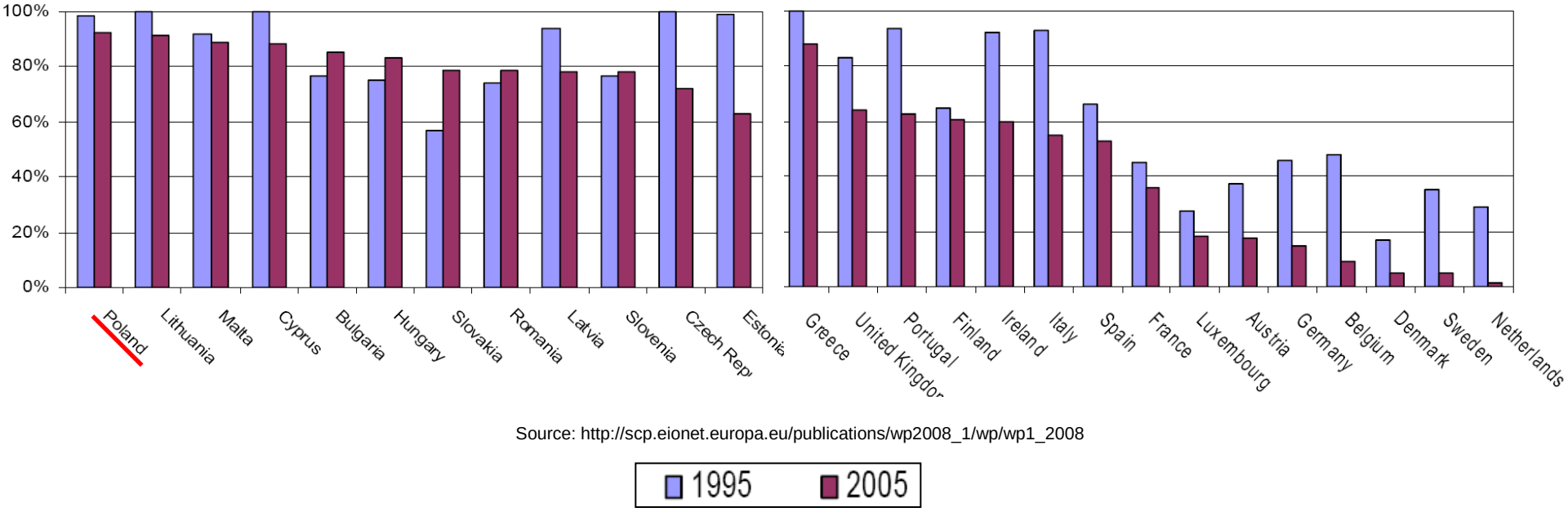
Source: http://www.eurobserv-er.org

Energy Production from Municipal Solid Waste per 1000 habitants 2009



Source: http://www.eurobserv-er.org

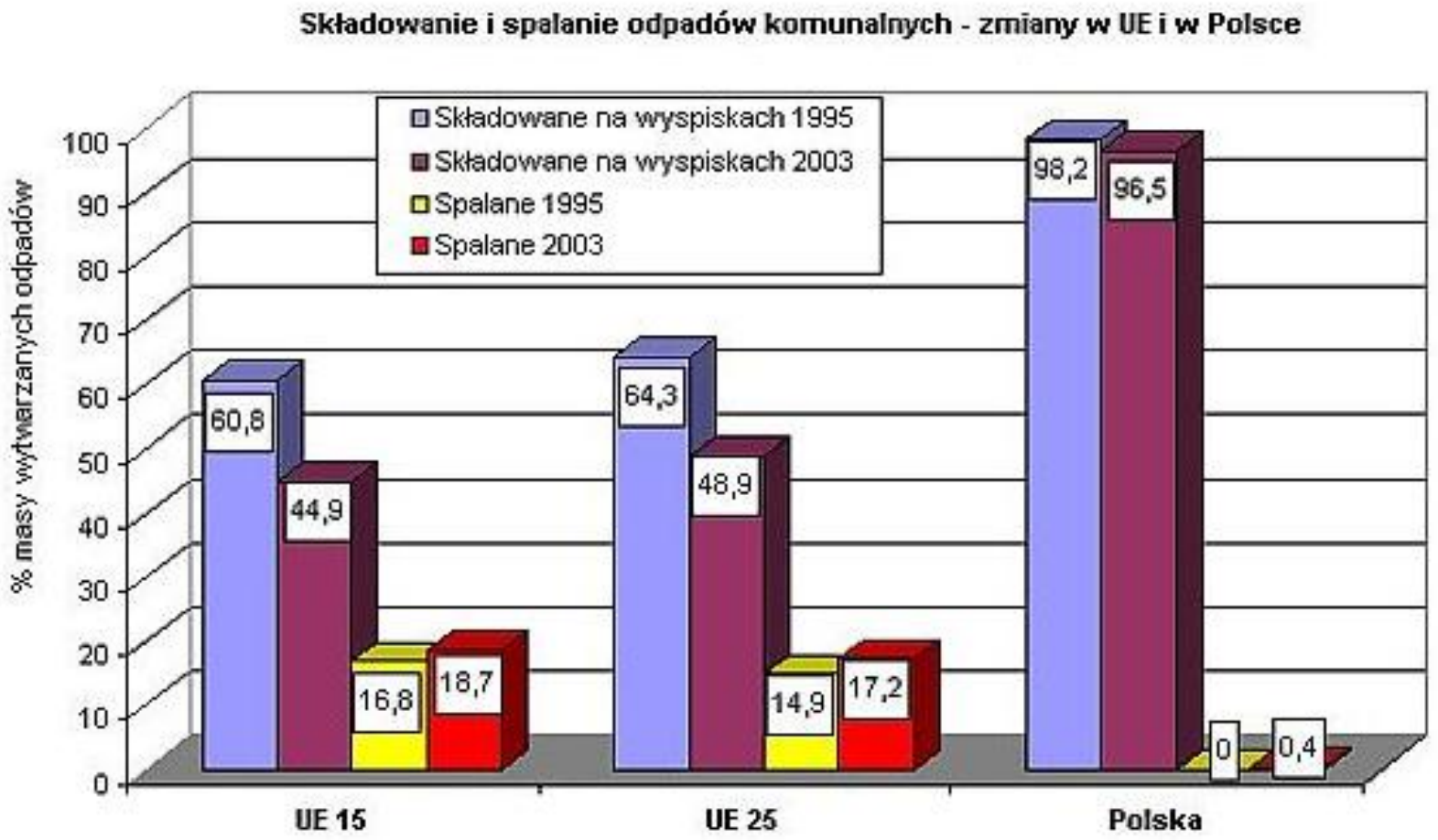
Landfill of municipal waste in the EU 1995-2005



Source: http://scp.eionet.europa.eu/publications/wp2008_1/wp/wp1_2008

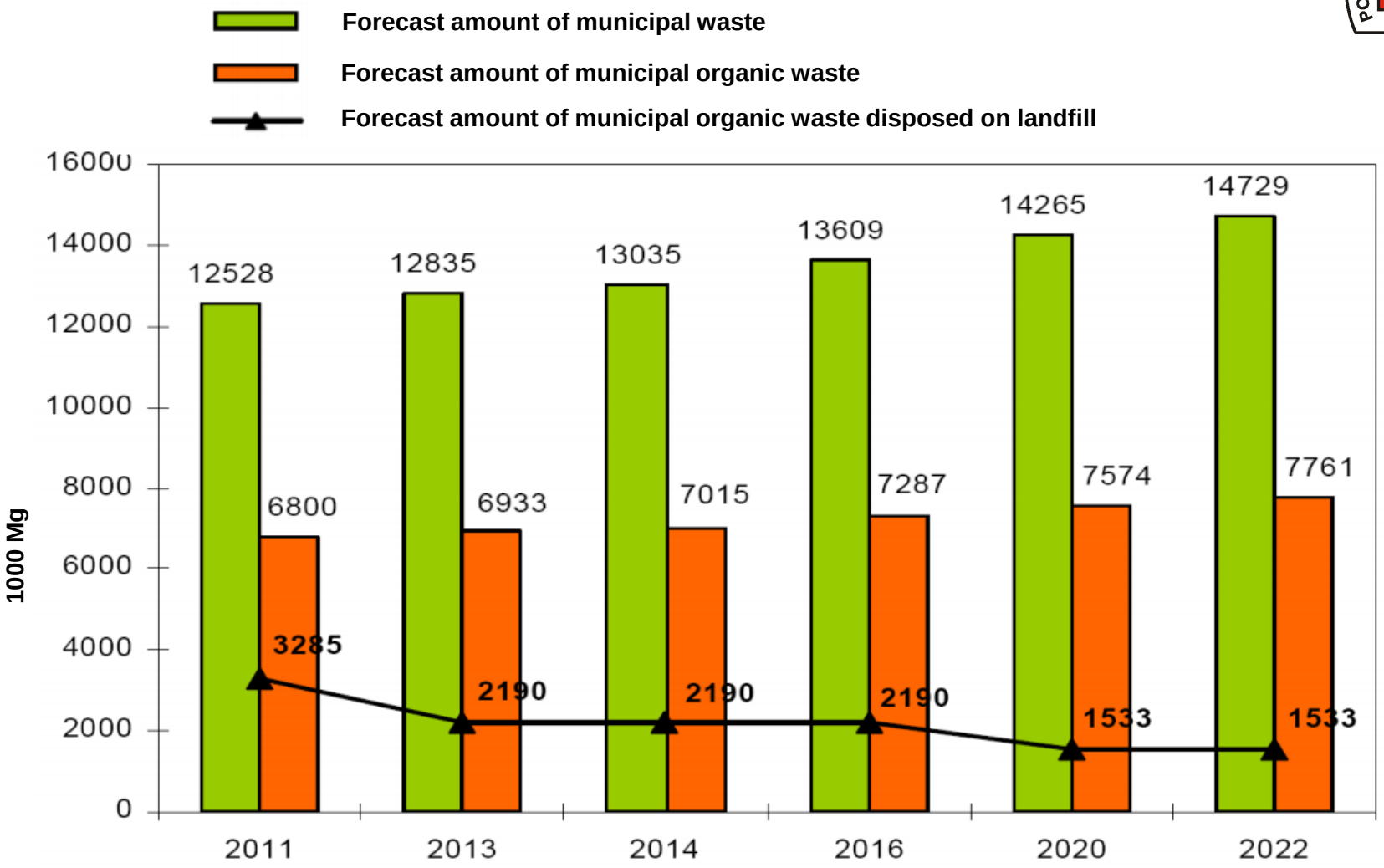
→ Biogas production could be an opportunity to recover the energy content of the organic fraction of municipal waste

Landfill of municipal waste in Poland



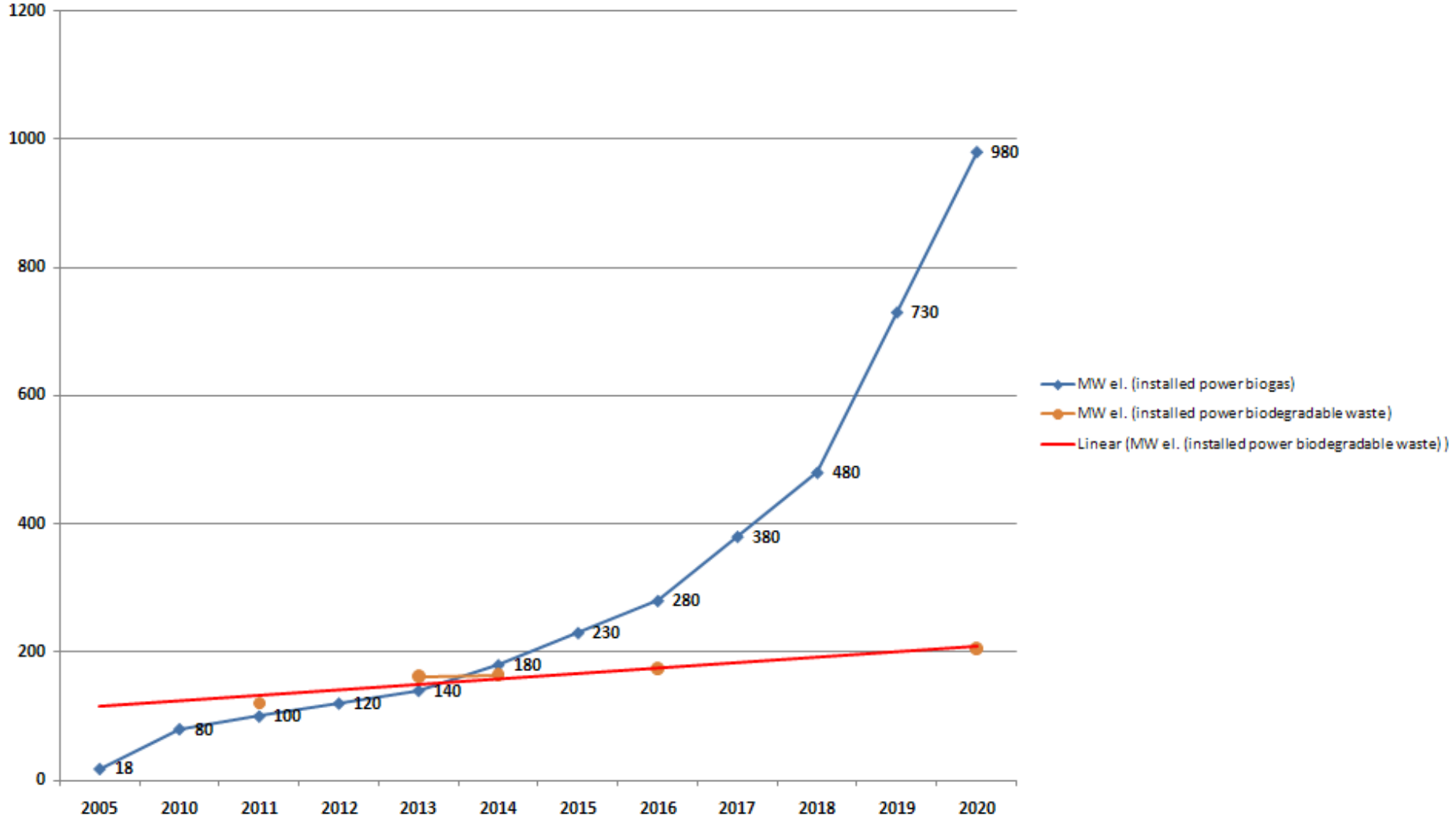
Rys. 1. Składowanie i spalanie odpadów komunalnych - zmiany w UE i w Polsce

Landfill of municipal waste in Poland



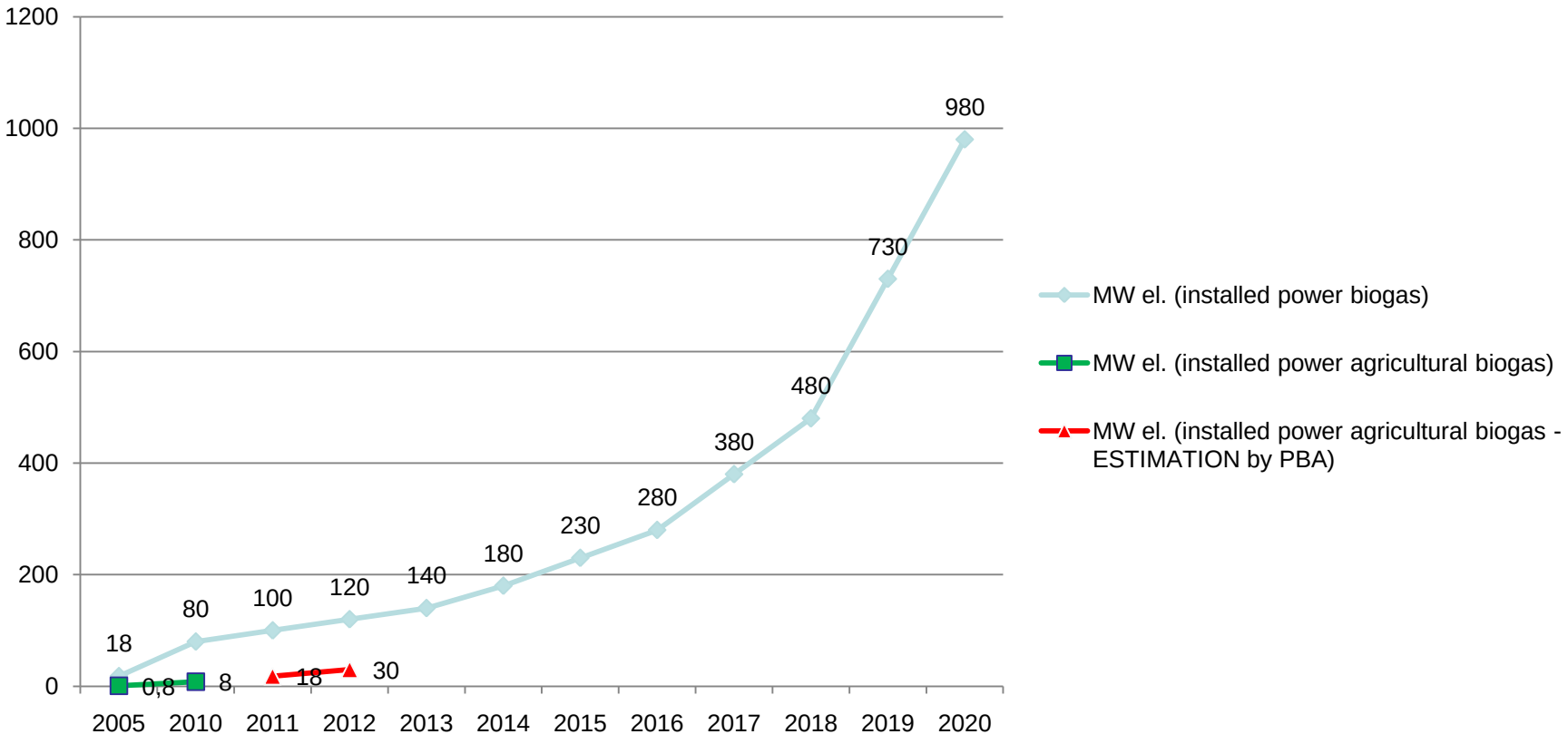
Source:

Biogas potential from organic waste in Poland



NREAP Poland 2020

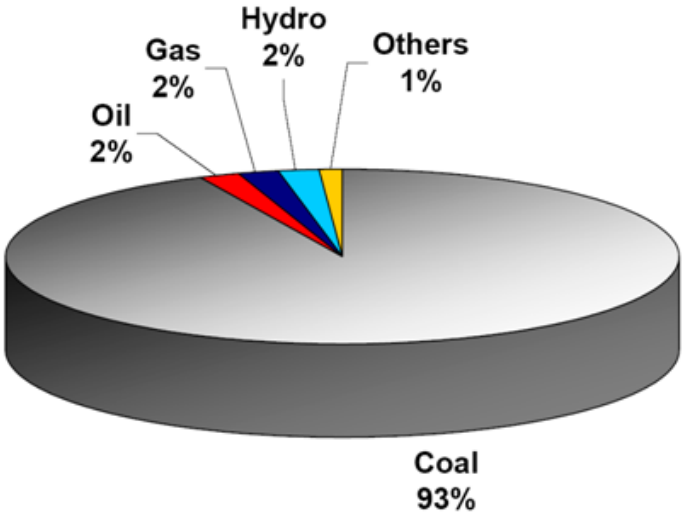
According to EU Directive 2009/28/EC



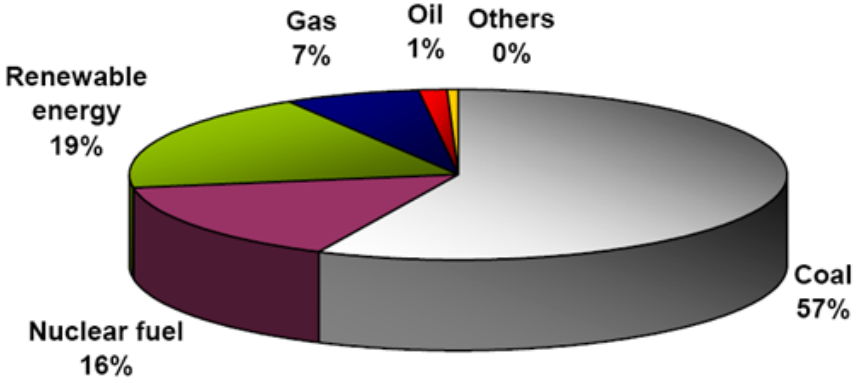
NREAP Poland 2020

According to EU Directive 2009/28/EC

Electricity production in Poland according to selected fuels



Forecast for Electricity production for selected fuels 2030



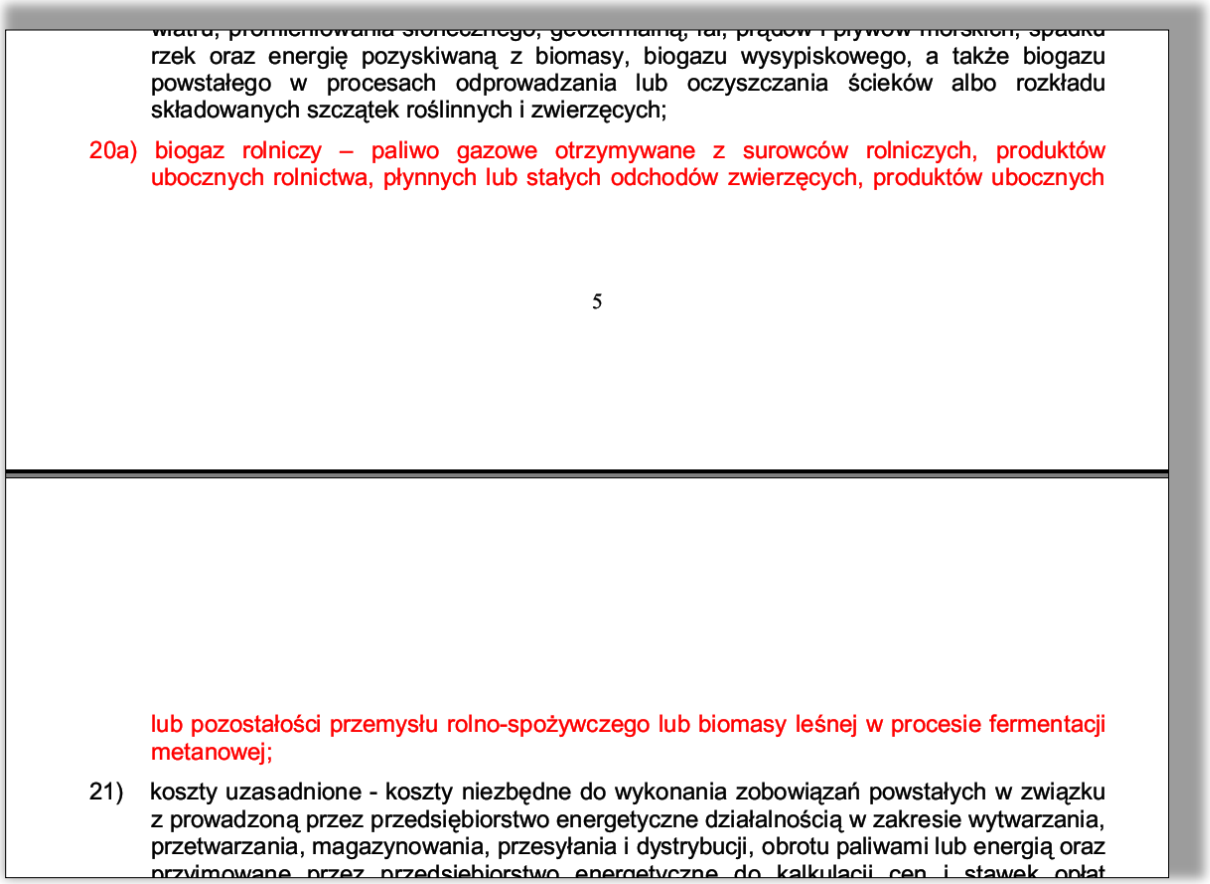
Biogas from organic waste in Poland

Support measures

- Certificates (Quota system):
  - Green (świadectwo pochodzenia) - 2019
  - Yellow (świadectwo pochodzenia z kogeneracji) - 2012
  - Violet (świadectwo pochodzenia z kogeneracji) - 2018
- Subsidies:
  - EU-Structural Funds 2007-2013
  - National Environmental Protection Fund (NFOŚ)
  - Special Economic Regions
- Other:
  - Obligation to purchase energy from RES
  - Obligation of energy grid operators to ensure priority for RES
  - Reduction of fee for connection to the grid (<5MW / CHP <1MW)
  - Exemption of energy produced from renewable sources from excise duty

Biogas from organic waste in Poland

- Polish Energy Law (01.01.2011) – Art.3/20a



wiatru, promieniowania słonecznego, geotermalną, fal, prądów i pływów morskich, spadku rzek oraz energię pozyskiwaną z biomasy, biogazu wysypiskowego, a także biogazu powstałego w procesach odprowadzania lub oczyszczania ścieków albo rozkładu składowanych szczątek roślinnych i zwierzęcych;

20a) biogaz rolniczy – paliwo gazowe otrzymywane z surowców rolniczych, produktów ubocznych rolnictwa, płynnych lub stałych odchodów zwierzęcych, produktów ubocznych

5

lub pozostałości przemysłu rolno-spożywczego lub biomasy leśnej w procesie fermentacji metanowej;

21) koszty uzasadnione - koszty niezbędne do wykonania zobowiązań powstałych w związku z prowadzoną przez przedsiębiorstwo energetyczne działalnością w zakresie wytwarzania, przetwarzania, magazynowania, przesyłania i dystrybucji, obrotu paliwami lub energią oraz przyjmowane przez przedsiębiorstwo energetyczne do kalkulacji cen i stawek opłat

Biogas from organic waste in Poland

- Polish Energy Law (01.01.2011) – Art.3/20a

Definition of agricultural biogas:

agricultural biogas - gas fuel derived from agricultural raw materials, products agricultural by-products, liquid or solid manure, by-products or residues of agro-food industry or forest biomass methane fermentation process.

Biogas from organic waste in Poland

Obstacles / Barriers

- Lack of long-term planning security:
  - ➢Price of certificates and energy, Expiration of certificates
- Lack of, or unclear definitions
- Conflict with existing regulations:
  - ➢After-fermentation product
- High administrative burdens (permission procedures)
- Lack of knowledge and experience in administration
- Lack of (successful) pilot plants
- Lack of local biogas experts and staff
- Lack of information in public – protests, low acceptance in public
- Low interest of municipalities – only 6% general interest (2009 study by BSJP)
- Limited local availability of biogas technologies
- Weak (waste treatment) infrastructures
- Currently very high initial cost for project development
- Long period of development of biogas projects

The UrbanBiogas Project

"Urban waste for biomethane grid injection and transport in urban areas"

Duration: 3 years

Coordinated by: WIP Renewable Energies, Germany

The objective is to prepare 5 European target cities for the production of biomethane from waste which is fed into the natural gas grid and optionally used for transport:

- City of Graz (Austria)
- City of Zagreb (Croatia)
- Municipality of Abrantes (Portugal)
- City of Rzeszów (Poland)
- City of Valmiera (Latvia)

Members of consortium in Poland: **PBA** (Polish Biogas Association)

PAE (Podkarpacka Agencja Energetyczna)

Additional partners: municipalities, waste companies, NGOs, etc.

Résumé / Conclusions

•Experiences from other countries shall be considered for biogas in Poland

•Local characteristics have to be considered

•The use of waste for biogas shall be priority

•Improve infrastructure / logistic for waste and agriculture

•Activate fallow agricultural land

•Public campaign is necessary in order to increase acceptance of biogas

•Poland has to fulfil the European targets on energy, waste, landfill, fertilizers:
→ biogas could help to fulfil these targets

•Some Eastern European countries are making good progress on biogas (Czech Republic, Slovenia)

•Developments depend on suitable framework conditions

Thank you for your attention!

Pierre Haider
Polish Biogas Association – PBA

info@pba.org.pl

www.pba.org.pl