



The Polish Energy Group

***Dom pełen
energii***

Home full of energy



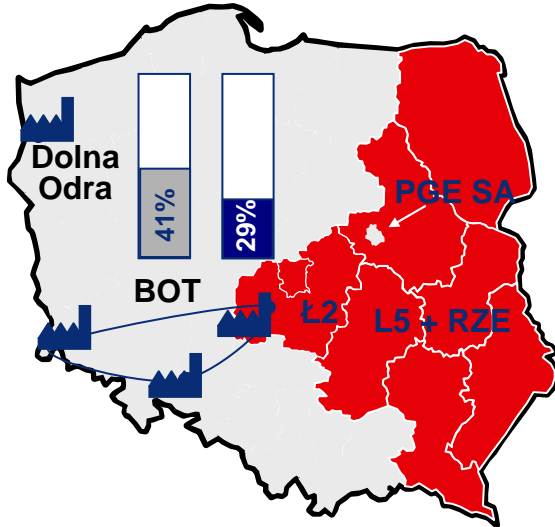
**The Polish
Energy Group**

Warsaw, June 2008

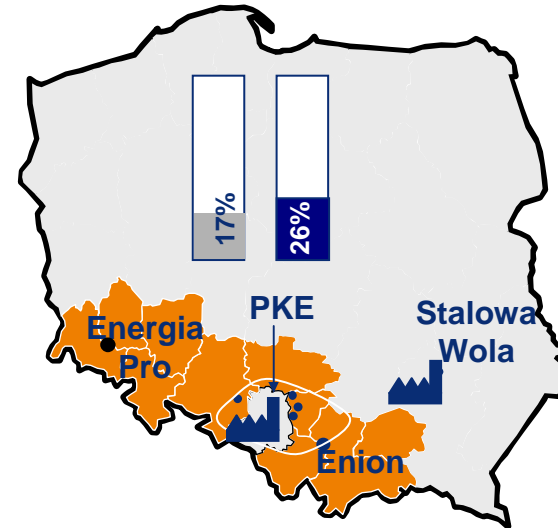


Organisation of Polish Energy Sector

PGE



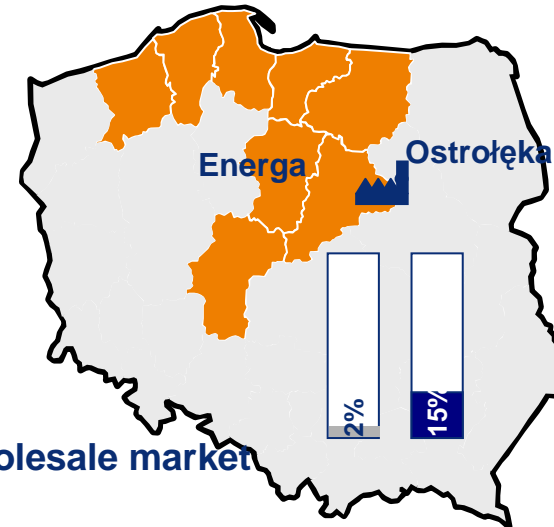
Tauron



ENEA



Energy



Power Plant



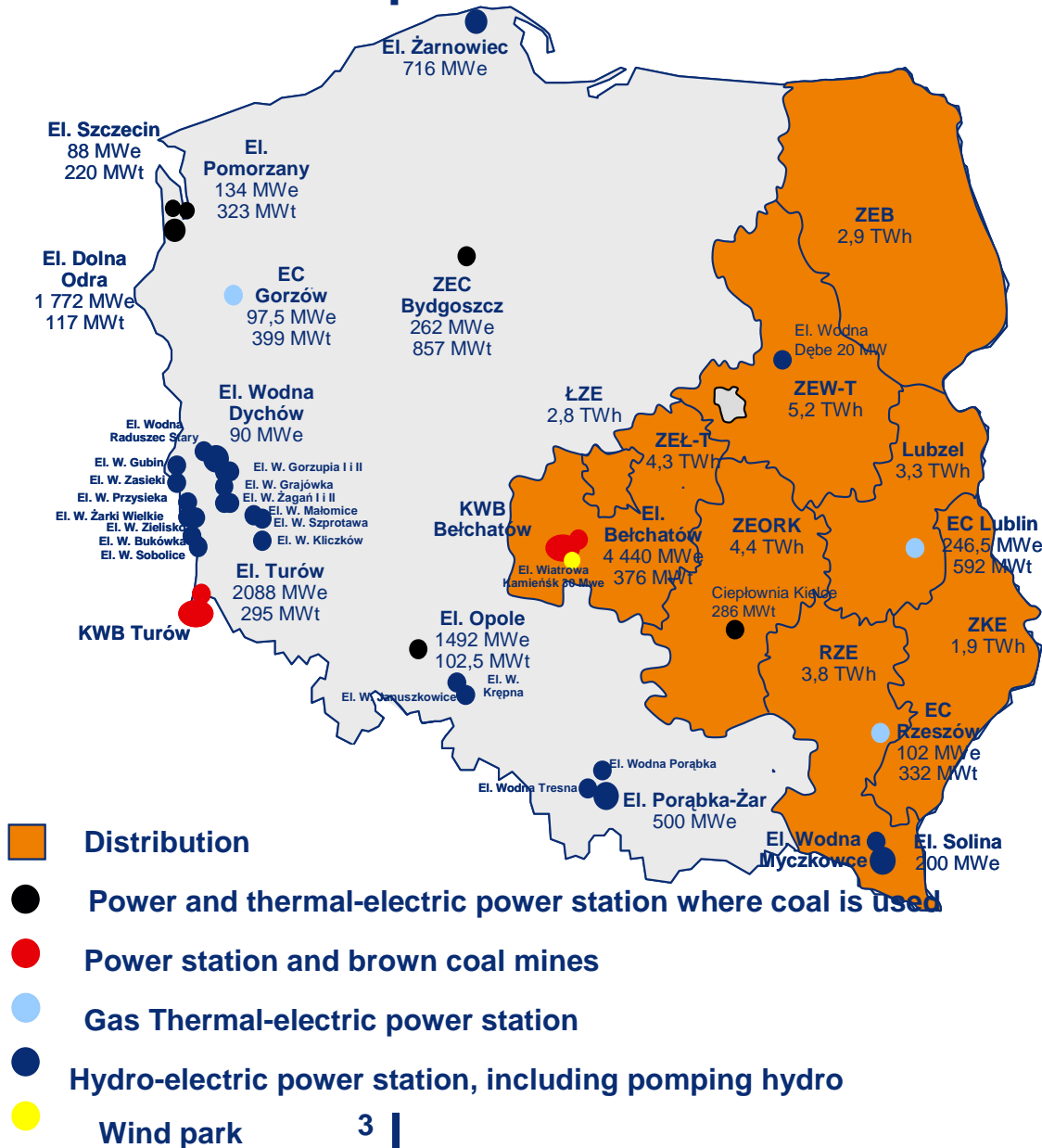
Share in a wholesale market



Share in a retail market



PGE The Polish Energy Group SA



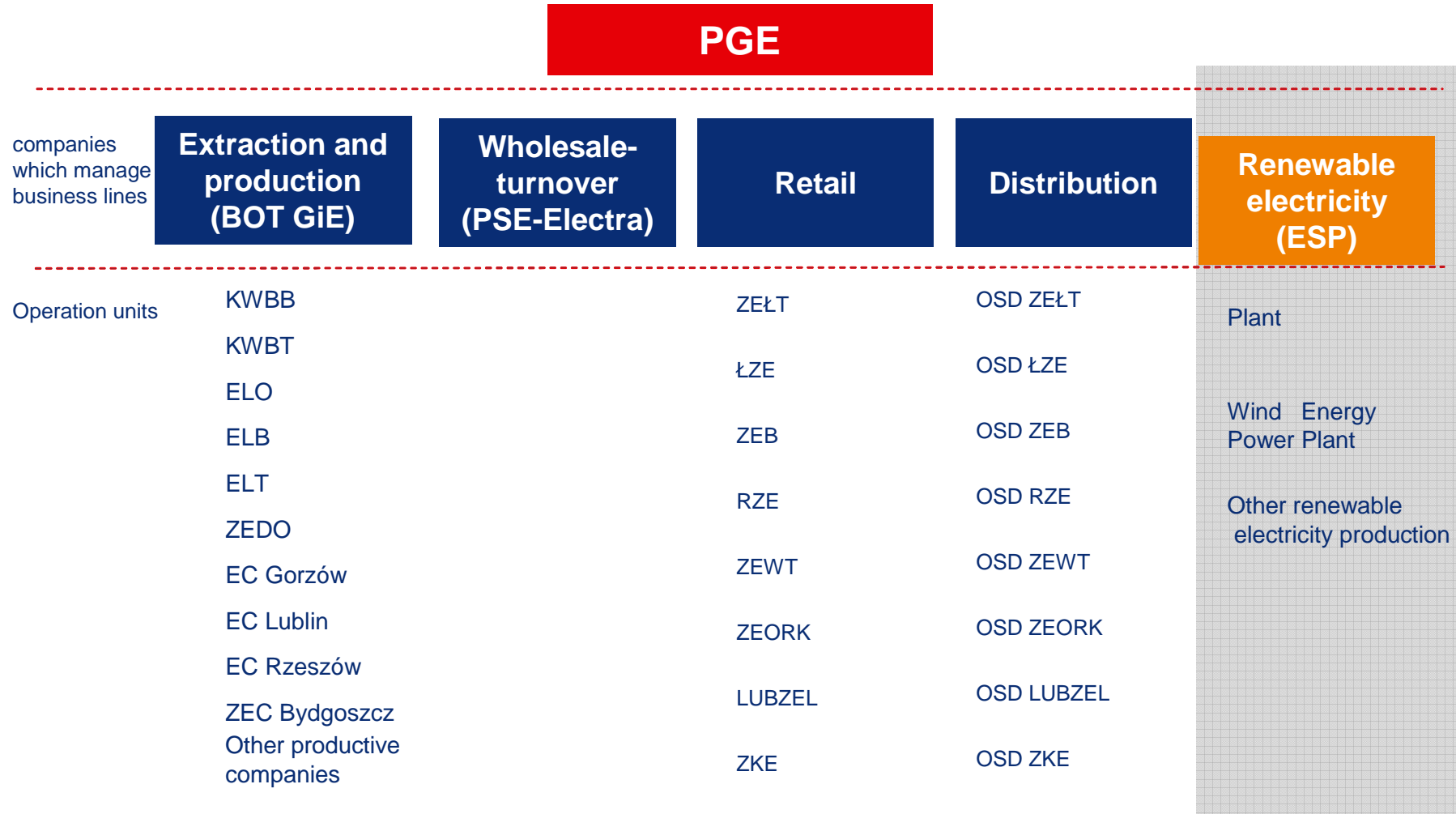
Basic data PGE SA

Installed power	~12 GW
Electricity production	~60 TWh
Number of customers	~5 mln
Number of employees	39 tys.
Share of a market	45%
Share of retail market	29%



PGE organisation structure

PGE will be organised as operation holding with strong corporation center and five business lines.





RES target in Poland

PGE elaborated two variants of RE development in the power sector in Poland- assumig 15% RE share at production and selling of electricity for final customers.

Variant I

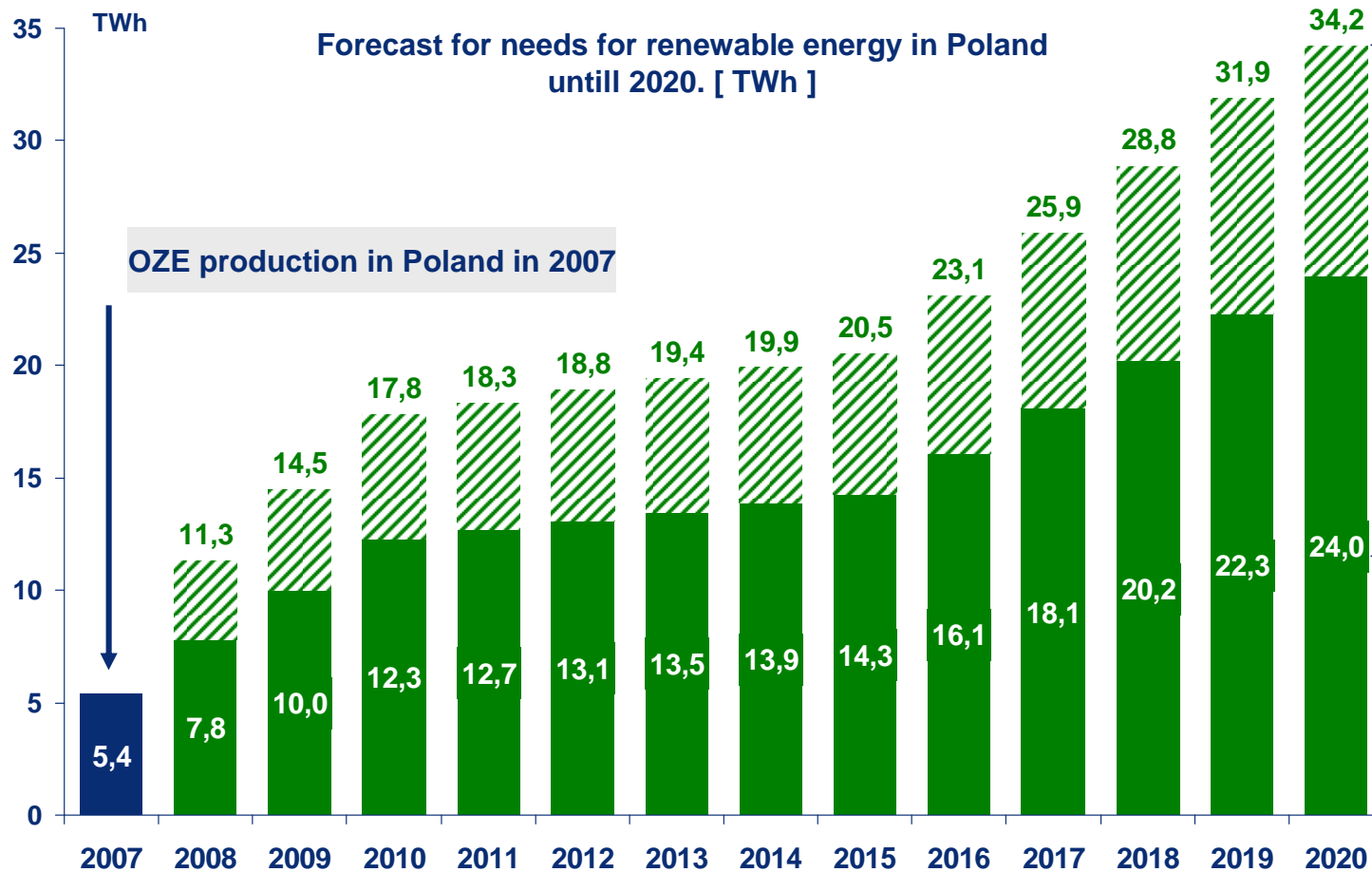
That is how much energy from OZE Poland should product to achieve 15% share in total production in 2020.

[228 TWh - 2020]

Variant II

That is how much energy from OZE Poland should product to achieve 15% share in total sale in 2020

[160 TWh - 2020]

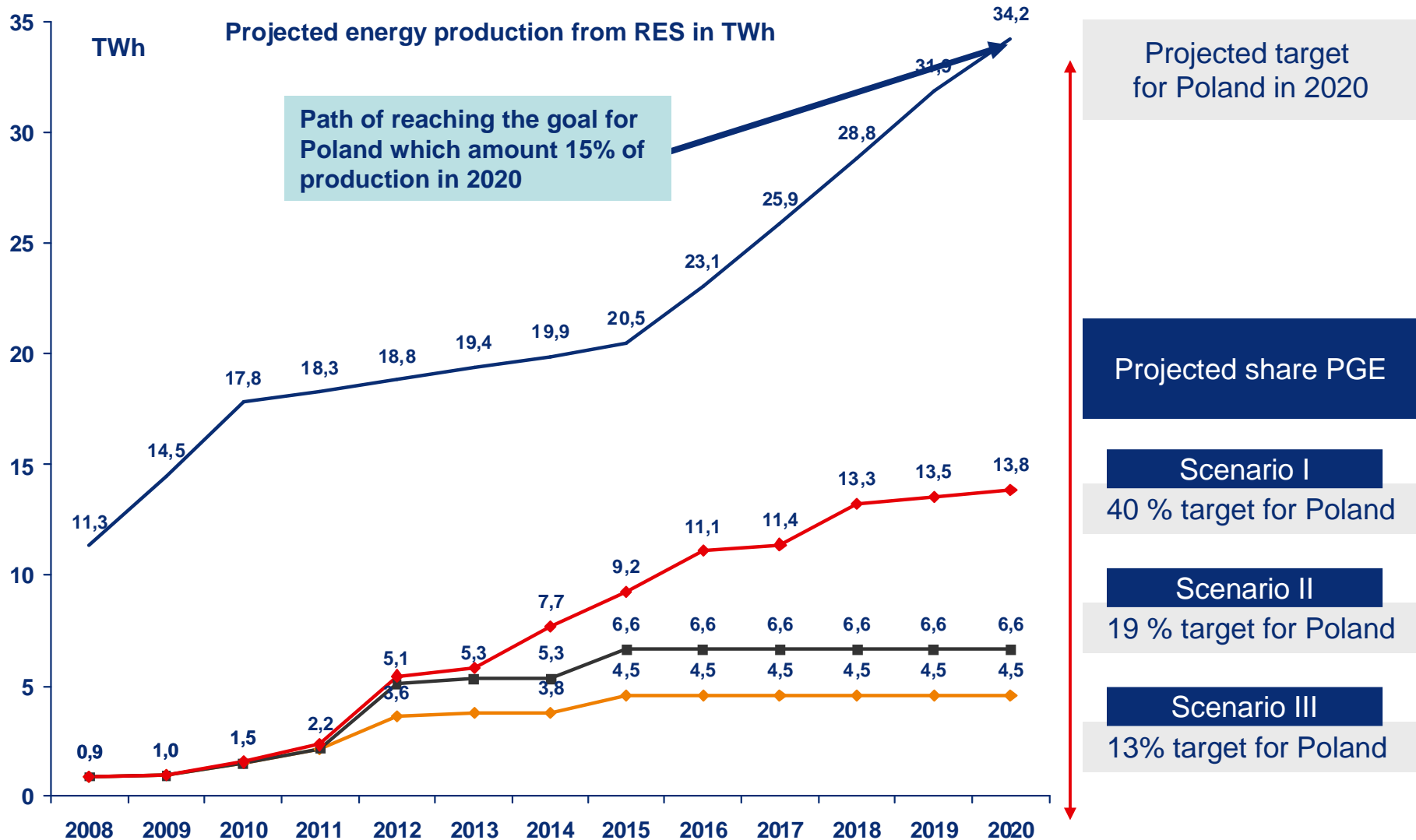


■ requirement counted after sale

▨ Requirement counted after production



PGE contribution into the RE target achievement in PL

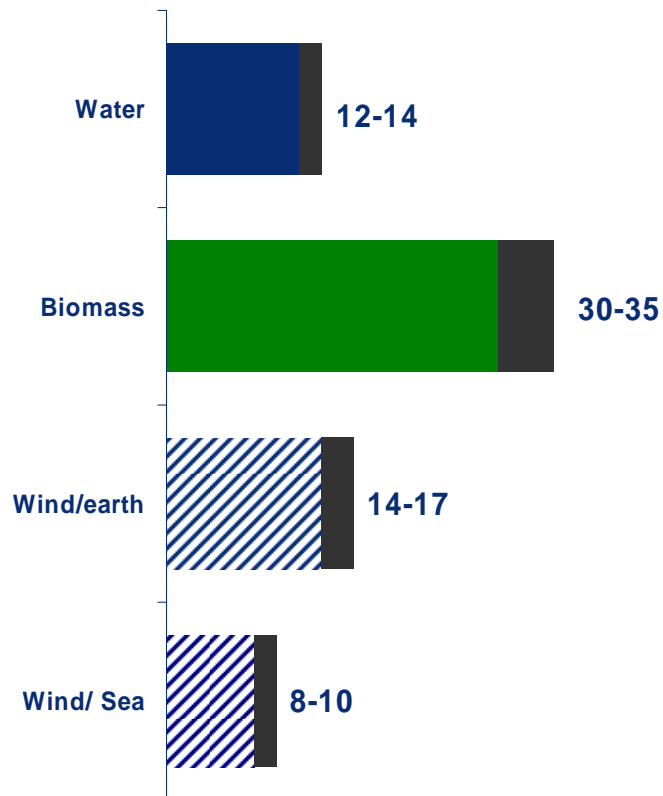




RES technical potential in Poland

Using the existing potential of renewable energy sources in Poland is quite hard.

Technical potential of RES in Poland



Technical potential may be estimated at 64 -76 TWh

Biomass

- ◆ Co-firing in existing instalations (limit content of biomass in fuel 8-10% for technical purposes)
- ◆ low costs of investing
- ◆ necessity of transport and/or biomass storing
- ◆ low fuel energy content
- ◆ Biomass market is little developed in Poland

Wind

- ◆ Production is unpredictable and ther is a need to maintain reserves in teh power system
- ◆ high cost of investment per MW
- ◆ quite low productivity
- ◆ potential resistance from ecologists

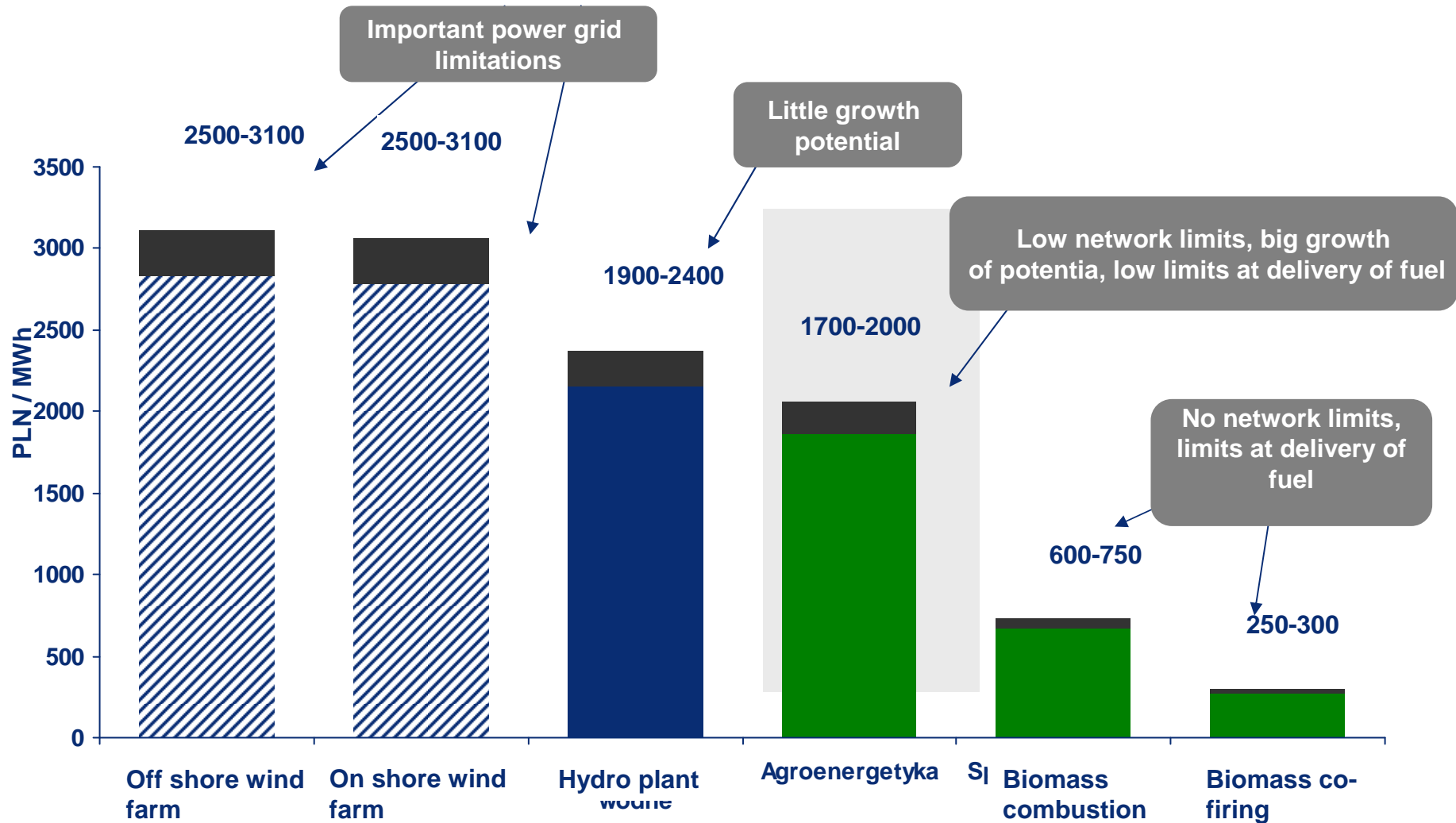
Water

- ◆ Not used water potential, mainly on Wisła and Odra, big ecologists' resistance against regulation of these rivers
- ◆ high cost of investment per MW



RE investment competitiveness

Investments are produce 1 MWh per year [PLN/MWh]





The most important actions for RE development in PGE

1

Plans for 1000 MW on shore wind farm bulding **2,2 TWh**

2

Plans for off-shore wind farm bulding (1-3) **1,65 – 5 TWh**

3

Development of co-firing and dedicated combustion of biomass in existing PGE instalations **2,1 TWh**

4

Agroenergy sector development **2,2 TWh**

5

Actions which support development of biomass market (for example creating electric platform of biomass trading)



Development of co-firing and dedicated biomass combustion in existing PGE instalations

OZE production	2008 [TWh]	Prognoza 2013 [TWh]
El. Bełchatów	0	ok. 0,20
El. Opole	0,15	ok. 0,26
El. Turów	0	ok. 0,20
ZEDO	0,17	ok. 0,75
Power Station		
EC Gorzów	-	ok. 0,13
EC Rzeszów	-	ok. 0,22
EC Bydgoszcz	-	ok. 0,20
EC Lublin	-	ok. 0,08
EC Kielce	-	ok. 0,03
Energetyka Boruta	-	ok. 0,04
Thermal Power Station		
In total	0,32	ok. 2,1

2008

In 2008 PGE will produce about **0,32 TWh** from RES in intalations which co-firing biomass

2013

In 2013 PGE is planning to produce about **2,1 TWh** from RES in co-firing and dedicated biomass instalations



Needs of PGE

Needs of PGE

PGE need to increase the production of electricity and heat from RES

Renewable energy

Co-firing and firing biomass in existing PGE instalations

Agroenergy

Wind on shore

Small hydro

Biomass

In order to cover 30% of demand for biomass for co-firing and combusting in large PGE instalations, PGE should establish own plantations of **14 000** ha

10 000 ha - existing area of energy crops in PL



Using the assets of KSC Polski Cukier

Cultivation area per each sugar factory of KSC: **6000 ha**

From **27 sugar** factories, which belong to KSC 20 of them where closed

Total land area for utilization for energy production in the closed sugar factories reaches **100-120 thous. ha**

The production potential of renewable energy in the closed sugar factories reaches about **250 MWe**



For methane fermentation of biomass:

1t corn, beet

80 m3 methan

1 ha

ok 4000 m3 methan

1 MWe x 1h

280 m3 methan

For keeping **1MWe** of installed capacity it is required to supply biomass from **450-500 ha**



Evolution of agroenergy (1)

Closed sugar factory

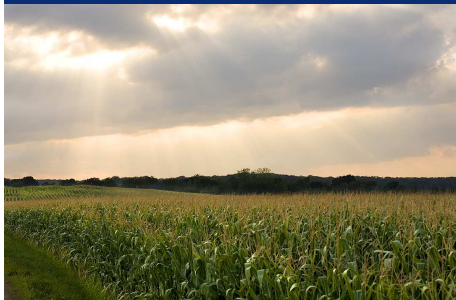


Biogas plant



Production of electricity and heat in one biogas plant of 1MW will supply app. 4,000 households.

Cultivation of biomass



Production of biomass in the area of 6,000 ha

Storage and processing biomass



Collecting and processing biomass for co-firing and combustion in existing installation of PGE- fuel needed to produce 0.03 TWh.



Evolution of agroenergetics (2)

PGE experience

Proces technologiczny

1

Initial conception about use of willnow sugar factory, assume zakładała budowę biogazowni opalanych paliwem pochodzącym z pirolizy buraków, kukurydzy i innych płodów rolnych. W wyniku przeprowadzonych analiz stwierdzono, że proces ten jest zbyt skomplikowanych technicznie i niesie ze sobą szereg ryzyk (np. ryzyko częstych remontów i przestołów instalacji wynikających z nadmiernego gromadzenia się pozostałości procesu spalania).

Piroliza buraków
cukrowych

2

Ustalono, że bardziej odpowiednim procesem technologicznym do wykorzystania potencjału odstawionych cukrowni będzie budowa biogazowni. Produkcja energii i ciepła będzie oparta na procesie fermentacji beztlenowej produktów rolniczych (ciekłych i stałych). Paliwem dla tych instalacji mogą być : produkty roślinne, gnojowica, gnojówka itp,

Fermentacja
beztlenowa produktów
rolniczych
(pozostałości roślin,
gnojowica, gnojówka)

Actual localizations of sugar factories belonging to KSC



Actually
analysing
localizations

- 1 PGE consider using cultivation acreage (beets, corn) belonging to not-working sugar factories (20 belonging to KSC and 10 belonging to other companies)
- 2 PGE analyse possibility of building biogas plants in the sugar factory (purpose is: 250 MW in all Poland) as well as collecting and processing biomass (briquette, pellets) for combustion and co-firing purposes in existing PGE instalations.



Basic assumptions for biogas plants

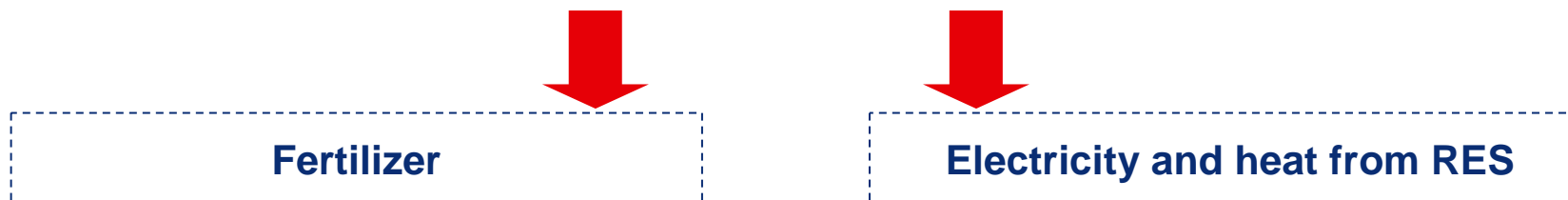
Raw material for biogas plant



Biogas plant

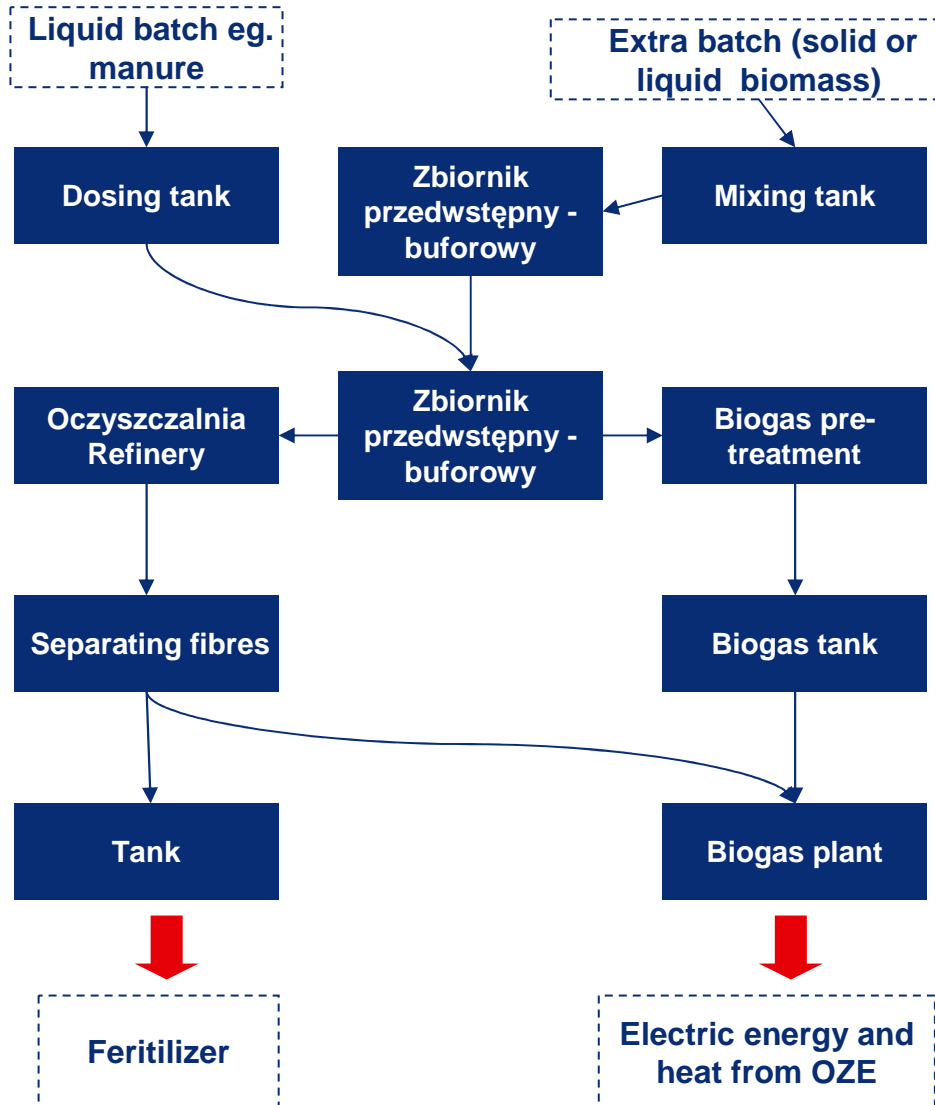


Basic products





Example instalation – Blåbjerg, Denmark



Mainly biogas parameters	
Animals excrement	222 tons /day
Extra biomas	87 tons /day
Biogas production	3,1 mln Nm ³ / year
Biogas storage possibility	4000 Nm ³
Biogas useage	Biogas plant
Date of put into operation	1996

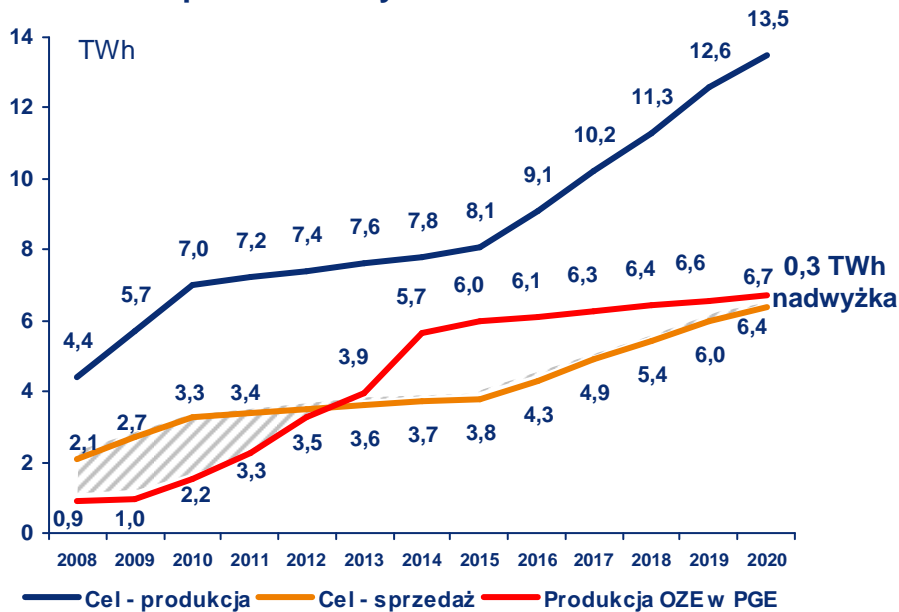


Agroenergy as potential element of development of RES in PGE.

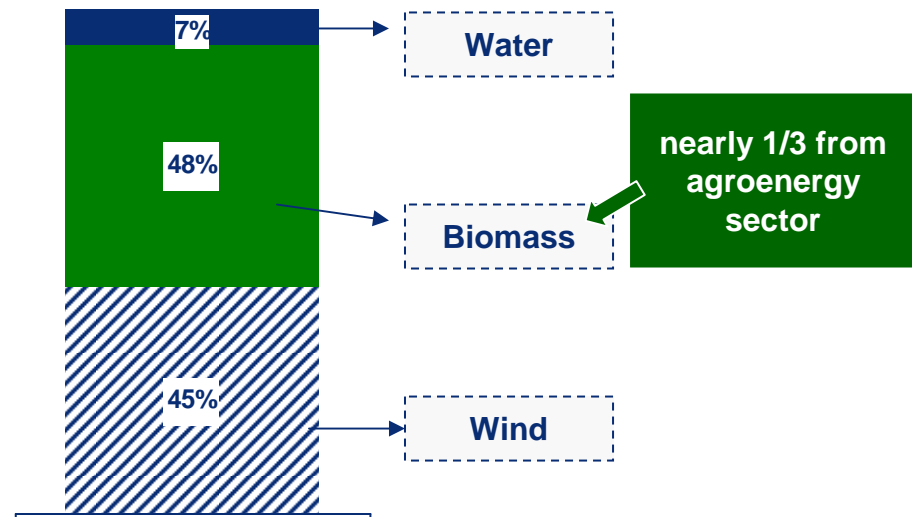
Basic assumptions:

- Current production OZE in PGE
- Co-firing and combustion of biomass development program in existing PGE.
- Agroenergy (150 MW)
- Off-shore wind farms (360 MW)
- On-shore wind farm (550 MW)

Target counted after energy production and sale by PGE and forecasted RE production by PGE in 2008-2020



Production structure of renewable energy in 2020.





Summary

- 1** PGE consider using chosen withdrawn sugar factories belonging to KSC for using their potential in agroenergy sector development (biogas plant, production and biomass preparing)
- 2** In one of five analysed by PGE withdrawn sugar factories of KSC it is planned to start-up a biogas plant. Letter of intent was signed.
- 3** PGE search for companies to cooperate in the agroenergy sector development in Poland.

Thank you fo your attention

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