The role of coal in the Polish energy system

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Main topics

- Coal – in the World and in Poland
- Polish energy system
- European Union climate and energy policy
- Clean Coal Technologies in Poland
Top Ten Coal Producers (2012) (hard coal+lignite)

- 9th position in the World
- 2nd position in EU

Source: World Coal Association
Hard coal extraction in EU 28

- UK: 18 mln t
- Germany: 14 mln t
- Poland: 12 mln t
- Romania: 7.65 mln t
- Spain: 9 mln t
- Portugal: 2 mln t
- France: 12 mln t
- Belgium: 2 mln t
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- **Polish hard coal sector**
  - Geological Resources: 66.5 billion tones
  - Recoverable resources: 48.3 billion tones
  - Developed resources: 19.1 billion tones
  - Employment rate: 107,000
  - 30 mines
  - The loss after 6 months of 2014: 250 mln euro
Polish mining machinery and equipment producers

- FAMUR S.A.
- KOPEX S.A.
- Fasing S.A.
- Compensus Sp. z o.o.
- Dąbrowska Fabryka Maszyn Elektrycznych DAMEL S.A.
- ELEKTROMETAL S.A.
- Fabryka Taśm Transporterowych Wolbrom S.A.
- Grupa Kapitałowa Wonam S.A.
- Grupa Powen-Wafapomp S.A.
- Przedsiębiorstwo HYDROMEL S.A.
- Przedsiębiorstwo Kompletacji i Montażu Syst. Automatyki CARBOAUTOMATYKA S.A.
- PUMAR Sp. z o.o.
- Sandvik Mining and Construction Sp. z o.o.
- Siemag Tecberg Polska Sp. z o.o.
- SPYRA PRIMO Poland Sp.z o.o.
- Zakład Maszyn Górniczych GLINIKA S.A.
- Zakłady Mechaniczne Urządzeń Wiertniczych Sp. z o.o.
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Lignite extraction in EU 28

- Germany: 185.4 mln t
- Poland: 65.8 mln t
- Czech Republic: 43.5 mln t
- Greece: 32 mln t
- Poland: 61.7 mln t
Polish lignite sector

- Geological Resources: 24.5 billion tones
- Recoverable resources: 14 billion tones
- Developed resources: 2.1 billion tones
- Employment rate: 24,000
- 5 mines
Polish Power System key figures for 2013

- Installed generation capacity: 38.6 GW
- Available generation capacity: 38.5 GW
- Capacity under disposal of TSO – 26.6 GW

- Gross generation: 164,4 TWh
- Gross consumption: 159,8 TWh
- Export: 12,3 GWh
- Import: 7,8 GWh
- Number of electricity consumers: 168,900
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Energy mix 2013 (electricity only)

- coal: 34.1%
- lignite: 10.4%
- gas: 3.2%
- hydro: 0.3%
- wind and other renewables: 2.4%
- other: 49.6%
Major power plants in Poland

- Dolna Odra: 8x220 MW
- Belchatów: 12x370 MW, 1x858 MW
- Kozienice: 2x500+8x225 MW
- Ostrołęka: 3x220 MW
- Skawina: 4x110 MW
- Pątnów: 6x200 MW
- Opole: 4x380 MW
- Rybnik: 8x225 MW
- Łagisza: 7x120 MW
- Łaziska: 2x125+4x225 MW
- Jaworzno: 6x225 MW
- Stalowa Wola: 2x125 MW
- Konin: 2x120 MW
- Łabiszyn: 7x120 MW
- Połaniec: 8x225 MW
- Turów: 3x260 + 3x235 + 3x200 MW
- Siersza: 2x160+4x120 MW
- Żarnowiec: 4x180 MW
- Żarów: 4x180 MW
- Porąbka-Żar: 4x135 MW

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Age structure of electricity generation devices

![Bar chart showing the age distribution of electricity generation devices (boilers and turbosets). The chart includes categories for under 5 years, 5-10 years, 10-15 years, 15-20 years, 20-25 years, 25-30 years, and over 30 years. The percentages for each category are as follows:

- Boilers:
  - Under 5 years: 4.95%
  - 5-10 years: 7.02%
  - 10-15 years: 3.11%
  - 15-20 years: 13.37%
  - 20-25 years: 6.71%
  - 25-30 years: 4.66%
  - Over 30 years: 47.53%

- Turbosets:
  - Under 5 years: 4.66%
  - 5-10 years: 7.91%
  - 10-15 years: 4.15%
  - 15-20 years: 14.04%
  - 20-25 years: 6.81%
  - 25-30 years: 17.96%
  - Over 30 years: 44.47%]
New Power Plants (1)

- **Kozienice**: 1000 MW
- **Stalowa Wola**: 400 MW
- **Ostrołęka**: 1000 MW
- **Opole**: 2x900 MW
- **New Power Plants**:
  - **Elektrownia jądrowa**: 2x3000 MW
  - **Elektrownia Północ**: 2x1000 MW
  - **Gorzów Wlkp.**: 560 MW
  - **Bydgoszcz**: 430 MW
  - **Włocławek**: 463 MW
  - **Wrocław**: 400 MW
  - **Blachownia**: 800-900 MW
  - **Jaworzno**: 910 MW
  - **Kędzierzyn-Koźle**: 360 MW
  - **Jastrzębie-Zdrój**: 75 MW
  - **Rybnik**: 900 MW
  - **Łagisza**: 410 MW
  - **Zabrze**: 130 MW
  - **Katowice**: 140 MW

**Fuels**:
- **nuclear**
- **Hard coal**
- **lignite**
- **Natural gas**
New Power Plants (2)

At the moment the following power plants are under development, with the total capacity over 4,500 MW:

- Stalowa Wola (TAURON) – 400 MW,
- Włocławek (PKN ORLEN) – 463 MW,
- Kozienice (ENEA) – 1,000 MW,
- Opole (PGE) – 2 x 900 MW,
- Jaworzno (TAURON) – 910 MW.

Additional units of total capacity 13,600 MW are under preparation.
EU climate and energy policy

Climate and energy package 2008:
To be achieved up to 2020:
- 20% increase in energy efficiency,
- 20% increase of renewable energy in final energy consumption,
- 20% decrease in CO2 compared to the year 1990.

New proposal 2014:
To be achieved up to 2030:
- 30% increase in energy efficiency,
- 30% increase of renewable energy in final energy consumption,
- 40% decrease in CO2 compared to the year 1990.
2050 Poland’s Energy policy directions

- Energy **efficiency** will remain a priority of the energy policy,
- Hard coal and lignite will remain **basic fuels** for power generation sector,
- Natural **gas** will play its role as a fuel for industry and resource for peak demand generation capacity, also as a reserve capacity for RES,
- Role of gas will be determined in particular by the price level of CO₂ allowances and conditions and costs of extraction of unconventional deposits (shale gas),
- Role of RES will increase with implementation of respective EU policy but further development of RES will depend on achieving economic and technological maturity,
- National Nuclear Energy Programme is to be implemented.
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Forecast of the electricity generation (TWh)

Source: Reference Scenario 2050 (National Technical University of Athens for European Commision 2013)
Clean Coal Technologies – Polish priorities

- New, environmentally friendly, highly efficient power units,
- The development of coal gasification (both on land and underground),
- The development of CCS – pilot plants: in future also commercial installations,
- The development of CO2 utilization technologies.
**Advanced Technologies for Energy Generation** - the biggest Polish research Programme on energy

- Developing a technology for high efficient zero emission coal blocks integrated with CO2 capture from exhaust gases,
- Developing a technology of oxyfuel combustion for pulverized fuel and fluidized-bed furnaces integrated with CO2 capture system,
- Developing a technology of coal gasification for high efficient production of fuels and electric power,
- Developing integrated technologies of fuel and energy production from biomass, agricultural wastes and other resources.
Clean Coal Technologies Centre in Katowice

- Investment costs 40 m eur
- 9,000 m² of floor space,
- 3 specialized, modern laboratories in Katowice + laboratory in Zabrze and the experimental mine in Mikolow,
- Opened in May 2013.

http://www.cctw.gig.eu/
Energy Centre at AGH University of Science & Technology in Cracow

- Investment costs 48 m eur,
- 15,000 m² of floor space,
- 38 specialized, modern laboratories,
- First part of the Centre will be opened in November 2014.
Thank you for attention!

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