„Trends and prospects of coal production and usage in Ukraine and globally”
14th of June 2017, Kiev, Ukraine

POLISH HARD COAL MINING SECTOR - CURRENT STATE AND PERSPECTIVES

Zbigniew Lubosik
Central Mining Institute, Katowice, Poland

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Plan of Presentation

- Polish coal basins
- Coal resources
- Hard coal production UE / Poland
- Hard coal producers in Poland
- Hard coal consumption in Poland
- Hard coal consumption in Poland till 2030
- Future of hard coal sector in Poland
Polish coal basins and coal production in Poland in 2016

Poland:
Total coal production – 130.6 Mt
Hard coal – 70.5 Mt
Lignite (brown coal) – 60.2 Mt

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Coal resources in Poland, Mt

**Hard Coal**

- GZW: 44505
- LZW: 11292
- DZW: 423

**Lignite**

- 91 deposits: 23516

Source: Polish Geological Institute, The balance of mineral resources deposits in Poland as of 31.12.2015

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Energy mix in Poland – year 2007 and 2015

Source: Energy Regulatory Office (Urząd Regulacji Energetyki)
Electricity mix in Poland – year 2007 and 2015

2007

- Hard coal-fired power station; 58.4%
- Lignite fired power station; 32.1%
- Gas power station; 2.4%
- Wind sources and other renewable energy power station; 1.7%
- Hydroelectric power station; 0.3%
- Industrial power stations; 5.2%

2015

- Hard coal-fired power station; 50.6%
- Lignite fired power station; 33.1%
- Gas power station; 2.6%
- Wind sources and other renewable energy power station; 6.2%
- Hydroelectric power station; 1.4%
- Industrial power stations; 6.0%

Source: Polskie Sieci Elektroenergetyczne
Hard coal consumption in Poland, Mt

Source: Central Statistical Office of Poland (Główny Urząd Statystyczny), Agencja Rynku Energii

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Coal extraction in Poland from 2007 to 2016, Mt

Source: mining companies, Industrial Development Agency JSC

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## Hard coal production in UE from 2007 to 2016, Mt

<table>
<thead>
<tr>
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<td>83</td>
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<td>77</td>
<td>76</td>
<td>79</td>
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<td>128</td>
<td>114</td>
<td>106</td>
<td>100</td>
<td>87,2</td>
</tr>
</tbody>
</table>

Source: EURACOAL
Polish hard coal mining industry in 2016

- Production – 70.5 Mt
  - 57.2 Mt Steam coal
  - 13.3 Mt Coking coal
- Number of underground mines – 22
- Employees – about 85 000 workers
- Extraction system – 96 single entry retreat longwalls were employed
- Average extraction depth was between 750 m and 850 m; the deepest shaft around 1320 m
Polish hard coal producers

- Halemba-Wirek Mine
- Pokój Mine
- Bielszowice Mine
- Ziemowit Mine
- Piast Mine
- Chwałowice Mine
- Jankowice Mine
- Marcel Mine
- Rydułtowy-Anna Mine
- Sośnica Mine
- Bolesław Śmiały Mine
- Bobrek-Centrum Mine
- Piekary Mine
- Makoszowy Mine
- Brzeszcze Mine
- Mysłowice-Wesoła Mine
- Wieczorek Mine
- Wujek Mine
- Murcki-Staszic Mine
- Borynia-Zofiówka-Jastrzębie Mine
- Pniówek Mine
- Budryk Mine
- Knurów-Szczygłowice Mine
- Krupiński Mine
- Janina Mine
- Sobieski Mine

2015  2016  2017

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Polish hard coal producers

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2015 2016 2017

2015
2016
2017

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- Wujek Mine
- Murcki-Staszic Mine

- Makoszowy Mine

- Borynia-Zofiówka-Jastrzębie Mine
- Pniówek Mine
- Budryk Mine
- Knurów-Szczygłowice Mine
- Krupiński Mine

- Janina Mine
- Sobieski Mine
- Brzeszcze Mine

- Bobrek-Piekary Mine

2015 2016 2017

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Polish hard coal producers

- Ratań Mine
- Wirek Mine
- Pokój Mine
- Bielszowice Mine
- Piast-Zwierzine Mine
- Piast Mine
- Bobrek Mine
- Jankowice Mine
- Marcel Mine
- Rydułtowy-Anna Mine
- Sośnica Mine
- Bolesław Śmiały Mine

- Borynia-Zofiówka-Jastrzębie Mine
- Pniówek Mine
- Budryk Mine
- Knurów-Szczygłowice Mine
- Krupiński Mine

- Mysłowice-Wesoła Mine
- Wieczorek Mine
- Wujek Mine
- Murcki-Staszic Mine

- Makoszowy Mine

- Bobrek-Piekary Mine

2015 2016 2017

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Polish hard coal producers

- **Ruda Mine**
  - Piast-Ziemowit Mine
  - ROW Mine
  - Sośnica Mine
  - Bolesław Śmiały Mine
- **Sośnica Mine**
- **Boleslaw Śmiały Mine**
- **Mysłowice-Wesoła Mine**
- **Wieczorek Mine**
- **Wujek Mine**
- **Murcki-Staszic Mine**
- **Makoszowy Mine**
- **Bobrek-Piekary Mine**

- **Borynia-Zofiówka-Jastrzębie Mine**
- **Pniówek Mine**
- **Budryk Mine**
- **Knurów-Szczygłowice Mine**
- **Krupiński Mine**
- **Janina Mine**
- **Sobieski Mine**
- **Brzeszcze Mine**

- **2015**
- **2016**
- **2017**

- [www.gig.eu](http://www.gig.eu)
### Polish hard coal producers – current state

<table>
<thead>
<tr>
<th></th>
<th>Katowice</th>
<th>JSW</th>
<th>Tauron WYDOBIEC</th>
<th>PG Silesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of mines (2017)</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Annual Extraction 2016 [Mt]</td>
<td>24 + 9.5 = 33.5</td>
<td>16.8 (11.6 cooking coal)</td>
<td>9.0</td>
<td>6.4</td>
</tr>
<tr>
<td>Employment 2016 [thous. EE]</td>
<td>31 +12 = 43</td>
<td>27.4</td>
<td>4.5</td>
<td>6.5</td>
</tr>
</tbody>
</table>

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Changes in Polish hard coal mining sector from 1989

- **Production [Mt]**: The production has increased steadily from 177.4 Mt in 1989 to 96 Mt in 2016.
- **Employment [thousands of people]**: Employment has decreased from 63,000 in 1989 to 22,000 in 2016.
- **Number of active longwalls**: The number of active longwalls has decreased from 183 in 1989 to 30 in 2016.
- **Number of coal mines**: The number of coal mines has decreased from 272 in 1989 to 30 in 2016.
- **The average depth of exploitation [m]**: The average depth has increased from 42 m in 1989 to 72 m in 2016.
Mining conditions in Polish hard coal mines

Average exploitation depth is approx. 770 m

Deepest mine (Budryk coal mine) operates at the level of 1290 m.
Temperature of side wall (wall): exceed 50 °C.

Source: ARP Katowice
Coal seams are mined in conditions of natural hazards.

- Gas hazard
- Fire hazard
- Dust hazard
- Seismic and rock burst hazard
- Water hazard
- Climatic hazard
- Radiation hazard

Such mining conditions negatively affect the costs of mining activity of Polish companies.
Factors affecting hard coal production in Poland

- Continual increase of exploitation depth,
- Heavy intensification of mining activity and its concentration on a small area,
- Multi-seam character of the beds,
- Occurrence of thick and durable roof rock complexes,
- Occurrence of residual pillars, abandoned coal seams and exploitation edges in the adjacent seams,
- Coal seams prone to bumping, and others mining hazards.
Demand forecast on the Polish market for hard coal to 2030

Source: Ministry of Energy

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Summary

1. Under the current level of extraction the economic resources available in Poland are sufficient for another several decades.

2. Coal seams on Poland are characterised by favourable parameters - mostly:
   - found at depths up to 1000 m,
   - has thickness between 1.5m and 3.5m,
   - are deposited in seams small slopes,
   - are characterized by high heating value.

3. An important issue is the efficiency of mining production.
4. Ensuring the Poland energy security is a great chance for development of the hard coal mining sector.

5. In particular, the most important actions which should be implemented in the sector are:

- using modern technologies to increase price competitiveness, labor safety, environmental protection,
- maintaining coal production costs at a competitive level relative to coal prices,
- maintaining satisfactory liquidity and creditworthiness of the coal system,
- rational management of labor resources providing stable and technically safe and economical workplaces in mines.

6. Major threat – EU Policy (emission levels, **Best Available Techniques**, others.)
Thank You for your Attention !!!

Zbigniew Lubosik:
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