

## **CURRENT STATE, IMPROVEMENTS AND LATEST TRENDS IN COAL PREPARATION IN POLAND**

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## INTRODUCTION

Poland is the largest coal producer in Europe.

In 2015 the coal output of steam coal amounted to **59.21 million tonnes** and **12.98 million tonnes** of coking coal.

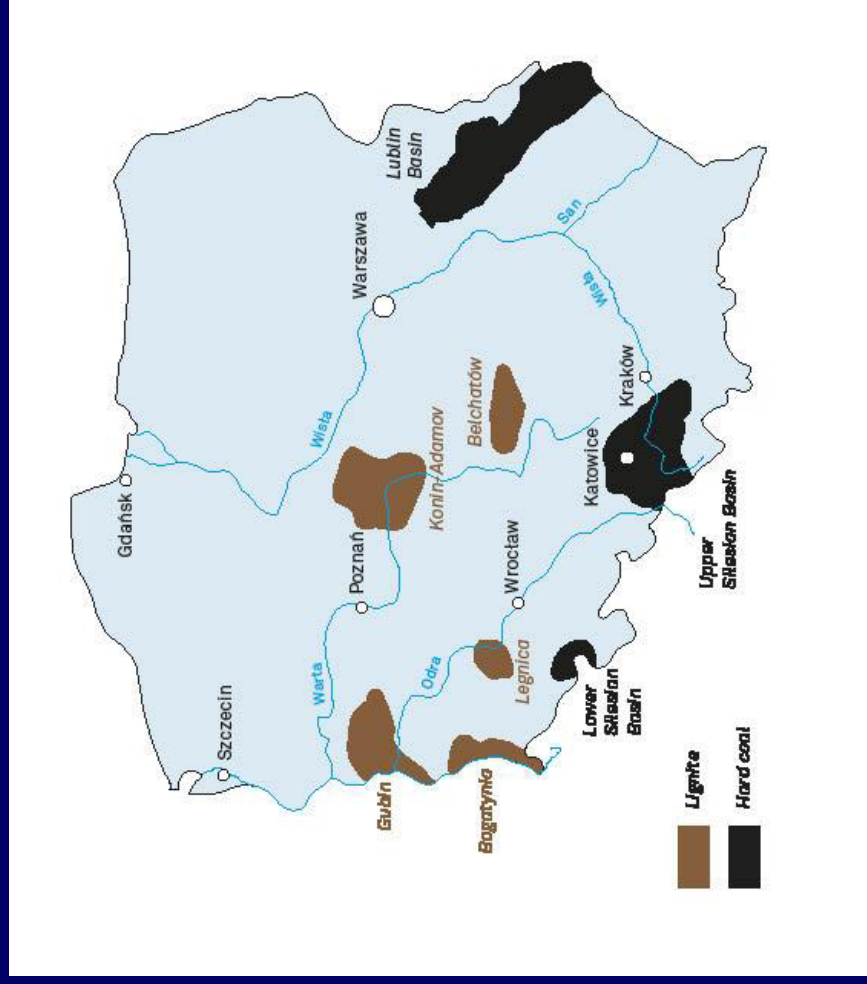
Poland also has the largest coal resources.

They amount to **52.0 billion tonnes** (resources supposed economic), but the amount of economic reserve base is deemed to be **3.7 billion tonnes**.

Coal can be found in two regions in Poland. These are the Upper Silesian Basin and the Lublin Basin.

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## OCCURRENCE OF HARD COAL DEPOSITS IN POLAND



## INTRODUCTION

In the **Upper Silesian Coal Basin** the following coal companies operate (the status on the mid of 2016):

- Kompania Węgłowa S.A. ( on 1.05.2016 Polish Mining Group) – operating in 11 coal mines,
- Katowicki Holding Węglowy S.A. – operating in 4 coal mines,
- Węglokoks Kraj Sp. z o.o. - operating in 2 coal mines,
- Jastrzębska Spółka Węglowa S.A. – operating in 5 coal mines,
- TURON Wydobyćcie S.A. – operating in 3 coal mines.

In the **Lublin Coal Basin** - operating in one mine (LW „Bogdanka” S.A.).

There are also the following small mines:

- PG „Silesia” Sp. z o.o. - property of a Czech coal company,
- Siltech Sp z o.o. – private mine,
- ECO-PLUS Sp. z o.o. – private mine.

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### WASHED COAL PRODUCTION

Approximately **60% of the Polish coal production is washed** with some form of coal preparation.

- The saleable coal has the following quality parameters:
- coking coal - ash content varies from 5.4% to 8.8% (average 6.8%) and sulphur content varies from 0.51% to 0.89% (average 0.67%),
  - steam coal for the power industry - the net calorific value ranges from 15.4 to 25.4 kJ/kg, ash content ranges from 9.9 to 30.1% (average 22.4%) and sulphur content from 0.56 to 2.59% (average 0.83%).

In Poland some power stations are adapted to burn raw coal (non-prepared coal) - its net calorific value can be 19.2 MJ/kg, and sometimes even less, whereas the ash content can be up to 26%, and the sulphur content of 1.57%.

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### NUMBER OF COAL PREPARATION PLANTS

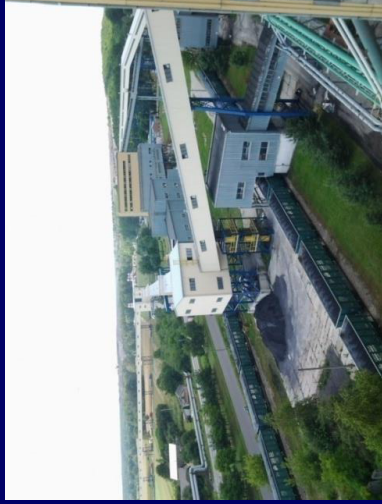
Coal companies	Number of CPP	Capacity [tph]	Range of size mm	Washed production [million Mg]	Type/Distribution of circuits
Kompania Węglowa S.A. (Polish Mining Group S.A.)	20	600-2.100	20-0 (85 %) >20 (15%)	~14.4	vibration screens, jaw crushers, (20) dense medium washer (18), grain jigger (2), jig washer (14), dense medium cyclone (1), hydrocyclone (6), spirals separator (4), flotation (7)
Katowicki Holding Węglowy S.A.	5	600-1.600	20-0 (78 %) >20 (22%)	~3.2	vibration screens, jaw crushers (5), dense medium washer (5), jig washer (1),
WĘGLOKOKS KRAJ Sp. z o. o.	2	1.500	20-0 (90 %) >20 (10%)	~0.5	vibration screens, jaw crushers (2), dense medium washer (2), jig washer, Barrel washer (2)
JSW S.A.	8	800-1.600	20-0 (98 %) >20 (2%)	~12.3	Bradford drum crushers, dense medium washer (8), jig washer (8), flotation (8)
TAURON Wydobycie S.A.	2	900	20-0 (80 %) >20 (20%)	~2.9	vibration screens, jaw crushers (2), dense medium washer (2), jig washer (2), spirals separator (2)
LW "Bogdanka" S.A.	1	2.400	20-0 (85 %) >20 (15%)	~7.4	vibration screens, jaw crushers (2), dense medium washer (2), jig washer (2)
PG "Silesia" Sp. z o.o.	1	575	20-0 (82 %) >20 (18%)	~1.2	vibration screens, jaw crushers (1), dense media washer (1), dense medium cyclone (1)



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### DEVELOPMENT OF COAL PREPARATION PLANT IN LW „BOGDANKA” (2400 t/h)

Photo: MIFAMA OPA CARBO - MIKOŁÓW





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### DEVELOPMENT OF COAL PREPARATION PLANT IN LW „BOGDANKA” (2400 t/h)

Photo: MIFAMA OPA CARBO - MIKOŁÓW



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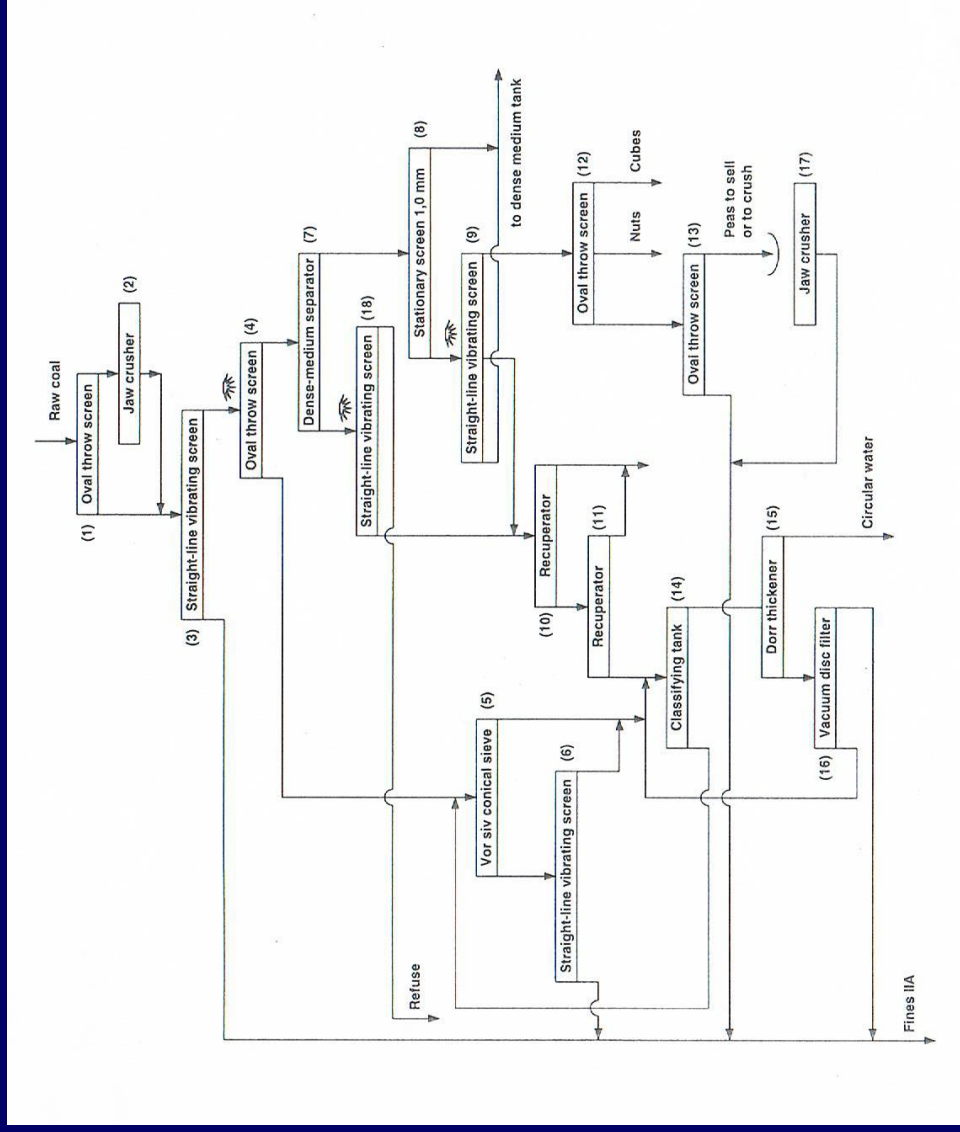
### DEVELOPMENT OF COAL PREPARATION PLANT IN LW „BOGDANKA” (2400 t/h)

Photo: MIFAMA OPA CARBO - MIKOŁÓW



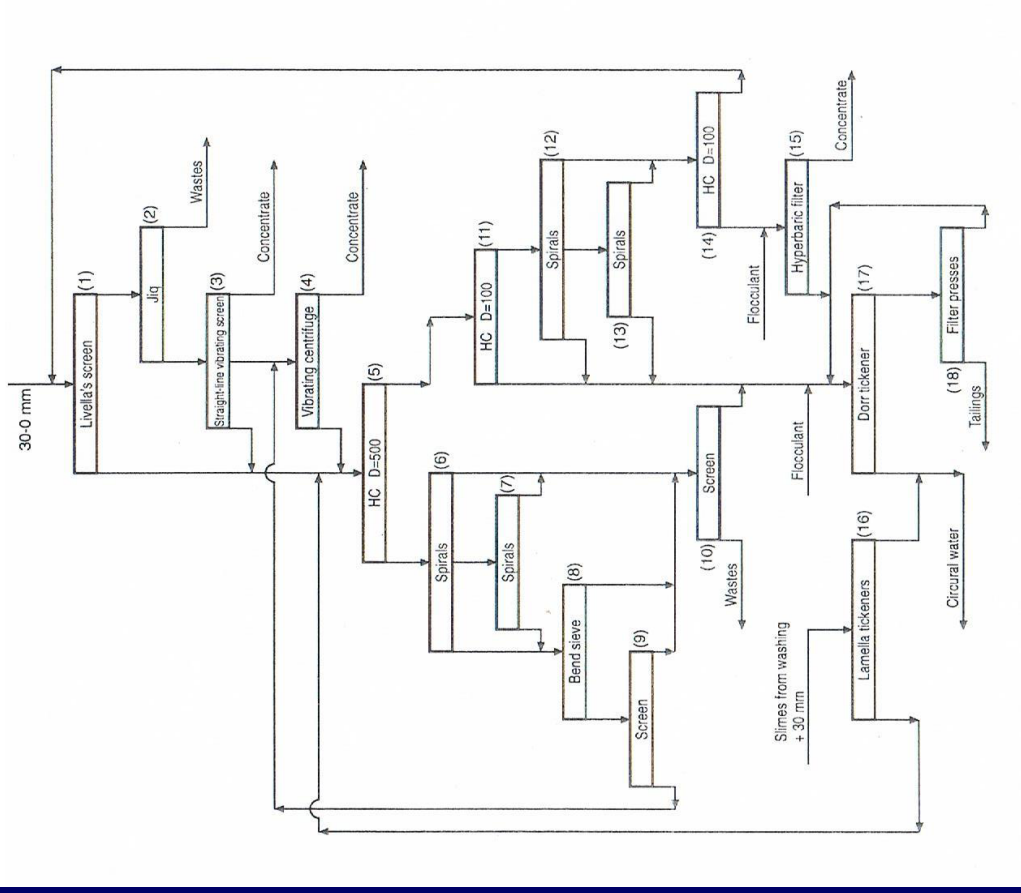
# Current state, improvements and latest trends in coal preparation in Poland

## FLWSHEET OF STEAM COAL PREPARATION PLANT



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## FLWSHEET OF COAL FINES PREPARATION AND DESULPHURIZATION PROCESS







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### SIGNIFICANT INDUSTRY CHANGES

The main changes in last 3 years:

- setting in order and improvement of particular process circuits:
  - reconstruction of raw coal preparation station,
  - modernisation of heavy-media separation system,
  - modernisation of jig wash,
  - elimination of flotation concentrate drying plant,
  - construction of flocculate measurement installation,
  - modernisation of dispatcher system,
  - modernisation of dust separation system,
- implementation of more efficient dewatering technologies for fine coal to improve the quality of the products and maximise the reduction of slimes disposal outside the water-slurry circuits,
- modern arrangements for preparation of power mixtures, up to date instrumentation of key technological circuits with electronic monitoring measurement equipment:
  - construction of electronic samplers for saleable coal,
  - construction of electronic analysers for qualification of basic qualitative parameters.

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### IMPROVEMENTS

#### R & D NEEDS

- developing new analyzers of ash, sulphur and moisture contents, which are more accurate for measuring on clean coal, middlings and wastes,
- automation and process control systems for devices of coal preparation technologies to increase productivity and efficiency,
- developing a new method to achieve a quick and accurate data on characterization of coal quality in terms of washability, improving dewatering of finest grains coal (below 0,063 mm) to reduce the load on closed water-slurry systems,
- new alternative utilization waste of mining.

#### SAFETY

- reduce the risks related to exposure to harmful and dangerous factors by reducing the emission of noise, dust, vibration, etc. derived from the use of machines and other means of production,
- reducing the exposure time of these factors on workers.



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### IMPROVEMENTS

#### WATER USAGE

- further reduction of water consumption by simplifying the water-slurry circuits,
- improving the efficiency of processes especially clarifying water, thickening and dewatering of products,
- reduction of water losses related to the operation of the settling ponds,
- reduction of the duration of wet processes limiting the grains contact with water,
- use of the underground water as the medium for conducting wet processes in a closed water-slurry system,
- implementing of dry separation technology of raw coal.

#### EFFICIENCY

technological possibilities of reducing the cost of preparation through the implementation of CMMS (Computerised Maintenance Management System) and PIMS (Production Information Management Systems), which includes: area of forecasting the quality of production, planning and integration of the extraction process with the preparation and sales process.

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### LATEST TRENDS

- replacement of thermal drying for mechanical dewatering, which reduce the emission of dust and gases into the atmosphere and consumption of coal or other fuels for their own needs or to reduce employment,
- automation of coal preparation process for the regulation parameters enrichment, changing transport system and method for storing (system of selective storage saleable coal),
- increased production of environmentally friendly coal,
- employment optimization,
- automation and visualization of production processes to help reduce employment and cost of processing.

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### CONCLUSION

Coal preparation plants existing in the mines fulfil their task in regard to efficiency and technology.

However, they require successive modernisation activities and investments to improve particular process circuits and reduce production costs.

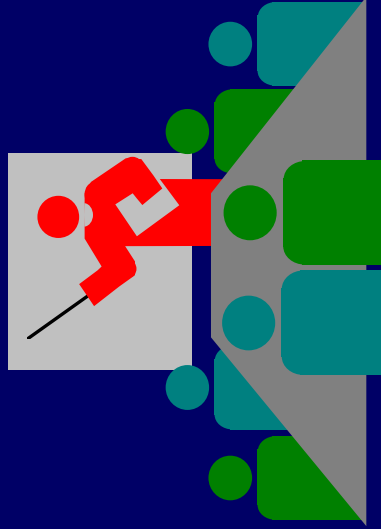
There is need to improve coal quality monitoring and stability of the feed quality and products of coal preparation with particular attention paid to the variety of marketable grades.

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## Current state, improvements and latest trends in coal preparation in Poland



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# Thank you for your attention !