Clean Coal Seminar 2014

Using lignite in the modern low-emission power plants

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Agenda

- Organisational structure
- Basic information
- Fuel mix
- Industrial resources of lignite
- Modernisations and investments
- Future goals
- Research and development activities





Organisational structure







- PGE Górnictwo i Energetyka Konwencjonalna S.A. (PGE GiEK S.A.) is a part of the PGE Capital Group and its main business is mining and electricity production.
- PGE GIEK S.A. generates over 48% of EBITDA of PGE Capital Group.





Oddział Elektrociepłownia Gorzów







Production data - fuel

The main fuel for power plants and combined heat and power plants of PGE GIEK S.A. is lignite and hard coal.

The pie chart presents the structure of fuels and other energy source materials used for power generation in 2013.







- Currently the Gubin and Złoczew projects are at the stage of obtaining the required administrative permits
- In both cases we are assuming to obtain the production licences in 2016-2017
- Construction of new power plants depends on the future nature of the climate policy
- The newly prepared projects for the Gubin and Złoczew deposits will be reviewed in terms of the development strategy for the complete generation portfolio of the company
- Active analysis of possibilities to secure other fuel resources for conventional power generation

Modernisations and investments





Investment Portfolio of PGE GiEK S.A.





The new 900 MWe units (5,6) in Opole Power Plant

Commissioning date	2018/2019	
Installed power	2 x 900 MWe	
Net unit efficiency	45,5 %	
Technology	Supercritical pulverized hard coal-fired boiler	
Emissions	SO ₂ – 100 mg/Nm ³ NO _x – 80 mg/Nm ³ Pył – 10 mg/Nm ³	

Under construction, CCS ready









The new ~450 MWe unit (11) in Turów Power Plant

Commissioning date	2018	
Installed power	~ 450 MWe	
Net unit efficiency	≥ 41,6 %	
Technology	Supercritical pulverized lignite-fired boiler	
Emissions	SO ₂ – 150 mg/Nm ³ NO _x – 200 mg/Nm ³ Pył – 10 mg/Nm ³	
Tender in progress, CCS ready		









Modernisation and reconstruction of lignite coal-fired units (3-12) in Bełchatów Power Plant

Commissioning date	2016 Unit no. 3 -8 finished	
Electric power increase	Up to 390 – 394 MWe / unit	
Unit efficiency increase	> 2 %	
Dust emission decrease	< 50 mg/Nm3	
NOx emission decrease	< 200 mg/Nm3	
Unit availability increase	> 90 %	
Under construction		









Puławy Gubin **CHP** Plant Power Plant y **ELD** Power Pomorzany **CHP** Plant Plant F Złoczew Bydgoszcz CHP Plant Power Plant F 2014 2015 2013 2016 2017 2018 2019 2020 2021

Future



Major decisions required





Research and development activities

Over the past years, the Company has implemented a number of projects qualified as research and development. In many cases, these were pre-investment analyses or other preliminary technical and economic studies.

In order to function in the most effective and innovative way on the energy market, we have set new challenges for the year 2014.

This year we are implementing **25** R&D projects including **4** new ones.





International cooperation



PGE GiEK S.A. is focused on foreign cooperation and has extensive experience in planning and organising international R&D projects and conferences.

The partnership includes universities, institutes, research facilities from the EU, Australia and Japan.

We have cooperated with JCoal to strengthen connections between research and practice in science, technology and engineering. Combined knowledge and experience give us a chance to develop innovative processes and turn concepts into reality.



Future goals

The PGE Group aspires to:

- Spend at least **1,5%** of its annual net profit of 2015 on R&D activities
- Maximise external financing

Establishment of sustainable sources of competitive advantage

Cooperation with R&D institutions

Cooperation with Polish energy groups



The most important R&D fields (out of ten)



Project Mercury for PGE GiEK S.A.

A consortium consisting of PGE GiEK S.A. and the Łódź University of Technology has taken part in the competition announced by the National Centre for Research and Development under The Innovative Economy Operational Programme. The relevant application – "Development of innovative and cost-effective technology to reduce mercury emissions to the atmosphere from the combustion of coal" – was submitted on November 30th 2012. It was positively evaluated and the grant was awarded for its implementation.

One of the stages of the project is to build a pilot installation with the main task to identify opportunities at the Bełchatów Power Plant to reduce the mercury content in the flue gas released into the atmosphere.





Investigation of technical and economic aspects of co-combustion of raw and pre-dried lignite in Bełchatów and Turów Power Plants

The pre-drying technology is expected to play an important role in the next generation of lignite power plants. Apart from improvements in boiler efficiency and unit heat rate, the process has potential to reduce air pollution.

Furthermore, lignite pre-drying technology is considered an indispensable in the future oxyfuel lignite-fired boilers. The present research is aimed at evaluating the potential of lignite pre-drying technology for two power units.







Development of oxy-combustion technology for Pulverized Coal and Fluidized Bed Combustion with CO2 capture system

The project objective is selection and development of the process and design assumptions for oxy-combustion integrated with CO2 separation and Carbon Capture and Storage (CCS) system.

The scope of work assigned to PGE GiEK S.A.:

- The choice of location of CCS installation during the feasibility study of a new power unit in Turów Power Plant,
- Selection of potential sites for geological storage of CO2 from the new unit.
- Determination of conditions related to the exit of CO2 to the selected storage locations.





THANK YOU FOR YOUR ATTENTION

