



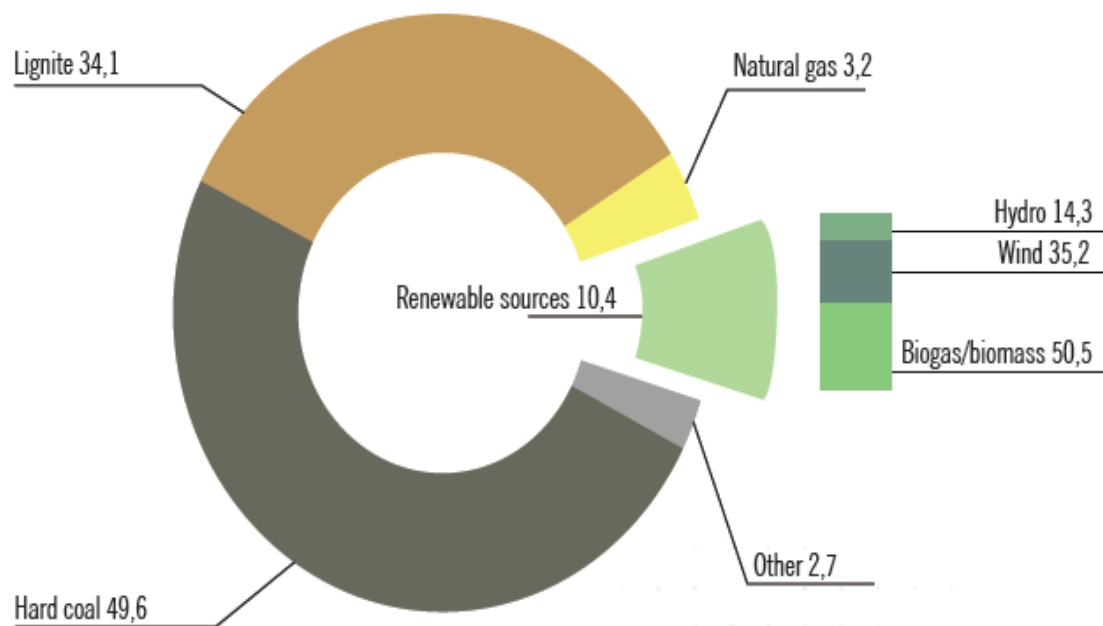
## **CCS – Polish Point of view**

Elzbieta Wroblewska, 29 October, 2015

**BASREC** conference, Warsaw

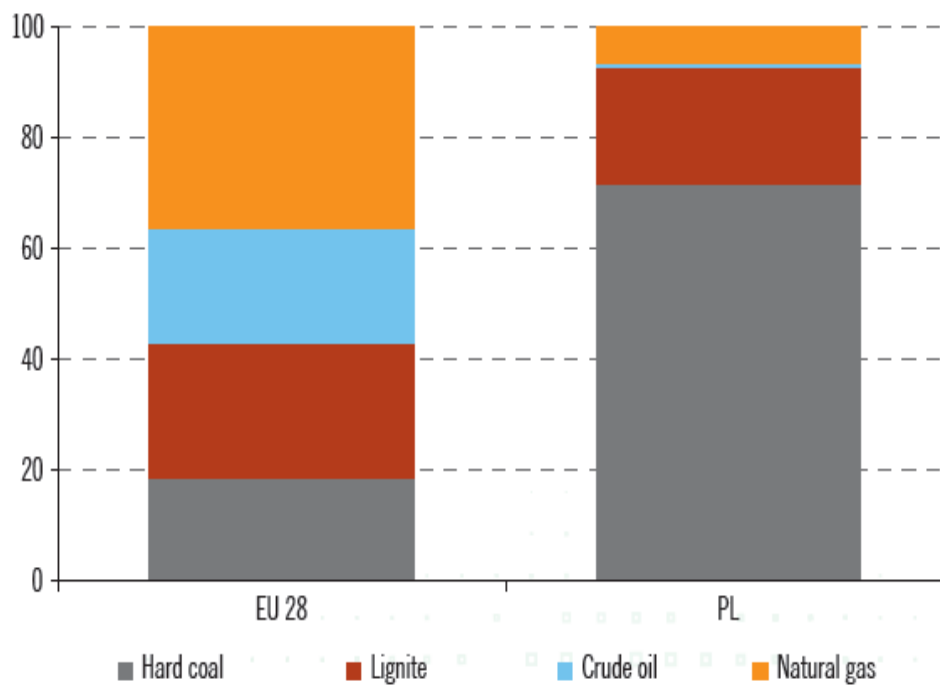
## Domination of coal in Poland's energy balance (1)

Structure of electricity generation by sources (2013) [%]



## Domination of coal in Poland's energy balance (2)

Structure of primary energy production by fuels (2012) [%]

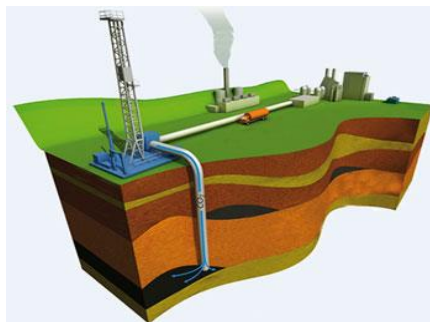


# Main challenges for CCS technology in Poland

**Public acceptance**

**Suitable geological  
storage for CO<sub>2</sub>**

**Implementation of CCS  
Directive**



**CCS demonstration  
projects**

**Options for CO<sub>2</sub>  
transport**

**Financial support for  
demonstration projects**

## Energy Policy of Poland till 2030 - Action plan for the years 2009-2012,

### Main actions for CCS (1)

- **Measure 6.5**
- Implementation of the Directive on the geological storage of carbon dioxide into the Polish legislation – 2011.
- **Conducting an information campaign targeted at the society on the most significant aspects of the CCS technology – until 2012.**  
(Information on CCS was available at the Ministry of Environment web page [http://www.mos.gov.pl/g2/big/2011\\_07/39a62ecbc694b894e515a08357b2ab1e](http://www.mos.gov.pl/g2/big/2011_07/39a62ecbc694b894e515a08357b2ab1e))
- Implementation of the *Programme for recognition of formations and structures for safe geological CO<sub>2</sub> storage and their monitoring* – 2009–2012. (done by State Geological Institute)

## Energy Policy of Poland till 2030 -Action plan for the years 2009-2012

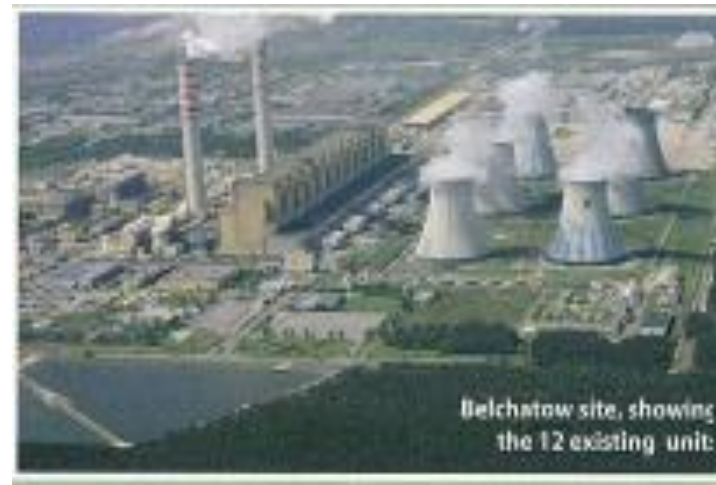
### Main actions for CCS (2) -Two DEMO CCS planned

- **Measure 6.6**
- Undertaking comprehensive activities on the EU forum aimed at including two Polish CCS installations in the European Commission list of demonstration projects co-financed from the reserve pool of allowances for new ETS system installations – 2009/2010.
- (result: two CCS DEMO projects identified: in Belchatow and in Kedzierzyn)
- Determining support instruments for Polish CCS projects – 2009–2010.
- (result: CCS DEMO in Belchatow on the list of grants from Recovery Plan and in NER 300, prepared financial program from Norwegian Funds)
- Commencement of implementation of two projects – 2009–2010.
- (result: feasibility studies done for Belchatow and Kedzierzyn CCS DEMO, Belchatow 857 MWe unit built as CCS ready)
- Preparing the national flagship programme on the development of clean coal technologies, including CCS – 2010.
- (result: draft program prepared in 2010 but abandoned later on)



## Implementation of CCS Directive in Poland

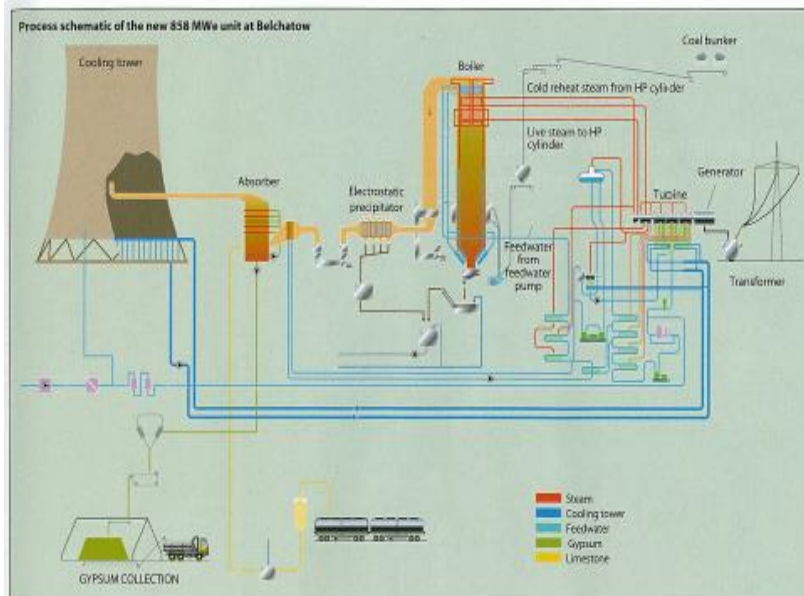
- Deadline for CCS directive transposition: by 25th June 2011,
- The directive was implemented through amendment to *Geological and Mining Law* and other legal acts,
- Ministry of the Environment was responsible for implementation of CCS directive.
- The amendment was adopted in 2013, however implementation is not complete; still some secondary acts are in the legal procedure



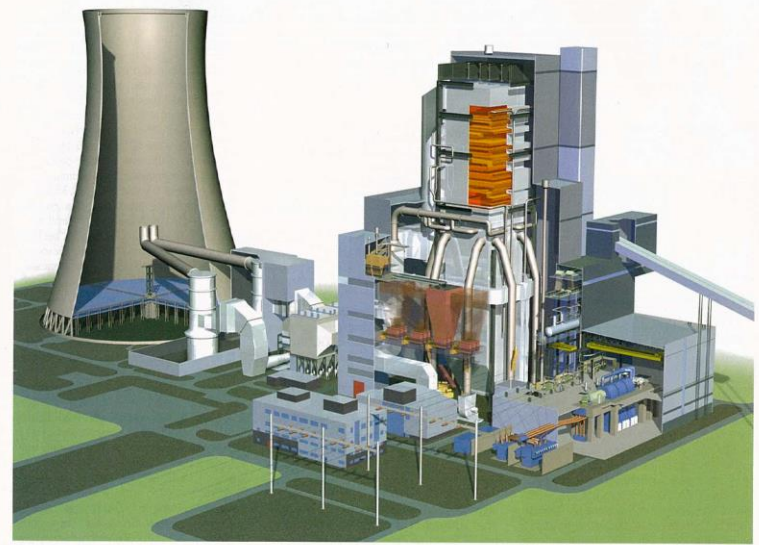


## Belchatow CCS DEMO project

- Belchatow CCS DEMO CO<sub>2</sub> post capture project –on the new 858 MW lignite-fired unit (abandoned at the stage of a CCS ready investment)
- Preparation to build the capture installations was advanced
- Transportation and storage system – in development phase
- Reason for abandonment: high costs and lack of sufficient (national) financial support



## 858 MWe supercritical extension for Belchatow





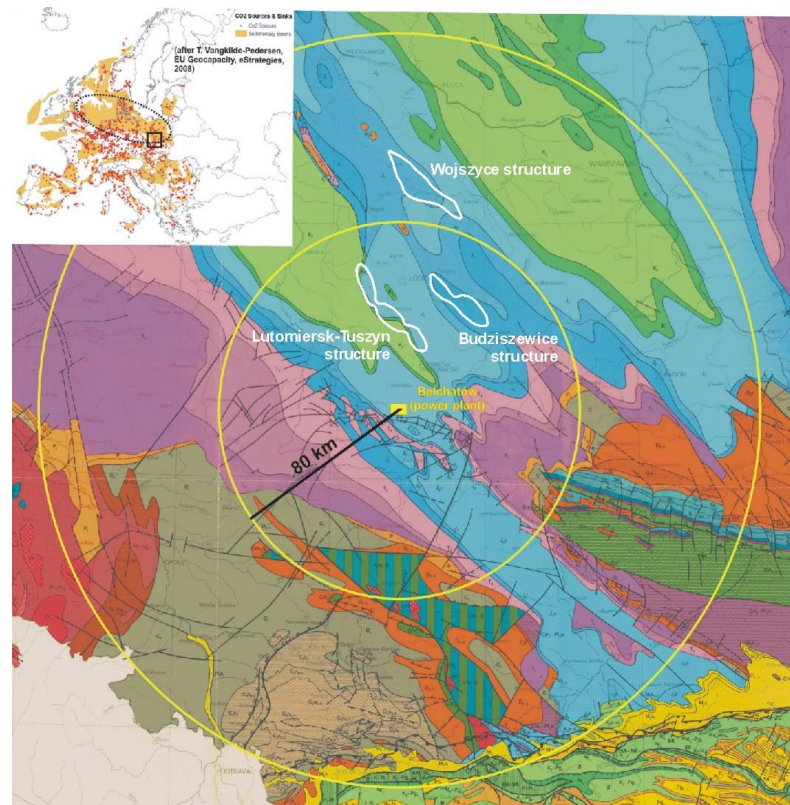
## Three potential CO<sub>2</sub> storages for the CCS Demo in Belchatow

Three geological structures chosen:

- Lutomiersk
- Budziszewice
- Wojszyce

(accepted by the local community)

PGE launched a regional information campaign on CCS by: meetings with local society, conferences and information on internet page

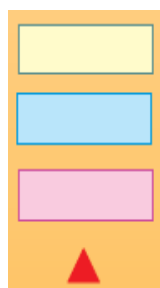


## Kedzierzyn DEMO CCS project in the scope of a polygeneration installation

- In Kedzierzyn AZOTY SA chemical plant it was planned to gasify hard coal in order to produce energy (electricity and heat) for the town Kedzierzyn and the plant itself as well as to manufacture chemical products: mainly methanol and/or hydrogen;
  - The plant was to be equipped with CCS installation and prepared to use also some biomass (20%) as supplement to hard coal (negative emissions expected);
  - Preparations to build the plant were well advanced;
  - Transportation and storage system – in development phase;
  - Reason for abandonment: as in the case of Belchatow - high costs and lack of sufficient (national) financial support
- 
- (CO<sub>2</sub> planned for capture 2.8 mln t/a)
  - (Investment costs 1.25 bln euro)



# Potential suitable locations for CO<sub>2</sub> storage from CCS DEMO Kedzierzyn



Low cretaceous structures

Low jurassic structures

Low trias structures

**Suitable places for CCS**



# Public acceptance for CCS - actions

- In the Ministry of Economy it was planned to create a Working Group, which would be responsible for preparing assumptions for a *Polish program of public acceptance for CCS*,
- Potential Members of the Group as planned: Ministry of Economy, Ministry of Environment, Polish Geological Institute, PGE -Polish Energy Group (including PGE Bełchatow Power Plant), PKE-Polish Energy Concern, Chemical Company Pulawy, Polish Clean Coal Technology Platform,
- Local Information campaign was carried on by the Belchatow DEMO project operator (PGE SA energy company)
- Information on CCS was available on the Ministry of Environment web page
- Site Char Project on CCS public acceptance was carried out in April 2012 (in Rawicz region having 2 depleted natural gas mines)

**Results of the project in Poland and in Scotland: in PL – big concerns as to costs, low level of understading of climate change threats; in Scotland- frequent referring to climate change issues, need for RES, energy efficiency and changes in people's behavior, understanding of potencial for CO2 utilization.**

## Suitable geological storage for CO<sub>2</sub> –National Programme for Geological Exploration

- The project, commissioned by the Ministry of the Environment and financed by National Fund for Environmental Protection and Water Management, entitled: „Assessment of formations and structures for safe CO<sub>2</sub> geological storage, including monitoring plans” was carried on in the years 2008-2012 (Budget of the project: 10 mln EUR),
- The project was aimed at: geological exploration of the territory of Poland, including the Polish exclusive economic zone on the Baltic Sea in order to select two CO<sub>2</sub> storage areas for proposed two CCS demo projects (BOT Elektrownia Bełchatów S.A. and PKE-ZAK Kędzierzyn),
- According to research findings the most prospective regions for CO<sub>2</sub> geological storage are deep, saline aquifers, located on Polish Lowlands.

# Polish Clean Coal Technology Program (PCCTP)

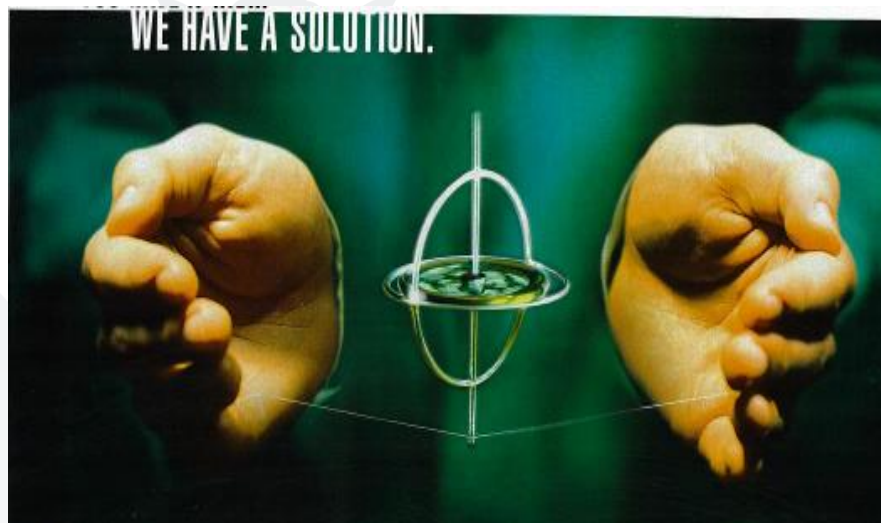
- Ministry of Economy was responsible for preparation and coordination of the program,
- First draft of the program was ready in 2010,
- The idea of the program was to support development of Clean Coal Technologies, especially CCS in Poland,
- The Program was abandoned due to difficulties with CCS demonstration projects,
- However, an R&D program entitled „New energy technologies for energy generation” was launched in 2009 and is successfully continued (up to the end of 2015).



# Conclusions

- CCS constituted an important component of the *Energy policy of Poland till 2030*;
- However, due to an early stage of development, CCS is not yet assessed as a commercial option for coal-fired power plants;
- Public acceptance – crucial for these activities, but CCS is currently perceived as a risky future technology with unclear prospects;
- The most important thing: development of the technology in demonstration plants (projects implemented already in USA and Canada, in the EU decisions still to be taken in: United Kingdom, The Netherlands);
- In Poland – CO<sub>2</sub> storage would take place mainly in on-shore aquifers, off-shore CO<sub>2</sub> storage would be a minor option;
- EOR interesting for LOTOS,
- CCUS - new project of TAURON SA concerning gasification of coal and production of methanol.





**Thank you for your attention**

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