

Polygeneration project with CCS at Kedzierzyn Chemical Plant



Polish answer for the challenges
of the EU energetic and climatic policy

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- **Over 95% of the Polish power engineering sector is dependent on coal.**
- **Coal has been and will continue to be the fundamental natural resource for Polish economy.**
- Polish economy's strategic objectives for the coming years should include the development of economically viable and environmentally-friendly methods of reducing CO₂ emissions.
- EU Climate Package, adopted at the end of 2008 **imposed upon Poland the obligation to capture around 60% of CO₂ emissions on the European Union scale.** Therefore it seems justified that Poland should become the site for demonstration facilities, which will enable the development and testing of Clean Coal Technologies.



Another equally important objective is **the internal diversification of energy supplies and creating solutions that will help Poland gain independence from external providers, mainly from Russia.** This is a prerequisite for improving Poland's and the European Union's energy security.



The concept developed by the ZAK-PKE consortium foresees the establishment of a **Zero-emission facility combining power engineering with chemical production.**

The aim of the installation is to implement the principles of EU's energy and environmental protection policy in terms of:

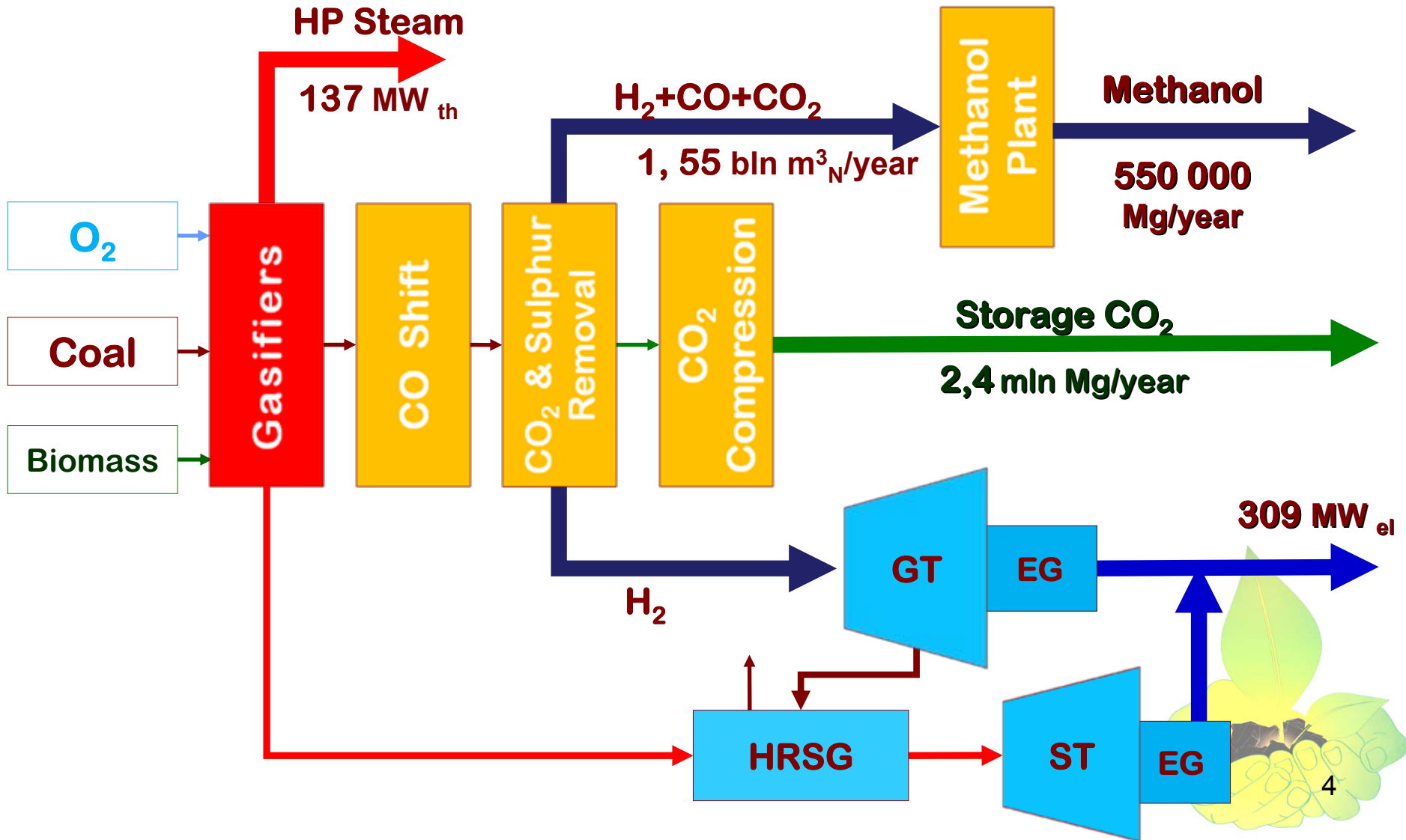
- ❑ **reducing CO₂ emissions** in order to minimize greenhouse gas emissions;
- ❑ providing the possibility for **biomass incineration** in order to increase the share of energy obtained from renewable sources;
- ❑ increasing the **use of primary energy to optimize the mining of nonrenewable energy resources.**



Moreover, **the facility is to enable the testing and further development of new technologies**, which can later be successfully exported to other domestic and external facilities.



PROJEKT KEDZIERZYN



Parameters of Zero-Emission Power & Chemical Complex

Parameters	Unit	Zero-Emission Power & Chemical Complex
Fuel consumption:		
– power coal	mn tons/year	2.09
– biomass	mn tons/year	0.25
Thermal power	MWt	137
Electric Power	MWe	309
Synthesis gas production:	bn Nm ³ /year	1.55
– equivalent metanol quantity	K tons/year 550	550
Captured CO ₂	mn tons/year	3.36
– neutralised (sequestered) CO ₂	mn tons/year	2.4
– equivalent contained in synthesis gas for metanol	mn tons/year	0.96
CO ₂ emission	%	8*
Reduction of CO ₂ emission	%	92

* Introduction of biomass into the combustion process can effect in negative total carbon emission



Zero-Emission Energo-Chemical Complex will enable the simultaneous generation of clean electrical power, heat and synthesis gas to be used by an adjacent methanol plant, as well as the storage of carbon dioxide emitted in the production process.



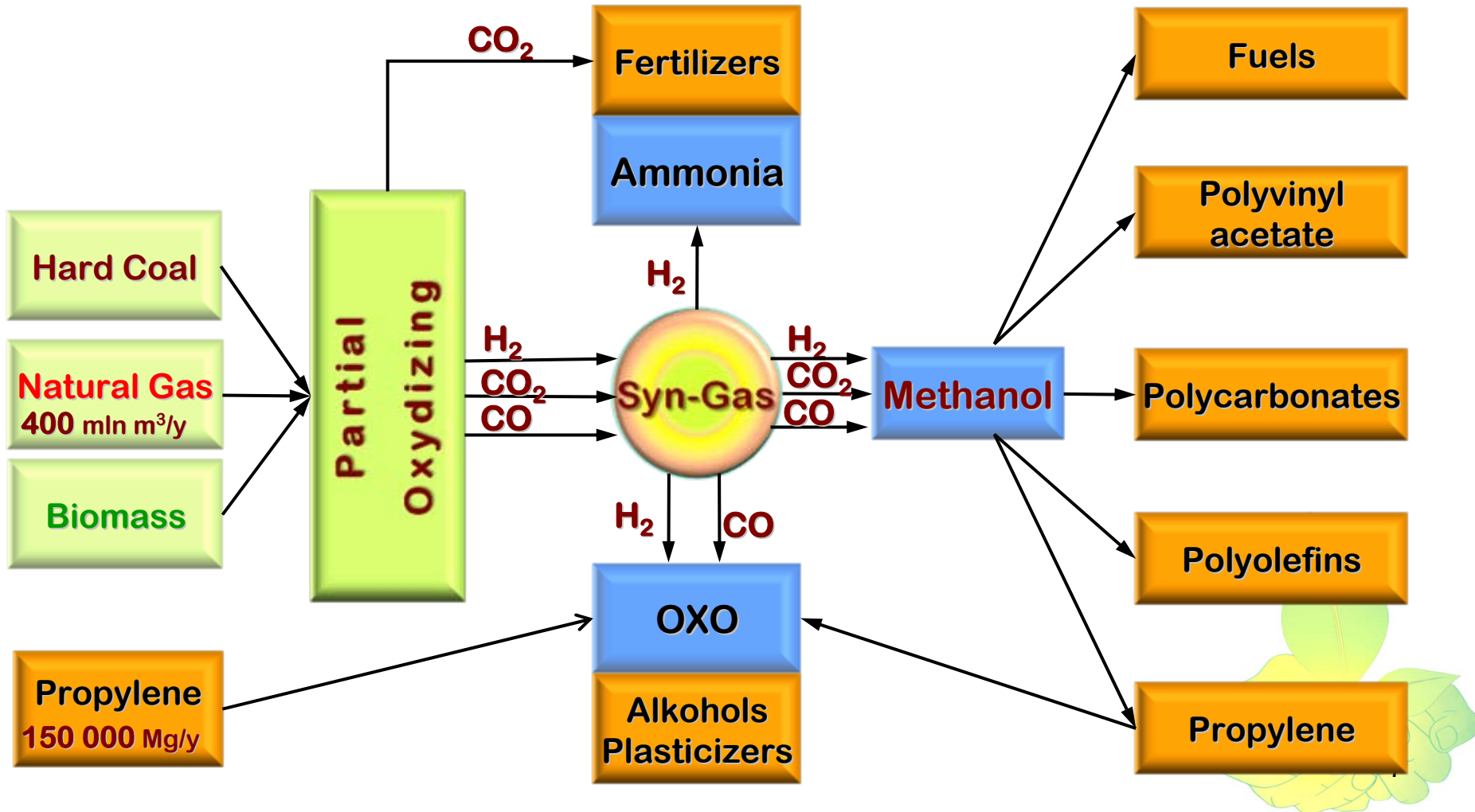
A technologically innovative combination of a power generating and a chemical facility.

This will enable effective use of the captured CO₂ in the production of advanced fertilizers and plastics, as well as chemical raw materials, such as methanol, urea and hydrogen, and - in the future - also synthetic fuels.



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Chemical Sequestration





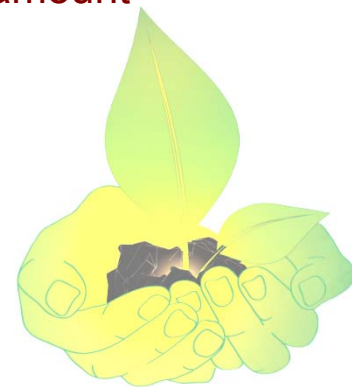
Idea behind The Project

The complex will be entirely environmentally-friendly. The combination of coal gasification technology (IGCC) and carbon capture and storage (CCS), as well as the supplement of up to 10% biomass in the combustion process **will yield negative carbon emissions.**

The complex will apply two methods of utilizing CO₂ generated in the process of coal gasification:

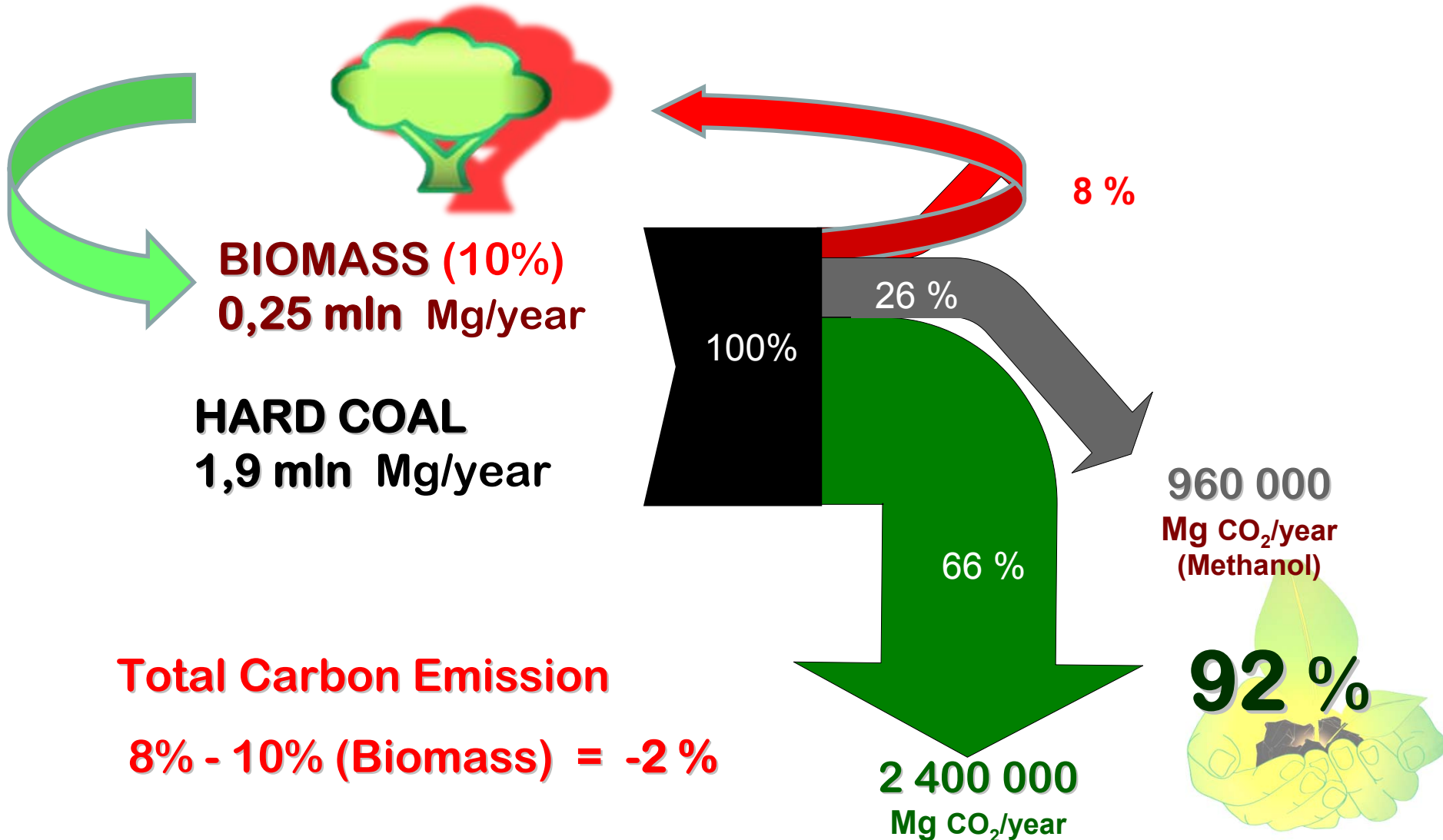
- 66%** - storing CO₂ underground in the deep layers of porous rock dating back to the Jurassic and Triassic period, located at the depth of over one km,
- 26%** - chemical “trapping” of CO₂ in methanol, urea and other chemical products of ZAK S.A.

The total reduction of CO₂ emissions will amount to nearly 3.3 million tons annually (**92%**). Taking into account the biomass (**10%**), a renewable energy source excluded from the carbon balance, **it is even possible to achieve a negative result, i.e. – 2% of CO₂ emissions.**



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Negative Carbon Effect



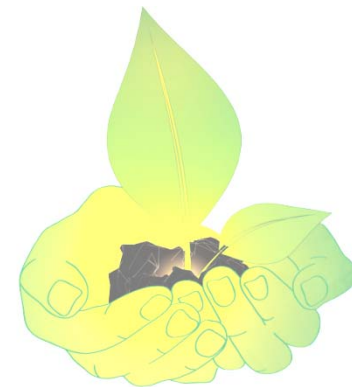
A STIMULUS FOR UPPER SILESIA

The ZAK-PKE investment is located in Upper Silesia - a region responsible for the greatest CO₂ emissions in the European Union (over 30%). Due to this location our project will help to reduce emissions where it is most needed.

Accompanied by a research programme and the application of 20 unique state-of-the-art technologies, the project may contribute to the creation of a Region of Knowledge and Innovation in Upper Silesia and Małopolska, developing Clean Coal Technologies.





The pilot scheme in Kędzierzyn will also pave the way for modernizing other power plants belonging to PKE:
Jaworzno, Łagisza, and Siersza.



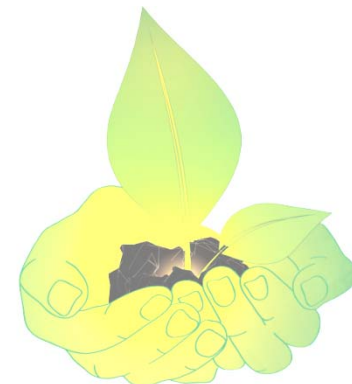
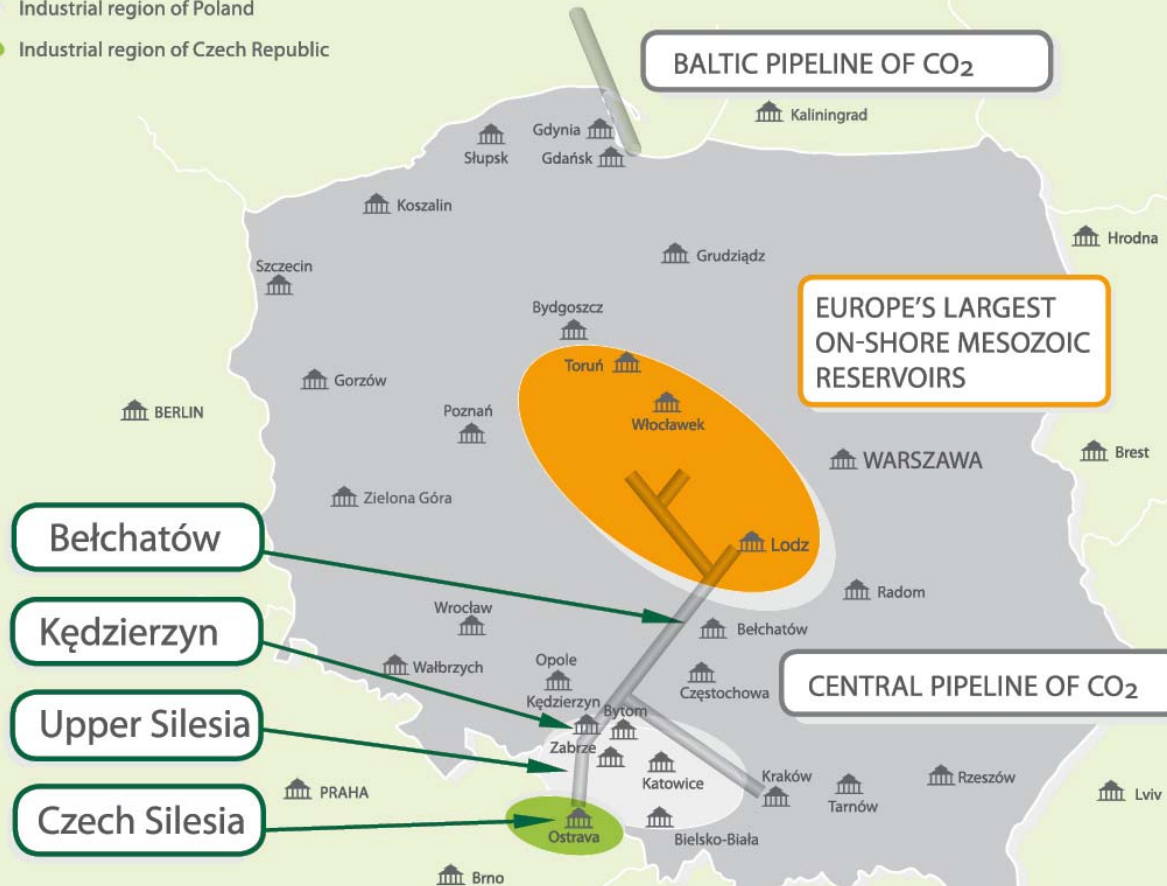
Possibilities of carbon transport and storage

 Possibilities of CO₂ transport

 Perfect area for CO₂ storage – porous Jurassic and Trias sandstones

 Industrial region of Poland

 Industrial region of Czech Republic





ZAK



Państwowy Koncern
Energetyczny
GRUPA TAURON

ZAK – PKE Project

A MILESTONE ON THE WAY TO ENERGY INDEPENDENCE AND SYNTHETIC COAL-BASED FUELS

Many European countries, including Poland, face the challenge to achieve both internal diversification of energy sources and the greatest possible independence from external energy supplies.

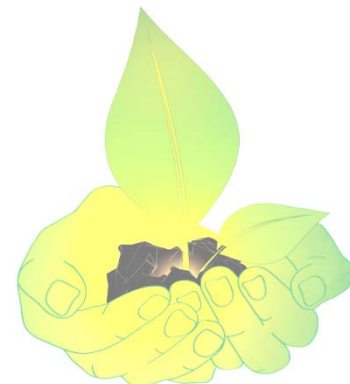
For countries whose economy depends on coal, such as Poland, the most attractive technologies include those involving coal gasification. Such technologies make it possible to combine power generation with the production of chemicals.

In the future, owing to such solutions, it will be possible to produce natural gas substitutes, full assortment of compounds based on carbon including synthetic fuels.



This project involves the construction of two coal gasification reactors, enabling the production of syn-gas.

The construction of a third reactor would eliminate the need for ZAK to import natural gas.





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**Thank you for your
attention**

