Sorption and flow of CO_2 in Polish gas shales

project **CO2SHALESTORE**

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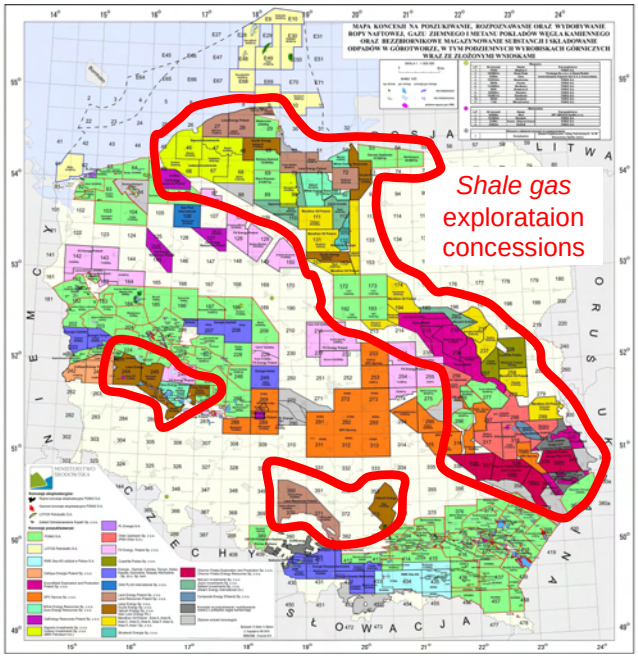
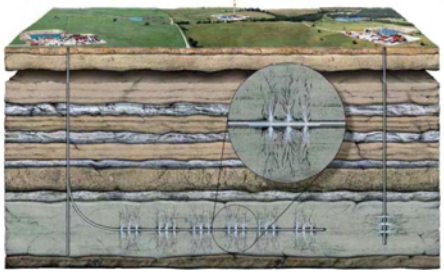
Current map of gas/oil exploration and production concessions in Poland



Proximate *gas shale* resources in Poland:
1,3 to 5,3 bln m³

What is *shale gas* and how to recover it?

- Unconventional gas resource along with *Tight Gas* and *Coalbed Methane (CBM)*
- Low permeability reservoirs: 0.0001 - 0.01 md
- High organic content TOC > 1-2% wg.
- Sorption of gas on organic matter in micro and nano pores
- „Free gas" in macropores and fractures
- In order to produce gas stimulation is needed, the most common method is hydraulic fracturing (slickwater)
- Injection of proppant in order to sustain fracture
- Low production rates but longer life of a well (up to 30 years)
- Horizontal wells provide higher recovery



Assumptions and objectives of the project

CBM vs. Shale Gas

	CBM	Shale gas
Source	Coal acts as a source rock and as reservoir	Shale acts as a source rock and as reservoir
Trapping mechanism	Adsorption in coal matrix	Adsorption in matrix of organic matter
Porosity	Low < 5-10 %	Low < 5 %
Permeability	0.5 – 80 md	0.0001 – 0.01 md but significantly enhanced by hydraulic fracturing

Objectives of the CO2SHALESTORE project:

1. assess the possibilities of CO_2 storage in gas bearing shales
2. investigate possibility of enhanced shale gas recovery by CO_2 injection

Research methodology

Task 1 - CO_2 interactions with shale reservoirs

Acquirement of shale samples from exploratory wells → Initial lab analysis: TOC, mineral composition, clay content, porosity, density, etc.

→ Batch reactor tests with CO_2 under *in-situ* conditions (P,T) → Secondary lab analysis: TOC, mineral composition, clay content, porosity, density, etc. Changes?

CO_2 sorption experiments on shale samples → **RESULTS** Selection of samples for further experiments

Task 2 - Enhanced gas recovery from gas shales

Plug-flow experiments of CO_2 injection into shale saturated with methane under *in-situ* confining pressure and temperature (cores with artificial fractures)

Shale swelling experiments with CH_4 and CO_2 → **RESULTS**

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