Shale gas in Poland

- 110 licences for prospecting and exploration of shale gas
- 44 wells, including 10 horizontal wells
- 2007-2013
Licenses for prospecting and exploration of shale gas

**Objective** – prospecting and exploration of deposit  
**Time** – definite (usually 3-5 years)  
**Scope of activity** – specified and confirmed  
**Control** – Ministry of the Environment, Mining Authority  
**Effect** – geological documentation

Possibility to obtain the licenses for shale gas exploitation

The activities under control

- Knowledge of process
- Geological and hydrogeological conditions
- Monitoring
- Impact analysis
Specific of the shale gas production

- Dense grid of production wells; numerous wells (several thousand per basin)
- Well pad bigger than in conventional exploration (temporary use)
- Long horizontal intervals; up to 2,000-3,000 m
- Production stimulated by hydraulic fracturing, several fracturing stages per well
- Water use for fracturing
- Flowback waters utilization
- Track transport more intensive than in conventional drilling
Potential environmental impacts

- Water use
- Hazard of fresh water contamination
- Surface pollution
- Land use
- Soil pollution
- Air pollution
- Noise pollution
- Seismic issues

What is the most important?

- Hydrailing fracturing
- Flowback fluids
- Water demand
Water management

Water demand
- 1,000 - 5,000 m³ per one stage used once in well history
- up to 10,000 m³ per well

Water sources for fracturing
- Surface water
- Shallow groundwater (the first aquifer)
- Usable aquifers (generally available)
- Shallow formation brines (Cretaceous, Jurassic)
- Sea water
- Mine water
- Flowback fluids
Groundwater resources in Poland

Legend

Source: Polish hydrogeological survey, 2011

Groundwater status in Poland

Source: Polish hydrogeological survey, 2011
How to maintain good groundwater status?

1. Good legal regulations (permit for water, environmental impact assessment, geological documentation, etc.)
2. Safe technologies
   - Best practices
3. Sustainable water management
   - Minimize water demand
4. Dedicated monitoring
5. Maximize recycle
   - Flowback treatment

Dedicated monitoring of environment

- Monitoring of quantity
- Monitoring of quality
- Monitoring of procedures
Monitoring of quantity

- Water use
- Waste and wastewater
- Emissions
- Noise
- Traffic

Monitoring of quality

- Possible migration of pollution
- Hydrodynamic modelling
- Tracer studies
- Environmental assessment at various stages of activities
First hydraulizing fracturing in horizontal well in Poland – Łebień (Lane Energy)

- State of the environment before the start of the hydraulic fracturing job - as a benchmark
- Observations and measurements during the hydraulic fracturing process and gas tests
- State of the environment after the hydraulic fracturing process and production tests
Scope of activity

- Seismic Monitoring
- Air and Noise Pollution
- Radioactivity – Radon level
- Potential emissions of shale gas
- Surface and Groundwater
- Technological fluids and waste

Conclusions

- More data and information
- Continuation of environmental research - Case studies
- Constant cooperation of science, industry and administration
- Procedures
- Low emission technologies

Environmental pressure analysis and monitoring.
Thank you for your attention.

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