



PGNiG

Polskie Górnictwo Naftowe
i Gazownictwo SA

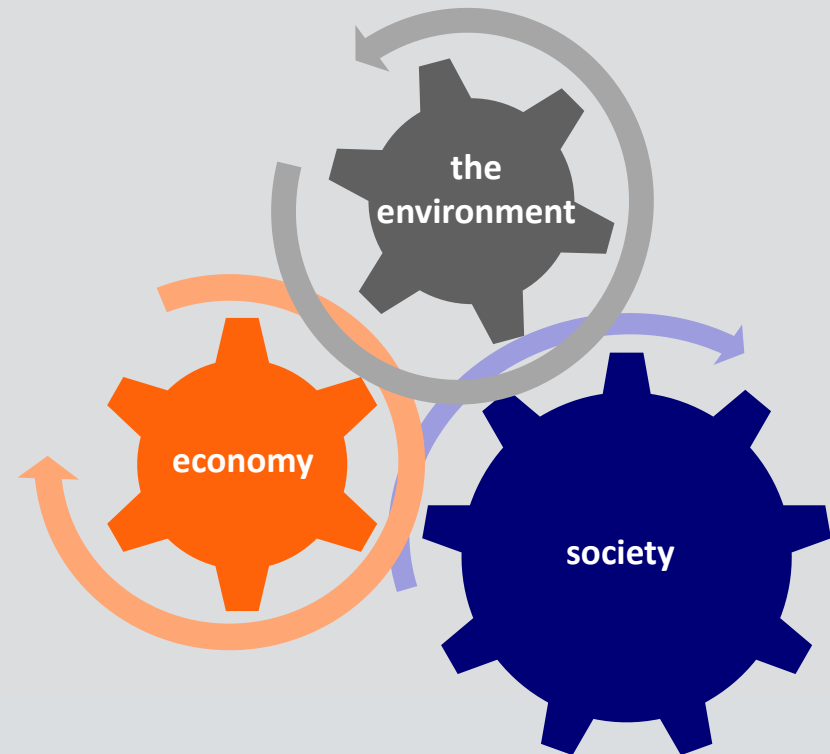
Gas from unconventional deposits: a chance for sustainable economic development

IGU seminar
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The concept of sustainable development is defined differently in different fields of science (1/2)

Definition

- What all definitions have in common is that sustainable development is a specific socio-economic development directed at satisfying human needs while taking account of environmental conditions.
- An important feature of sustainable development is its multilevel nature – the main goal is to balance fundamental elements of a system that shapes the future of the community, namely the environment, society and economy, in such a way that the development of one element does not threaten the other two.
- Economically speaking, sustainable development means that economic growth increases social cohesion (reduces social stratification, provides equal opportunities and prevents marginalisation and discrimination, among other things) and improves the quality of the environment through, among other things, the reduction of the adverse environmental impact of production and consumption, and the protection of natural resources.



Many organisations, including international ones, are focused on sustainable development (2/2)

Organisations engaged in sustainable development

- United Nations Environment Programme (UNEP)
- United Nations Development Programme (UNDP)
- European Union institutions:
 - European Parliament
 - European Commission
 - European Economic and Social Committee.



The most important international law documents that address sustainable development include:

- Agenda 21
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters

The principle of sustainable development in Poland

- In Poland, the principle of sustainable development has constitutional status – it is enshrined in Article 5 of the Constitution of the Republic of Poland of 2 April 1997, and the definition of sustainable development has been included in the Environmental Protection Law*:

‘socio-economic development in which political, economic and social activities are integrated without disrupting the environmental balance and the permanence of basic natural processes in order to ensure that basic needs of individual communities or citizens of both the current and future generation may be satisfied’

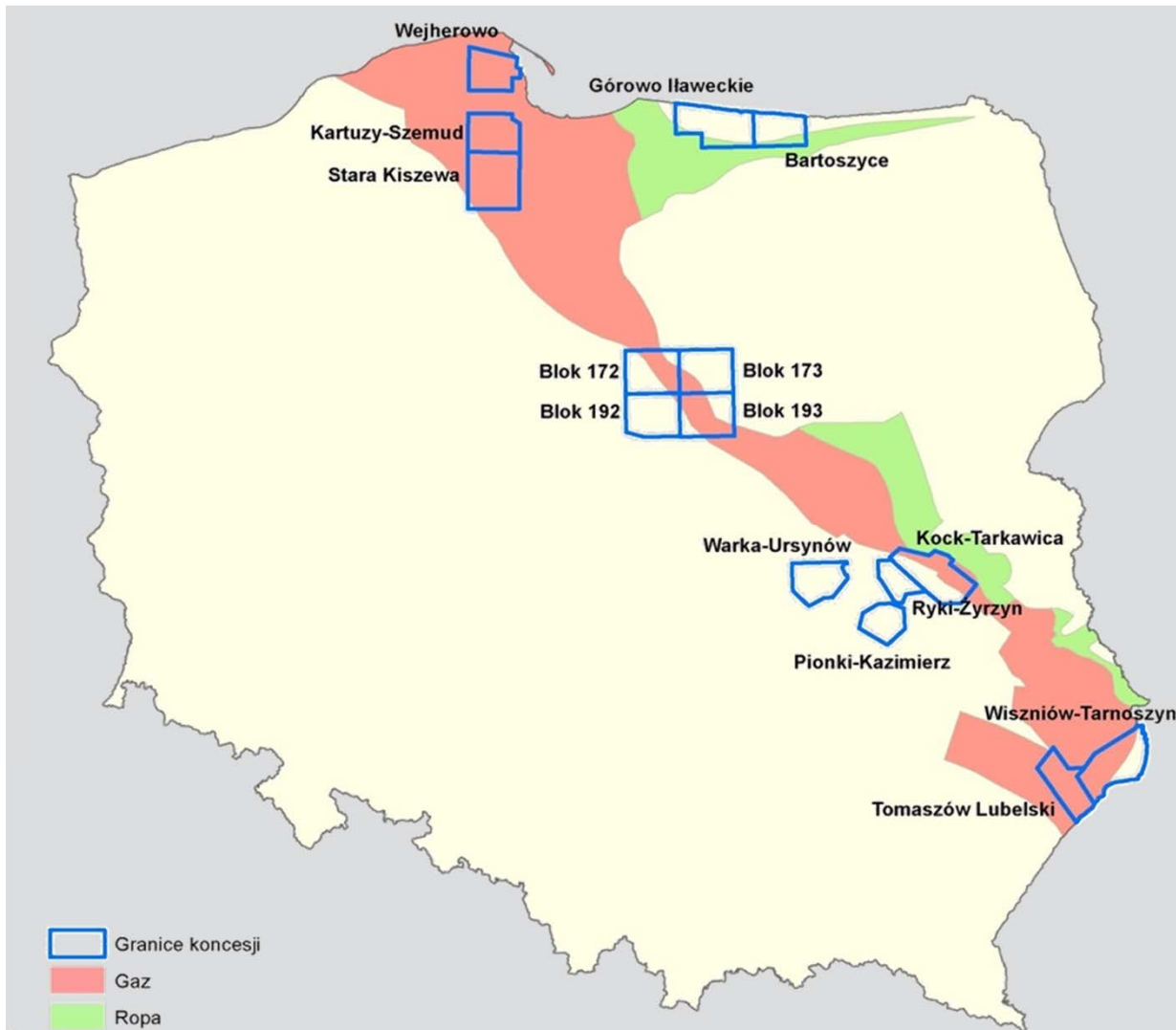
* The Act of 27 April 2001 – Environmental Protection Law: Journal of Laws of 2001, No 62, item 627

What opportunities does the development of the shale gas sector in Poland offer?

The development of the shale gas sector offers many opportunities for the Polish economy

- 1) Strengthening Poland's **energy independence**, in particular reducing the country's dependence on gas imports or – in a long term scenario - even making it independent of such imports.
 - 2) Potentially lower prices of gas for consumers, which may increase the **competitiveness** of the Polish industry and economy.
 - 3) A chance for **employment** growth as a result of investments.
 - 4) Increasing State and local government revenues, thus generating funds for **infrastructural and social investments**.
 - 5) Supplying gas to many municipalities in Poland that previously did not have any supply sources of gas, which may boost their energy efficiency and gradually **limit reliance on coal as primary fuel**.
- Although the shale gas sector in Poland is still in its early stages, it is developing dynamically.
 - According to early estimates by the Polish Geological Institute, shale gas deposits can meet the country's demand for gas for around 65 years (the current gas consumption in Poland is around 15 billion m³, of which around 11 billion m³ is imported).
 - New source of supply within the European Union will decrease the level of dependence on imports and strengthen the internal energy market

PGNiG holds 15 licenses to prospect and explore for unconventional deposits in Poland



- The Pomerania and Lublin regions may play an important role in the history of the shale gas sector in Poland.
- **78%** of Poles surveyed are in **favour** of the extraction of shale gas.
- **7 %** of those surveyed are against it – according to a survey carried out by the Public Opinion Research Centre (CBOS) in May 2013.

Environment protection and full compliance are key aspects of our prospecting and development plans

What benefits may municipalities gain in connection with the development of the shale gas sector in the region?

1

Hydrocarbon deposit prospecting and exploration stage

- Municipalities gain less benefits at the hydrocarbon deposit prospecting and exploration stage due to short-term nature of the works.

2

Hydrocarbon deposit extraction stage

- Municipalities gain much more benefits at the shale gas extraction stage than at the stage of prospecting works (large scale of investments and long investment period)

At both stages of works benefits for municipalities may include:

- additional **budget revenues** from taxes and fees, from which other investments in municipalities may be financed,
- **infrastructural investments** implemented by the investor,
- additional market for contracts for local entrepreneurs, which **creates new jobs** in municipalities,
- the investor's active participation in the life of the local community.

1. Hydrocarbon deposit prospecting and exploration stage – potential benefits for municipalities

1

Additional budget revenues

At the stage of prospecting works, municipalities may gain additional revenues from:

- licence fees,
- lease agreements and property tax,
- environmental charges,
- fees relating to the acquisition of permits,
- other fees relating to drilling rig operation.

2

Infrastructural investments

Due to the specific nature of prospecting works, investors implement, among others, the following preparatory investments:

- expansion and modernisation of local roads,
- construction of water supply systems or the increase of their capacity,
- construction of deep wells (which are handed over to municipalities after works are completed).

The implementation of investments in the region offers the opportunity to supply gas to municipalities!

3

Additional market for contracts

During works, investors get supplies from local shops and companies. This leads to the creation of an additional market for contracts for local entrepreneurs in a given municipality, which in turn results in the creation of new jobs in the municipality.

Moreover, around 10 – 15 inhabitants may be employed to perform auxiliary works at one drilling rig.

2. Hydrocarbon deposit extraction stage – potential benefits for municipalities

1

Additional budget revenues

At the stage of extraction works municipalities may gain additional revenues from:

- usage fees and licence fees,
- property tax,
- share in PIT and CIT taxes,
- other.

2

Infrastructural investments

- The implementation of investments in the region offers the opportunity to supply gas to municipalities.
- Intensifying the involvement in the development of municipal infrastructure.

3

Additional market for contracts

- During extraction works, investor create a steady market for contracts for local entrepreneurs.
- It is estimated that around 30 inhabitants may find employment at the stage of extraction works.

Due to the long-term nature of such investments, investors may take active part in the life of the local community by supporting local community organisations (schools, libraries, etc.) and important events (sports and cultural events).

PGNiG S.A. understands local communities' needs

Dialogue and respect for local communities are at the forefront of PGNiG S.A.'s activities on many levels. Diversification of these actions helps the company perform them effectively and maintain a good rapport with local communities and local government administration in areas covered by prospecting works.

The dialogue is carried out via:

- Informational and educational workshops,
- Website tupkipolskie.pl,
- Meetings with local communities,
- Dialogue sessions with non-governmental organisations,
- Municipal Consultative Council,
- Continued co-operation with municipalities.

Potential benefits for the country and economy

1

Increasing the competitiveness of the economy

- The Energy Studies Institute estimates that 1 000 m³ of Polish shale gas will cost around \$350. This means a reduction in gas prices of 25–30 %.
- Cheaper gas may help accelerate economic development and increase the competitiveness of the Polish industry.

2

Reducing energy dependence

- Polish shale gas is the chance to reduce the dependence on external gas supplies.

3

Increased budget revenues

- According to the Centre for Social and Economic Research (CASE), additional State budget revenues from industrial-scale extraction of shale gas in Poland during the 2019–25 period may range from PLN 20 billion even up to PLN 90 billion.

Shale gas and the environment

Shale gas has the same composition as conventional gas – the cleanest and the most eco-friendly source of energy of all fossil fuels.

1

Low pollutant emission

- Shale gas is composed almost exclusively of methane, NGLs and inert nitrogen.
- It does not contain sulphur or heavy metals.
- Much less nitrogen oxides, carbon monoxide and carbon dioxide are emitted during the combustion of natural gas.

2

Safe investment process

- Shale gas prospecting and extraction is carried out to the highest safety standards.
- In Poland, pursuant to EU provisions, administrative procedures related to drilling constitute a comprehensive system of safeguards against the adverse impact of works on the environment.

3

Low environmental impact of the investment

Equipment used for drilling is located on a given site only for the time being – after the drilling, most of the site is remediated and used as before. Production infrastructure is the same as for conventional deposits.

Hydraulic fracturing – reports

1

‘Environmental aspects of hydraulic fracturing carried out at the Łebień LE-2H well’ – a report prepared by the Polish Geological Institute.

‘Fracturing did not affect the cleanliness of the atmosphere. An increased noise level was observed during the fracturing. No impact of the fracturing works on the quality of surface waters and groundwaters was observed, and water abstraction itself did not deplete groundwater resources in the drilling rig area. The fracturing did not cause any vibrations or tremors on the surface that could pose a threat to buildings or infrastructure’.

2

‘Environmental aspects of natural shale gas and shale petroleum prospecting and production’ – a report prepared by the Ministry of the Environment and the Polish Geological Institute.

The main points:

- shale gas extraction does not cause seismic tremors,
- drinking water contamination with natural gas or fracturing fluid is unlikely,
- for Poland, where energy production is based on hard coal and brown coal (over 87 %), shale gas offers the real opportunity to reduce greenhouse gas emissions.

Shale revolution in the U.S. – the ‘gas era’

- The ‘shale revolution’ began in the U.S. in 2000. The revolution reached its tipping point and made real impact on the U.S. market situation in 2010.
- Industrial-scale extraction of unconventional hydrocarbons reshaped the structure of energy production in the U.S., increasing the share of gas to around 30 % and reducing the country’s energy imports.
- The U.S. is currently the world’s biggest producer of natural gas, with an annual volume of appr. 650 billion m³. Depending on demand growth, the country may be able to meet its energy demand in 2030



- Natural gas prices in the U.S. currently hover around \$ 130 per 1 000 m³ (gas price at the Henry Hub terminal is appr. 3.5 USD per MMBtu).
- Experts estimate that by 2020 natural gas prices will range from \$ 142 to \$ 220 per 1 000 m³.

Benefits of unconventional hydrocarbon extraction in the U.S.

1 Economy

- The American annual GDP has increased by \$ 70 billion due to unconventional hydrocarbon extraction
- State budget revenues increased by \$ 74 billion in 2012
- A lower gas price has spurred the development of the energy-intensive sector, e.g. the chemical industry

2 Society

- Lower natural gas price
- A reduction in electricity prices
- New jobs in the shale gas sector and in related sectors (2.1 million of jobs in 2012)
- On average, the American household net income has increased by \$ 1 200 due to lower prices of natural gas, electricity, and products and services

3 The environment

- Lower greenhouse gas emissions due to a shift from coal-fired energy production to natural gas-fired energy production:
- CO2 emissions have been reduced by half
- NOx emissions have been reduced by 2/3
- SO2 emissions have also been drastically reduced

The estimated impact of the 'shale revolution' on the Polish economy

- The shale gas sector in Poland will not develop as dynamically as the U.S. sector (different economic, political and geological conditions)
- In the report 'Directions 2013. Positive economic shocks', published on 22 January, DnB Nord bank and consulting company Deloitte estimate that successful development of Polish shale gas resources may increase the Polish GDP by a total of 3 % in the period 2013–2022.
- Deloitte and DnB Nord experts assess however, that shale gas extraction will not be a silver bullet for Poland. Taking into account the estimated amount of shale gas resources in Poland, 'the difference between two possible scenarios: the first being a fiasco (a failure to extract significant amounts of shale gas) and the other (the shale gas project being successful) is not that big. Poland will not become another Norway anytime soon'.
- Long term impact on both relative energy prices and coal demand may yet prove to be significant, strengthening gas position as a bridge towards more environmentally friendly energy mix



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Thank you for your attention

**Developing prospecting works in a way that is friendly
to local communities**

Informational and educational workshops

As part of educational and informational activities for local communities, in the period 2012–2013 PGNiG held training workshops in areas covered by licences. Around 300 representatives of local governments of areas covered by prospecting works took part in the workshops.



Website łupkipolskie.pl

Website łupkipolskie.pl provides up-to-date information on shale gas in Poland and abroad. The website also offers information on current activities covered by PGNiG licences to prospect for unconventional deposits, which makes it a source of up-to-date information also for local communities in areas covered by works.

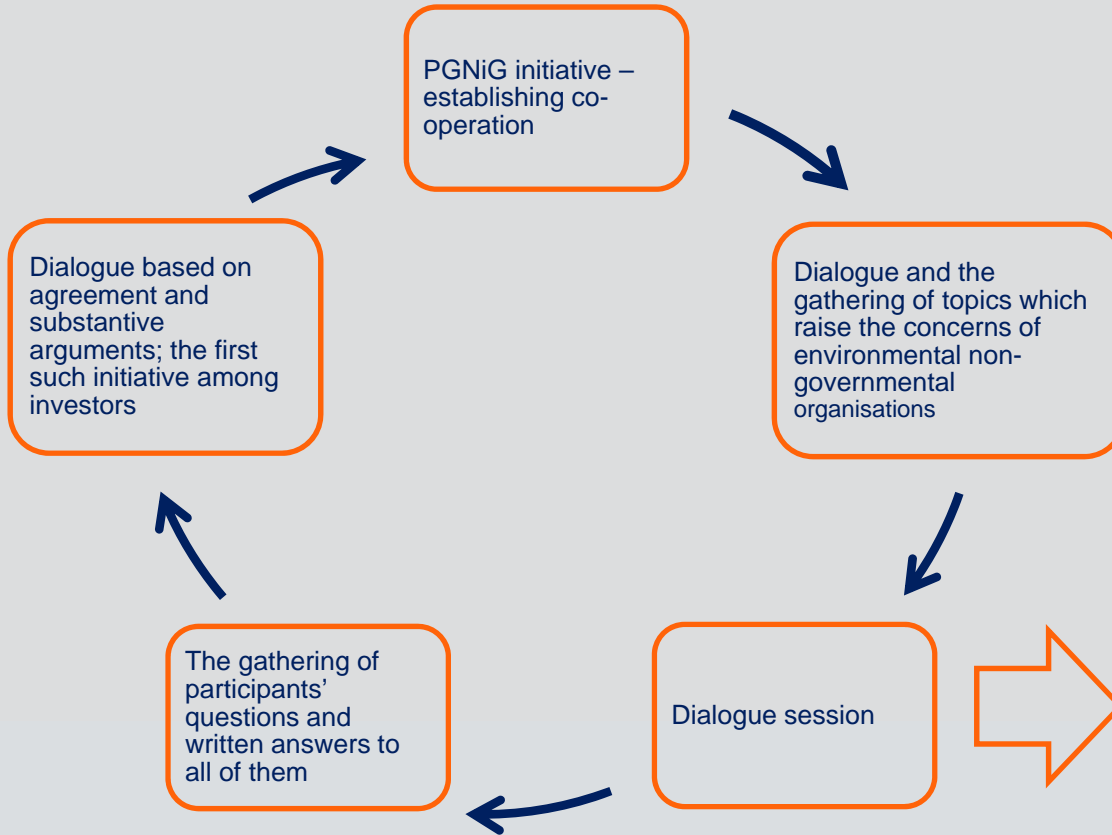


Meetings with communities

PGNiG holds regular meetings with local communities in the Pomorskie and Lubelskie provinces to provide substantive knowledge on works performed. During the meetings, experts answer all questions asked by inhabitants and correct frequently non-substantive allegations made by circles that oppose shale gas prospecting. The meetings are held in a calm atmosphere and in a spirit of a substantive discussion.



Dialogue session with non-governmental organisations



Meeting of PGNiG experts with representatives of ecological NGOs



Municipal Consultative Council

**Krokowa
municipality**



The Municipal Consultative Council has a social mandate and operates in a spirit of co-operation with the investor, in a transparent and open manner. The aim of the Council is to present local community's concerns, expectations and needs relating to PGNiG in a fair manner, to creatively and pro-actively seek constructive and mutually satisfying solutions and to accurately present PGNiG's activities.

- The first Municipal Consultative Council in Poland in the Krokowa municipality has a social mandate and aims to present local community's expectations and needs relating to PGNiG in a fair manner.
- The Council (appointed on 14 December 2012) consists of 9 persons, selected from among candidates recommended by municipality's inhabitants (3 persons), community/non-governmental organisations and media active in the municipality (2 persons + 1 person), representatives of the Municipality Council (2 persons) and the mayor of the municipality.
- It is the first such initiative in Poland to form part of activities aimed at continued dialogue between PGNiG and local communities on important issues related to the prospecting for gas from unconventional sources.

There are plans to set up Municipal Consultative Councils in other municipalities covered by licenses to prospect.

Co-operation with municipalities covered by a licence to prospect

As part of activities aimed at improving and maintaining support for social initiatives of municipalities in which prospecting works are performed, PGNiG S.A. engages in continued co-operation aimed at the development of culture but also at the dissemination of substantive knowledge of shale gas among communities and local governments.

