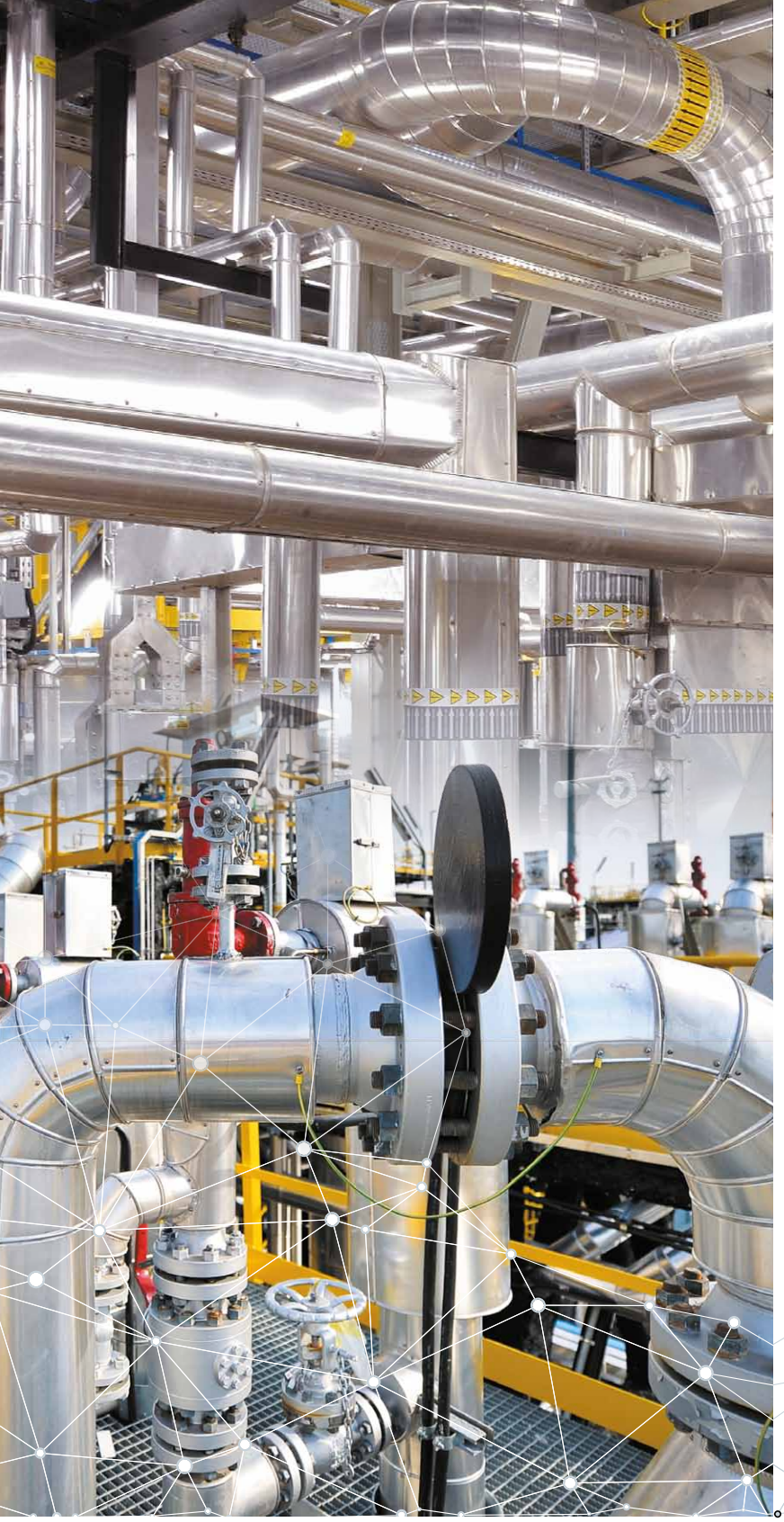


OIL AND GAS IN POLAND

5 TENDER BLOCKS

LICENSING ROUND
INFORMATION AND
OPPORTUNITIES
2019

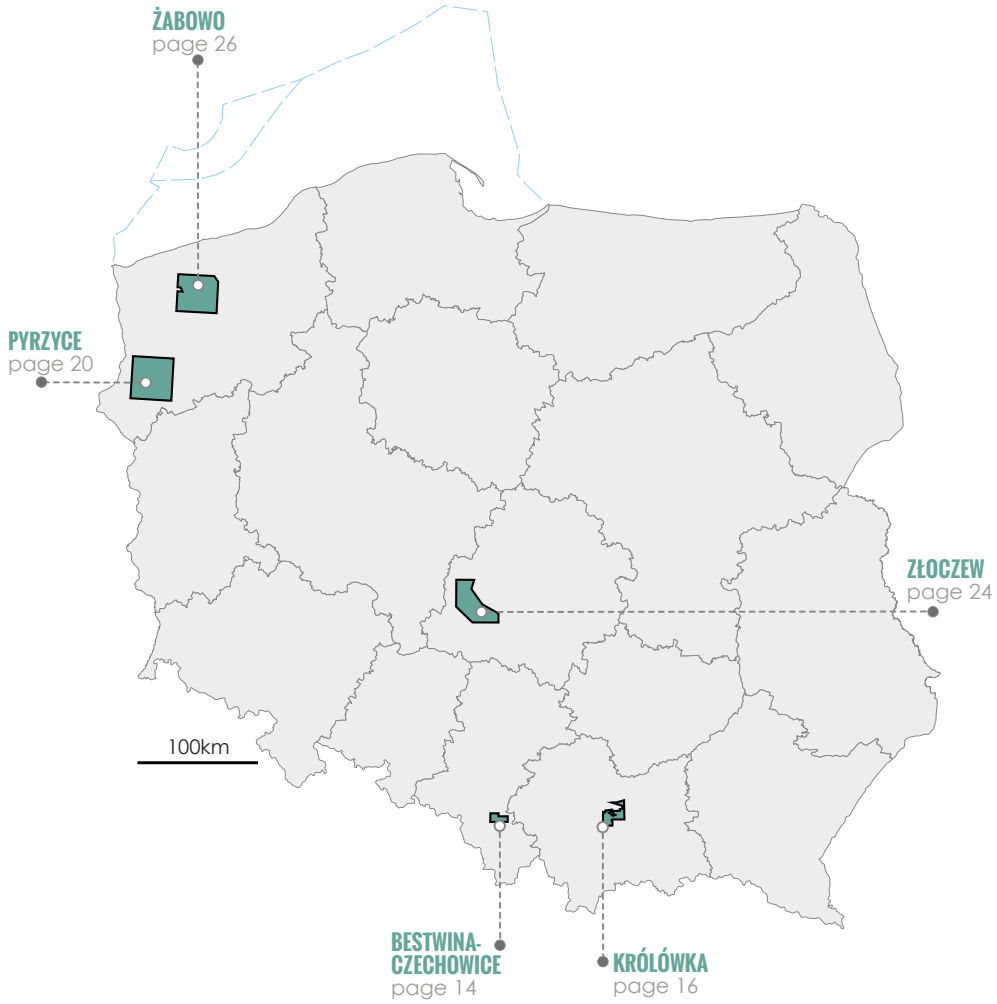
MINISTRY OF THE ENVIRONMENT

Polish Geological Institute
National Research Institute

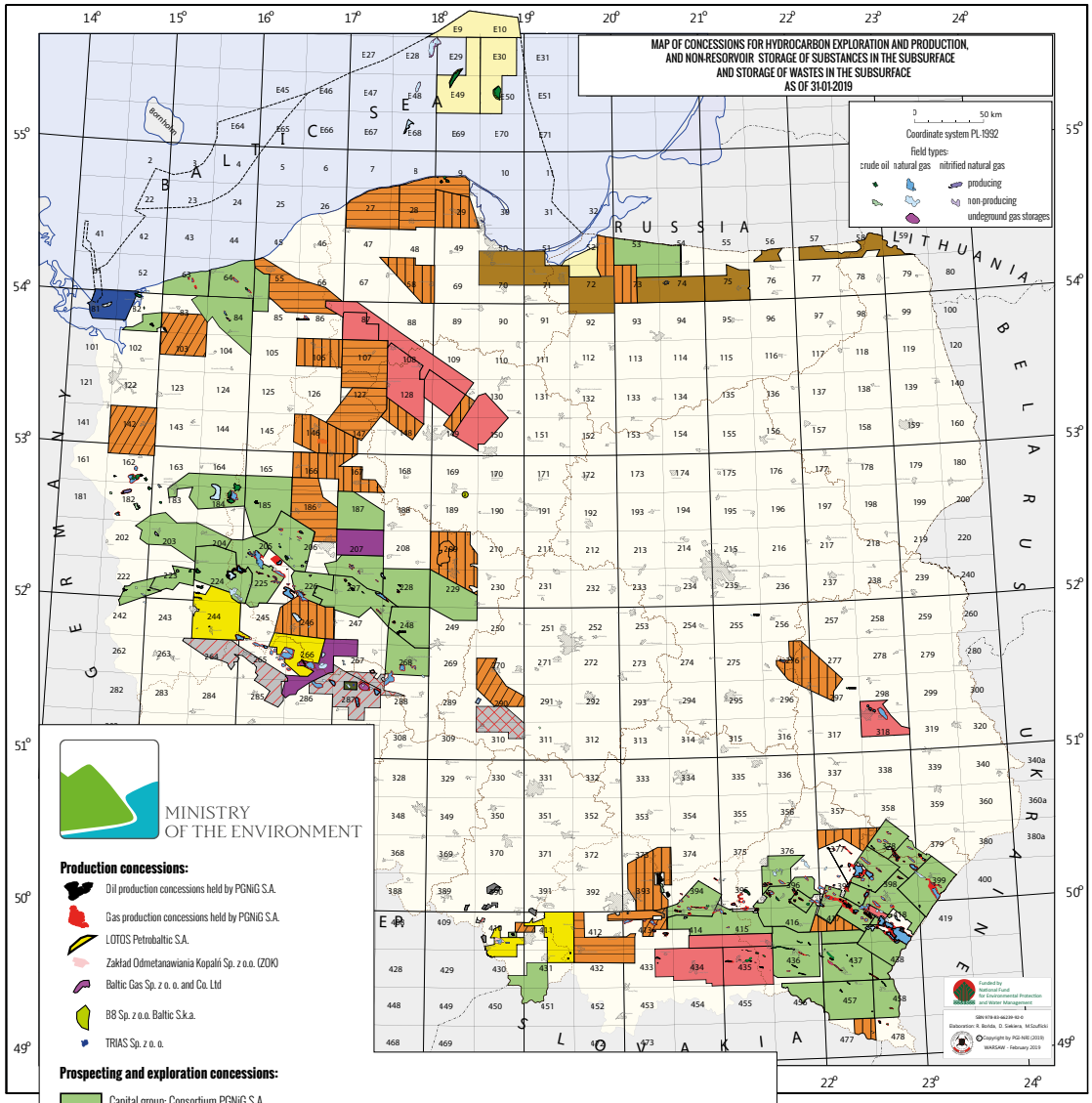
National Fund
for Environmental Protection
and Water Management

POLAND

5 TENDER BLOCKS



ROUND IV	TENDER AREA	TARGET
page 14	Bestwina-Czechowice	conventional and unconventional/hybrid: Carpathian Foredeep, Carpathian Paleozoic basement (Devonian and Carboniferous)
page 16	Królówka	conventional and unconventional/hybrid: Carpathians, Carpathian Foredeep, Carpathian Paleozoic basement
page 20	Pyrzyce	conventional and unconventional: Permian (Rotliegend and Zechstein/Weissliegend and Main Dolomite)
page 24	Złoczew	conventional: Carboniferous and Permian (Rotliegend and Zechstein/Z. Limestone and Main Dolomite)
page 26	Żabowo	conventional: Permian (Rotliegend and Zechstein/Main Dolomite)


MAP OF CONCESSIONS FOR HYDROCARBON EXPLORATION AND PRODUCTION,
AND NON-RESORVOIR STORAGE OF SUBSTANCES IN THE SUBSURFACE
AND STORAGE OF WASTES IN THE SUBSURFACE
AS OF 31-01-2019
0 50 km
Coordinate system PL-1992
Field types:
crude oil natural gas nitrified natural gas
producing
non-producing
undeground gas storages
MINISTRY
OF THE ENVIRONMENT
Production concessions:
Oil production concessions held by PGNiG S.A.
Gas production concessions held by PGNiG S.A.
LOTOS Petrobaltic S.A.
Zakład Odmetanawiania Kopalń Sp. z o.o. (ZOKO
Baltic Gas Sp. z o. o. and Co. Ltd
B8 Sp. z o.o. Baltic S.k.a.
TRIAS Sp. z o. o.
Prospecting and exploration concessions:
Capital group: Consortium PGNiG S.A.
Entrepreneur: PGNiG S.A.
Capital group: LOTOS Petrobaltic S.A.
Entrepreneur: LOTOS Petrobaltic S.A.
Capital group: TRIAS Sp. z o.o.
Entrepreneur: TRIAS Sp. z o.o.
Capital group:Blue Gas N'R'G Sp. z o.o.
Entrepreneur: Blue Gas N'R'G Sp. z o.o.
Capital group: San Leon Energy PLC
Entrepreneurs: Energia Karpaty Zachodnie,
Gora Energy, Liesa Energy
Capital group Central European Pertoleum Ltd
Entrepreneur: Central European Pertoleum Ltd
Capital group: PKN Orlen S.A.
Entrepreneurs: Orlen Upstream,
FX Energy Poland
Capital group: Stena Investment S.A.R.L.
Entrepreneur: ShaleTech Energy
Capital group: Palomar Capital Advisors Limited – San Leon Energy B.V.
Entrepreneurs: Energia Zachód, Rawicz Energy
Concessions of prospecting and production
of coal bed methane
Pending applications
Pending applications submitted according
to the article 46 of the Act on Geological and Mining Law
Pending applications submitted according
to the article 47 of the Act on Geological and Mining Law
Round 2 blocks
Round 3 blocks
Round 4 blocks
Funded by
National Fund
for Environmental Protection
and Water Management
Elaboration: R. Bunda, D. Sekara, M.Szuficki
Copyright by PGI-NRI (2019)
WARSAW - February 2019
RUSSIA
LITHUANIA
BELARUS
UKRAINE
SLOVAKIA
GERMANY
POLAND
BALTIC SEA

PREFACE

According to the Polish Geological and Mining Law the granting of a concession for the exploration of a hydrocarbon deposit and the production of hydrocarbons from a deposits, or a concession for the production of hydrocarbons from a deposit in Poland is proceeded according a tender procedure or open door procedure (on a request of an entity).

On the 28 of June 2018, the Polish Ministry of the Environment announced the boundaries of tender areas selected for the 4th licensing round for concessions for prospection, exploration and exploitation of hydrocarbons in 2019. The geologists of the Polish Geological Institute-NRI and Department of Geology and Geological Concessions of the Ministry of the Environment selected 5 tender areas (promising for discoveries of conventional and unconventional oil and gas deposits) based on the geological data resources stored in the National Geological Archive.

The "open door" procedure was introduced by the amendment of the Geological and Mining Law of June 15, 2018. An entrepreneur may apply for a concession in any area that is not a subject of a tender.

In this folder we present the general information about 5 tender areas dedicated to 4th licensing round. Each of these tender areas is shortly described, including the characteristics of the geology and petroleum plays with the map illustrating the geographic position, neighboring concessions, hydrocarbon deposits in the neighborhood, wells and 2D and 3D seismic surveys.

The detailed geological data on the tender areas (location, environmental restrictions, geology, petroleum plays, hydrocarbon deposits, wells, seismic, gravimetry, magnetic and magnetotelluric investigations and prospecting and exploration perspectives) are collected in the individual geological data packages, which will be published at the beginning of the tender.

We believe that this publication will contribute to the better understanding of the Polish licensing law and encourage investments in the Polish oil and gas market. Here we recommend the websites dedicated to tender areas in Poland:

https://www.pgi.gov.pl/obszary-przetargowe.html
https://bip.mos.gov.pl/koncesje-geologiczne/

IV LICENSING ROUND QUALIFICATION PROCEDURE

Every entity interested in obtaining a concession for the exploration of a hydrocarbon deposit and the production of hydrocarbons from a deposit, or a concession for the production of hydrocarbons from a deposit needs to undergo the qualification procedure. During the procedure an entity is assessed in terms of the state security. The requirements include positive opinions of the Financial Supervision Authority, the Head of the Internal Security Agency and the Head of the Foreign Intelligence Agency.

The application for the qualification procedure is submitted (in 5 copies) to the Ministry of the Environment. The application shall include:

1. data identifying the entity, including designation of its legal status;
2. data relating to the capital structure and capital links of the entity;
3. data relating to the sources of origin of the financial resources, and relating to the financial condition of the entity;
4. data relating to the organisational structure of the entity;
5. data of all persons who are members of managing and supervising bodies as well as data of persons acting under the authority of the same, including, in the case of:
   a) Polish citizens or foreigners with PESEL number assigned – first and last name, PESEL number, and position or function performed in a given entity,
   b) foreigners without PESEL number – first and last name, date and place of birth, first names of parents, nationality, current residence address, passport number or number of another document confirming their identity, as well as position or function performed in a given entity;
6. signature of a person authorised to submit statements of will on behalf of the entity.

The application form and the requirements regarding the attachments are set out in Regulation of the Council of Ministers of 20 April 2015 on the application for a qualification procedure:

https://www.gov.pl/documents/1379842/1381036/Rozp_M%C5%9A-w_z_dnia_20_kwietnia_2015_r_EN.DOCX/f0be03a8-67e2-3d3d-bb01-ceb90d42c732

The assessment of qualification is valid for 5 years. The entity has a right to apply for conducting new qualification procedure, but not later than 4 months before the expiration date of the valid decision. The entity has 14 days to inform the Ministry of the Environment about changes of information mentioned in points 1-5.

The Ministry of the Environment provides a up-to-date register of qualified entities on the website:

https://bip.mos.gov.pl/rejestry-ewidencje-archiwa/departament-geologii-i-koncesji-geologicznych/wykaz-podmiotow-kwalifikowanych/

IV LICENSING ROUND THE GRANTING OF A CONCESSION

A concession for the exploration of a hydrocarbon deposit and the production of hydrocarbons from a deposit in Poland is granted for a period of 10 to 30 years and is divided into 2 phases:

(I) exploration phase (which lasts no longer than 5 years and can be extended);

(II) production phase (starts after obtaining an investment decision).

In the case where a deposit is partly documented, it is also provided that the hydrocarbon production from the deposit can be started even as the exploration phase is still underway (the so-called phased in deposit documentation). The condition for the start of production is the award of an investment decision.

IV LICENSING ROUND TIMETABLE

June 28th, 2018	announcement of the boundaries of tender areas selected for the 4th licensing round for concessions for prospection, exploration and exploitation of hydrocarbons in 2019
Q4, 2019	a call for tender – invitation for offer submission (a call for tender is published in the Official Journal of the European Union)
till 14 days after a call for tender	deadline to submit an application for clarifications regarding the tender conditions
min. 90 days after a call for tender	timeframe for offer submission for entities with positive result of the qualification procedure

The offers evaluation will be based on the following criteria:

1) experience in exploration of hydrocarbon deposits or production of hydrocarbons from deposits,

2) technical ability to perform abovementioned activities,

3) financial capabilities of the bidder,

4) technology of conducting geological work,

5) the scope and timing of the proposed geological works,

6) the scope and timing of mandatory geological sampling,

7) the scope of cooperation with research units* in development and implementation of innovations in the exploration and production of hydrocarbons.

*** list of approved research units will be published on the following website: www.bip.mos.gov.pl**

IV LICENSING ROUND
THE TENDER PROCEDURE SCHEME

SELECTION OF THE TENDER AREAS
and definition of the minimum scope of works, based on perspectivity assessment
Ministry of the Environment, PGI-NRI

▼

QUALIFICATION PROCEDURE

▼

PREPARATION OF TENDER AREA INFORMATION PACKAGES
PGI-NRI, Ministry of the Environment

▼

OFFSHORE
Approval
Ministry of Energy, Ministry of Marine Economy and Inland Navigation or Head of Maritime Office,
Opinion
State Mining Authority, Ministry of National Defence, Ministry of Marine Economy and Inland Navigation
Ministry of the Environment

ONSHORE
Approval
Ministry of Energy
Opinion
head of local administration, mayor of town/city
Ministry of the Environment

▼

PUBLICATION OF A TENDER NOTICE IN THE OFFICIAL JOURNAL OF EU
Ministry of the Environment

▼

TIME FOR PREPARATION AND SUBMISSION OF AN OFFER (MINIMUM 90 DAYS)

▼

EVALUATION AND SELECTION OF THE MOST FAVOURABLE OFFER
Ministry of the Environment

▼

GRANTING OF A CONCESSION
AND CONCLUSION OF AN AGREEMENT
ON THE ESTABLISHMENT OF THE MINING USUFRUCT
Ministry of the Environment

▼

EXPLORE!

OPEN DOOR PROCEDURE

The entity can also choose the area and apply for a license submitting an application to the Ministry of the Environment. The scope of the application is specified in art. 49eb of the Geological and Mining Law. The area indicated by the entity cannot be a subject of a tender or any other concession, and the maximum acreage is 1200 km^2.

In case of several applications are submitted for the same area, the first one is announced.

The announcement published in the EU Official Journal contains:

- information about the submission of an application for a concession,
- type of activity for which a concession is to be granted (exploration and production or production itself);
- the area in which the activity is to be carried out;
- deadline for submission of competitive offers – at least 90 days;
- criteria of evaluation of offers together with the determination of their significance:
  - experience in performing activities of exploration of hydrocarbon deposits or production of hydrocarbons from deposits,
  - technical ability to perform abovementioned activities
  - technology of conducting geological work,
  - the scope and timing of the proposed geological work,
  - the scope and timing of mandatory geological sampling.

After the deadline for submission of competitive offers expires, the concession authority evaluates the submitted offers and then conducts the administration procedure for the entity that obtained the highest rating. Under the administration procedure, the Ministry of the Environment obtains approvals and opinions from the authorities indicated in the Geological and Mining Law.

Ministry grants the concession to the entity or consortium who submitted the application. Before the granting of a concession, consortium must submit cooperation agreement concluded by all the parties.

IV LICENSING ROUND OPEN DOOR PROCEDURE SCHEME

QUALIFICATION PROCEDURE

▼

SUBMISSION OF AN OFFER

▼

PUBLICATION OF AN ANNOUNCEMENT IN THE OFFICIAL JOURNAL OF EU
Ministry of the Environment

▼

TIME FOR PREPARATION AND SUBMISSION OF AN COMPETITIVE OFFER (MINIMUM 90 DAYS)

▼

EVALUATION AND SELECTION OF THE MOST FAVOURABLE OFFER
Ministry of the Environment

▼

OFFSHORE
Approval
Ministry of Energy, Ministry of Marine Economy and Inland Navigation or Head of Maritime Office,
Opinion
State Mining Authority, Ministry of National Defence, Ministry of Marine Economy and Inland Navigation
Ministry of the Environment

ONSHORE
Approval
Ministry of Energy
Opinion
head of local administration, mayor of town/city
Ministry of the Environment

▼

GRANTING OF A CONCESSION AND CONCLUSION OF AN AGREEMENT ON THE ESTABLISHMENT OF THE MINING USUFRUCT
Ministry of the Environment

▼

EXPLORE!

ROUND 4
5 TENDER BLOCKS

01 TENDER BLOCK
BESTWINA-CZECHOWICE

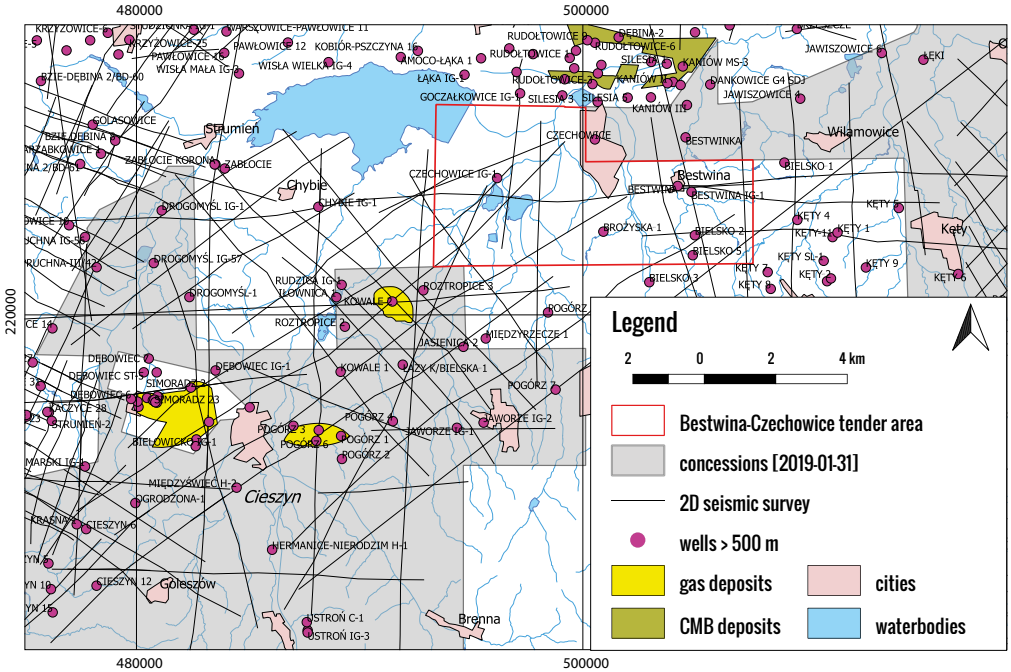
ACREAGE: 83.25 km²
20,571 **ACRES**

The Bestwina-Czechowice tender area is located in the Małopolska Petroleum Province, also called as the North Carpathians Province by the (USGS). The area can be described as a typical example of undercapitalized areas. The main phase of exploration efforts in the Bestwina-Czechowice area were taken in the 40's and 50's when in Pogórz, Dębowiec Śląski and Marklowice gas fields have been discovered in the neighborhood. Slight increase of exploration activity in 2003 caused the Kowale field discovery, where the hydrocarbon accumulations have been documented in two horizons between 382 and 395 m MD.

The biogenic gas system (called by the USGS the shallow biogenic gas system) developed in the Miocene of the Carpathian Foredeep is one of two active petroleum plays, which have been identified in the tender area. It can produce the multilayer conventional gas fields. Also, the so-called hybrid gas fields (concurrence of conventional and tight types of accumulations) can occur, as well. The second petroleum systems is related to the Paleozoic basement of the Carpathians and Carpathian Foredeep. The main source rocks are coal rich layers in the Carboniferous, while traps occur within the Carboniferous clastic intervals and in the lower part of overlying Miocene. The Silesia, Kaczyce and Marklowice gas fields in the vicinity are related to this system.

Seven deep wells reach the Carboniferous in the Bestwina-Czechowice tender area. Also, numerous wells penetrated the Miocene of the Carpathian Foredeep. Irregular 2D seismic survey has been performed with 1–1.5 km gap between the sections in the western part of the tender area. The eastern part is documented by 7 seismic profiles done in 1976-1991. In total, 18 lines of 2D seismic of total length of 388.36 km and no 3D seismic survey have been performed so far.

In the Bestwina-Czechowice tender area there are still a lot of perspective objects identified on 2D seismic survey, which weren't drilled out. Commercial gas production in the vicinity and numerous oil and gas shows recorded in the wells indicate prolific nature of the area.



01 TENDER BLOCK BESTWINA-CZECHOWICE

Location: onshore, part of the Polish Ministry of the Environment concession blocks: 410 and 411; in the areas of the following counties and communes: Śląskie province, Bielsko-Biała county, communes: Czechowice-Dziedzice (participation in the concession block – 61.41%), Jasienica (2.47%), Bestwina, (20.97%), Wilamowice (2.11%); Bielsko-Biała urban county, urban commune Bielsko-Biała (6.12%); Pszczyna county, commune: Goczałkowice-Zdrój (6.92%).

Concession type:
prospecting and exploration of hydrocarbon deposits and extracting hydrocarbon from deposits

Type of deposits:
conventional for gas
unconventional and hybrid for gas

Participation:
winner of the tender 100%

Structural stages:
Alpine (Carpathians and Carpathian Foredeep)
Variscan (Devonian and Carboniferous basement of Carpathian units; Lower Paleozoic of the Upper Silesian Block)
Cadomian

Petroleum plays:
I – autochthonous Miocene of the Carpathian Foredeep
II – Paleozoic basement of the Carpathians

Source rocks:
I – claystones and mudstones of the Skawina Formation of the Carpathian Foredeep
II – fine-clastc rocks of the Upper Carboniferous (paralic and limnic series) of the Carpathian basement

Reservoir rocks:
I – conglomerates, sandstones, sands and mudstones of the Dębowiec and Skawina formations of the Carpathian Foredeep
II – Lower Devonian sandstones, Middle and Upper Devonian and Lower Carboniferous limestones and dolomites, sandstones and mudstones of paralic and limnic series of the Upper Carboniferous and coal beds of the Carpathian basement

Seal rocks:
I – numerous layers of claystones within the autochthonous Miocene of the Carpathian Foredeep, flysch deposits of the Subsilesian or Silesian units
II – fine-grained clastic rocks of the autochthonous Miocene of the Carpathian Foredeep, claystones and mudstones of the Subsilesia and Silesia flysch successions, fine-grained clastic rocks of the Upper Carboniferous paralic and limnic series

Trap type:
I – structural-lithological
II – structural, lithological, CBM

Thickness of overburden:
I – 200–600 m
II – 400–1,000 m

Key wells (TVD):
Bestwina IG-1 (1,572.6 m), Bielsko 1 (1,203.0 m), Bielsko 2 (1,362.2 m), Bielsko 5 (1,700.7 m), Brożyska 1 (1,208.5 m), Czechowice R-1 (1,109.0 m), Czechowice IG-1 (1,511.0 m)

Complete seismic surveys (owner):
1978-1984: 6 lines Górnośląskie Zagłębie Węglowe 2D (State Treasury)
1990-1991: 12 lines Cieszyn-Andrychów 2D (PGNiG S.A.)

Oil and gas deposits in the vicinity (G – gas; O – oil):
Kowale (G) – documented in 2009; balance resources in 2017 – 82.75 mln m^3; industrial resources in 2017 – 26.66 mln m^3; production in 2017 – 1.79 mln m^3; cumulative production to 2017 – 18.17 mln m^3

Pogórz (G) – documented in 1958; balance resources in 2017 – 11.91 mln m^3; industrial resources in 2017 – 11.83 mln m^3; production in 2017 – 0.09 mln m^3; cumulative production to 2017 – 37.0 mln m^3

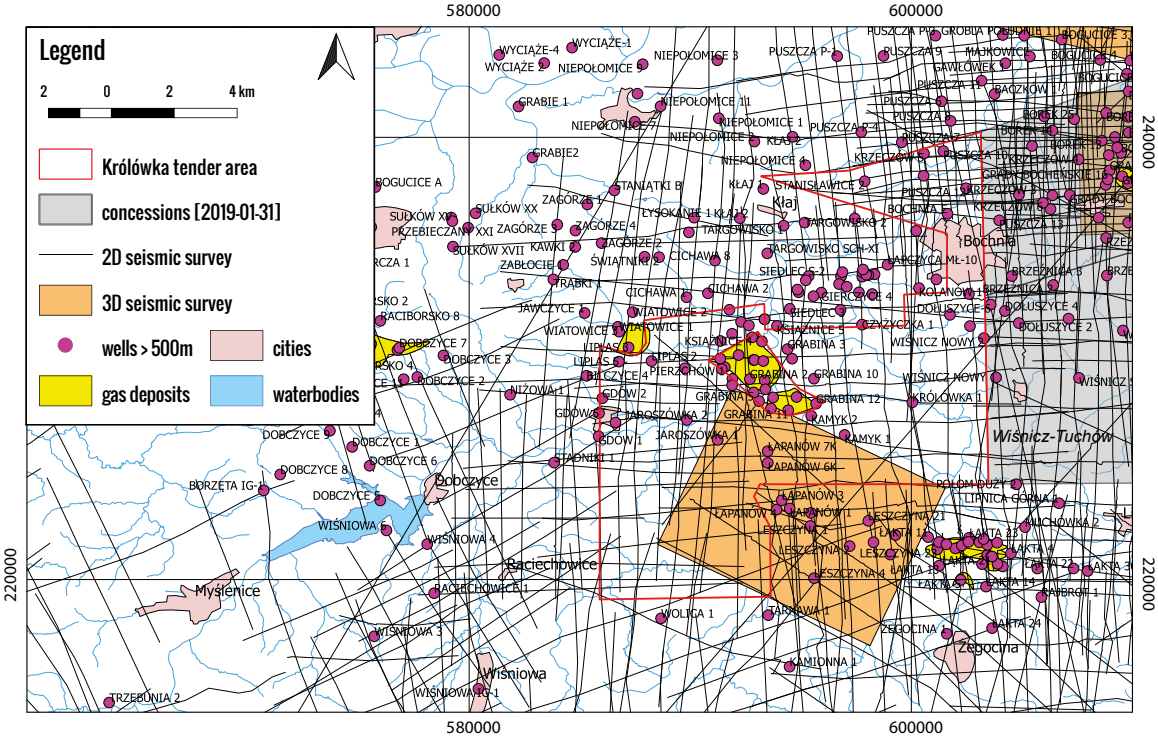
Dębowiec Śląski (G) – documented in 1955; balance resources in 2017 – 31.23 mln m^3; industrial resources in 2017 – 1.69 mln m^3; production in 2017 – 1.56 mln m^3; cumulative production to 2017 – 309.71 mln m^3

The possible minimum work program of prospecting and exploration phase:
Stage I (12 months) – reprocessing and reinterpretation of archival geological data
Stage II (48 months) – execution of 2D seismic survey (30 km); drilling of one well to the depth of 1,500 m (TVD) with a full set of geophysical data allowing the interpretation of a lithology, saturation and petrophysical properties of reservoir horizons, as well as to ensure safety during the drilling process. In case of deposit discovery – performance of production tests; analysis and interpretation of the obtained data

02 TENDER BLOCK KRÓLÓWKA

ACREAGE: 188.75 km²
46,641 ACRES

The hydrocarbon potential of the Królówka tender area is confirmed by numerous hydrocarbon deposits discovered in the Miocene of the Carpathian Foredeep and in the Carpathian basement in the close neighborhood. At least three conventional petroleum systems occur in the area. The first and the shallowest system is developed in the Cretaceous-Paleogene flysch deposits of the Outer Carpathians. The second system is related to the biogenic gas generated during sedimentation and accumulated in fine- and coarse-grained clastic deposits in the Miocene of the Carpathian Foredeep, favoring the formation of multi-horizontal stratigraphic traps. The last petroleum play occurs in the Carpathian basement, at depths between 500 and 1000 m. Apart from the Jurassic, high porosity was observed in the Cambrian sandstones and Middle to Upper Devonian and Carboniferous carbonates, while the fine-grained Silurian clastics, Middle and Upper Devonian Carbonates and Lower Carboniferous (kulm) clastics are supposed to be the effective source rocks. The migration of the gases from the neighboring areas should also be considered in this case. Fifty-two deep wells reached the Carpathian basement in the Królówka tender area. The Miocene of the Carpathian Foredeep has been drilled out in additional 14 wells. The 2D seismic survey includes 101 lines of total length of 1437.18 km. One 3D seismic survey has been performed.



02 TENDER BLOCK KRÓLÓWKA

Location: onshore, part of the Polish Ministry of the Environment concession blocks: 393 and 413; in the areas of the following counties and communes: Małopolskie province, Bochnia county, communes: Bochnia (participation in the concession block – 25.78%), urban Bochnia (6.96%), Drwinia (1.59%), Nowy Wiśnicz (8.57%), Łapanów (22.89%), Trzciana (0.12%); Myślenice county, commune: Raciechowice (6.47%); Wieliczka county, communes: Gdów (27.34%), Kłaj (0.29%).

Concession type:
prospecting and exploration of hydrocarbon deposits and extracting hydrocarbon from deposits

Type of deposits:
conventional for oil and gas

Participation:
winner of the tender 100%

Structural stages:
Carpathian (Carpathians)
Paleogene/Miocene (Carpathian Foredeep)
Paleozoic-Mesozoic
Precambrian

Petroleum plays:
I – Paleozoic-Mesozoic
II – Miocene
III – Carpathian

Source rocks:
I – fine-grained Silurian clastics, Middle and Upper Devonian Carbonates, Lower Carboniferous (kulm) clastics of the Paleozoic-Mesozoic basement of the Carpathians
II – siltstones and claystones of the Badenian and Sarmatian of the Carpathian Foredeep
III – Menilite, Cieszyn, Verovice, Grodziszcze and Lgota beds of the Carpathians

Reservoir rocks:
I – Precambrian sandstones (hypothetical), Middle and Upper Devonian and Lower Carboniferous carbonates, Upper Jurassic carbonates of the Carpathian basement
II – sandstones and siltstones of the Badenian and Sarmatian of the Carpathian Foredeep
III – Istebna and Ciężkowice sandstones of the Carpathians

Seal rocks:
I – Miocene fine-grained clastics of the Carpathian Foredeep
II – Miocene fine-grained clastics of the Carpathian Foredeep and the Carpathians
III – fine-grained clastics within the Carpathian succession

Trap type:
I, II, III – structural, lithological

Thickness of overburden:
I – 500–1,000 m
II – 0–500 m
III – 0–100 m

Key wells (TVD):
Dołuszyce 1 (1,485.3 m), Grabina 12 (1,654.0 m), Królówka 1 (1,802.0 m), Liplas 2 (2,942.8 m), Krzeczów 2 (961.0 m), Stanisławice 2 (1,002.0 m), Wiśnicz Nowy 2 (1,607.0 m)

Complete seismic surveys (owner):
1974: 1 line Myślenice-Sucha-Rabka 2D (State Treasury)
1975: 3 lines Sucha-Rabka-Nowy Targ 2D (State Treasury)
1976: 2 lines Brzesko-Pilzno-Olszyny 2D (State Treasury)
1978: 3 lines Bochnia-Czchów-Pilzno 2D (State Treasury)
1978: 3 lines Żywiec-Wadowice-Gdów 2D (State Treasury)
1984-1968: 7 lines Wiśniowa-Łąkta 2D 2D (State Treasury)
1987-1988: 10 lines Niepołomice-Gdów-Myślenice 2D (State Treasury)
1989: 4 lines Dobczyce-Gdów-Wolica 2D (PGNiG S.A.)
1989: 3 lines Niepołomice-Gdów-Myślenice 2D (PGNiG S.A.)
1991-1992: 10 lines Dobczyce-Gdów-Wolica 2D (PGNiG S.A.)
1992: 2 lines Myślenice-Limanowa-Czchów 2D (PGNiG S.A.)
1993: 6 lines Liplas-Grobla-Żukowice 2D (PGNiG S.A.)
1993: 5 lines Liplas-Puszcza 2D (PGNiG S.A.)
2001-2002: 6 lines Raciechowice-Stadniki 2D (PGNiG S.A., State Treasury)
2003: 13 lines Puszcza-Krzeczów-Borek 2D (State Treasury)
2004: 15 lines Kamyk-Niepołomice 2D (State Treasury)
2004: 1 lines Krzeczów-Rajsko-3C 2D (State Treasury)
2005: 2 lines Wiśnicz 2D (State Treasury)
2007: 5 lines Tarnawa-Czchów 2D (State Treasury)

Oil and gas deposits in the vicinity (G – gas; O – oil):
Dąbrówka (G) – documented in 1976; balance resources in 2017 – 26.58 mln m^3; industrial resources in 2017 – 3.45 mln m^3; production in 2017 – 1.38 mln m^3; cumulative production to 2017 – 433.6 mln m^3

Grabina-Nieznanowice (G) – documented in 1971; balance resources in 2017 – 324.20 mln m^3; industrial resources in 2017 – 12.42 mln m^3; production in 2017 – 1.89 mln m^3; cumulative production to 2017 – 165.05 mln m^3

Grabina-Nieznanowice S (G) – documented in 1987; balance resources in 2017 – 205.53 mln m^3; industrial resources in 2017 – 110.33 mln m^3; production in 2017 – 0.10 mln m^3; cumulative production to 2017 – 17.46 mln m^3

Łapanów (G) – documented in 2008; balance resources in 2017 – 286.12 mln m^3; industrial resources in 2017 – 286.10 mln m^3; production in 2017 – 8.14 mln m^3; cumulative production to 2017 – 38.1 mln m^3

Łąkta (G+O) – documented in 1971; balance resources in 2017 – 205.70 mln m^3 of natural gas and 4.58 ktonnes of condensate; industrial resources in 2017 – 11.78 mln m^3 of natural gas and 0.00 ktonnes of condensate; production in 2017 – 2.88 mln m^3 of natural gas and 0.00 ktonnes of condensate; cumulative production to 2017 – 823.56 mln m^3 of natural gas and 50.65 ktonnes of condensate

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – integration and reinterpretation of archival geological data

Stage II (48 months) – executing of 2D seismic lines (20 km) or drilling of one well to the minimal depth of 600 m (TVD) and maximal depth of 4,500 m (TVD) together with a set of geophysical data allowing the interpretation of lithology, saturation and petrophysical properties as well as to ensure safety during geological work. In case of deposit discovery – performing of production tests and preparing to exploitation; drilling of second well to the minimal depth of 1,500 m (TVD) and maximal depth of 4,500 m (TVD) with a full set of geophysical data allowing the interpretation of lithology, saturation and petrophysical properties as well as to ensure safety during geological work. In case of deposit discovery – performing of production tests and preparing to exploitation; analysis and interpretation of obtained data

02 TENDER BLOCK KRÓLÓWKA

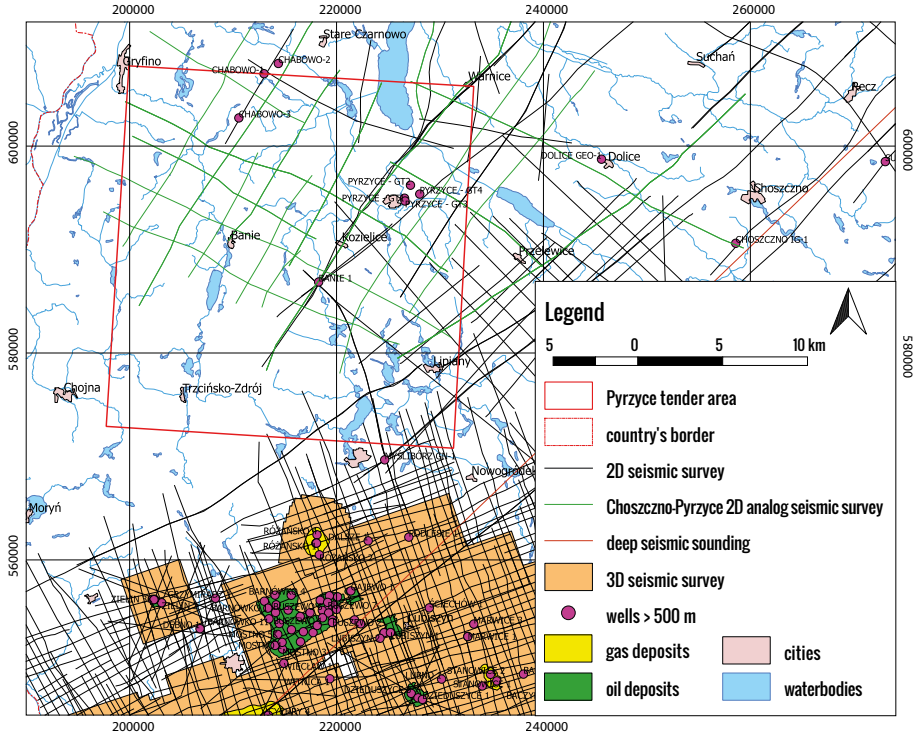
03 TENDER BLOCK PYRZYCE

ACREAGE: 1,171.72 km²
289,538 ACRES

The hydrocarbon prospects in the Pyrzyce tender area are mainly associated with conventional petroleum system developed in the Main Dolomite (Ca2) of the Zechstein (Upper Permian). Both – source and reservoir rocks occur within and accumulations of oil and gas are expected. The undiscovered potential for natural gas in the Rotliegend (Lower Permian) sandstones is also suggested, as the gas shows have been observed in the wells therein. However, there are still no commercial discoveries in this interval in the neighborhood, so far.

Numerous discoveries in the Main Dolomite occur in the southern neighborhood of the Pyrzyce tender area. One of them is the largest oil and gas field in Poland – Barnówko-Mostno-Buszewo (BMB, PGNiG S.A.). This and the others are mostly related with a large carbonate platform and slope deposits. However, in the Pyrzyce, as an area located basinward and beyond the main carbonate shelf, the Main Dolomite traps are expected as developed in small, isolated carbonate platforms. The Zielin field in the vicinity is an example of this kind of oil accumulations. The secondary exploration target is associated with the Rotliegend alluvial fans developed around the Wolsztyn High. Unfortunately, there is only one well reaching the Rotliegend in the Pyrzyce tender area (Banie 1). However, natural gas flows have been noted within.

Only one deep well reaches the Permian in the Pyrzyce tender area. However, another 14 wells are located in the close neighborhood. The seismic survey includes 28 lines (2D) of total length of 287.8 km (mostly from 1970s and 1980s in analogue format). The most recent seismic data was collected in 2011 by FX Energy. No 3D seismic survey has been performed, so far.



03 TENDER BLOCK PYRZYCE

Location: onshore, part of the Polish Ministry of the Environment concession blocks: 142 and 162; in the areas of the following counties and communes: Zachodniopomorskie province, Gryfino county, communes: Stare Czarnowo (participation in the concession block – 0.32%), Widuchowa (4.65%), Chojna (4.80%), Trzcińsko-Zdrój (6.34%), Gryfino (10.24%), Banie (17.62%); Myślibórz county, communes: Nowogródek Pomorski (0.33%), Myślibórz (14.99%); Pyrzyce county, communes: Przelewice (<0.01%), Warnice (3.75%), Lipiany (6.06%), Bielice (6.58%), Kozielice (8.07%), Pyrzyce (16.19%); Stargard county, commune: Stargard (0.06%).

Concession type:
prospecting and exploration of hydrocarbon deposits and extracting hydrocarbon from deposits

Type of deposits:
conventional and unconventional for gas

Participation:
winner of the tender 100%

Structural stages:
Variscan
Permian–Mesozoic

Petroleum plays:
I – Carboniferous–Lower Permian/Rotliegend
II – Zechstein/Main Dolomite

Source rocks:
I – Lower Carboniferous clastones and mudstones, hypothetically Upper Carboniferous clastic rocks (Westphalian paralic series)
II – organic-rich interbeds within the Zechstein/Main Dolomite

Reservoir rocks:
I – Rotliegend and possibly Weissliegend sandstones
II – Zechstein/Main Dolomite carbonates

Seal rocks:
I – Zechstein (Werra) evaporites
II – Zechstein evaporites

Trap type:
I, II – structural, lithological

Thickness of overburden:
I – 3,700–4,200 m
II – 3,628–3,760 m

Key wells (TVD):
Banie 1 (4,090.0 m), Chabowo 1 (2,708.0 m), Cychry 1 (3,076.0 m), Myślibórz GN 1 (3,893.0 m), Różańsko 1 (3,253.0 m), Różańsko 1A (3,198.0 m), Różańsko 2 (3,305.0 m), Różańsko 3K (3,201.0 m), Różańsko 4 (3,201.5 m), Stargard 1 (5,444.0 m), Zielin 1 (3,343.0 m), Zielin 2 (3,442.0 m), Zielin 3 (3,342.0 m), Zielin 3K (3,331.1 m), Zielin 3K BIS (3,256.9 m)

Complete seismic surveys (owner):
1978-1979: 6 lines Myślibórz-Krzyż 2D (State Treasury)
1986: 2 lines Chociwel-Czaplinek 2D (State Treasury)
1989-1990: 8 lines Marianowo 2D (State Treasury)
1995: 1 line Gorzów Wielkopolski-Lubniewice 2D (PGNiG S.A.)
1996: 2 lines Myślibórz-Karsko-Golin 2D (PGNiG S.A.)
2003: 2 lines Gorzów Wielkopolski-Myślibórz 2D (State Treasury)
2011: 7 lines Płońsko 2D (State Treasury)

Oil and gas deposits in the vicinity (G – gas; O – oil):
Różańsko (G) – documented in 1995; balance resources in 2017 – 2,231.52 mln m^3; industrial resources in 2017 – 744.49 mln m^3; production in 2017 – none; cumulative production to 2017 – 168.49 mln m^3

Barnówko-Mostno-Buszewo (G+O) – documented in 1996; balance resources in 2017 – 2,574.22 mln m^3 of natural gas and 6,190.95 ktonnes of oil; industrial resources in 2017 – none of natural gas and 3,727.49 ktonnes of oil; production in 2017 – 398.94 mln m^3 of natural gas and 302.55 ktonnes of oil; cumulative production to 2017 – 5,120.16 mln m^3 of natural gas and 6,409.04 ktonnes of oil

Gajewo (G+O) – documented in 2011; balance resources in 2017 – 13.15 mln m^3 of natural gas and 36.51 ktonnes of oil; industrial resources in 2017 – 13.44 mln m^3 of natural gas and 37.68 ktonnes of oil; production in 2017 – 2.71 mln m^3 of natural gas and 302.55 ktonnes of oil; cumulative production to 2017 – 5.26 mln m^3 of natural gas and 17.21 ktonnes of oil

Lubiszyn (G+O) – documented in 1999; balance resources in 2017 – 2.14 mln m^3 of natural gas and 5.96 ktonnes of oil; industrial resources in 2017 – none of natural gas and 5.82 ktonnes of oil; production in 2017 – 0.88 mln m^3 of natural gas and 2.36 ktonnes of oil; cumulative production to 2017 – 42.42 mln m^3 of natural gas and 203.56 ktonnes of oil

Zielin (G+O) – documented in 1995; balance resources in 2017 – none of natural gas and 0.82 ktonnes of oil; industrial resources in 2017 – none of natural gas and 0.42 ktonnes of oil; production in 2017 – 5.43 mln m^3 of natural gas and 0.89 ktonnes of oil; cumulative production to 2017 – 415.53 mln m^3 of natural gas and 154.69 ktonnes of oil

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – interpretation and analysis of archival geological data

Stage II (48 months) – execution of 2D seismic lines (50 km); drilling of one well to the maximal depth of 4,200 m with a full set of geophysical data allowing the interpretation of lithology, saturation and petrophysical properties, as well as to ensure safety during geological work. In case of deposit discovery – performing of production tests and preparing to exploitation; analysis and interpretation of obtained data

03 TENDER BLOCK PYRZYCE

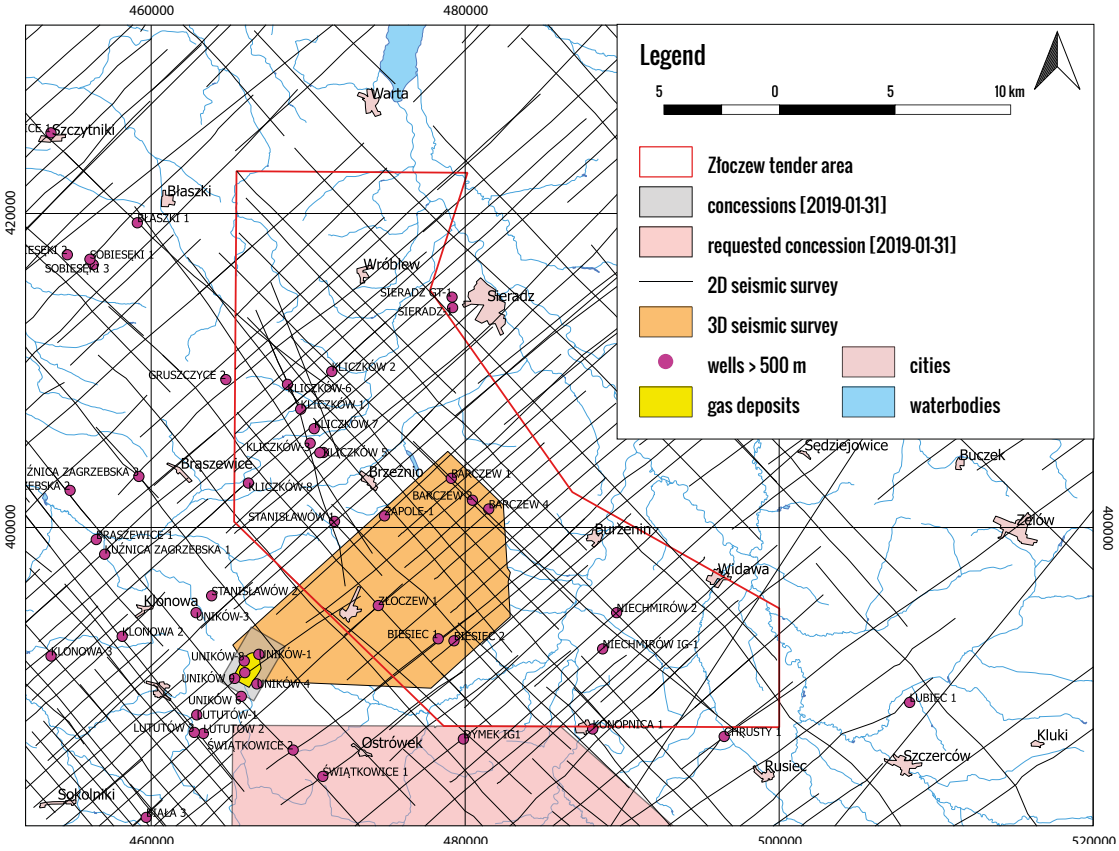
04 TENDER BLOCK ZŁOCZEW

ACREAGE: 702.48 km²
173,586 **ACRES**

The hydrocarbon prospects in the Złoczew tender area is related to two petroleum systems. The first includes the reservoir horizons developed in fractured carbonates of the top of the Carboniferous, Rotliegend aeolian sandstones and Zechstein Limestone carbonates. The second is developed in the Zechstein/Main Dolomite.

The source rocks – Lower Carboniferous fine-clastics – have been recognized in numerous wells. They have low TOC, while maturity is irregular and quite low in some places (gas and oil shows or dead oil encountered), as an effect of complicated tectonic history. The role of the Lower Carboniferous clastic rocks as potential reservoirs is possible only when fractured (their primary porosity and permeability equal around zero). Reservoir properties of the Rotliegend sandstones vary in terms of porosity and permeability. Gas accumulations can be encountered mainly in structural and stratigraphic or mixed traps. There are sealed by the Zechstein evaporites. In the Main Dolomite, two hydrocarbon accumulations have been discovered in the southern neighborhood of the Złoczew tender area. These are Uników and Gomunice fields.

Twenty-two deep wells reaches the prospective horizons in the Złoczew tender area and in its close vicinity. The seismic survey includes 77 lines (2D) of total length of 1038.8 km. Also 119.8 km² of 3D seismic survey has been performed, so far.



04 TENDER BLOCK ZŁOCZEW

Location: onshore, part of the Polish Ministry of the Environment concession blocks: 270 and 290; in the areas of the following counties and communes: Łódzkie province, Bełchatów county, commune: Rusiec (participation in the concession block – 0.55%); Łask county, commune: Widawa (14.53%); Sieradz county, communes: Błaszki (2.63%), Brąszewice (2.88%), Brzeźnio (18.29%), Burzenin (14.71%), urban Sieradz (1.29%), Sieradz (9.63%), Warta (2.20%), Wróblew (16.05%), Złoczew (10.39%); Wieluń county, communes: Konopnica (6.75%), Ostrówek (0.10%).

Concession type:
prospecting and exploration of hydrocarbon deposits and extracting hydrocarbon from deposits

Type of deposits:
conventional for gas

Participation:
winner of the tender 100%

Structural stages:
Variscan
Permian-Mesozoic

Petroleum plays:
I – Carboniferous–Lower Permian/Rotliegend
II – Zechstein/Main Dolomite

Source rocks:
I – Carboniferous claystones and mudstones
II – organic-rich interbeds within the Zechstein/Main Dolomite

Reservoir rocks:
I – Carboniferous and Rotliegend sandstones, Zechstein Limestone
II – Zechstein/ Main Dolomite carbonates

Seal rocks:
I, II – Zechstein evaporites

Trap type:
I, II – structural, lithological

Thickness of overburden:
I – 2,900–3,300 m
II – 2,400–2,900 m

Key wells (TVD):
Barczew 1 (3,220.0), Barczew 2 (2,691.8), Barczew 4 (2,908.8), Biesiec 1 (3,023.0 m), Biesiec 2 (2,987.0 m), Chrusty 1(3,571.4 m), Dymek IG-1 (2,797.0 m), Kliczków 1 (2,979.0 m), Kliczków 2 (3,368.7 m), Kliczków 3 (2,634.0 m), Kliczków 5a (3,204.0 m), Kliczków 6 (3,353.0 m), Kliczków 7 (3,201.0 m), Kliczków 8 (2,951.3 m), Konopnica 1 (2,960.0 m), Masanów 1 (2,631.0 m), Niechmirów IG-1 (2,892.0 m), Niechmirów 2 (3,587.0 m), Prosna 1 (2,300.0 m), Stanisławów 1 (3,162.0 m), Zapole 1 (2,878.8 m), Złoczew 1 (2,980.0 m)

Complete seismic surveys (owner):
1972: 1 line Kalisz–Iwanowice 2D (State Treasury)
1972: 1 line Zduńska Wola–Szczerców–Mierzyn 2D (State Treasury)
1975: 2 lines Kalisz–Turek–Sieradz 2D (State Treasury)
1976-1977: 27 lines Ostrów Kaliski–Bełchatów 2D (State Treasury)
1976: 4 lines Sieradz–Piotrków Trybunalski 2D (State Treasury)
1981: 1 line Kalisz–Ostrzeszów–Złoczew 2D (State Treasury)
1981-1983: 7 lines Szczerców–Piotrków Trybunalski 2D (State Treasury)
1982: 1 lines Błaszki 2D (State Treasury)
1983: 6 lines Uników –Złoczew 2D (State Treasury)
1996: 1 line Zduńska Wola 2D (TEXACO)
2005: 120 km^2 Złoczew Zachód 3D (State Treasury)
2013: 17 lines Sieradz–Łódź 2D (State Treasury)
2015: 9 lines Barczew 2D (State Treasury)

Oil and gas deposits in the vicinity (G – gas; O – oil):
Gomunice (O) – documented in 1987; balance resources in 2017 – 39.73 ktonnes; industrial resources in 2017 – none; production in 2017 – none; cumulative production to 2017 – 0.92 ktonnes

Uników (G) – documented in 1973; balance resources in 2017 – 170.00 mln m^3; industrial resources in 2017 – none; production in 2017 – none; cumulative production to 2017 – none

The possible minimum work program of prospecting and exploration phase:
Stage I (12 months) – interpretation and analysis of archival geological data
Stage II (48 months) – execution of 3D seismic survey (100 km^2) and its interpretation, taking into account reinterpretation of archival 3D survey "Złoczew Zachód", collected by previous operator – RWE Dea S.A.; drilling of at least one well to a maximal depth of 3,500 m with an obligatory coring of perspective intervals and full set of geophysical data allowing the interpretation of lithology, saturation and petrophysical properties as well as to ensure safety during the drilling process. In case of deposit discovery – performance of production tests and preparing to exploitation; analysis and interpretation of obtained data

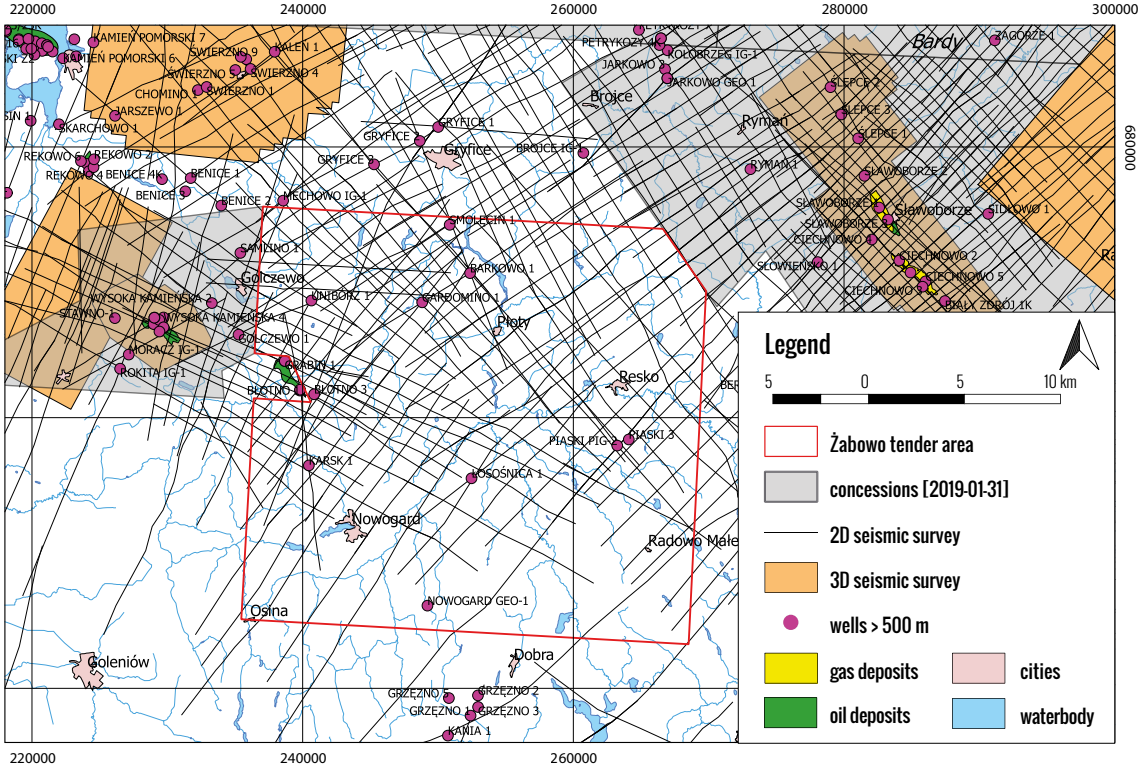
05 TENDER BLOCK ŻABOWO

ACREAGE: 990.32 km²
244,713 **ACRES**

The Żabowo tender area is located in the Pomeranian Petroleum Province. The hydrocarbon prospects are related here to two petroleum systems. In the first one, the Carboniferous fine-clastics are regarded as source rocks, while Rotliegend sandstones form the main reservoir horizon. The second system is related to the Zechstein/Main dolomite, in which carbonate layers are reservoirs, while organic-rich interbeds are considered as source rocks. The Zechstein evaporites with salts and clay deposits form regional seal. Structural and tectonic traps can be expected in both systems. Also, lithological and mixed traps could occur in the southern part of the area.

In the close vicinity of the Żabowo tender area, numerous oil deposits in the Zechstein/ Main Dolomite have been discovered in Błotno, Sławoborze, Wysoka Kamieńska and Rekowo. Natural gas deposits in the Rotliegend sandstones occur in Ciechnowo and Sławoborze. Also new gas field in Siemidarżno has been documented in 2016 in the close neighborhood.

Fourteen deep wells reaches the prospective horizons in the Żabowo tender area and in its neighborhood. The seismic survey includes 99 lines (2D) of total length of 1370.0 km. No 3D seismic survey has been performed, so far.



05 TENDER BLOCK ŻABOWO

Location: onshore, part of the Polish Ministry of the Environment concession blocks: 83 and 103; in the areas of the following counties and communes: Zachodniopomorskie province, Goleniów county, communes: Maszewo (participation in the concession block – 0.11%), Nowogard (28.47%), Osina (2.45%); Gryfice county, communes: Gryfice (8.06%), Płoty (19.19%); Kamieńsk county, commune: Golczewo (4.41%); Łobez county, communes: Dobra (1.52%), Łobez (0.06%), Radowo Małe (15.49%), Resko (19.41%), Węgorzyno (0.83%).

Concession type:
prospecting and exploration of hydrocarbon deposits and extracting hydrocarbon from deposits

Type of deposits:
conventional for oil and gas

Participation:
winner of the tender 100%

Structural stages:
Permian-Mesozoic

Petroleum plays:
I – Carboniferous–Lower Permian/Rotliegend
II – Zechstein/Main Dolomite

Source rocks:
I – Carboniferous claystones and mudstones
II – organic-rich interbeds within the Zechstein/Main Dolomite

Reservoir rocks:
I – Rotliegend sandstones
II – Zechstein/Main Dolomite carbonates

Seal rocks:
I, II – Zechstein evaporites; Triassic claystones and mudstones

Trap type:
I, II – structural, lithological

Thickness of overburden:
I – 3,584.0–4,089.5 m
II –2,930.0–3,588.5 m

Key wells (TVD):
Piaski PIG-2 (3,922.0 m)

Complete seismic surveys (owner):
1976: 1 line Gorzysław-Petrykozy 2D (State Treasury)
1976: 2 lines Wysoka Kamieńska 2D (State Treasury)
1979-1981: 38 lines Wysoka Kamieńska-Błotno 2D (State Treasury)
1979-1983: 7 lines Wolin-Gostyń-Błotno 2D (State Treasury)
1979-1983: 11 lines Gryfice-Trzebiatów 2D (State Treasury)
1980: 5 lines Nowogard-Resko 2D (State Treasury)
1983-1984: 9 lines Nowogard-Resko 2D (State Treasury)
2000: 2 lines Gryfice 2D (PGNiG S.A.)
2002: 15 lines Piaski-Resko 2D (State Treasury)
2006: 9 lines Rybokarty-Komorowo (State Treasury)

Oil and gas deposits in the vicinity (G – gas; O – oil):
Ciechnowo (G) – documented in 1995; balance resources in 2017 – 15.92 mln m^3; industrial resources in 2017 – 27.73 mln m^3; production in 2017 – 7.11 mln m^3, cumulative production to 2017 – 254.29 mln m^3

Sławoborze (G) – documented in 2009; balance resources in 2017 – 59.19 mln m^3; industrial resources in 2017 – 58.32 mln m^3; production in 2017 – 5.53 mln m^3; cumulative production to 2017 – 92.84 mln m^3

Sławoborze (O+G) – documented in 2005; balance resources in 2017 – 4.42 ktonnes of oil and 1.45 mln m^3 of natural gas; industrial resources in 2017 – 4.42 ktonnes of oil; production in 2017 – 0.12 ktonnes of oil and 0.06 mln m^3 of natural gas; cumulative production to 2017 – 17.33 ktonnes of oil and 10.61 mln m^3 of natural gas

Błotno (O+G) – documented in 1985; balance resources in 2017 – 8.29 ktonnes of oil and 1.96 mln m^3 of natural gas; industrial resources in 2017 – 8.26 ktonnes of oil; production in 2017 – 0.42 ktonnes of oil and 0.04 mln m^3 of natural gas; cumulative production to 2017 – 38.07 ktonnes of oil and 7.90 mln m^3 of natural gas

Rekowo (O+G) – documented in 1994; balance resources in 2017 – 1.37 ktonnes of oil and 0.27 mln m^3 of natural gas; industrial resources in 2017 – 1.45 ktonnes of oil; production in 2017 – 0.08 ktonnes of oil and 0.01 mln m^3 of natural gas; cumulative production to 2017 – 31.42 ktonnes of oil and 4.45 mln m^3 of natural gas

Wysoka Kamieńska (O+G) – documented in 1980; balance resources in 2017 – 16.09 ktonnes of oil and 32.74 mln m^3 of natural gas; industrial resources in 2017 – 16.61 ktonnes of oil; production in 2017 – 3.73 ktonnes of oil and 0.27 mln m^3 of natural gas; cumulative production to 2017 – 415.99 ktonnes of oil and 29.74 mln m^3 of natural gas

The possible minimum work program of prospecting and exploration phase:

Stage I (12 months) – reprocessing, integration and reinterpretation of archival seismic and borehole data

Stage II (48 months) – execution of at least 45 km^2 of 3D seismic survey to trace the geometry of the traps and reduce the prospecting risk; drilling of one well to the maximal depth of 3,500 m together with full set of geophysical data allowing the interpretation of lithology, saturation and petrophysical properties, as well as to ensure safety during geological work. In case of deposit discovery – performing of production tests and preparing to exploitation; analysis and interpretation of obtained data

05 TENDER BLOCK ŻABOWO


480-V-050
UWAGA
STREFA
2

OIL AND GAS IN POLAND

OIL AND GAS IN POLAND

HISTORY OF HYDROCARBON DISCOVERIES IN POLAND

Petroleum traditions in Poland date back to the Middle Ages when crude oil seepages from the Carpathian flysch have been exploited. The discovery of kerosene distillation from petroleum and the invention of kerosene lamp in 1853 by Ignacy Łukasiewicz, a Polish pharmacist and entrepreneur, prompted exploration for more productive sources of petroleum. Łukasiewicz, the pioneer of petroleum industry in Europe, was the co-founder of the first oil mine worldwide (at Bóbrka near Jasło, SE Poland) and designed the first petroleum refinery in the world. The beginning of petroleum extraction at Bóbrka (5 years before the first oil well drilling in Pennsylvania) and the discovery of a large oil plays in Eastern Carpathians at the turn of the 19th century (including the largest oilfield in the Carpathian flysch* near Borysław) marked the beginning petroleum industry development in that region. The Sub-Carpathian reservoirs are still being produced today, although a majority of crude oil comes from reservoirs that have been discovered in Central Poland after The Second World War.

16th Century Petroleum from the Carpathian flysch is used commercially

1853 The method of petroleum distillation developed for the purposes of production and application of kerosene lamps

1854 The first oil company in the world established by Ignacy Łukasiewicz and Tytus Trzecieski starts to produce crude oil at Bóbrka near Krosno. The Bóbrka Mine is still active and produces oil

1856 The first oil refinery, designed by Ignacy Łukasiewicz is opened at Ulaszowice

1896 Discovery of the largest Tertiary oil reservoirs at Borysław

1909 With an output of over 2 million tonnes of oil per year Poland is the third producer of petroleum in the world, behind USA and Russia

1954 The first underground gas storage facility in Europe is commissioned at Roztoki near Jasło

1958 Przemyśl – the largest gas field in Poland – discovered

1981 The first offshore oil reservoir discovered by Petrobaltic Company in the Polish economic zone of the Baltic Sea

1990 Coal bed methane (CBM) is first produced in the Upper Silesian Coal Basin where an exploratory drilling programme is underway

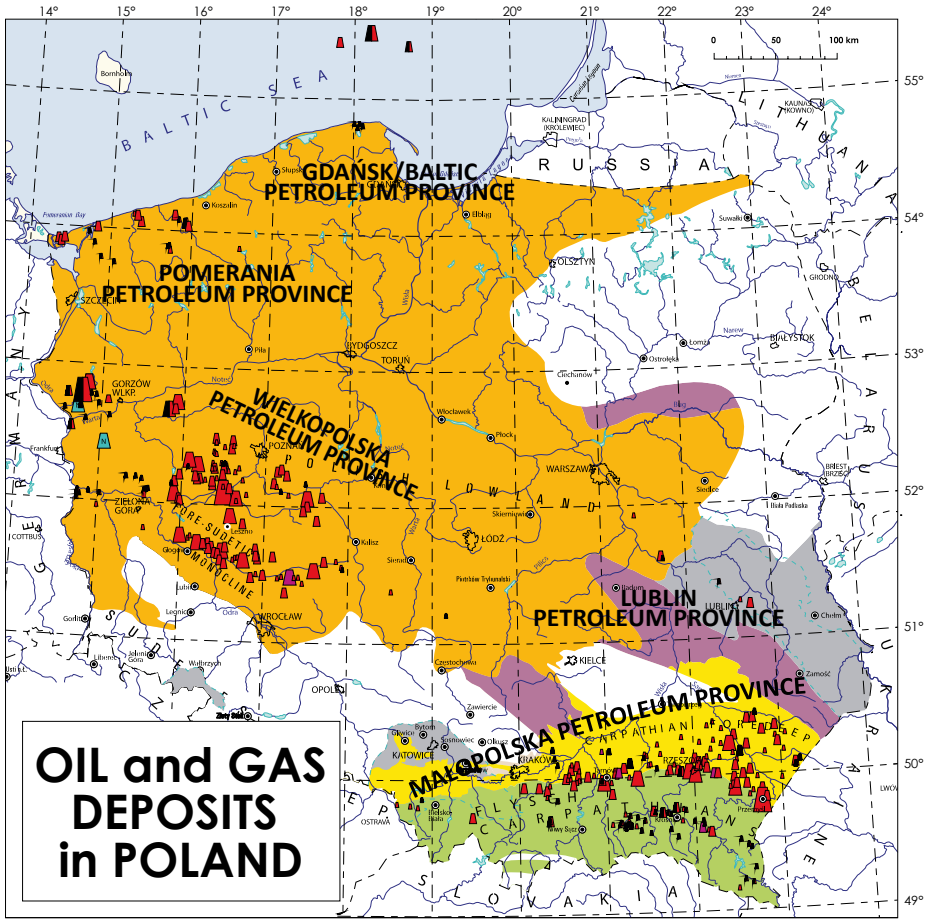
1993 Barnówko-Mostno-Buszewo – the largest oilfield in Poland – is discovered

2007 The first tight gas reservoir

2016 First licensing round for hydrocarbon concessions

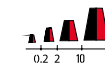
2018 Open door procedure for hydrocarbon concessions

OIL AND GAS IN POLAND

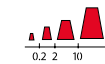


RESOURCES:

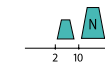
Oil reservoirs



Oil and gas reservoirs



Gas reservoirs



High-nitrogen natural gas reservoirs

Underground gas storage


Coal bed methane prospective areas

Voivodeship towns

Other towns

State boundaries

Rivers

Water reservoirs (natural and artifcial)

Oil- and gas-bearing rocks of the Carpathian foredeep

Oil- and gas-bearing rocks of the flysch Carpathians

Permian (Zechstein & Rotliegend)

Carboniferous oil- and gas-bearing formations

Pre-Carboniferous oil- and gas bearing formations

Areas without prospective oil and gas occurrences

SOURCE: POLISH GEOLOGICAL INSTITUTE - NATIONAL RESEARCH INSTITUTE

OIL AND GAS IN POLAND

OIL RESOURCES IN POLAND

Polish reserves of both conventional and unconventional oil and gas concentrate in four regions: the Carpathians, Carpathian Foredeep, Polish Lowlands (including Wielkopolska, Pomerania, Gdańsk and Lublin Petroleum Provinces) and the Baltic Sea. The largest resources and reservoirs of hydrocarbons occur in the Polish Lowlands.

CRUDE OIL	NUMBER OF DEPOSITS	EXPLOITABLE RESOURCES [KT]				ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [KT]	PRODUCTION [KT]
		ANTICIPATED ECONOMIC			ANTICIPATED SUBECONOMIC [KT]		
		TOTAL	A+B	C			
TOTAL RESOURCES	**86**	**23 598.46**	**14 660.23**	**8 938.23**	**395.34**	**14 482.15**	**939.240**
INCLUDING RESOURCES OF EXPLOITED FIELDS							
TOTAL	64	23 160.61	14 543.09	8 617.52	9.70	14 365.27	939.24
BALTIC SEA	2	6 765.55	6 728.33	37.22	—	6 029.98	208.99
CARPATHIANS	27	679.05	574.24	104.81	9.70	143.93	22.49
CARPATHIAN FOREDEEP	6	355.84	208.70	147.14	—	60.83	15.99
POLISH LOWLAND	29	15 360.17	7 031.82	8 328.35	—	8 130.53	691.77
INCLUDING RESOURCES OF NON-EXPLOITED FIELDS							
TOTAL	7	382.03	108.29	273.74	329.53	116.50	
CARPATHIAN FOREDEEP	3	115.93	—	115.93	329.53	—	
POLISH LOWLAND	4	266.10	108.29	157.81	—	116.50	
INCLUDING ABANDONED FIELDS							
TOTAL	15	55.82	8.85	46.97	56.11	0.38	
CARPATHIANS	2	1.50	—	1.50	3.75	—	
CARPATHIAN FOREDEEP	3	4.58	4.58	—	50.93	—	
POLISH LOWLAND	10	49.74	4.27	45.47	1.43	0.38	

OIL AND GAS IN POLAND

OIL DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [KT]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [KT]	PRODUCTION [KT]
BALTIC (2)	**TOTAL: 6 765.55**	**TOTAL: 6 029.98**	**TOTAL: 208.99**
B 3	2 145.32	1 695.08	90.89
B 8	4 620.23	4 334.90	118.10
CARPATHIAN FOREDEEP (12)	**TOTAL: 476.35**	**TOTAL: 60.83**	**TOTAL: 15.99**
BRZEZÓWKA	15.38	3.58	1.49
CETYNIA	45.00[P]	—	—
GROBLA	35.89	12.54	3.71
JASTRZĄBKA STARA	37.05	1.88	1.73
KORZENIÓW	5.93[P]	—	—
LUBACZÓW	115.93	—	—
ŁĄKTA	4.58	—	—
MNISZÓW	325.40[P]	—	—
NOSÓWKA	44.05	27.50	3.24
PŁAWOWICE	78.04	12.73	4.60
TARNÓW	4.13[P]	—	—
WIERZCHOSŁAWICE	145.43	2.60	1.22
CARPATHIANS (29)	**TOTAL: 680.55**	**TOTAL: 143.93**	**TOTAL: 22.49**
BIECZ	2.87[P]	—	0.21
BÓBRKA-ROGI	107.29	10.97	2.25
BRZEGI DOLNE	0.61	0.14	0.07
CZARNA	1.06	0.36	0.19
DOMINIK.-KOB.-KRYG	4.93[P]	2.76	0.19
DWERNIK	1.82[P]	0.96	0.23

OIL DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [KT]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [KT]	PRODUCTION [KT]
FELLNERÓWKA-HANKA	15.73	1.50	0.30
FOLUSZ-PIELGRZYMKA	43.88	14.98	0.98
GORLICE	29.44	0.05	0.08
GRABOWNICA	—	—	2.68
HARKLOWA	20.65	3.51	0.73
IWONICZ-ZDRÓJ	17.95	2.29	0.48
JASZCZEW	72.75	15.44	0.95
KROŚCIENKO	13.28	11.44	0.73
KRYG-LIBUSZA-LIPNIKI	59.74	23.48	1.43
ŁODYNA	25.34	7.84	1.55
MAGDALENA	3.75[P]	—	—
MRUKOWA	0.08[P]	—	0.04
OSOBNICA	81.54	10.76	2.37
POTOK	23.50	13.13	0.72
REJ. GRABOWNICA	10.86	0.01	—
ROZTOKI	13.63	2.92	0.57
SŁOPNICE	1.50	—	—
TURASZÓWKA	0.97	0.09	0.17
TURZE POLE-ZMIENNICA	1.26	1.26	0.47
WAŃKOWA	79.34	9.60	3.08
WĘGLÓWKA	57.11	8.68	1.80
WOLA JASIENICKA	1.86	1.38	0.11
ZATWARNICA	1.26	0.38	0.11

[P] – anticipated subeconomic

OIL AND GAS IN POLAND

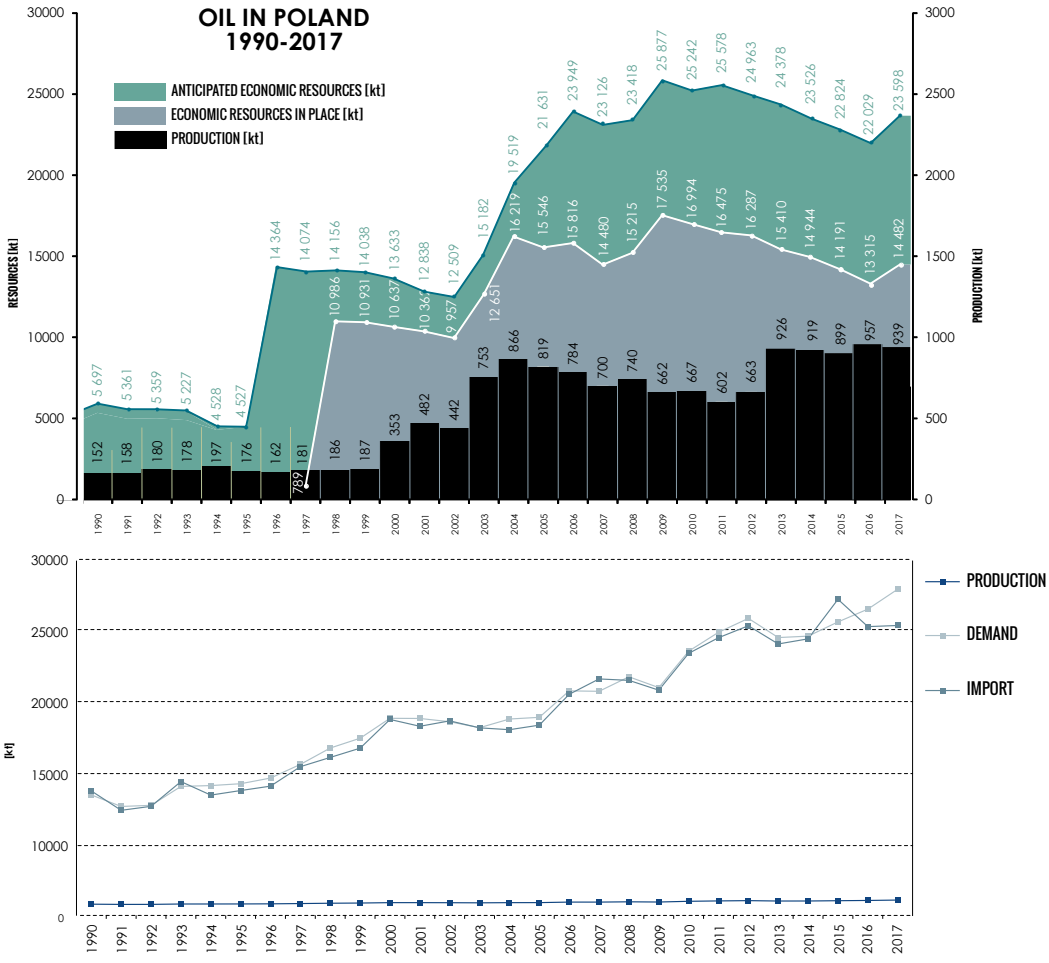
OIL DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [KT]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [KT]	PRODUCTION [KT]
POLISH LOWLAND (43)	**TOTAL: 15 676.01**	**TOTAL: 8 247.41**	**TOTAL: 691.77**
ANTONIN 1	5.74	—	—
BABIMOST	—	—	—
BIAŁOGÓRA-E	1.43[P]	0.38	—
BŁOTNO	8.29	8.26	0.42
BMB	6 190.95	3 727.49	302.55
BRESLACK-KOSARZYN	—	—	—
BUK	29.67	26.18	0.76
CYCHRY	1 310.84	55.26	0.36
DASZEWO	4.27	—	0.39
DĘBKI	7.79	7.81	0.32
DZIEDUSZYCE	472.83	254.31	8.04
GAJEWO	36.51	37.68	8.87
GLINNIK	7.10	4.49	0.27
GOMUNICE	39.73	—	—
GÓRZYCA	186.81	158.38	4.07
GROTÓW	1 716.60	1 293.16	15.29
GRYŻYNA	72.33	—	—
JASTRZĘBSKO	19.00	—	—
JENINIEC	7.66	7.56	—
KAMIEŃ MAŁY	707.08	289.90	—
KAMIEŃ POMORSKI	7.07	6.64	1.69
KIJE	9.29	0.37	0.16
KIJE NE	—	—	—

OIL DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [KT]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [KT]	PRODUCTION [KT]
KOSARZYN - E	—	—	—
KOSARZYN - S	—	—	—
KOSARZYN N	—	—	—
LUBIATÓW	3 854.33	1 776.16	322.15
LUBISZYN	5.96	5.82	2.36
MICHORZEWO	13.94	13.23	7.77
MOZÓW S	1.86	1.83	1.37
NAMYŚLIN	16.96	—	—
OŁOBOK	25.39	20.71	1.40
RADOSZYN	576.00	384.00	5.70
REKOWO	1.37	1.45	0.08
RETNO	14.61	14.61	2.86
RYBAKI	0.45	0.48	—
SIERAKÓW	157.81	116.50	—
SŁAWOBORZE	4.42	4.42	0.12
STĘŻYCA	86.57	8.05	0.05
WYSOKA	16.09	16.61	3.73
ZIELIN	0.82	0.42	0.89
ŻARNOWIEC	42.17	1.52	0.05
ŻARNOWIEC W	17.70	3.73	0.05

OIL AND GAS IN POLAND

OIL PRODUCTION AND DEMAND IN POLAND

In 2017, Poland produced 939 kt of crude oil and condensate, which is 4% of the total domestic demand. The balance of that much needed commodity was imported. Petroleum is the second largest source of primary energy (after coal) and satisfies approx. 25% of the total demand as the key fuel used by final consumers (mainly in the transport sector).



CRUDE OIL RESOURCES PRODUCTION, CONSUMPTION AND IMPORTS IN POLAND (1990 - 2017)

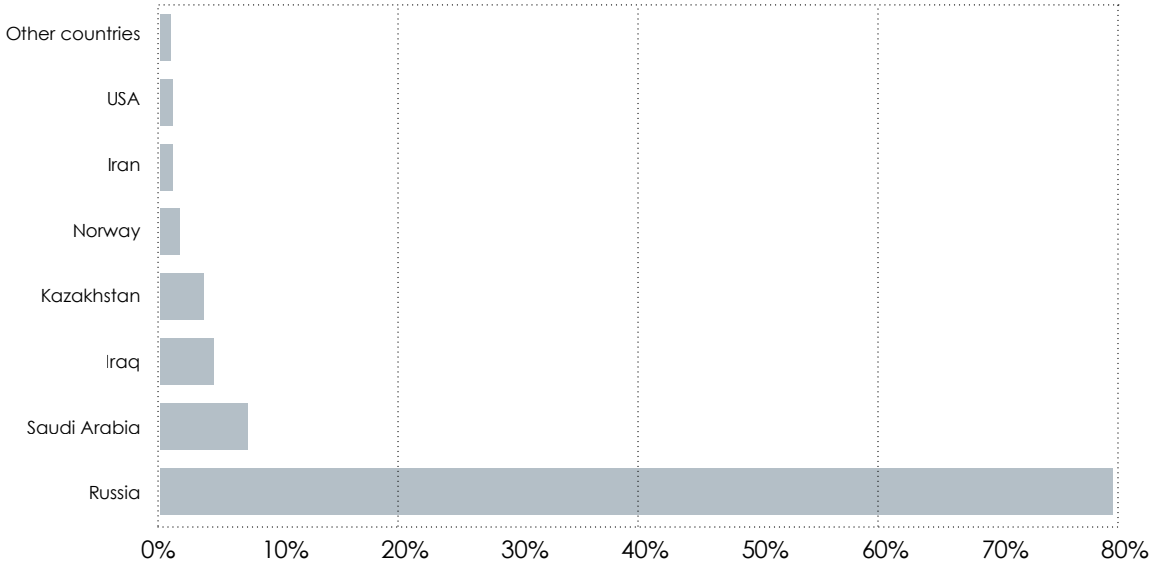
SOURCE: EUROSTAT, 2016; THE BALANCE OF MINERAL RESOURCES DEPOSITS IN POLAND 1990-2017; MINISTRY OF ENERGY; PGNIG S.A.; ORLEN; BP STATISTICAL REVIEW OF WORLD ENERGY 2016; STATISTICS POLAND 2017.


600-I-580

OIL AND GAS IN POLAND

OIL IMPORT

As of 2017, almost 80% of crude oil imports came from Russia through the Przyjaźń Oil Pipeline (comparing to almost 90% inn 2015). Oil imports from Middle East countries (Saudi Arabia – 7%, Iraq and Iran, as well as from Kazakhstan, Norway and the USA is gaining importance. Poland is technically prepared for increasing imports from countries other than Russia thanks to, among other, liquid fuel transhipment terminals on the Baltic Sea with a total capacity of 45 million tonnes per year. Gdańsk Naftport is the largest of them (44 million tonnes per year).



SHARES IN DELIVERIES TO DOMESTIC REFINERIES (2017).
SOURCE: IEA. POLAND, 2016

OIL AND GAS IN POLAND

GAS RESOURCES IN POLAND

As of end 2017, Poland produced 5 billion m³ of natural gas. This satisfied one third of the domestic demand that has been growing since early 1970s to reach 17.3 billion m³ in 2016 and rises steadily.

GAS	NUMBER OF DEPOSITS	EXPLOITABLE RESOURCES				ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
		ANTICIPATED ECONOMIC [MLN M³]			ANTICIPATED SUBECONOMIC [MLN M³]		
		TOTAL	A+B	C			
TOTAL RESOURCES	**295**	**116 956.98**	**72 184.62**	**44 772.36**	**2 230.26**	**50 607.80**	**5 009.12**
INCLUDING RESOURCES OF EXPLOITED FIELDS							
TOTAL	207	93 812.27	63 439.03	30 373.24	672.60	42 496.60	5 009.12
BALTIC SEA	2	787.60	783.68	3.92	—	704.53	25.82
CARPATHIANS	28	1 064.90	641.93	422.97	7.54	297.38	31.34
CARPATHIAN FOREDEEP	84	30 778.10	17 108.61	13 669.49	15.06	7 437.92	1 310.96
POLISH LOWLAND	93	61 181.67	44 904.81	16 276.86	650.00	34 056.77	3 641.00
INCLUDING RESOURCES OF NON-EXPLOITED FIELDS							
TOTAL	56	22 765.51	8 745.59	14 019.92	1 421.68	8 058.16	
BALTIC SEA	2	3 807.05	—	3 807.05	—	3 765.25	
CARPATHIANS	3	240.00	240.00	—	74.93	—	
CARPATHIAN FOREDEEP	12	2 450.39	101.00	2 349.39	—	1 145.52	
POLISH LOWLAND	39	16 268.07	8 404.59	7 863.48	1 346.75	3 147.39	
INCLUDING ABANDONED FIELDS							
TOTAL	32	379.20	—	379.20	135.98	53.04	
CARPATHIANS	5	80.00	—	80.00	92.44	—	
CARPATHIAN FOREDEEP	7	13.40	—	13.40	42.55	—	
POLISH LOWLAND	20	285.80	—	285.80	0.99	53.04	

OIL AND GAS IN POLAND

GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
BALTIC (2)	**4 594.65**	**4 469.78**	**25.82**
B 3	231.83	183.14	10.25
B 4	2 014.20	1 972.40	—
B 6	1 792.85	1 792.85	—
B 8	555.77	521.39	15.57
CARPATHIAN FOREDEEP (103)	**TOTAL: 33 241.89**	**TOTAL: 8 583.44**	**TOTAL: 1 310.96**
BATYCZE	2.51	4.91	4.87
BIAŁOBOKI	42.28	26.28	2.90
BISZCZA	114.52	81.45	2.41
BLIZNA-OCIEKA	119.95	33.19	—
BRZEZOWIEC I,II	112.61	44.06	0.01
BRZEZÓWKA	15.86	0.50	0.26
BRZEŹNICA	45.59	45.59	—
BRZÓZA KRÓLEWSKA	24.00		—
BUSZKOWICZKI	149.89	32.99	7.04
CHAŁUPKI	163.85	18.11	9.78
CHOTYNIEC	40.00		—
CIERPISZ	689.66	252.99	13.32
CZARNA	32.94	12.52	—
DĄBRÓWKA	26.58	3.45	1.38
DĘBOWIEC ŚLĄSKI	31.23	1.69	1.56
DZIKÓW	915.08	130.14	68.67
DZIKÓW STARY	16.00	16.00	—
GÓRA ROPCZYCKA	120.66	83.94	2.25
GRABINA-NIEZNANOWICE	324.20	12.42	1.89
GRABINA-NIEZNANOWICE S	205.53	110.33	0.10
GRĄDY BOCHEŃSKIE	—		—
GROBLA	53.70	0.80	0.26
GRODZISKO DOLNE	110.30	61.73	1.91
GUBERNIA	0.95		0.41
HUSÓW	372.88	372.88	—
HUSÓW-ALBIGOWA-KRASNE	1 480.83	348.13	25.71
JADOWNIKI	330.00		—
JAROSŁAW	816.81	73.52	8.25

GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
JASIONKA	1 024.37	546.18	43.02
JASTRZĄBKA STARA	0.68	0.47	0.07
JAŚNINY PÓŁNOC	195.60	24.47	9.82
JEŻOWE NW	13.10[P]	9.41	0.74
JODŁÓWKA	969.44	58.65	5.67
KACZYCE I	31.50		—
KAŃCZUGA	39.97	1.30	4.05
KĄTY RAKSZAWSKIE	16.10	8.62	0.45
KIELANÓWKA-RZESZÓW	2 134.24	152.66	52.08
KORZENIÓW	—		—
KORZENIÓW (GAZ)	6.57[P]		—
KOWALE	82.75	26.66	1.79
KRAMARZÓWKA	1 272.89	1 272.89	—
KSIĘŻPOL	218.87	11.37	3.31
KUPNO	102.37	55.48	3.68
KURYŁÓWKA	249.14	45.63	22.85
LIPNICA-DZIKOWIEC	154.00		—
LUBACZÓW	391.03	9.59	29.24
LUBLINIEC	183.62	96.56	14.74
ŁAPANÓW	286.12	286.10	8.14
ŁAPCZYCA	1.96[P]		0.16
ŁAZY	13.40		—
ŁĄKTA	205.70	11.78	2.88
ŁĘKAWICA	46.15	42.18	5.75
ŁĘTOWICE-	109.01	19.29	0.13
ŁUKOWA	245.34	203.70	13.60
MARKOWICE	65.98	63.42	6.44
MIROCIN	428.27	74.86	45.97
MOŁODYCZ	88.93	59.10	1.60
MORAWSKO	186.18	28.49	4.59
NIWISKA	21		—
NOSÓWKA	4.49	4.90	0.44
NOSÓWKA (GAS)	385.07	156.98	0.22

OIL AND GAS IN POLAND

GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
NOWOSIELEC	73.80	29.92	1.35
PALIKÓWKA	636.91	132.80	12.12
PILZNO POŁUDNIE	684.99	216.53	16.44
PODOLE	9.68	8.59	—
POGÓRSKA WOLA	14.98P	—	—
POGÓRZ	11.91	11.83	0.09
POGWIZDÓW	75.18	25.18	1.94
POTOK GÓRNY	34.69	—	1.37
PRUCHNIK	376.14	55.62	48.61
PRZEMYŚL	7 816.95	620.85	439.68
PRZEWORSK	345.77	207.30	26.99
RACIBORSKO	431.23	15.89	0.21
RAJSKO	122.85	34.85	6.56
RĄCZYNA	228.53	120.46	—
ROKIETNICA	120.00	—	—
RUDKA	130.02	33.77	9.57
RUDOŁOWICE	400.00	—	—
RYLOWA	398.16	94.78	26.16
RYSIE	14.58	0.76	0.43
SARZYNA	41.03	25.01	0.69
SMOLARZYNY	171.19	34.43	3.14
SOKOŁÓW	26.00	—	—
STOBIERNA	163.56	152.43	2.85
SWARZÓW	28.80	28.80	—
SZCZEPANÓW	186.90	96.56	4.52
TARNOGRÓD-WOLA	194.55	49.13	22.19
TARNÓW (JURASSIC)	251.22	187.02	5.26
TARNÓW (MIOCENE)	834.75	687.36	21.85
TERLICZKA	464.19	78.21	3.82
TRYŃCZA	20.00	—	—
TRZEBOWNISKO	335.80	149.95	0.68
USZKOWCE	—	—	—
WIERZCHOSŁAWICE	34.65	0.52	0.15
WOLA OBSZAŃSKA	206.76	139.68	18.08
WOLA ROKIETNICKA	137.54	137.54	22.20
WOLA ZARCZYCKA	16.00	—	—
WYGODA	8.17	—	
ZAGORZYCE	99.63	29.12	5.15
ZALESIE	1 887.09	139.65	141.18
ZAŁĘŻE	119.71	102.10	3.73
ŻOŁYNIA-LEŻAJSK	516.62	41.81	28.99
ŻUKOWICE	96.72	—	—
CARPATHIANS (36)	**1 384.90**	**297.38**	**31.34**
BEDNARKA	7.45P	—	0.45
BIECZ	1.93P	—	—
BÓBRKA-ROGI	19.09	0.25	0.06
CZARNA	0.97	0.03	0.15
DĄBRÓWKA	7.57	0.88	3.47
DOMINIK.-KOB.-KRYG	—	—	—
DRAGANOWA	86.45	40.67	0.90
DWERNIK	0.09P	—	0.02
FOLUSZ-PIELGRZYMKA	6.31	3.57	0.29
GORLICE	31.03	—	0.02
GORLICE-GLINIK	4.31	0.36	0.77
GRABOWNICA	—	—	1.13
HARKLOWA	0.18	0.11	
ISKRZYNIA	91.88P	—	—
IWONICZ-ZDRÓJ	5.84	2.16	0.30
JASZCZEW	206.24	59.41	4.51
JUROWCE-SROGÓW	37.98	22.28	6.56
KROŚCIENKO	0.89	0.48	0.01
LACHOWICE-STRYSZAWA	240.00	—	—
ŁODYNA	52.60	1.95	0.41
MAGDALENA	0.56P	—	—
OSOBNICA	41.50	2.96	0.60
POTOK	7.63	1.14	0.02
REG. GRABOWNICA	84.08	0.02	—
ROZTOKI	132.24	34.42	7.67

p – anticipated subeconomic

OIL AND GAS IN POLAND

GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
SANOK-ZABŁOTCE	139.15	—	3.27
SŁOPNICE	80.00	—	—
STRACHOCINA	121.50	121.50	—
STRZESZYN	2.66	2.29	—
SZALOWA	70.38	2.15	0.46
TURZE POLE-ZMIENNICA	0.05	0.05	0.02
WAŃKOWA	4.98	0.43	0.15
WETLINA	73.00P	—	—
WĘGLÓWKA	—	—	—
WOLA JASIENICKA	1.08	0.27	0.07
ZATWARNICA	0.19	—	0.01
POLISH LOWLAND (152)	**77 735.54**	**37 257.20**	**3 641.00**
ALEKSANDRÓWKA	140.50	58.61	10.78
ANTONIN 1	7.20	—	—
BABIMOST	815.00	—	—
BIAŁOGARD	36.93	31.63	11.08
BIAŁOGÓRA-E	0.86P	1.02	—
BŁOTNO	1.96	—	0.04
BMB	2 574.22	—	398.94
BOGDAJ-UCIECHÓW	3 367.79	2 142.65	81.03
BONIKOWO	328.63	—	—
BOROWO	65.00	—	—
BORZĘCIN	15.40	33.80	15.76
BRESLACK-KOSARZYN	—	—	—
BROŃSKO	14 149.58	12 749.65	866.08
BRZOSTOWO	60.81	35.25	2.42
BRZÓZKA	75.40	—	—
BUK	9.52	—	0.04
BUKOWIEC	66.83	45.33	—
CERADZ DOLNY	85.27	—	—
CIECHNOWO	15.92	27.73	7.11
CIECIERZYN	427.91	215.48	14.84
CZEKLIN	95.00	—	—
CZESZÓW	397.76	300.16	5.93

GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
DASZEWO	27.72	—	—
DASZEWO N	949.39	175.68	23.70
DĘBINA	189.71	—	—
DĘBKI	2.74	2.77	0.11
DUSZNIKI E	—	—	—
DZIEDUSZYCE	67.65	—	1.19
ELŻBIECINY	31.66	31.66	21.06
GAJEWO	13.15	13.44	2.71
GLINNIK	0.55	0.39	0.03
GORZYCE	28.00P	—	—
GORZYSŁAW N	313.88	120.00	38.18
GORZYSŁAW S	418.11	53.46	1.13
GÓRA	55.15	29.44	32.43
GÓRZYCA	336.10	301.06	32.18
GRABÓWKA E	32.74	21.18	—
GRABÓWKA W	170.00	—	—
GROCHOWICE	1 048.63	14.49	49.16
GRODZISK-26	1.01	7.80	—
GROTÓW	851.98	704.80	15.70
GRYŻYNA	420.85	—	—
JABŁONNA	227.58	227.58	54.38
JABŁONNA S	58.57	20.00	30.69
JABŁONNA W	159.13	158.43	28.40
JANKOWICE	—	—	—
JAROCIN	389.02	257.30	0.51
JASTRZĘBSKO	96.00	—	—
JENINIEC	0.97	—	—
KALEJE	404.38	257.24	0.01
KALEJE-E	3.25	2.81	0.13
KAMIEŃ MAŁY	129.58	57.73	—
KAMIEŃ POMORSKI	9.41	—	0.29
KANDLEWO	239.53	—	—
KARGOWA	2 650.00	—	—
KARMIN	495.74	495.74	
KĄKOLEWO	240.00	—	—
KIJE	4.04	—	—

OIL AND GAS IN POLAND

GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
KIJE NE	0.13p	—	—
KLĘKA E	—	—	—
KOMORZE	340.05	—	—
KOSARZYN – E	—	—	—
KOSARZYN – S	—	—	—
KOSARZYN N	—	—	—
KOŚCIAN S	3 081.27	1 504.26	338.52
KOŚCIAN S-CA2	1 310.00p	—	—
KROMOLICE	44.84	44.75	19.98
KROMOLICE S	443.65	393.92	1.85
KULÓW	34.95	—	—
LIPOWIEC	100.00	—	—
LIPOWIEC E	462.77	157.07	—
LISEWO	778.82	774.82	45.49
LUBIATÓW	1 115.49	845.16	184.05
LUBISZYN	2.14	—	0.88
ŁĘKI	30.32	24.47	1.58
MEŁGIEW A I	734.25	127.56	20.31
MICHORZEWO	3.91	—	1.60
MIĘDZYCHÓD	4 209.64	2 085.80	51.47
MIĘDZYZDROJE E	300.00	—	—
MIĘDZYZDROJE W	300.00	—	—
MIŁOSŁAW E	926.45	925.00	—
MŁODASKO	17.38	17.38	24.62
MOZÓW S	0.47	—	0.16
NAMYŚLIN	24.72	—	—
NARATÓW	54.83	33.32	23.62
NIECHLÓW	130.35	9.52	14.38
NIEMIERZYCE	—	—	—
NOWA SÓL	8.75p	—	—
NOWY TOMYŚL	409.42	288.32	23.44
OŁOBOK	4.82	—	0.15
PAKOSŁAW	249.00	—	—
PAPROĆ	3 063.11	2 650.85	186.78
PAPROĆ W	1 926.04 650.00p	1 746.09	132.21
PODRZEWIE	321.90	0.31	4.44
PORAŻYN	87.89	52.02	—
PRZYTÓR	360.00	—	—
RADLIN	2 939.21	1 155.19	146.25
RADOSZYN	114.33	100.39	0.92
RADZIĄDZ	160.71	—	10.83
RADZIĄDZ-W	40.00	—	—
RAWICZ	475.00	—	—
RAWICZ-DOLOMITE	230.00	—	—
REKOWO	0.27	—	0.01
RETNO	1.94	—	0.34
ROSZKÓW	185.76	185.67	20.79
RÓŻAŃSKO	2 231.52	744.49	—
RUCHOCICE	400.57	368.87	39.41
SĘDZINY	80.00	—	—
SIERAKÓW	93.91	55.62	—
SŁAWOBORZE	59.19	58.32	5.53
SŁAWOBORZE	1.45	—	0.06
SOLEC	76.00	—	—
STANOWICE	602.03	—	—
STĘSZEW	—	—	—
STĘŻYCA	401.79		
STRYKOWO	—	—	—
SZEWCE E	53.21	—	—
SZEWCE W	—	—	—
SZLICHTYN-GOWA	138.05	112.79	25.41
ŚLUBÓW	2.11	—	8.72
ŚRODA	136.37	136.34	20.59
TARCHAŁY	1 512.59	404.74	11.86
TRZEBUSZ	6.41	6.41	5.18
TURKOWO	50.00	—	—

p – anticipated subeconomic

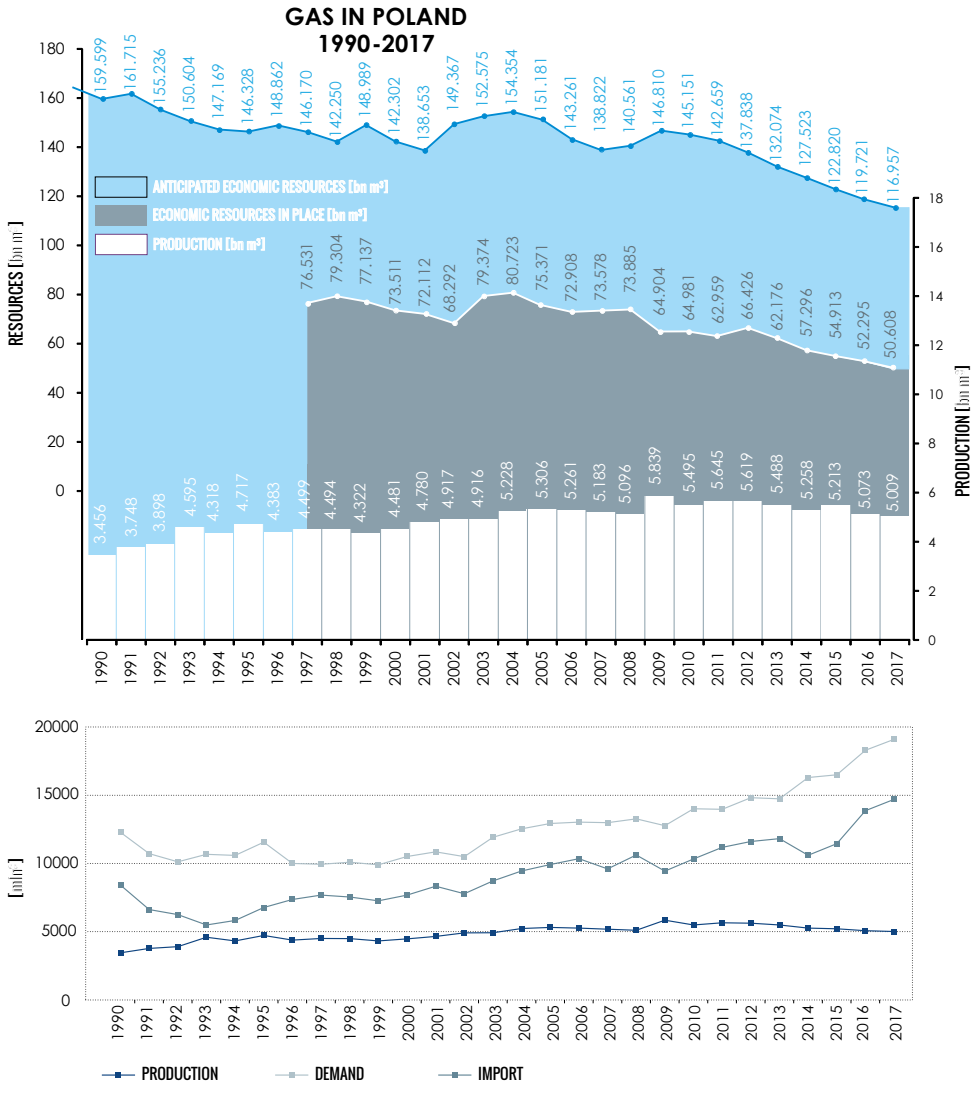
OIL AND GAS IN POLAND

GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]	GAS DEPOSITS	ANTICIPATED ECONOMIC RESOURCES AS A PART OF EXPLOITABLE RESOURCES [MLN M³]	ECONOMIC RESOURCES IN PLACE AS PART OF ANTICIPATED ECONOMIC RESOURCES [MLN M³]	PRODUCTION [MLN M³]
UJAZD	103.29	0.30	0.10	WINNA GÓRA	108.53	104.64	17.78
UNIKÓW	170.00	—	—	WRZOSOWO	600.00	—	—
WIELICHOWO	659.72	648.96	104.01	WYSOCKO	4.32	2.29	0.66
WIERZCHOWICE	5 728.12	—	—	WYSOCKO MAŁE E	47.26	47.05	1.21
WIERZCHOWICE E	14.68	—	—	WYSOKA	2.74	—	0.27
WIERZCHOWICE W	37.55	—	—	ZAKRZEWO	210.00	—	—
WIERZCHOWO	10.78	10.69	—	ZAŁĘCZE	256.90	—	101.25
WIERZOWICE	390.53	93.36	2.55	ZANIEMYŚL	281.19	279.84	—
WIEWIERZ E	—	—	3.31	ZBĄSZYŃ	2 520.00	1 671.03	—
WIEWIERZ	2.25	1.98	1.86	ZIELIN	—	—	5.43
WILCZE-ROTLIEGEND	498.73	—	—	ŻAKOWO	2 150.00	—	—
WILCZE-DOLOMITE	285.00	—	—	ŻARNOWIEC	6.82	1.25	0.07
WILGA	—	—	—	ŻARNOWIEC W	1.42	0.79	0.46
WILKÓW	618.76	508.86	93.82	ŻUCHLÓW	701.20	177.07	190.72

P – anticipated subeconomic

OIL AND GAS IN POLAND

GAS PRODUCTION AND DEMAND IN POLAND



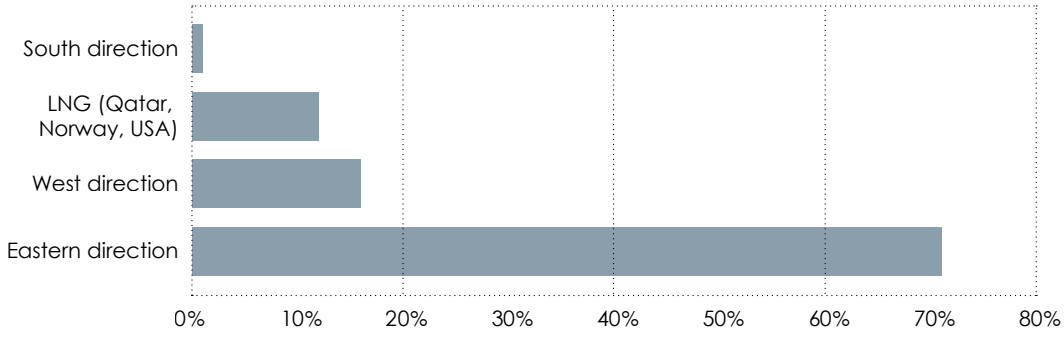
NATURAL GAS RESOURCES, PRODUCTION, CONSUMPTION AND IMPORTS IN POLAND (1990 - 2017)

SOURCE: EUROSTAT, 2016; THE BALANCE OF MINERAL RESOURCES DEPOSITS IN POLAND 1990-2017; MINISTRY OF ENERGY; PGNIG S.A.; ORLEN; BP STATISTICAL REVIEW OF WORLD ENERGY 2016; STATISTICS POLAND 2017.

OIL AND GAS IN POLAND

GAS IMPORT

Natural gas imports amounted to 14.7 billion m³ in 2017 and satisfied over 76% of the total domestic consumption. The east direction (mostly Russia) supplied the most of natural gas imported in 2017. The west direction was the other significant source of imported gas that supplied 16% of gas. Poland actively makes efforts to diversify gas supply, including LNG imports to the Świnoujście LNG Terminal, extension of gas connections with neighbouring countries (the socalled interconnectors or reversible gas pipelines that allow for the flow of gas in both directions) and the planned connection with Denmark (Baltic Pipe project) that would enable access to the gas from Norwegian fields.



THE STRUCTURE OF POLAND'S SUPPLY OF NATURAL GAS (2017)
SOURCE: PGNIG S.A.

TRANSMISSION AND STORAGE

Natural gas is transported through a grid of transmission and distribution pipelines that in total is 190 000 km long, including almost 11 000 km of gas transmission pipelines. There are 65 points of entry in the transmission system that enable delivery of gas from imports, underground gas storage facilities, mines or domestic production sites to the grid. The volume of transmitted gas is in excess of 14 billion m^3 per year. Moreover, a 684 km-long transit section of the Yamal Gas Pipeline, connecting gas fields in the north of Russia with West Europe, crosses the Polish territory. A LNG (Liquid Natural Gas) terminal, commissioned in 2016, is in operation at Świnoujście. The LNG technology involves transportation of liquefied natural gas by special tanker ships (methane carriers) in a temperature of approx. – 162°C to gas terminals for regasification, i.e. converting back to natural gas at atmospheric pressure. Liquefied gas takes up about 1/600th the volume of natural gas in the gaseous state. Once regasified, the gas is transported by pipelines to the users. The capacity of Świnoujście Terminal is 5 billion m^3 of gas per year, and may be increased to 7.5 billion m^3, or about 50% of the total gas requirements of Poland. LNG is increasingly used for transportation of natural gas. Currently, some 42% of the internationally traded natural gas is transported in the form of LNG. Crude oil is transmitted by pipelines. This is and environmentally friendly and effective way of transportation due to high throughput capacities of oil pipelines. The main oil pipelines are:

• The "Przyjaźń" ("Friendship") Pipeline – a double pipeline running from the Adamowo, border crossing with Belarus, to Schwedt in Germany. The Adamowo-Płock section is 234 km long (transmission capacity: approx. 43 million tonnes per year). The Płock-Schwedt section is 416 km long with a transmission capacity of 27 million tonnes per year)

• The reversible 237 km-long Pomeranian Pipeline with transmission capacities of up to 1 million tonnes in the direction of Gdańsk and 28 million tonnes in the direction of Płock. The pipeline connects the "Przyjaźń" Pipeline with Naftoport Terminal in Gdańsk.

STORAGE

Gas storage is primarily intended to enhance gas availability in the periods of a higher demand for gas, insofar as gas supply must remain stable throughout the year due to technology requirements. Crude oil is stored in either surface or underground tanks. Like natural gas, crude oil may be stored in salt caverns, too. There are nine Underground Natural Gas Storage (NUGS) facilities in Poland, of which seven for high-methane gas and two for nitrogen-rich gas, with a total capacity of 2.9 billion m^3 (as of end 2015), which represents approx. 18.3% of the annual consumption. UNGS facilities act as strategic reserve by absorbing any surplus of supply in the summer and offsetting a higher demand in the winter. All storage facilities are owned and operated by PGNiG (Polish Oil and Gas) Company. The storage facilities are commonly established in:

• depleted natural gas or oil reservoirs – the most common type of underground natural gas storage facilities. They have the advantage of an excellent knowledge of the local geological structure, pre-existing equipment, drilling wells and surface infrastructure, including piped connections to the transmission system. They are capable of only one gas injection/withdrawal annual cycle.

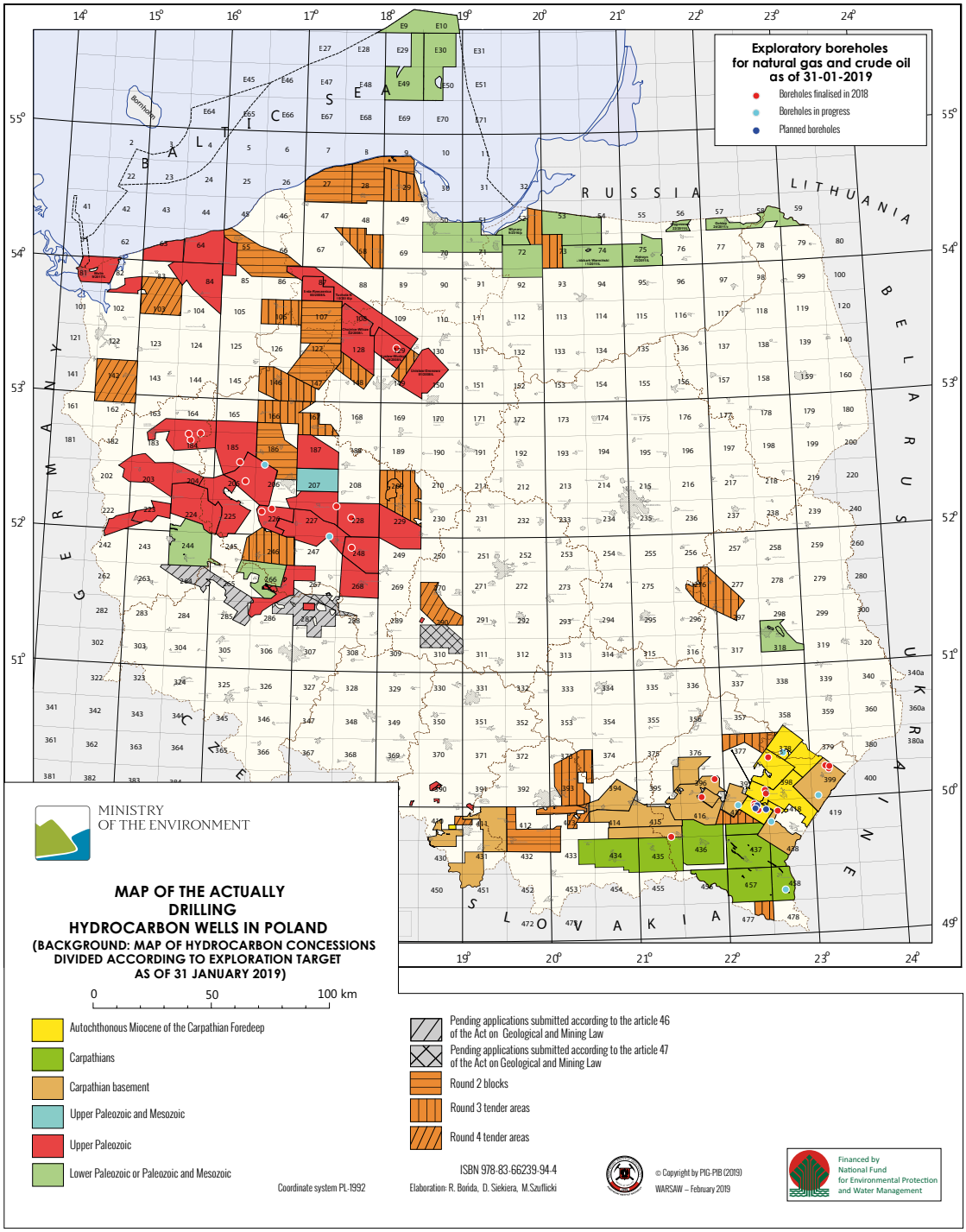
• salt caverns – the caverns are created by leaching the salt out and their advantages include long-term gas storage and several injection/withdrawal annual cycles capability.

• aquifer storage – there are no facilities of this kind in Poland.

TYPE	LOCATION	WORKING CAPACITY [MLN M^3]	MAX WITHDRAWAL RATE [MLN M^3/DAY]	MAX INJECTION RATE [MLN M^3/DAY]
DEPLETED GAS RESERVOIR	BRZEŹNICA	100	0.93	1.1
	HUSÓW	500	5.76	1.15
	STRACHOCINA	360	3.36	2.64
	SWARZÓW	90	1.0	1.0
	WIERZCHOWICE	1 200	9.6	6.0
SALT CAVERN	KOSAKOWO	145	9.6	2.4
	MOGILNO	590	18	9.6

UNDERGROUND HIGH-METHANE GAS STORAGE FACILITIES IN POLAND

SOURCE: PGNIG S.A.


Exploratory boreholes
for natural gas and crude oil
as of 31-01-2019
Boreholes finalised in 2018
Boreholes in progress
Planned boreholes
MINISTRY
OF THE ENVIRONMENT
MAP OF THE ACTUALLY
DRILLING
HYDROCARBON WELLS IN POLAND
(BACKGROUND: MAP OF HYDROCARBON CONCESSIONS
DIVIDED ACCORDING TO EXPLORATION TARGET
AS OF 31 JANUARY 2019)
0
50
100 km
Autochthonous Miocene of the Carpathian Foredeep
Carpathians
Carpathian basement
Upper Paleozoic and Mesozoic
Upper Paleozoic
Lower Paleozoic or Paleozoic and Mesozoic
Pending applications submitted according to the article 46
of the Act on Geological and Mining Law
Pending applications submitted according to the article 47
of the Act on Geological and Mining Law
Round 2 blocks
Round 3 tender areas
Round 4 tender areas
Coordinate system PL-1992
ISBN 978-83-66239-94-4
Elaboration: R. Bonda, D. Siekiera, M.Szuflicki
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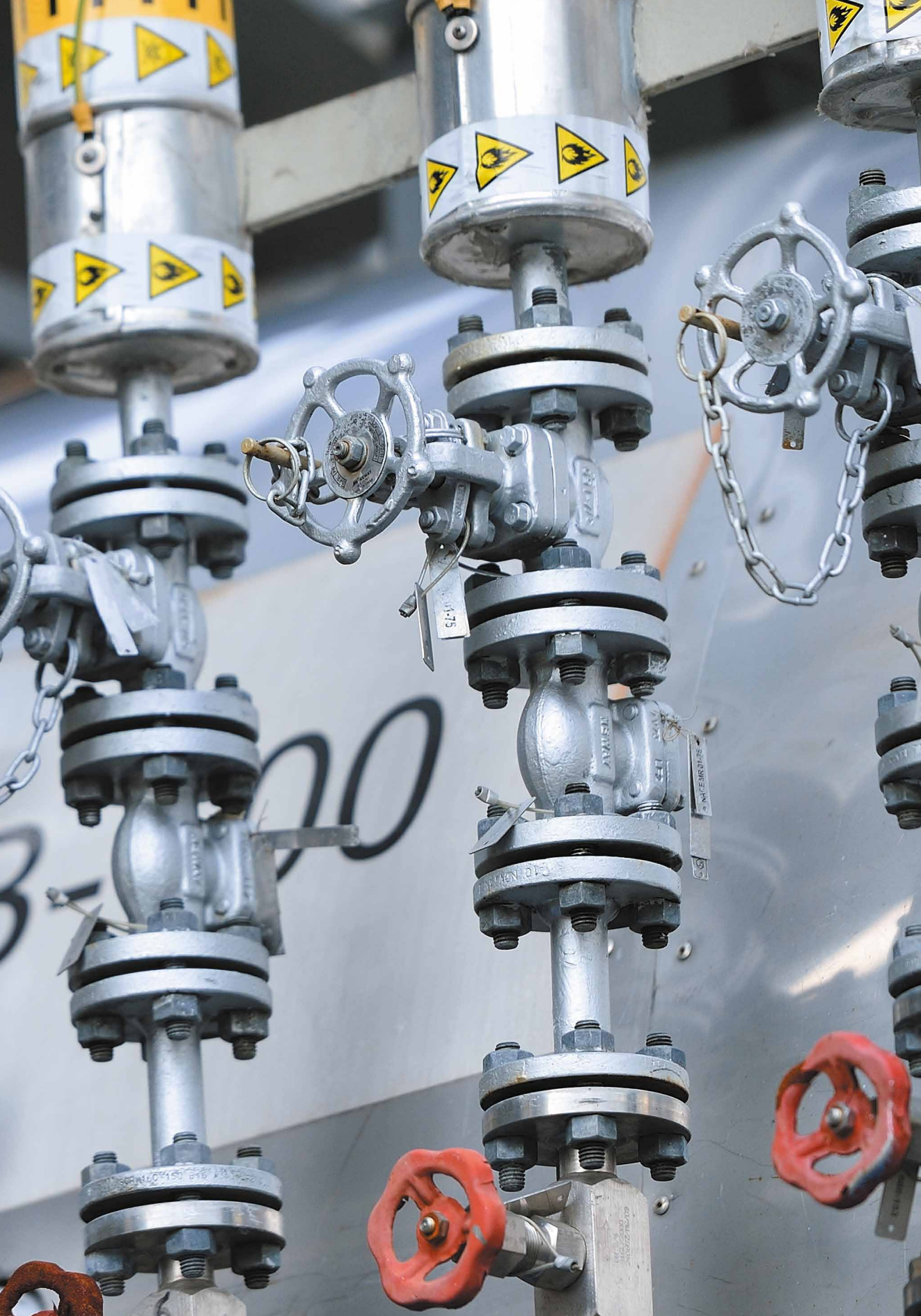

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Ministry of the Environment

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