



MINISTER ENERGII

Preventive Action Plan

prepared on the basis of art. 4.1.a of the *Regulation No 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC*

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3rd Edition

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1. Legal basis

In accordance with the provisions of the Act of 4 September 1997 *on government administration* (Polish Journal of Laws of 2016, item 543, as amended) the Minister of Energy shall exercise supervision over the functioning of the domestic energy systems, including the principles of rational economy and energy security needs of the country. In addition, the Act of 10 April 1997 – *Energy Law* (the Journal of Laws of 2012, item 1059, as amended) provides that the responsibilities of the Minister of Energy in the scope of energy policy shall include, *inter alia*, the supervision of the security of supply of gaseous fuels.

The Minister of Energy, as an authority responsible for the security of the supplies of natural gas within the meaning of art. 3.2 of the *Regulation No 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC* (hereinafter referred to as Regulation 994/2010), acting pursuant to art. 4.1. as read in conjunction with art. 5.4 of the Regulation 994/2010 hereby presents the update of the Preventive Action Plan prepared on the basis of the 2016 *Risk Assessment Relating to the Security of Gas Supply in Poland* (hereinafter referred to as the Risk Assessment).

2. Summary

The present Preventive Action Plan contains an analysis of the threats identified in the Risk Assessment and presents proposals for actions the implementation of which will contribute towards an increase of Poland's energy security in the natural gas sector.

The definition of protected customer¹ encompasses household consumers connected to the natural gas distribution network, entities providing essential social services as well as district heating installations to the extent that they deliver heating to household customers and to the entities referred to above. All energy undertakings selling natural gas to protected customers within the territory of the Republic of Poland are under an obligation to apply measures aimed at ensuring gas supplies to their customers in cases referred to in art. 8.1 of the Regulation 994/2010 (the so-called supply standard). The quantity of natural gas necessary to satisfy the requirements of the aforementioned supply standard for natural gas customers which have the status of protected customer is approximately 9.841,4 GWh of natural gas over the course of 30 days of exceptionally high demand for natural gas.

The present document outlines the actions aimed at ensuring the implementation of the infrastructure standard, i.e. the capacity of infrastructure to satisfy peak demand during a day of exceptionally high gas demand occurring with a statistical probability of once in 20 years (N-1 factor). Regulation 994/2010 imposes upon the Member States an obligation to apply measures aimed at ensuring that the N-1 factor reaches the level exceeding 100% by December 3, 2013. The current value of the N-1 factor for Poland is 127,6%.

¹ Notified to the European Commission on 2.12.2011, sign: DRO-III-41220-2/16/11, ref. no. 2394/11.

3. Results of the 2016 Risk Assessment Relating to the Security of Gas Supply to Poland and the infrastructure standard.

During the 2016/2017 winter peak, the anticipated maximum gas demand was estimated at 80,5 mcm/day (approximately 883 GWh/day²). This figure is in line with the forecast of gas consumption prepared by OGP GAZ-SYSTEM S.A.

Technical capacities to receive gas from sources are available at the level of approx. 125,6 mcm/day (1 378 GWh/day), assuming the maximum available capacities of entry points for imported gas and withdrawal capacities for UGS facilities, i.e. withdrawal capacity at the beginning of the cycle of gas withdrawal from storage facilities (at the beginning of the characteristics). The expansion of Mallnow metering station and Point of Interconnection (hereinafter referred to as POI) has enabled a physical backhaul on the Yamal pipeline to Poland making it possible to physically deliver gas from eastern Europe in case of disruption of planned gas deliveries through Belarus as well as in case of contractual congestions from OOO GAZPROM EXPORT. Furthermore, at the Wysokoje point there are unused technical capacities of 5,7 mcm/day (62,5 GWh/day), which should be used as a market-based measure, for example, in the event of disruption to natural gas supply at the Drozdowicze point (measure is available after agreeing with the supplier). It needs to be emphasized that a political crisis involving a conflict with a country which supplies natural gas may make it impossible to increase the supplies of gas delivered through the Wysokoje point.

²1 m³ of methane-rich natural gas = 10.972 kWh
1 m³ of high-nitrogen natural gas (Lw) = 9.111 kWh
1 m³ of high-nitrogen natural gas (Ls) = 8.000 kWh

Table 1. List of interconnection points.

Point name	Interconnector between	Transmission capacity (GWh/d)		comments
		Entry PL	Exit PL	
Tietierowka	PL - BY	7,3	-	supply local demand
Kondratki	PL - BY	1024,3	-	Entry to Polish Transmission System is determined by the capacity of Point of Interconnection - 254,4 GWh/d
Wysokoje	PL - BY	169,1	-	
Drozdowicze	PL - UA	135,6	-	
Hermanowice	PL - UA	-	45,3	only on ininterruptible basis
GCP GAZ-SYSTEM/ONTRAS	PL - DE	48,7	26,8	
Mallnow	PL - DE	164,9**	931,1	
Cieszyn	PL - CZ	28,0/4,3*	-	

* 28,0 - October - April; 4,3 - May - September.

**187,4 (GWh/d) from 01.01.2017.

In the analysis of uninterrupted system operation the following assumptions were made:

- level of daily supply of imports on the eastern border at the level of the maximum contractual capacities (contractual limitations have been taken into account on the trading side), i.e. using the capacity allocation on continuous and interruptible basis;
- the entry point from Transit Gas Pipeline System (Point of Interconnection, hereinafter referred to as POI) is operating at full technical capacity – 23 mcm/day (254,4 GWh/day) on the basis of virtual reverse flow service at Yamal pipeline.
- supply from the GCP GAZ-SYSTEM/ONTRAS and Cieszyn entry points at full technical capacity;
- the volume of gas supplies from domestic sources at the level of 6,8 mcm/day (74,6 GWh/day);
- analyses take into account supplies from the LNG Terminal in Świnoujście to the level of 13,7 mcm/day (158 GWh/day). In June 2016, the first ship arrived at the LNG Terminal in Świnoujście carrying first commercial delivery of liquefied natural gas;
- gas withdrawal capacity from UGS facilities at the level of technical capacity, i.e. 47,7 mcm/day (523,3 GWh/day).

N-1 factor calculated for the purposes of Risk Assessment, with the analyzed area being the territory of the Republic of Poland (values provided in mcm at the temperature of 0°C, i.e. in accordance with the Polish Standards), on the basis of the data for the single largest natural gas infrastructure system in Poland, i.e. System's Regulating and Metering Station Włocławek (possibility of supply to the system at the level of 23.0 million mcm/day - 254,4 GWh/day). The values adopted in the following calculations were derived from statistical surveys of the Minister of Energy, information obtained from the entities responsible for the performance of tasks related to the security of the gas system operation for the previous calendar year, and the data obtained in the course of correspondence with representatives of the gas sector; these values are as follows:

EPm	57,4
Sm⁽¹⁾	47,8
Pm⁽²⁾	6,8
LNGm	13,7
Im	23,0
D_{max}	80,5
N-1	127,6%

(1) technical capacity of UGS facility (Sm) defined for the state of full fill level of active volume.

(2) production capacity of nitrogen removal plant at peak demand times does not correspond to technical capacity.

The condition of the Polish gas system in terms of security thereof has been determined on the basis of calculations performed for the purposes of Risk Assessment. The value of the N-1 factor exceeds 100%, which means that the existing infrastructure is able to satisfy customers' gas demand even in the event of disruption of the single largest component of the said infrastructure. Nevertheless, the detailed analyses of gas distribution pertaining to individual supply disruption scenarios indicate that there is a need to make further investments in the field of gas infrastructure. The most sensitive scenario with regard to supply disruption is "eastern variant" (lack of gas deliveries from eastern direction). Also identified cases where there may be serious problems with gas supply due to failure of large / important objects of the system and the limited capacity of some pipelines of the national transmission system. The analyses performed have helped to identify the so-called "bottlenecks"; the operator has undertaken investment activities, the implementation of which will help eliminate such bottlenecks and improve the security of gas supply.

Until recently, the Polish transmission system was oriented towards a single direction of supplies. Traditionally, gas was transmitted along the east-west axis, with natural gas originating from one supplier only. Such situation had changed after Poland undertook

genuine diversification activities such as making physical reverse on Yamal pipeline possible as well as launching LNG Terminal, which improved State's energy security and the diversification of sources of supply. It is worth mentioning that investments already finished by OGP GAZ-SYSTEM S.A. such as extension and modernization of Gustorzyn, Odolanów and Rembelszczyzna gas nodes as well as constructed gas pipelines Gusotrzyn - Rembelszczyzna, Gustorzyn - Odolanów, Szczecin - Gdańsk and Szczecin - Lwówek significantly improved safety by increasing capacities in key parts of the transmission system.

It needs to be pointed out that in the event of a political crisis involving a conflict with the country which supplies natural gas, in case of long-term disruption, situations may occur in which there is no real possibility of ensuring alternative supplies of natural gas. In particular, in the event that the supply of natural gas through three main pipelines supplying the European market (the *Nord Stream*, *Yamal* and *Brotherhood* pipelines) is interrupted, one is compelled to conclude that it will not be possible to ensure stable supplies of natural gas to Central Europe. The introduction of supplies through the physical reverse flow on the Yamal-Europe gas pipeline presupposes the availability of natural gas on the German market, which may be problematic in the case of the aforementioned scenario.

If Poland undertakes genuine diversification activities associated with the construction of "North gate" and the North-South Gas Corridor – with particular emphasis on the construction of Baltic Pipe and expansion of LNG Terminal – this situation will change. The construction of the "North gate" will contribute towards the diversification of sources of gas supply in Poland.

4. The needs of protected customers and the supply standard

According to the article 2.1 of the Regulation 994/2010 the definition of protected customer includes household consumers connected to the natural gas distribution network, entities providing essential social services as well as district heating installations to the extent that they deliver heating to household customers and to the entities referred to above.

Moreover, small and medium sized enterprises connected to a gas distribution network and essential social services, connected to a gas distribution or transmission network may only be considered "protected" in so far they do not represent more than 20 % of the final gas consumption.

Statistical data gathered by the Ministry of Energy indicate that gas consumption by the additional groups of protected consumers do not exceed 20% of the total consumption. The total share of small and medium-sized enterprises and providers of essential social services is 12% of the final consumption of gas. Natural gas consumption of the household customers is 27% of the final use of gas.

Natural gas consumption - 2015	Household customers	Small and medium enterprises	Essential social services [PKD2007 - 85, 86, 87, 88]	District heating
100%	27%	9%	3%	3%

All gas undertakings selling natural gas to protected customers within the territory of the Republic of Poland are under an obligation to apply measures aimed at ensuring gas supplies to their customers in cases referred to in art. 8.1 of the Regulation 994/2010. The table below presents the quantities of gas used by protected customers within the meaning of the aforementioned definition in cases specified in art. 8.1 of the Regulation 994/2010.

Table 2: Supply standard for protected customers in accordance with art. 8.1 of the Regulation 994/2010.

Energy undertaking	Type of gas	Standard: extreme temperatures throughout the period of 7 days of peak demand for gas	Standard: 30 days of exceptionally high demand for gas	Standard: 30 days of disruptions to the single largest gas infrastructure
		likelihood of occurrence – once in every 20 years [GWh]	likelihood of occurrence – once in every 20 years [GWh]	average winter conditions [GWh]
Supplier 1	E (high-methane gas)	128,1	548,9	513,5
	Lw (low-methane gas subgroup)	22,6	96,9	78,8
Supplier 2	E (high-methane gas)	1957,2	8388,1	6205,2
	Lw (low-methane gas subgroup)	68,7	294,4	195,5
	Ls (low-methane gas subgroup)	29,4	125,9	77,6
Supplier 3	E (high-methane gas)	21,9	94,6	21,0
Supplier 4	E (high-methane gas)	0,01	0,2	0,2
Supplier 5	E (high-methane gas)	0,8	3,5	2,8
Supplier 6	E (high-methane gas)	0,2	1,0	0,3
Supplier 7	E (high-methane gas)	11,5	3,8	19,5
Supplier 8	E (high-methane gas)	0,2	1,0	0,6
Supplier 9	E (high-methane gas)	51,1	175,2	34,5
Supplier 10	E (high-methane gas)	0,1	0,5	0,1
Supplier 11	E (high-methane gas)	25,1	107,4	107,4
Total (GWh)		2316,9	9841,4	7257,0

Source: Research based on data provided by energy undertakings.

It has been determined on the basis of data provided by Polish gas suppliers that the quantity of natural gas necessary to satisfy the requirements of the aforementioned supply standard for natural gas customers which have the status of protected customers is

approximately 9 841,4 GWh of natural gas over the course of 30 days of exceptionally high demand for natural gas. The above supply standard is covered by the volume of compulsory stocks of natural gas amounting to 8 505,64 GWh as well as by trade stocks which amount to a further 24 TWh.

5. Duties with respect to the security of operation of the gas system

5.1. The role of operators in ensuring the security of natural gas supplies

According to art. 9c.1 of the *Energy Law*³, transmission system operator, distribution system operator and storage system operator shall – insofar as pertinent to their respective fields of operation – be responsible, *inter alia*, for:

- 1) the security of supply of gaseous fuels by ensuring the security of operation of the gas system and the implementation of the contracts concluded with the users of this system;
- 2) coordinated and effective dispatching;
- 3) operation, maintenance and repairs of the network, installations and facilities;
- 4) ensuring the long-term gas system capability to satisfy the reasonable needs in terms of the transmission of gaseous fuels in domestic and cross-border trading, the distribution and storage of such fuels or gas liquefaction as well as in terms of the extension of the gas system (and, where applicable, the extension of interconnections with other gas systems);
- 5) the cooperation with other gas system operators or energy undertakings for the purposes of ensuring the reliable and efficient functioning of gas systems and of coordinating the development thereof;
- 6) the exercise of control over the capacities of gas storage facilities and liquefied natural gas facilities;
- 7) the management of gaseous fuels distribution and the maintenance of quality parameters of such fuels;
- 8) the provision of services essential to ensure the correct functioning of the gas system;
- 9) the balancing of the system and the management of gas system limitations which constitute a non-market based measure within the meaning of Regulation 994/2010;

³ The Journal of Laws of 2012, item 1059, as amended.

10) the provision of information to system users and the operators of other systems concerning the conditions for the provision of transmission or distribution services, gaseous fuel storage services or natural gas liquefaction services, including information on the cooperation with interconnected gas systems.

In addition, in accordance with the Act of 16 February 2007 *on stocks of crude oil, petroleum products and natural gas, and the rules of conduct in circumstances of a threat to the fuel security of the State and disruptions on the petroleum market*⁴ (hereinafter referred to as the Act on Stocks), the operators of transmission systems, distribution systems and interconnected gas systems are under an obligation, *inter alia*, to develop natural gas consumption restriction plans (art. 58 of the Act on Stocks).

The restriction plans developed by operators shall determine the maximum hourly and daily quantities of natural gas consumption by individual customers connected to their respective networks for each individual supply level. Following the development of the aforementioned schemes, operators shall notify the customers of the applicable maximum natural gas consumption quantity for each individual supply level as specified in the approved restriction plan. The quantities in question shall be incorporated into the gas supply contracts, transmission service contracts or gas distribution contracts as well as into comprehensive service contracts. It needs to be pointed out that the restrictions which stem from the restriction plans shall not be applicable to household natural gas consumers as well as to customers whose consumption of natural gas does not exceed 417 cm/h (4,6 MWh/h).

During the period in which natural gas restrictions remain in force, the transmission system operator:

- 1) performs duties related to the imposition of restrictions by determining and publicly announcing the supply levels, in accordance with the restriction plans;
- 2) coordinates the activities of energy undertakings, other gas system operators and storage system operators in order to ensure the security of the gas system and the implementation of the limits imposed;
- 3) uses the full capacity and available volume of natural gas storage installations connected to the gas system;
- 4) releases compulsory natural gas stocks (with the consent of the Minister of Energy).

⁴ The Journal of Laws of 2014, item 1695, as amended.

5.2. The tasks of energy undertakings in ensuring the security of natural gas supplies

In accordance with the provisions of Regulation 994/2010, in the event of disruptions in the supplies of gas or of exceptionally high demand for gas, energy undertakings shall first of all apply instruments based on market mechanisms. In the event of an emergency, instruments based on market mechanisms should be accorded priority in the process of mitigation of the consequences of supply disruptions. In cases where, despite the fact that all applicable market-based measures have been applied for the purposes of securing gas supplies, the available gas supplies have nevertheless proved insufficient (including, in particular, insofar as the needs of protected customers are concerned), non-market based measures may also be applied (including the release of compulsory stocks as well as introducing natural gas consumption restrictions).

In accordance with art. 49 of the Act on Stocks, energy undertakings which engage in economic activities involving international trading of natural gas and the import of natural gas as well as entities commissioning services which involve the transmission or distribution of natural gas are under an obligation to have in place procedures applicable in the event of:

- 1) disruptions to the supply of natural gas to the gas system;
- 2) unexpected increase in the consumption of natural gas by customers.

The aforementioned procedures should, in particular, define the manner of:

- 1) obtaining additional supplies of natural gas from other sources or directions;
- 2) reducing the consumption of natural gas by customers, in accordance with the terms and conditions of the contracts concluded with such customers, in a manner which does not constitute a restriction on the consumption of gas.

The procedures referred to above are agreed upon with the entities responsible for the implementation thereof, including, as appropriate, with the operators of other gas systems, and subsequently provided to the transmission system operator.

In addition, pursuant to art. 50.1 *of the Act on Stocks*, energy undertakings shall perform activities aimed at preventing the risk of disruptions to the supplies, including, in particular, the activities specified in the applicable procedures. One is therefore compelled to conclude that the aforementioned procedures do not impose restrictions on enterprises insofar as their ability to apply other market-based measures for the purposes of preventing disruptions to the supply of natural gas is concerned.

Art. 24 of the *Act on Stocks*, on the other hand, imposes upon energy undertakings which engage in economic activities involving international trading of natural gas and the import of natural gas shall be under an obligation to maintain compulsory stocks of natural gas, to ensure the supply of gas to Poland and minimize the impact of: threat to the fuel supply safety of the state, malfunctioning of the networks of gas system operators or unexpected increase in the natural gas consumption.

Compulsory stocks of natural gas are maintained in a quantity which corresponds to at least 30 days of average daily import of such gas, using storage facilities the technical parameters of which ensure that the stocks in question may be released into the gas system in their entirety within a period not exceeding 40 days. Compulsory stocks may be maintained outside the territory of the Republic of Poland – within the territory of another member state of the European Union and the member state of the European Free Trade Agreement (EFTA), which is a party to the agreement on the European Economic Area, in the storage installations connected to the gas system which comply with the requirements laid down in the *Act on Stocks*. In particular, the technical parameters storage facilities and gas networks, to which installations are attached, should provide the ability to deliver within 40 days of the total amount of mandatory reserves held outside the territory of the Polish to national transmission or distribution network.

In connection with the change of the *Act on Stocks*, has been expanded list of entities obliged to maintain compulsory stocks of natural gas. This modification will positively affect the polish energy security by inhibiting the downward trend in the level of compulsory stocks, which this trend has been observed over the years.

6. Obligations to provide public services related to the security of natural gas supplies

Public duties related to the to the security of natural gas supplies are laid down in two legal instruments, i.e. *the Energy Law* and *the Act on Stocks*.

6.1. The Energy Law

According to art. 9c.1 of the *Energy Law*, the transmission system operator shall be responsible for the security of supply of gaseous fuels. In order to achieve this objective,

the operator in question shall be under an obligation to ensure the security of the functioning of the gas system and the implementation of contracts concluded with the users thereof.

Art. 4.1 of the *Energy Law* imposes upon the system operator an obligation to ensure that the facilities, installations and networks have the capacity to ensure the continuous and reliable supply of gaseous fuels, in accordance with the applicable quality standards. The provisions of art. 9c.1.3 of the *Energy Law* contain more detailed rules pertaining to the above obligation, providing that the usage, maintenance and repairs of networks, installations and facilities, along with interconnections with other gas systems, are to be conducted in a manner which ensures the reliable functioning of the system which remains under the management of the given operator.

The security of supply of gaseous fuels is also ensured through the manner in which operators plan the development of their systems. The development plan intended to ensure that both the present and future demand for gaseous fuels is satisfied, prepared by transmission system and distribution system operators in accordance with art. 16 of the *Energy Law* shall include, in particular, the anticipated scope of gaseous fuel supply, projects pertaining to the modernisation, extension or construction of networks as well as contemplated new sources of gaseous fuels and projects pertaining to the modernisation, extension or construction of interconnections with foreign gas systems. The plans of transmission system operators and distribution system operators are drawn up for periods of 10 and 5 years respectively. The plans are prepared in close cooperation with the interested parties, i.e. entities connected to the network, communes as well as – in the case of plans prepared by transmission system operators – with the local government of the province in which the given investment project is to be implemented.

On the basis of art. 32.3 of the *Energy Law*, the Regulation of the Council of Ministers on the minimum level of diversification of foreign gas supplies (The Journal of Laws for year 2000, no. 95, item 1042) was issued, specifying the maximum share of gas imported from a single state of origin in relation to the total quantity of gas imported in the given year.

Art. 40.1 of the aforementioned legal instrument, which provides that “*the President of the Energy Regulatory Office may require an energy undertaking whose licence has expired to continue the performance of activities covered by such licence for a period not exceeding 2 years where the public interest so requires*”, may also be considered an obligation to perform public services pertaining to the security of supplies of natural gas. It needs to be pointed out that any losses which such undertaking may incur as a result of complying with such obligation shall be covered by the State Treasury

in the amount limited to the amount of reasonable costs of activities specified in the relevant licence, provided that due diligence is exercised.

6.2. The act on stocks of crude oil, petroleum products and natural gas, and the rules of conduct in circumstances of a threat to the fuel security of the State and disruptions on the petroleum market

The Act on Stocks specifies the main obligations of public services related to ensuring the security of supplies. However, it needs to be pointed out that in the event of disruptions to the supplies of gas or of an unexpected increase in the consumption thereof, energy undertakings are under an obligation to apply the available market measures before resorting to extraordinary measures. The measures in question may, in particular, include additional supplies of natural gas from other directions or sources as well as restrictions in the consumption of gas resulting from the contracts concluded with customers (commercial restrictions) and should be defined in the procedures which energy undertakings engaged in economic activities involving the import of natural gas as well as entities commissioning services which involve the transmission or distribution of natural gas are under an obligation to have in place under art. 49 of the Act on Stocks.

The procedures referred to above are immediately provided to the transmission system operator or the operator of the interconnected gas system following consultations with the entities responsible for the implementation thereof, including, as appropriate, with the operators of other gas systems or customers. It needs to be pointed out that pursuant to art. 49.3 of the Act on Stocks, the duty to prepare operational procedures does not apply to household customers of natural gas.

Art. 24.1 provides that energy undertakings which engage in economic activities involving international trading of natural gas and the import of natural shall be under an obligation to maintain compulsory stocks of natural gas in order to ensure the supply of natural gas to the Republic of Poland as well as to minimise the consequences of threats to the fuel supply security of the state, the malfunction of the gas network or the unexpected increase in the consumption of natural gas.

Pursuant to the statutory provisions referred to above, compulsory stocks of natural gas are to be maintained in a quantity which corresponds to at least 30 days of average daily import of such gas. The technical parameters of the storage facilities in which the stocks in

question are stored must ensure that the stocks in question may be released into the gas system in their entirety within a period not exceeding 40 days.

Art. 25.6 of the aforementioned act provides that, in connection with the obligation to maintain compulsory stocks, an energy undertaking which engages in economic activities involving international trading of natural gas and the import of natural gas shall be under an obligation to notify the President of the Energy Regulatory Office of its intention to commence the import of natural gas no later than within 30 days before the day on which such import is to commence.

According to art. 28 of the aforementioned act, the compulsory stocks of natural gas constitute the property of the energy undertakings which engage in economic activities involving international trading of natural gas and the import of natural gas, unless constitute assets of the entity receiving the order to maintain mandatory reserves. Furthermore, the costs incurred by such undertakings in connection with the performance of the above obligation shall be included in the costs of the reasonable activities thereof⁵.

Furthermore, in accordance with art. 54 of the Act on Stocks, in the event of:

- 1) a threat to the fuel supply safety of the state,
- 2) an unexpected increase in the consumption of natural gas by customers,
- 3) disruptions in the supply of natural gas to the gas system,
- 4) malfunctioning of the networks of gas system operators,
- 5) a threat to the safety of the functioning of gas networks,
- 6) a threat to the personal safety of individuals,
- 7) a threat of substantial property damage,
- 8) the need for the Republic of Poland to comply with international obligations,

restrictions in the consumption of natural gas may be introduced for specific periods of time within the territory of the Republic of Poland or parts thereof. Such restrictions involve limiting the maximum hourly and daily consumption of natural gas. This measure may be applied exclusively with respect to commercial customers. Pursuant to art. 58.4 of the Act on Stocks, restrictions which stem from restriction plans shall not be applicable to household natural gas consumers.

⁵within the meaning of art. 3.21 of the Energy Law.

7. Identified threats

The description of the structure of the natural gas market presented in the *Risk Assessment* contains two basic groups of risks, which were subjected to a detailed analysis. Furthermore, the *Risk Assessment* also presents a number of scenarios which have a profound influence on the possibility of ensuring the import and transmission of natural gas within the territory of the Republic of Poland. Among the risks identified the following categories were mentioned: infrastructural risks, political/market risks and market risks.

7.1. Infrastructural risks

Infrastructural risks are related to the danger of gas infrastructure suffering damage as a result of any human conduct, whether intentional or non-intentional, or as a result of any natural phenomena. The risks in question pertain primarily to malfunctions of the key components of the national transmission system which could lead to problems with the supply of gaseous fuels in the domestic network.

The scenarios of events adopted in the *Risk Assessment* refer to technical problems which may occur both within the territory of Poland and abroad. Due to the limited possibilities of reaction to technical disruptions which occur outside the territory of Poland (changes in supply routes – entry points to the gas transmission system), the present analysis focuses on scenarios which involve technical disruptions occurring within the territory of Poland, resulting in the risk of interruptions in natural gas supplies.

The analyses of the functioning of the gas system in the event of a crisis performed by OGP GAZ-SYSTEM S.A. have been conducted under the assumption that customer demand for gas amounts to 80,5 mcm/day (883 GWh/day).

The revision of scenarios also takes into account the physical reverse gas flow on the Yamal-Europe pipeline, functioning of LNG Terminal in Świnoujście as well as the increased supply capability from gas storage facilities related to their extension.

The scenarios of damage to infrastructure identified for the purposes of *Risk Assessment* which may have an impact on the security of natural gas supplies in Poland include, in particular:

- 1) gas compressor station malfunctions;
- 2) gas node malfunctions.
- 3) terminal LNG malfunctions.

7.2. Political/market and market risks

Political/market risks occur as a result of the links between the politics of states and the activities pursued by energy companies. These links are characterised by the intervention of state governments (mostly of non-EU countries) in individual sectors of their domestic economies. Such interventions may lead to the suspension of the implementation of trade contracts and intergovernmental agreements as a result of unstable political situation (as in the case of the 2004, 2006, 2008, 2009, and 2014/2015 gas crises) as well as to the imposition of legal regulations which have an impact on the activities of some of the entities operating in the energy sector.

Market risks, on the other hand, are risks related to the functioning of the gas market which arise as a consequence of increasing the share of natural gas in the energy balance and a low supply diversification indicator as well as risks related to the conduct of gas suppliers.

Political/market and market risks encompass the possible scenarios of disruptions to the supplies of natural gas at main entry points to the transmission system on cross-border connections:

- 1) the Belarusian variant;
- 2) the Ukrainian variant;
- 3) the eastern variants.

The details on the directions of covering demand for natural gas in the event of a specific crisis scenarios are included in *the Risk Assessment* prepared in 2016.

8. Risk matrixes

The risk matrix presented below was included in the updated version of the *Risk Assessment Relating to the Security of Natural Gas Supply in Poland*.

2016 Risk assessment – Risk matrix

Consequences Major	Eastern variant(lack of supplies of natural gas from eastern direction, sustained gas transmission using the Yamal- Europe pipeline); Eastern variant (lack of supplies of natural		
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	gas from gas deliveries from eastern direction, stopped gas transmission using the Yamal- Europe pipeline); Gas nodes malfunctions.		
Consequences Noticeable			
Consequences Insignificant	No supplies from the Mogilno UGS facility; Malfunction at the Jarosław gas compressor station; Malfunction at the LNG Terminal in Świnoujście.	Belarusian variant (without Wysokoje)*	Ukrainian variant*
Probability	Low	Average	High

* Assessment of the effects of occurrence of the crisis scenario takes into account the proposed actions in the area of market-based and non-market based measures.

Probability of Scenario Occurrence	Description
Low	Risk is unlikely to materialize.
Average	Occurrence and non-occurrence of the risk is equally probable.
High	It is expected that the risk will occur.

Consequences of the scenario	Description
Insignificant	The impact of risk does not lead to changes in the supply of gas to customers thanks to appropriate market-based measures (gas storage, system accumulation).
Noticeable	The risk has an adverse impact on the supply conditions, but the market is still able to solve this problem exclusively by means of market-based measures, while customers are not forced to reduce or significantly change their normal consumption.
Major	The risk results in the disruptions to supplies and non-market-based measures must be taken or emergency measures must be introduced in order to safeguard supplies (at least insofar as supplies to protected customers are concerned).

The above risk matrix prepared by the transmission system operator demonstrates an increase in the level of security of operation of the gas network. However, it is still necessary to conduct further activities aimed at fully securing the needs of natural gas customers by extending the system of cross-border connections with EU countries, including the construction of interconnectors with the Czech, Slovak and Lithuanian transmission systems as well as the continuing development of gas storage infrastructure and increasing the efficiency of the internal natural gas transmission network.

9. Identified preventive measures

The currently available market-based security of gas supply pertaining to the supply side:

- *increasing the flexibility of gas production* – due to the need to maintain the rational management of gas deposits, there is no possibility of significant increase of the extraction of gas in the event of a crisis situation. The maximum domestic production of gas is at constant level of 6,8 mcm/day (74,6 GWh/day).
- *increasing the flexibility of import* – Gas is supplied to the Polish transmission system through Point of Interconnection on the basis of virtual reverse flow service at Yamal pipeline up to 23 mcm/day (254,4 GWh/day).
- *commercial storage of gas* – at the present stage, Poland has 7 methane-rich natural gas storage facilities with total active volume of approximately 33 TWh;
- *LNG terminal capacity and maximal send-out capacity* - in June 2016, the first ship arrived at the LNG Terminal in Świnoujście carrying first commercial delivery of liquefied natural gas. During the first stage of the operations of the LNG terminal the off-take of 13,7 mcm/day (158 GWh/day) of natural gas is possible.
- *diversification of gas supplies and gas routes* – interconnector between Poland and the Czech Republic (Cieszyn) allows for gas supplies entry point to the Polish system with capacity of 28,0 GWh/day (October – April), 4,3 GWh/day (May-September). *GCP GAZ-SYSTEM/ONTRAS* - From 1 April 2016 connection of the separate cross border points between GAZ-SYSTEM S.A. (Poland) and ONTRAS (Germany) Gubin, Kamminke and Lasów into one new network point Grid Connection Point GAZ-SYSTEM/ONTRAS (*GCP GAZ-SYSTEM/ONTRAS*) was established. Capacity on firm basis from Germany to Poland amounts to 48,7 GWh/day.

- *reverse flows* - in the event of a crisis, Poland may increase the supplies of natural gas on the basis of the existing contracts as well as using the physical reverse flow on the Yamal-Europe pipeline. The extension of the Mallnow station has enabled the achievement of reverse flow gas capacity from Germany to Poland amounting to 16,8 mcm/day (184,4 GWh/day on the firm basis, from 01.01.2017).
- *the application of short-term and long-term contracts* – the contracts concluded on the Polish market include both medium- and long-term contracts as well as framework contracts which enable the purchase of natural gas by way of spot transactions.
- *investments in infrastructure, including bi-directional capacity* :

No.	Preventive measure	Responsible entity	Deadline
1.	Increasing the capacity of the LNG terminal in Świnoujście.	Polskie LNG /OGP GAZ-SYSTEM	2023/2027
2.	Construction of an interconnector with Denmark – Baltic Pipe.	OGP GAZ-SYSTEM	2022
3.	Construction of the western section of the North-South Corridor: – Transmission infrastructure projects between Lwówek and Strachocina; – Poland - Czech Republic Interconnector - "Stork II".	OGP GAZ-SYSTEM	2021/2022
4.	Construction of the eastern section of the North-South Corridor – Transmission infrastructure projects between Rembelszczyzna and Strachocina.	OGP GAZ-SYSTEM	2023/2027
5.	Construction of an interconnector with Slovakia along the North-South Corridor.	OGP GAZ-SYSTEM	2020/2021
6.	Implementing investment projects enabling the simultaneous, maximum withdrawal of natural gas from the Mogilno Cavern Underground Storage Facility and the Włocławek entry point.	OGP GAZ-SYSTEM/ EuRoPol GAZ/ Gas Storage Poland	2020

7.	Increasing storage capacity to 4 bcm and increasing withdrawal capacity from storage facilities.	PGNiG	2022
8.	Reaching an agreement with Gazprom on the increased flexibility of natural gas supply through individual entry points into the domestic system.	PGNiG	2019
9.	Conclusion of gaseous fuel supply contracts incorporating load shedding provisions – creating a catalogue of market-based measures on the demand side.	Energy undertakings operating in the natural gas trade sector	2018
10.	Increase the gas network in the region of Mazovia from this direction which will power the area of Bialystok (the area currently supplied from the Tietierowka).	OGP GAZ-SYSTEM/ EuRoPol GAZ/ Polska Spółka Gazownictwa	2021
11.	Implementation/completion by the trading undertakings of activities intended to supplement natural gas volumes by making the existing contracts more flexible, or the provision of additional volumes of natural gas within the framework of emergency contracts (including framework agreements) in the event of a crisis.	Energy undertakings operating in the natural gas trade sector	2019
12.	Extension of the “Warsaw ring” system.	OGP GAZ-SYSTEM	2021

**prepared on the basis of the OGP GAZ-SYSTEM S.A. Project of Development Plan with respect to the current and future demand for gaseous fuels for years 2018-2027 as well as the data provided by energy undertakings*

Table 3: List of identified preventive measures.

The currently available market-based security of gas supply pertaining to the demand side:

- increase of energy efficiency (the white certificate system);
- increase of the share of RES in the energy market.

10. Reporting

The entities performing the activities specified in *the Preventive Action Plan* are under an obligation to provide the Minister of Energy with quarterly reports pertaining to the implementation of activities aimed at increasing the security of natural gas supplies. The reports in question shall contain a timetable of works, the estimated time of project completion, threats to the implementation of the project identified by the implementing entity as well as the influence of the project on the crisis scenarios identified in the current *Risk Assessment* and *the Preventive Action Plan*.

Furthermore, by September 1 of each year at the latest, the transmission system operator shall, in cooperation with the companies which engage in the import of natural gas into the territory of the Republic of Poland, prepare a report for the authority competent in this regard, pertaining to the preparation of the gas system for the winter season, taking into account an analysis pertaining to the coverage of peak demand for natural gas under error-free conditions.

11. Conclusions

The preventive measures specified in the document allow for:

- the diversification of supply routes and sources;
- the further liberalization of the natural gas market;
- the development of transmission infrastructure on interconnection points;
- the increase in the storage and withdrawal capacities of UGS facilities.

The European natural gas supply system and the provisions of Regulation 994/2010 are based on the principle which provides that market-based measures shall be the first to be applied. On the existing natural gas market characterized by a high degree of competitiveness, the primary factor which has an influence on the quantity of natural gas used by customers during a crisis situation is the supply and demand game which takes place on the market, wherein the prices of raw materials on the spot market or on commodities exchanges naturally influence the demand of enterprises.

The domestic natural gas supply security system, governed by the provisions of the Act on Stocks as well as of the Regulation of the Council of Ministers of September 19, 2007 *on the method and procedure of introducing restrictions in the consumption of natural gas*, relies on the application of market-based and non-market-based measures, including, in particular, the release of compulsory natural gas stocks.

It is also necessary for trading enterprises to increase the share of market-based measures applied in the event of a crisis. Participants of the gas market need to develop detailed procedures for action in extraordinary circumstances which take into account the use of emergency contracts (including framework agreements), measures for the diversification of sources and routes for the supply of natural gas to the customers thereof as well as the broader application of intermittent services as a method of self-limitation amongst industrial natural gas customers. A more flexible approach to import contracts, allowing for changes to supply routes to be made where necessary as well as ensuring additional natural gas volumes within the framework of emergency contracts (including framework agreements) would make it possible to ensure the supply of natural gas at an appropriate level in the event of a crisis.

Energy undertakings engaging in economic activities in the field of trade in gaseous fuels which sell natural gas to end customers should also perform an analysis of the market

with regard to ensuring additional capabilities in terms of supply of natural gas for the purposes of satisfying peak demand for such gas.

The gas system itself also requires further modernisation, including the construction and modernisation of interconnectors as well as the further comprehensive extension of gas storage infrastructure aimed at increasing the storage capacity for natural gas which constitutes commercial stocks of the enterprises involved.

It should be pointed out that since 2016, owing to the implemented investment projects (LNG Terminal in Świnoujście with corresponding investments in transmission system as well as expansion of the Mallnow metering station, which increased technical import capacity from Germany), the technical capacity in terms of natural gas import into Poland from new directions (forming an alternative to the eastern direction) have increased by approximately 11 bcm/year.

In the view of the Minister of Energy, the further integration of the Polish gas system with the systems of other EU Member States will make it possible for undertakings operating within the territory of the Republic of Poland to gain access to the highly developed and diversified natural gas markets as well as to ensure the greater flexibility of the supply security system should any of the contemplated crisis scenarios materialize. In this regard, particular emphasis must be placed on the construction of the subsea gas pipeline connecting the natural gas transmission systems of Denmark and Poland – Baltic Pipe. Providing access to commercial regasification regarding the launch of the LNG Terminal (13,7 mcm/day, 150 GWh/day) additionally improve State's energy security and the diversification of sources of supply. Analyzed the feasibility of the second phase of the development of infrastructure which allows the terminal to receive up to 7,5 bcm/year, which, combined with the anticipated expansion of infrastructure will increase the level of energy security is also at the regional level.

The possibility of the second phase development project of the LNG terminal which allows to receive up to 7,5 bcm/year is analyzed. This investment, combined with the anticipated expansion of infrastructure, will increase the energy security also at the regional level.

The value of the N-1 factor calculated for the purposes of the Risk Assessment on the basis of the data for the single largest natural gas infrastructure system in Poland, i.e. System's Regulating and Metering Station Włocławek, exceeds 100%, which means that the existing infrastructure makes it possible to ensure the security of customer supplies even in the event of disruption of the single largest component of the said infrastructure.

Nevertheless, the detailed analyses of gas distribution pertaining to individual supply disruption scenarios indicate that there is a need to make further investments in the field of gas infrastructure. The identification of the so-called bottlenecks (i.e. areas where the transmission volume of natural gas remains limited) has been carried out, allowing the operator to undertake investment activities the implementation of which will help to eliminate such bottlenecks and improve the security of gas supply.

Consultation document:

The document was consulted and agreed with the authorities of the Federal Republic of Germany, the Czech Republic and the Slovak Republic.