

2016 - 2025 TEN-YEAR NETWORK DEVELOPMENT PLAN OF BULGARTRANGAZ EAD

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DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations are used for the purposes of this document:

AGRS – Automatic Gas Regulation Station

LNG – Liquefied Natural Gas

GMS – Gas Metering Station

GPB – Gas Pipeline Branch

GRS – Gas Regulation Station

the Company – Bulgartransgaz EAD is an independent combined gas operator in the Republic of Bulgaria

EU – European Union

GDC – Gas Distribution Company

ME - Ministry of Energy

EWRC – Energy and Water Regulatory Commission (formerly SEWRC)

BEH – Bulgarian Energy Holding EAD

VS – Valve Station

EEC – End Energy Consumption

CS – Compressor Station

PF – Pigging Facility

MGP – Main Gas Pipeline

TGP – Transit Gas Pipeline

MPa – Megapascal (unit of pressure)

m³ or cubic meter – unit of volume which in this document for the purposes of determining a natural gas quantity, represents the natural gas quantity in a volume of one cubic meter at 293.15 K (200C) and absolute pressure of 0.101325 MPa.

EIA – Environmental Impact Assessment

Natural Gas Transmission – transport of natural gas through the gas transmission networks owned by Bulgartransgaz EAD

PEC– Primary Energy Consumption

BP – Building Permit

CIW – Construction and Installation Works

SMEs – Small and medium-sized enterprises

BSTC – Black Sea Technological Company

UGS – Underground Gas Storage

National Gas Transmission Network (NGTN) – gas transmission network the main purpose of which is natural gas transmission to customers in Bulgaria connected thereto and also to interconnection points. The NGTN is owned by Bulgartransgaz EAD and used for performing transmission services;

Gas Transmission Network for Transit Transmission (GTNTT) – gas transmission network the main purpose of which is natural gas transit transmission from the Bulgarian-Romanian border to the borders with Turkey, Greece and Macedonia, used also for natural gas transmission to customers in Bulgaria connected to the network or to interconnection points on the territory of Bulgaria. The GTNTT is owned by Bulgartransgaz EAD and used for performing transmission services;

Bulgartransgaz EAD gas infrastructure – includes the NGTN, the GTNTT and UGS Chiren

ENTSO – European Network of Transmission System Operators for Gas

CEF – Connecting Europe Facility

CESEC - Central and South Eastern Europe Gas Connectivity

BRUA – Gas transmission corridor Bulgaria-Romania-Hungary-Austria

IAP – Ionian Adriatic gas pipeline

TAP – Trans-Adriatic Pipeline

TANAP – Trans-Anatolian Natural Gas Pipeline

SOURCES USED

- 2020 Energy Strategy of the Republic of Bulgaria as of June 2011
- National Statistical Institute - GDP, PEC, EEC and other data, (www.nsi.bg)
- Data on natural gas consumption, Eurostat, (www.epp.eurostat.ec.europa.eu)
- 2001-2014 National energy balance of the Republic of Bulgaria,
- A list of Projects of Common Interest, webpage of the European Commission, Directorate Energy, (www.ec.europa.eu)
- A Report of the World Bank, Economic Consulting Associates Ltd (ECA) and Infraproject Consult Ltd Bulgaria: Options to Improve Security of Gas Supply
- Public information related to the development of the gas market in the region, published on the web pages of the following companies:
 - Transgaz S.A. (www.transgaz.ro)
 - Gazprom (www.gazprom.com)
 - DESFA S.A. (www.desfa.gr)
 - Botas (www.botas.gov.tr)
 - JP Srbijagas (www.srbijagas.com) GA-MA AD (www.gama.com.mk)
 - DEPA, S.A. (www.depa.gr)
 - ITGI (www.edison.it)
 - TAP (www.trans-adriatic-pipeline.com)
 - Shah Deniz (www.bp.com)
 - Romgaz (www.romgaz.ro)
- Information related to natural gas production in Bulgaria, webpage Petroceltic International Plc (the former Melrose Resources), (www.petroceltic.com)
- Bulgartransgaz EAD 2016-2020 Business Programme, approved by Minutes No.116/18.12.2015 of a meeting of Bulgartransgaz EAD Management Board and Minutes No.21/08.01.2016 of Bulgartransgaz EAD Supervisory Board.
- Regional Investment Plan 2014-2023 Central and Eastern Europe
- Regional Investment Plan 2014-2023 South Corridor
- ENTSOG 2015-2024 Ten-Year Network Development Plan
- GIE – Gas Infrastructure Europe
- IEA - International Energy Agency
- IGU – International Gas Union, Working committee 2 - UGS
- EIA – U.S Energy Information Administration
- IENE – Institute of Energy for South – East Europe
- BP Statistical Review of World Energy – June 2015
- Turkish Policy Quarterly – 2015
- Platts
- Gas in Focus 2015



- Eustream – Presentation – 21st Annual BBSPA Conference – April, 2015 Wien
- DEPA Annual Report 2010
- Information from other corporate documents and correspondence with stakeholders

INTRODUCTION

Bulgartransgaz EAD's Ten-year plan for development of the natural gas transmission and storage infrastructure has been developed for the period 2016-2025 and sets out the vision for the development of the company as an independent transmission operator. It is consistent with the major European, regional and national priorities, namely ensuring the security of supply of natural gas, ensuring the diversification of natural gas supply sources and routes and the creation of sustainable, liberalized and interconnected gas market and with the „winter package of measures to safeguard the energy security in the EU“, adopted in February 2016 by the EC.

The priority activities for development of Bulgartransgaz EAD infrastructure in the period 2016 – 2025 are aimed to improve and enhance the existing main and auxiliary gas transmission infrastructure and the associated equipment, its modernization, rehabilitation and expansion, the development of interconnectivity and the expansion of storage capacity. Their realization will give to Bulgaria the potential to become an important regional gas hub.

The major objective of the TYNDP is to give maximum transparency for the future prospects for development of the gas transmission networks and the natural gas storage facility. The TYNDP identifies and analyses the trends and factors determining the need of investments, as well as their allocation over time. All market participants will thus be informed and this will enable making long-term investment decisions.

The implementation of the investment strategy presented in this TYNDP will provide the opportunity to increase the use of natural gas in the country with the respective economic, social and environmental benefits, and diversify the sources and routes of gas supply. It will also promote the establishment of a competitive natural gas market resulting in a wider choice for the market participants, including price-wise for all market participants. Having regard to achieving full transparency and balance between the interests of TSOs and the market participants, the TYNDP is subject to public consultation initiated by Bulgartransgaz EAD based on which the interrelations between the Company's projects and the development plans of the stakeholders can be considered and synchronized in the TYNDP. All justified proposals will be studied and taken into account.

TYNDPs are prepared by the gas transmission operators on the territory of the European Union in line with Art. 22 of Directive (EC) 2009/73. The Bulgarian gas transmission operator Bulgartransgaz EAD develops its TYNDP in line with Art. 81d, para 1 of the Energy Act (EA) published in SG 54 dated 17.07.2012 valid as of 17.07.2012.

The national TYNDPs serve as the basis for development of the Gas Regional Investment Plans (GRIPs), as well as the Community-wide Network Development Plan (TYNDP) developed by the European Network of Transmission System Operators for Gas (ENTSOG).

BULGARTRANGAZ EAD PROFILE

Bulgartransgaz EAD is a sole owner joint stock company, registered on 15.01.2007 by a Decision of Sofia City Court. The owner of 100% of its shares is Bulgarian Energy Holding EAD whose principal is the Ministry of Energy (ME).

By virtue of Decision of the Energy and Water Regulatory Commission Bulgartransgaz EAD is certified independent transmission operator in Bulgaria in line with the requirements of Directive 2009/73/EC concerning common rules for the internal market in natural gas, Regulation (EC) No.715/2009 on conditions for access to the natural gas transmission networks and Chapter Eight, letter (a) of the Energy Act. The Decision has been approved in line with the opinion of the European Commission of 22.04.2015.

The Decision approved by EWRC proves that Bulgartransgaz EAD meets to the criteria for certification and implements the requirements for independence, namely:

- the Management Board of the independent transmission operator is the competent authority responsible for decisions, linked to TSO current activity, the management of the network and the activities, required for the draft of the TYNDP;
- the independent transmission operator has the right to make independent decisions regarding assets, required for the functioning, maintenance and development of the transmission network and the gas regimes control;
- the requirements for professional independence of the members of the Management Board and the members of the Supervisory Board of Bulgartransgaz EAD have been met;
- Bulgartransgaz EAD has at its disposal the necessary resources including human, technical, financial and physical, required to meet its obligations when carrying out the natural gas transport activity;
- Bulgartransgaz has its own identity, independent IT systems and equipment, independent premises and security access systems thereto, as well as its own external contractors or external consultants for the access to these systems;
- when carrying out its activity, the independent transmission operator provides services that are non-discriminatory for the different network users and does not restrict, distort or prevent competition in generation or gas supply.

In compliance with the provisions of the Energy Act and Directive 2009/73 (EC) of March, 2013 Bulgartransgaz EAD is governed by a two-tier organizational management structure: Supervisory Board and Management Board.

Bulgartransgaz EAD is a combined gas operator carrying out natural gas transmission and storage activities. The company is an owner and operator of the national gas transmission network (NGTN), the gas transmission network for transit transmission (NGTNTT) and the underground gas storage Chiren.

The Company is the holder of the following licenses, issued by the State Energy and Water Regulatory Commission (SEWRC):

For natural gas transmission: Licenses No. L-214-06 and No. L-214-09 of 29.11.2006.

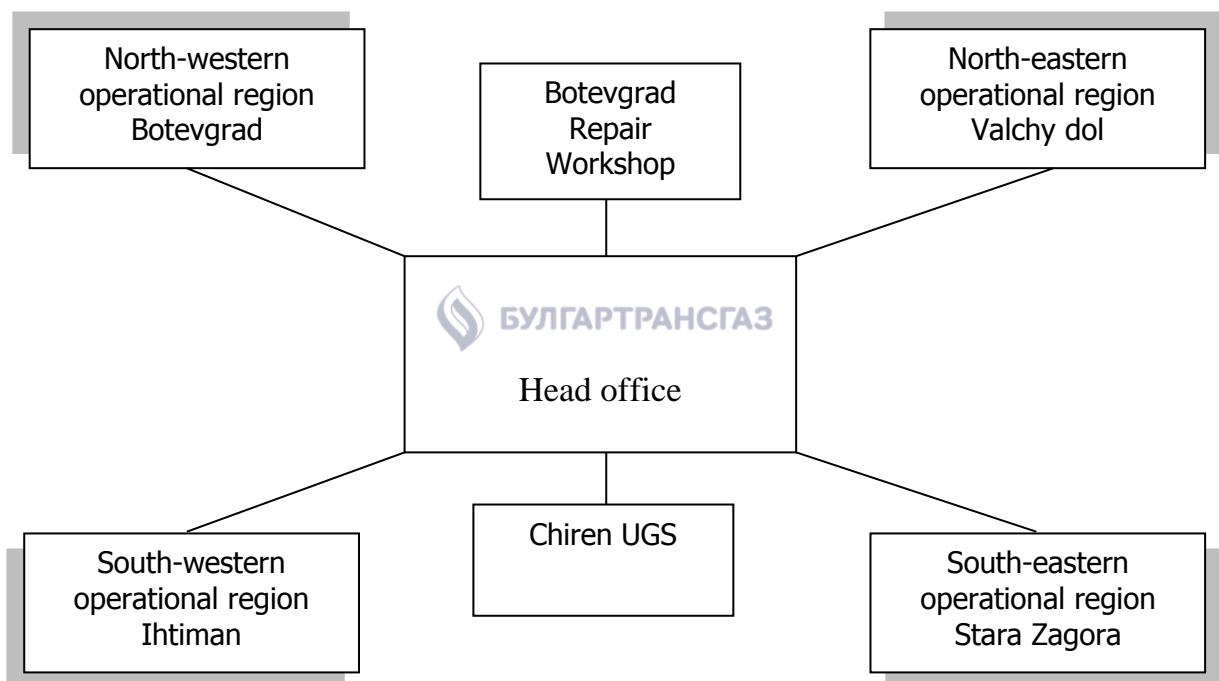
For natural gas storage: License No. L-214-10 of 29.11.2006.

The basic requirements for these activities are governed by the Energy Act and the by-laws harmonized with the European legislation in that field.

Bulgartransgaz EAD plays a key role and is responsible for the uniform management and reliable operation and efficient use of the natural gas transmission system, including the gas

pipelines, compressor stations, Chiren UGS for the development of the networks in accordance with the long-term gas sector forecast and development plans in compliance with the quality and quality reporting requirements, the networks' development in accordance with the long-term forecasts and plans for gas supply development, maintenance, operation, management and development of the underground gas storage Chiren, non-discrimination of users with regard to natural gas transmission and storage. Apart from that, engineering, investment and service activities are carried out.

The organisational structure of the Company includes a Head office and four operational regions - North-western operational region Botevgrad, North-eastern operational region Valchi dol, Southeastern operational region Stara Zagora, Southwestern operational region Ihtiman, responsible for the operational management and maintenance of the network on the respective territory as well as Chiren UGS and Botevgrad Repair Workshop.



Since its establishment Bulgartransgaz EAD constantly strives at improving the quality of the offered services and provide added value for the development of the gas market in Bulgaria, integral part of the corporate policy. As result of the sustainable business model, the company shows very good financial results which tend to remain unchanged in future and allow the investments in the reliability and the development of the natural gas transmission and storage infrastructure.

The Company pursues transparent, non-discrimination and social responsible behaviour. It works to ensure secure conditions and sustainable development of the natural gas market in the country and the region. As part of the common European gas network Bulgartransgaz EAD is guided by the requirements of the Third Energy Package, the European and the Bulgarian legislation.

DESCRIPTION OF NATURAL GAS TRANSMISSION AND STORAGE INFRASTRUCTURE



Compressor station Strandja

Bulgartransgaz EAD Gas infrastructure on the territory of the Republic of Bulgaria consists of the national gas transmission network supplying natural gas to most Bulgarian users, the gas transmission network for transit transmission ensuring mainly natural gas transport to Turkey, Greece and Macedonia with a total length of 2 765 km and the underground gas storage in Chiren (UGS Chiren), directly connected to the national gas transmission network.

National gas transmission network (NGTN), gas transmission network the main purpose of which is natural gas transmission to consumers in Bulgaria connected thereto, comprising about 1 835 km main gas pipelines and high-pressure gas pipeline branches, three compressor stations – CS Kardam-1, CS Valchi Dol and CS Polski Senovets with total installed capacity of 49 MW, gas regulation stations, gas metering stations, electrochemical protection system, cleaning facilities, communications system, information system and other ancillary facilities. Its technical transmission capacity amounts to 7,4 bcm/y and the maximum working pressure is 54 bar.

Gas transmission network for transit transmission (GTNTT), gas transmission network the main purpose of which is natural gas transit transmission, used also for gas transmission to customers in Bulgaria connected thereto, comprising 930 km gas pipelines and six compressor stations – CS Kardam-2, CS Provadia, CS Lozenets, CS Strandja, CS Ihtiman and CS Petrich, with total installed capacity of 225 MW, electrochemical protection system, cleaning facilities, communication system, information system and other ancillary facilities. It mainly transports natural gas quantities from an entry point at the Bulgarian-Romanian border to the exit points to Turkey, Greece and Macedonia. Its technical capacity for natural gas transit transmission in total to the three directions amounts to 17,8 bcm/y and the maximum working pressure is 54 bar.

Bulgartransgaz EAD constructed and since 10.01.2014 has put into commercial operation a reverse flow station metering natural gas quantities between the transit and national gas

transmission networks GMS Ihtiman and by using it the Operator can transport natural gas quantities to networks users of the two networks.

The **Underground Gas Storage Chiren** was built on the lands of Chiren village based on the already depleted gas condensate field. It is equipped with specialized underground and surface facilities required to secure injection, production and quality of the stored gas. Chiren UGS is also equipped with a compressor station with total installed capacity of 10 MW. The present storage capacity can provide storage of 550 mcm natural gas. The withdrawal and injection capacity according to the formation pressures and other factors is of 0.5 mcm/d (minimum) up to 3.4 mcm/d (maximum) for withdrawal, in case of emergency withdrawal the maximum capacity is up to 4.2 mcm/d at the following conditions – emergency situation, full gas storage reservoir and for a short time period (a maximum of 30 days), and 0.5 mcm/day (minimum) to 3.16 mcm/d (maximum) for injection.

The main entry and exit points of Bulgartransgaz EAD gas transmission network are the following:

Interconnection entry-exit point (IP) Negru Voda 1/Kardam – a connection between Bulgartransgaz EAD national gas transmission system and the gas transmission system operated by Transgaz S.A. (Romania), located on the Bulgarian-Romanian border in the area of Negru Voda/Kardam;

Interconnection entry-exit point (IP) Negru Voda 2,3/Kardam – a connection between Bulgartransgaz EAD national gas transmission system for transit transmission and the gas transmission system operated by Transgaz S.A. (Romania) on the Bulgarian-Romanian border in the area of Negru Voda/Kardam;

Interconnection entry-exit point (IP) Kulata/Sidirokastro – a connection between Bulgartransgaz EAD gas transmission network for transit transmission and the gas transmission system operated by DESFA (Greece), located on the Bulgarian-Greek border in the area of Kula/Promachonas;

Interconnection point (IP) Strandja/Malkoclar – an exit point, connection between Bulgartransgaz EAD national gas transmission system for transit transmission and the gas transmission system operated by Botas (Turkey), located on the Bulgarian-Turkish border in the area of the village of Strandja, Bolyarovo municipality.

Interconnection point (IP) Gueshevo/Jidilovo – an exit point, connection between Bulgartransgaz EAD national gas transmission system for transit transmission and the gas transmission system operated by GA-MA (Macedonia), located on the Bulgarian-Macedonian border in the area of the village of Guyeshevo, Kuystendil municipality.

Interconnection entry-exit point (IP) Ruse/Giurgiu – a connection between Bulgartransgaz EAD national gas transmission system and the gas transmission system operated by Transgaz S.A. (Romania) on the Bulgarian-Romanian border in the region of Ruse/Giurgiu (pending construction of the part of the gas pipeline under the Danube river);

Entry-exit point GMS Ihtiman – a reverse flow gas metering station, a connection of the gas transmission network for transit transmission and the national gas transmission network, enabling commercial metering of the quantities transferred between the two networks;

GMS Provadia – an entry point from local production of the national gas transmission network;

GMS Dolni Dabnik – entry point from local production of the national gas transmission network;

Entry-exit point GMS Chiren – connection between the national gas transmission network and UGS Chiren.

NATURAL GAS MARKET IN THE COUNTRY AND THE REGION



GMS Ruse-East (Interconnection Bulgaria – Romania)

1. NATURAL GAS MARKET IN BULGARIA

Natural gas consumption in Bulgaria for 2015 is 2 961 bcm, an increase of 10.5% compared to the consumption in 2014 (2 680 bcm). The growth in consumption is a result of increased exports by the industry and the decreasing prices of the natural gas due to the low oil and petroleum products prices that are cost factor in the long-term contracts with Russia.

Bulgartransgaz EAD transmission and storage activities are regulated and carried out on in line with the licenses issued by the SEWRC. The basic requirements for these activities are governed by the Energy Act and the by-laws harmonized with the European legislation in the field.

To date no important natural gas fields have been found in the Republic of Bulgaria and natural gas consumption in the country is mainly secured through gas imports of one single source the Russian Federation. Natural gas reaches Bulgaria following one route – through the territories of Russia, Moldova, Ukraine and Romania.

Natural gas produced domestically also enters in the gas transmission network, however the developed fields are of limited resource and in 2015 only 2.6% of the annual domestic consumption in has been covered thereby.

Quantities broken by sources of supply in 2015 are as follows:

Nº	Type of supply	Quantity, mcm	Relative share
1	Imported natural gas	2 910	97,4%
2	Local production	78	2,6%
TOTAL		2 988	100%

The main customer of the natural gas transmission service to connected customers and the gas distribution networks in the country is the public supplier Bulgargaz EAD. Other customers using the natural gas transmission services through the national gas transmission network are Overgas Inc. Ad and Agropolichim AD.

By virtue of a long-term contract OOO Gazprom export has booked a significant part of the capacity of the transit transmission network by the natural gas transmission service through the territory of Bulgaria from the entry point on the border with Romania to the exit points at the borders with Turkey, Greece and Macedonia.

Local natural gas production in the period 2000-2004 is symbolic (below 1%) and results mostly from the fields of the company Oil and Gas Exploration and Production AD. Since 2004 the company Melrose Resources OOD (later acquired by Petroceltic Ireland) has started natural gas local production firstly from Galata field and then from the newly discovered fields Kaliakra and Kavarna with access to the gas transmission system secured by Bulgartransgaz EAD at entry point GMS Provadia. As a result of the gradual development and operation of the field, local production increased significantly and reached its peak in 2011 – 443 mcm or 14% of domestic consumption. By contrast, local production in 2010 was only 74 mcm or 3% of domestic consumption for that year. A gradual decrease of the quantities produced locally started in 2012. Currently production from concessions in the country is limited and covers up to about 2 - 3% of annual consumption. Due to the depletion of Petroceltic fields its share on daily and annual basis continues to drop in 2015.

The last seismic studies of new marine areas in the block Galata show a 23% probability of new resources of 3.5 bcm.

A number of natural gas exploration licenses have been issued in the country, whereas the best studied and with possibility for real production in the coming years is the gas condensate field Koynare of Direct Petroleum (acquired by the company Trans-Atlantic), block A-Lovech with forecast resources of 13.7 bcm.

Production companies and the two major groups of consumers are connected to Bulgartransgaz EAD transmission network – trade companies licensed for natural gas distribution and supply and non-household customers directly connected to the transmission network.

The share of household gas supply in the country still remains too small compared to the EU member states, however an increase in next years is expected. Growth rate can also be reported in the consumption of compressed natural gas. Stimulating gas supply by means of expanding the gas transmission network to new regions and ensuring the access to natural gas to new municipalities, distribution companies and new non-household consumers is one of the priorities of the Energy Strategy of Bulgaria.

Chiren UGS plays the main role in securing natural gas in case of shortage at the entry points of the gas transmission network to the country, compensating the seasonal swings in consumption and ensuring the emergency reserve.

- **Major gas market participants in the country:**

- Bulgartransgaz EAD – a combined gas operator responsible for the performance of natural gas transmission and storage activities;
- Bulgargaz EAD – a public supplier of natural gas in Bulgaria responsible for ensuring the supply of natural gas at prices and under conditions regulated and approved by the EWRC (Energy and Water Regulatory Commission);
- Gas traders/shippers - conclude transactions for natural gas supply with the public supplier, public providers, consumers, other gas traders, production companies, natural gas storage companies and the combined operator;
- Gas distribution companies – by combining the activity supply from end supplier with the activity natural gas distribution, they supply natural gas to users connected to their networks. It is their obligation to construct and develop the gas distribution networks according to the long-term business plans and conditions approved by EWRC;
- Non-household natural gas consumers, connected to the transmission network;
- Non-household natural gas consumers, connected to the distribution networks;
- Household natural gas consumers.

- **Market potential and development prospects**

Bulgartransgaz EAD operates in a rapidly changing natural gas market developments and endeavours to contribute to achieve better developed, liquid and liberalized in the country and the region. Currently natural gas storage capacity at Chiren UGS and local production are the main alternatives concerning security of supply in case of disruption of imports from the main entry point Negru Voda 1 since as of the beginning of 2016 as well there exists insufficient level of competitiveness of the supply sources for the national gas market.

The expectations are in the coming years the number of the entry points from where gas enters the gas transmission network to increase significantly in connection with the interconnection projects with Romania, Greece, Turkey and Serbia. They will enable the supplies of natural gas from different sources thus in turn boosting the competition and will positively effect on consumers. The new gas interconnections will considerably increase the entry-exit capacity between Bulgaria and Greece, Turkey, Romania, Serbia and Macedonia and will at the same time ensure the possibility for access to and supplies from LNG terminals in neighbouring countries as well.

The following other potential gas projects are considered for the region which would affect market development, enhance diversification and security of gas supply and respectively infrastructure development: the gas hub Balkan, the conceptual project for implementation of bi-directional natural gas supplies through the territory of Slovakia, Romania, Bulgaria, Hungary, Czech Republic and Austria – Eastring and the gas transmission corridor Bulgaria-Romania-Hungary-Austria (BRUA). TESLA is one of the other possible projects, providing for the gas transport along the route Greece – Macedonia – Serbia – Hungary – Austria.

Regarding the forthcoming study works of the local natural gas deposits and granted concessions for development of the deposits on the territory of the country (both onshore and in the Black Sea shelf – the block Han Asparuh and block Silistar – in February 2016 a contract for prospecting and exploration of oil and gas has been signed with Shell for a term of 5 years), the expectations for the next 10-15 years are the share of local production to increase, including and after proving the resources in block "A-Lovech" - Koynare by drilling

wells and testing them, and after proving the potential of the block Galata, again by carrying out tests in the wells (newly drilled and existing ones). Chiren UGS is of strategic importance for the energy security of the country. Its modernization is also important for the construction of a gas distribution centre in Bulgaria. Currently Chiren UGS is considered mainly as a storage of local importance and a major tool in ensuring security of supply, but in the long term the prospects are its conversion into a commercial storage facility with a significant role in the development of competition and increase of the benefits for natural gas users in the integrated and interconnected regional market. The construction of the planned interconnections with Turkey, Greece, Romania and Serbia will enhance the market integration in the region and is a prerequisite Chiren UGS to play an increasingly important role in securing additional flexibility of the gas transmission systems at a regional level, significant contribution to managing congestions and seasonal optimization of the use of the gas transmission systems. In this respect, a project for its expansion is ongoing, which is the first step in the concept of storage capacity expansion in the region and was defined as "a project of common interest." The drilling of a new deviated exploitation well E-72 started in 2015, thus marking the start of the process of modernization and expansion of Chiren UGS. By the end of 2016 the expectations are that another new deviated exploitation well E-73 will be drilled and commissioned.

To complete the project for the expansion of Chiren UGS another 10 exploitation wells are planned to be drilled to 2020, including the replacement of some of the surface equipment. The volume of active gas in the gas storage facility is hence expected to rise from 550 mcm to up 1 bcm. The daily deliverability will also increase from 3.4 mcm (4.2 mcm emergency withdrawal) to about 10 mcm.

A gradual increase in national consumption started in 2015. The economy is expected to stabilize in the next years, which is a pre-requisite for the growth in natural gas consumption.

2. NATURAL GAS MARKET IN THE REGION

The development of the natural gas market in the region is related to the expected growth of natural gas consumption in Bulgaria's neighbouring countries, based on one hand on the expected increased consumption and on the other - the existing contracts for natural gas supply from the Russian Federation to the Balkans, as well as the opportunities for natural gas supplies from new sources by the Southern Gas Corridor, the potential of local production. These expectations are in line with the plans for construction of new connections between the gas transmission systems of Bulgaria with Romania, Turkey, Greece and Serbia. In addition, natural gas advantages (economic, technological and environmental) resulted in the relatively rapid growth of its consumption in the last thirty years worldwide. This is laid down in the Europe 2020 Strategy where the main objectives of the EU 20:20:20 are set regarding the climate and energy which are based on the encouraging policy to transfer to less waste and waste-free technologies and in particular the replacement of the energy facilities in most industrial enterprises and those in the chemical industry towards the use of cleaner fuels as certainly natural gas is. The growing need of sustainable development of the transport sector also focuses on the use of methane as an alternative fuel. This requires a rapid construction of compressor stations on the territory of the Pan-European transport corridors. The measures mentioned shall contribute to overcoming the consequences of air pollution by reducing the emissions of carbon and nitrogen oxides.

The review of the natural gas markets in the neighbouring countries outlines the main trends

for development of the regional gas market:

2.1 Greece

Currently our country has one interconnection point with Greece – Kulata/Sidirokastro. This interconnection serves mainly as an entry point enabling Greece to receive Russian natural gas and during the January 2009 crisis physical reverse flow to Bulgaria was carried out through this interconnection. As of January 1, 2014 the Bulgarian gas transmission system has a technical possibility to ensure capacity for physical natural gas transmission in direction from Greece to Bulgaria through this point to the amount of 3 mcm/d, 1 mcm/d of which firm capacity and 2 mcm/d interruptible.

Natural gas consumption in Greece has increased more than twice over the last decade to reach up to 4 bcm/y in 2011 and 2012. In 2013 the consumption is 3.6 bcm/y as the electricity generation takes a significant part (around 70%).

Most of the consumption is covered by imports of LNG sources in local terminals – 15%; from the gas pipeline connection with Turkey – 17% and the gas pipeline connection with Bulgaria with a source of supply the Russian Federation – 68%.

According to the forecasts of natural gas demand in Greece, published in the Regional Investment Plan "Southern Corridor" 2014-2023, the supposed levels are 4.7 bcm/y by 2016 and 5.5 bcm/y by 2021.

The Greek company DEPA has three long-term contracts with foreign companies for natural gas supply – with the Russian OOO Gazprom Export – up to 3 bcm/y, the Algerian Sonatrach (LNG) - up to 0.6 bcm/y, and the Turkish Botas – up to 0.75 bcm/y and the total volume under these contracts does not exceed 4.3 bcm/y. Recently, DEPA announced their plans to expand the gas distribution network in the country to meet the constantly increasing number of household clients in the period by 2018.

In order to satisfy its natural gas needs during growing domestic consumption, Greece has the opportunity to use various supply sources, including the constructed terminal for liquefied natural gas in Revithoussa with 5 bcm year capacity, which is still partially used and has reserves for increasing the quantities for gas storage and delivery. Its expansion to 7 bcm is also planned for 2016/2017.

The project announced by the company Gastrade for construction of a new LNG terminal in Aegean Sea - Alexandroupolis has a strategic location close to DESFA's gas transmission network and it is ranked as project of common interest. The other project Aegean LNG in the Kavala region proposed by DEPA remained as a concept and did not receive support for EC funding.

In May 2010 Greece signed a non-binding Memorandum of Understanding with Qatar for LNG import, including plans to import Qatari LNG and construction of a € 3.5 billion LNG terminal with a capacity of 7 bcm/y in Western Greece.

Part of the gas corridor connecting Turkey-Greece-Italy is the project ITGI – Poseidon with capacity of 8 bcm/y. The realization of this project will give Italy and the European countries an opportunity for natural gas supply from the Caspian Sea.

Poseidon is an offshore section of ITGI through the Ionian Sea to connect the gas transmission systems of Greece and Italy where Edison and DEPA are partners with equal shares. On 24th February, 2016 a Memorandum of Understanding in the field of gas supplies across the Black Sea from Russia through third countries to Greece and from Greece to Italy along the southern route was signed in Rome between OOO Gazprom, DEPA SA and Edison SpA. The agreement reflects the interest of the countries in this route and they commit to

benefit as much as possible from the work carried out by Edison and DEPA within the ITGI Poseidon project. The future of ITGI remained unclear after the investment decision on the selection of the project – Trans Adriatic gas pipeline (TAP).

TAP is the westward continuation of TANAP. The gas pipeline will link with TANAP on the Turkish-Greek border and will cross Greece, Albania, the Adriatic Sea and will reach Southern Italy in line with the initial announcement 10 bcm will be transported. Project's shareholders are BP (20%), SOCAR (20%), Snam S.p.A. (20%), Fluxys (19%), Enagás (16%) and Axpo (5%). In March, 2016 the European Commission supported the TAP construction and confirmed that the Trans Adriatic gas pipeline complies with all rules for free competition in the EU and will materially enhance to the energy security. The first natural gas is expected to be transported at the end of 2019 at the earliest.

Plans for TAP extension to the northwest are developed – the Ionian-Adriatic Gas Pipeline (IAP) to supply gas to Albania, Montenegro, Sothern Croatia, Bosnia and Herzegovina whereas the TAP consortium has signed a Memorandum of Understanding and cooperation with the TSOs of the respective countries - (BH-gas, Plinacro and Geoplin Plinovodi), and the Energy Ministries of Albania, Bosnia and Herzegovina, Croatia and Montenegro. Further political support for the construction of this branch TAP – IAP dates from May, 2013 when the governments of Albania, Bosnia and Herzegovina, Croatia and Montenegro signed a MOU in support of the two gas pipelines. Both the existing gas pipeline between Bulgaria and Greece which in compliance with the requirements of Regulation (EC) 994/2010 as of January 1, 2014 provides the possibility (firm capacity) for gas transmission towards Bulgaria and the future Interconnector Greece-Bulgaria (IGB) are of key significance to the gas supplies from Shah Deniz gas field to Bulgaria, considering the intentions for connection between TEP and IGB near the town of Komotini, Greece. In 2013 the public supplier Bulgargaz EAD and Consortium Shah Deniz signed a preliminary supply contract for 1 bcm/y for a term of 25 years and the first gas to Bulgaria is to supplied at the end of 2019, at the earliest. The contract comes into force after the final investment decision on the second stage of development of the Shah Deniz II field in the Caspian Sea signed on 17th December, 2013.



Planned gas transmission infrastructure connecting Europe with Shah Deniz II.

Source BP

2.2 Turkey

Consumption in Turkey in 2014 is about 49.2 bcm and is expected to reach 59 bcm by 2020.

Natural gas makes up over 30% of total energy consumption with the main consumer being electricity generators (56% of total consumption) and industrial and household consumption making up over 20% each. Demand is expected to continue to increase in future, as Turkey plans to develop more gas fired power plants. Household and industrial consumption are also expected to increase along with the construction of more distribution gas pipelines and expansion of the existing distribution networks following privatization of the distribution companies.

Turkey produces small amounts of natural gas, covering an insignificant part of the domestic consumption (about 1% in 2013). The country imports natural gas mostly from the Russian Federation. However, the share of Russian imported gas has been declining in recent years, as Turkey diversifies its gas supply by importing from Iran and Azerbaijan, also by LNG mostly from Algeria and Nigeria.

Natural gas export from Russia to Turkey in 2014 reached 26.9 bcm which is 54.76% of the total natural gas imports in turkey (49.2 bcm), from Iran (18.13%), Azerbaijan (12.33%), Algeria (8.48% through LNG), Nigeria (2.8% through LNG), and of LNG Spot market (3.43%).

The existing gas infrastructure in the country is with cross-border capacity for import of 53 bcm/y. In 2014 the imported natural gas quantities are as follows: (6.6 bcm/y from Azerbaijan, 10 bcm/y from Iran, 16 bcm/y from Blue Stream, 5.6 bcm/y from LNG, 14 bcm/y from Russia through Bulgaria). This would be sufficient to cover demand levels until 2018.

To compensate the ever-growing natural gas demand Turkey will rely on the construction of the Trans-Anatolian Gas Pipeline (TANAP) that is to transport gas from the Azeri field Shah Deniz II from the Georgian-Turkish border to the western Turkish border (1850 km, DN 1200). The first stage capacity is 16 bcm/y of which 10 bcm will be transit transported to the European market and 6 bcm are to cover the Turkish domestic consumption. The project is expected to be developed by the stage capacity increase up to 23 bcm/y by 2013, 31 bcm/y by 2026, reaching 60 bcm/y in its last stage. TANAP shareholding is 58% - the state oil and gas company of Azerbaijan (SOKAR), 30% - Botas and 12% - British Petroleum. In January, 2016 the TANAP consortium determined the makeup of the joint venture to build the section on the territory of the Turkish region Eskisehir to the Greek border.

The construction and the commissioning of the gas pipeline is expected in 2018.

Following the statements made at political level by Russia on suspension of the project South Stream, on December 1, 2014 OAO Gazprom and the Turkish company Botas signed a Memorandum of Understanding on the possibility of construction of a new sea gas pipeline to Turkey with a capacity of 63 bcm/y. The working name of this gas pipeline is Turkish Stream, considering the option for a branch from it to be constructed to Bulgaria as part of the supply routes to EU countries.

In the event that the other new projects planned are implemented (e.g. a new gas pipeline from Iraq (10 bcm/y), the Southern Gas Corridor projects and the new LNG terminal on the South coast (10 bcm/y), Turkey will play more significant role not only as a transit country of Caspian gas but also as a supplying country and/or a transporter of additional natural gas quantities to the neighbouring countries in Europe due to its favourable geographic location since it is closely situated to 70% of the world's proven gas reserves. In case of continuously rising natural gas consumption, in the near future Turkey will need about 6.0-7.0 bcm active

gas to be stored in underground gas storage facilities. In this regard, Turkey is implementing an ambitious program of expansion of existing storage facilities and construction of new ones on its territory. Together with the two constructed and operating LNG terminals (Marmara Ereğlisi with an annual capacity of 8.2 bcm after the expansion and Aliaga with an annual capacity of 6 bcm), respectively with gas storage capacity – 172.2 and 156.8 mcm, respectively 2 other gas storages - Sultanhani (Aksaray) and Silivri (Marmara), respectively with capacity 1.5 and 2.66 bcm operate in the country, and the total amount of active gas that can be stored in Turkey is currently around 4.5 bcm. Moreover, Turkey is constructing 3 new gas storage facilities Tuz Golu 1 UGS in salt cavern – 960 mcm, Tuz Golu 2 UGS in salt caverns – 2 040 bcm, Tarsus UGS– 1 bcm.

The expansion of the Silivri (Marmara) gas storage is under way, initially to 2.84 and later to 4.3 bcm. The strategic plan of the Ministry of Energy and Natural Resources of Turkey for the period 2015-2019 envisage the storage volume to reach – 10 % of the equivalent of the annual natural gas consumption which amounts to about 5.6 bcm in 2019 according to the preliminary estimates. After 2020 the total volume of the gas stored in underground gas storages together with the capacities of the two LNG terminals is expected to reach about 8 bcm. The storage development programme implemented by Turkey is in line with the securing of the expected additional gas flows which the countries may receive from Russia.

North-western Turkey is a major natural gas consumer. At present, the main problem of the gas transmission system of Turkey is provision of the natural gas quantities in the region of Istanbul. The country experience seasonal natural gas demand and during winter additional gas quantities are provided from the Balkan direction due to the insufficient storage capacity.

In addition to the above, there is further potential for expansion of the interconnectivity between Bulgaria and Turkey. According to a preliminary Bulgartranzgaz EAD evaluation, the economically feasible amount of additional capacity is within 3 bcm/y. The realization of this project would contribute significantly to the economic growth of both countries, as Turkey is an important transit hub in gas transportation from the Caspian region, Central Asia and the Middle East.

2.3 Romania

Romania is characterized by well-developed gas infrastructure, high level of development of the distribution networks and underground natural gas storage facilities. It is distinguished by its gas industry with long-established traditions and significant domestic production (over 85% of the consumption) and 8 gas storages: Tirgu-Mures – with volume of active gas 300 mcm, Nades-Prod-Seleus – 50 mcm, Sarmase – 800 mcm, Cetatea de Balta –100 mcm, Bilciuresti – 1.31 bcm, Urziceni –360 mcm, Ghercesti – 150 mcm and Balanceanca – 50 mcm. An expansion of Tirgu-Mures Nades-Prod-Seleus has been planned. Romania has gas storages with natural gas storage volume of more than 3 bcm active gas. Roman-Margineni Gas Storage is in project phase.

The country has nine cross-border gas pipelines - 5 with Ukraine, 3 with Bulgaria and 1 with Hungary, 6 of them being cross-border entry points and 3 exit points.

The country has large natural gas reserves, about 600 bcm which puts it on fourth place in EU as a country producer of natural gas, following Great Britain, Netherlands and Germany. These quantities would have be enough to satisfy the consumption of Romania for the next 50 while the production on daily basis is not sufficient to cover the whole annual consumption.

The field "Neptune" in the Black Sea, being developed by the Romanian company OMV Petrom (a subsidiary of OMV Austria) and the American company ExxonMobil is in an

advanced process of study. According to data from the initial drilling "Domino"-1, the field reserves have been estimated within the range of 42 to 84 bcm, with expected annual production levels of 6.5 bcm. The production is expected to start as of 2019. Possibilities the quantities to be sold on the market in Central Europe and Turkey are under consideration.

The balance of demand is met by imports of Russian gas based on contracts with Gazprom. The import of natural gas from Russia is about 15% of total consumption in the country.

Over the past ten years demand declined from 18 bcm/y in 2006 to only 12 bcm/y in 2014, and only 1.1 bcm (9%) is imported from Russia. According to the forecasts of natural gas demand in Romania, published in the Regional Investment Plan "Southern Corridor" 2014-2023, it is expected to remain about 13 bcm/y.

The existing supply contracts with Gazprom provide for estimated maximum annual volume of 7.5 bcm/y.

The Program for gas infrastructure development in Romania is bound to a large extent to the development of the Black Sea deposits. In this regard, modernization and expansion of the existing gas corridor connecting the Romanian gas transmission network with the Hungarian one, including gas pipelines and compressor stations (the project is included in Transgaz S.A. Ten-Year Network Development Plan) are planned. Its implementation will provide a route for natural gas transmission from the deposits in the Black Sea, through the territory of Romania and Hungary to Baumgarten hub in Austria, and reversibility of the Interconnection of Romania with Hungary.

The project is part of the concept for coordinated development of the gas transmission networks of Bulgaria, Romania and Hungary (transmission corridor Bulgaria-Romania-Hungary-Austria) for bi-directional natural gas transmission between the countries from sources of the Southern Gas Corridor and the deposits in the Black Sea, and transmission of Central European gas to South Eastern Europe. The existing part of this corridor is the new Interconnection Ruse-Giurgiu.

The gas infrastructure development plans in Romania provide for full utilization of the capacity of the existing interconnector with Hungary (4 bcm/y), the LNG project AGRI (Azerbaijan - Georgia - Romania) with capacity of 7 bcm/y (2 bcm of which are provided for Romania), as well as the project White Stream – a branch of the South Caucasian gas pipeline for supplies directly across the Black Sea from Georgia.

2.4 Macedonia

The natural gas market in Macedonia is in the process of development and only the northern part of the country was gasified. Currently the only Interconnection of Macedonia is with Bulgartransgaz EAD gas transmission network for transit transmission with design capacity of 1 bcm/y delivering at present Russian natural gas for the needs of Macedonia. The existing Macedonian gas infrastructure has a capacity of 800 mcm/y, under-utilized, with only about 16% load factor of the gas pipeline. It is planned to be expanded to 1.2 bcm/y.

Since 2004 natural gas consumption has been increasing gradually but is still at a very low level, reaching about 140 mcm/y for the period 2014-2015. Natural gas is mostly used in industries (as final consumption) and by the district heating companies (heat production). Currently there is no constructed gas distribution network in Macedonia.

The Ministry of Economy of Macedonia estimated that natural gas consumption will increase significantly over the next few years after the construction and run into operation of new combined heat and power plants (CHP) in the country. Increase of gas consumption by households in the country was foretasted as well. Forecasts indicate that natural gas demand for the period by 2020 could in the most optimistic estimates reach about 1 bcm/y. Within

the framework of the CESEC initiative a project in a conceptual stage has been offered for interconnection between the existing gas transmission systems of Macedonia, Bulgaria and Greece.

Having regard to the above mentioned, this Plan does not consider a need of additional capacity to this country, nor development of any interconnection with it.

2.5 Serbia

Natural gas accounts for only 13% (2.5 bcm/y consumption in 2014) of the primary energy consumption in Serbia. Industrial consumers account for 63% of the total consumption, followed by households (20%) and district heating companies (17%).

A World Bank financed study (South East Europe Regional Gasification Study) forecasted gas demand for 2020 to reach 3.4 bcm/y in 2020. Demand is expected to be driven by increased household consumption and industrial demand by the planned development of the distribution networks. This is underlined by the existing energy strategy of the Serbian government.

Natural gas supplies to Serbia are carried out through Hungary, by import from Russia which amounted to over 90% of the total natural gas import. In 2012 the country signed a long-term supply contract with Gazprom with maximum annual volume of 2.5 bcm/y by 2020.

To ensure enough natural gas quantities Serbia plans to expand the existing underground storage Banatski Dvor from 450 mcm to 1.2 bcm/y which will cover almost half of the annual consumption in the country. If this project is realized together with the Russian partners from Gazprom who own the control package of shares of the company Banatski Dvor (51% Gazprom and 49% Srbijagas), Serbia shall be able to compensate a possible natural gas shortage.

Serbia is also interested in other alternatives for diversification of the supply sources and routes by new interconnections with the neighbouring gas markets.

A significant project in this regard is the planned Interconnector Bulgaria-Serbia, which is at the stage of feasibility study. In the medium term Bulgartransgaz EAD gas transmission system is expected to be able to provide the capacity and ability to deliver these alternative quantities upon realization of the other planned interconnections and international gas pipeline projects in the region.

2.6 Conclusions

In connection with the review of the neighbouring countries' gas markets, it can be summarized that there are objective expectations for growth of natural gas consumption in Bulgaria's neighbouring markets.

Currently the necessary infrastructure – interconnections and access to terminals for liquefied natural gas import through which the alternative gas supplies in the country shall be carried out is not available. This is an issue which other countries in the region are also facing. This circumstance is a key prerequisite for an accelerated construction of the planned new interconnections between Bulgaria and Romania, Turkey, Greece, Serbia and the connectivity with the cross-border projects, the Southern Gas Corridor projects, as well.

Within the concept of increasing the energy security of EU, an improvement of the LNG supply to third countries is set out by building the infrastructure and ensuring domestic markets with an access to the global LNG market. Currently, the annual import capacity of the LNG terminals in Europe amounts to 208.96 bcm and is not filled up. Expanding the existing facilities with 76.85 bcm and the construction of new ones has been planned. Now the load level of receiving LNG terminals in Europe is about 30-40%. On the European

market liquefied natural gas comes mainly from Algeria, Qatar, Oman, Yemen, Libya, Nigeria, Egypt, Trinidad and Tobago etc.

The measures of the European Commission in the so called “winter package” also envisage incentivizing and more efficient use of the existing gas storages by introducing better operation and optimization rules for the natural gas cross-border transmission. The data for 2015 shows that Europe has a storage capacity of about 146 bcm active gas.

Currently, Bulgaria has only one source for natural gas supplies – the Russian Federation, which determines almost full dependence on the Russian gas supplies, and the local production is insignificant. The existence of only one route for natural gas import from Russia through the territory of Ukraine, Moldova and Romania has a negative impact on the security of supplies for the country.

The implementation of the planned infrastructure projects in the region and the priority gas distribution centre – Balkan hub in Bulgaria will result in stable integration of the gas market and ensure its connection to the gas hubs in Central and Eastern Europe, as well as access to the sources of the Southern Gas Corridor. Favourable conditions for diversification will be created thus reducing the energy dependence.

Last but not least, the capacity of the existing infrastructure in Bulgaria will be fully utilized.

NATURAL GAS TRANSMISSION AND STORAGE

1. NATURAL GAS TRANSMISSION COVERING CONSUMPTION IN BULGARIA

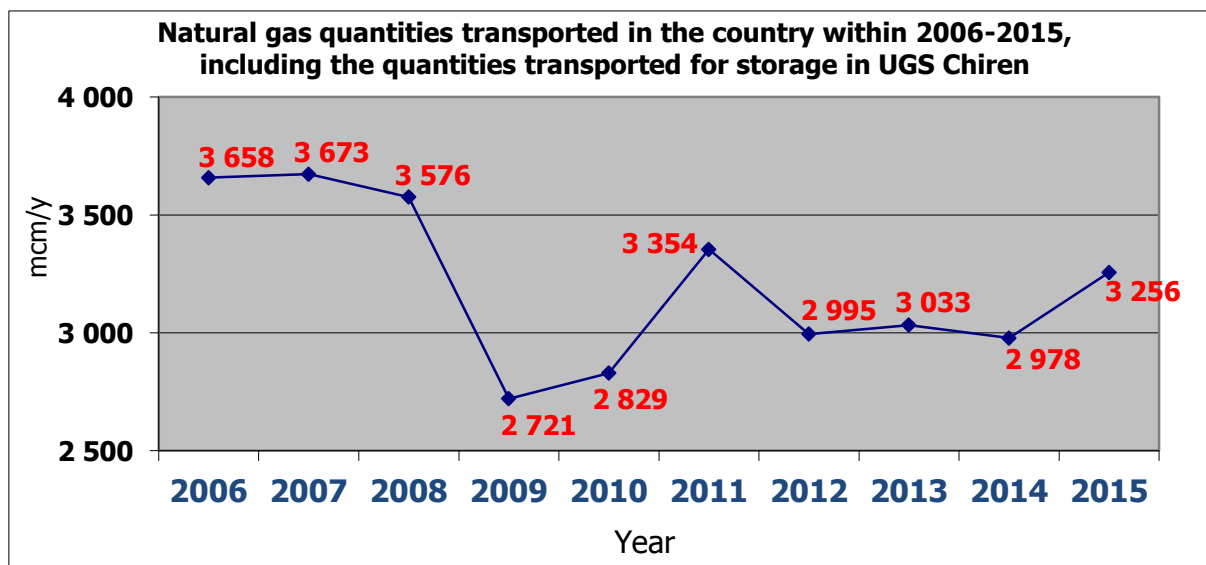
License No L-214-06/29.11.2006 has been issued to Bulgartransgaz EAD for a period of 35 years enabling the natural gas transmission activity.

In its capacity as a licensed gas transmission operator Bulgartransgaz EAD shall ensure:

- Uniform management and reliable operation of the gas transmission networks to secure natural gas transmission in compliance with the requirements for service quality and reliability;
- Maintenance, rehabilitation and modernization of the sites and facilities of the gas transmission networks according to the national and European technical requirements, occupational safety rules and the conditions for environmental protection, while applying the good practices in these areas;
- Development of the gas transmission networks in line with the economic feasibility and the social and economic needs of our country;
- Access of clients to the gas transmission services under transparent and non-discriminatory conditions according to the requirements of the national and the Community legislation and the good European practice.

In 2015 the natural gas quantities transported along the gas transmission network for the country amount to 3 256 mcm (including the quantities transported for injection in UGS Chiren), amounting to 9.3% increase compared to the previous year (2 978 mcm), as a result of the increase consumption with more than 10%.

Over the last ten years the transported natural gas quantities (including the quantities transported for injection in Chiren UGS) are indicated in the diagram:



The natural gas quantities indicated as delivered in the country from import and local production (2 988 mcm) and respectively the actually transported natural gas quantities (3 256 mcm) differ due to the fact that the transmission activity also includes:

1. Quantities transported for injection in UGS Chiren;
2. Difference between the injected and withdrawn quantities in UGS Chiren;
3. Difference in the natural gas quantity under pressure in the gas transmission system (linepack);
4. Technological losses, technological differences in the class of accuracy of the metering devices, etc.

The technical design capacity of the natural gas transmission network to most of the consumers in the country amounts to 7.4 bcm/y.

2. NATURAL GAS TRANSIT TRANSMISSION



Compressor station Lozenets

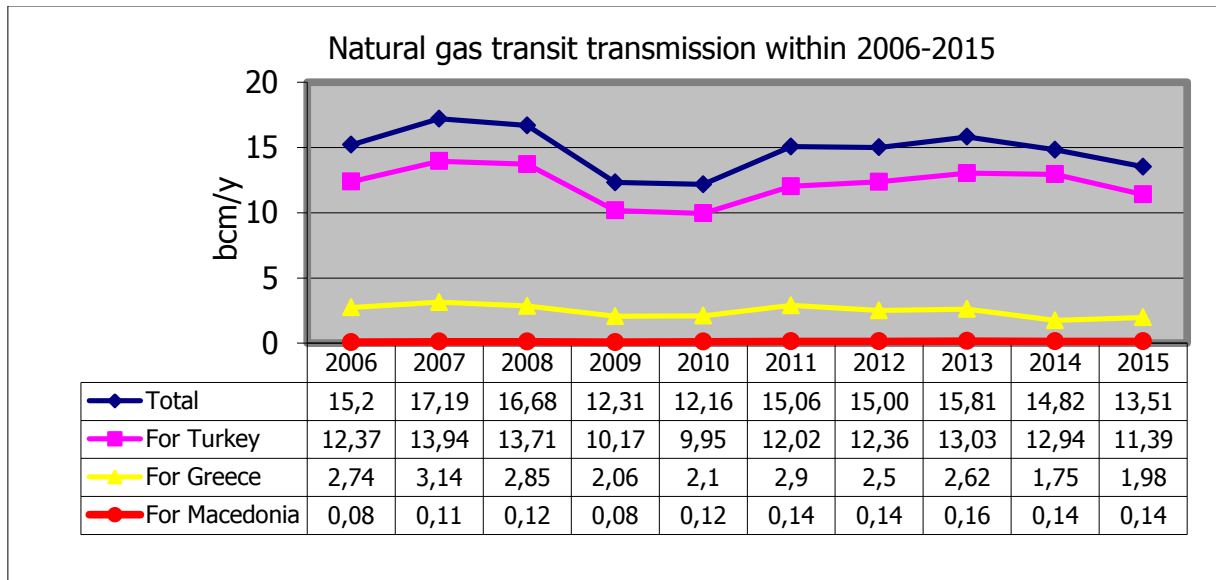
The natural gas transit transmission is carried out by Bulgartransgaz EAD under the License owned, No L-214-09/29.11.2006 issued by SEWRC for a period of 35 years.

The transit transmission of natural gas is performed through gas pipelines with a total length of 930 km and six compressor stations with total installed capacity 225 MW providing deliveries in three main directions – Turkey, Greece and Macedonia. The transported quantities meet 100% of consumption in Macedonia, about 70% of consumption in Greece and about 35% - 40% of consumption in Turkey.

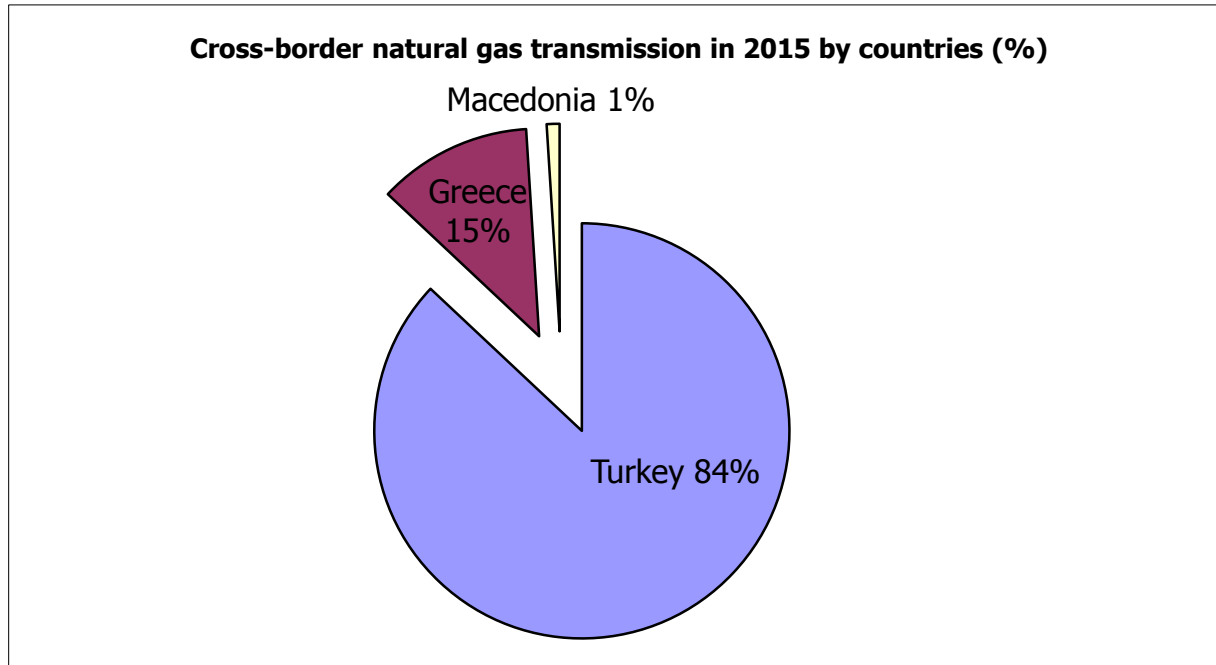
The transited natural gas quantities in 2015 were 13.51 bcm or 8.8% less compared to 2014 (14.82 bcm). The maximum technical capacity for natural gas transit transmission to all three directions amounted to 17.8 bcm and to the respective countries was as follows: Turkey 14

bcm/y; Greece 3 bcm/y; Macedonia 0.8 bcm/y.

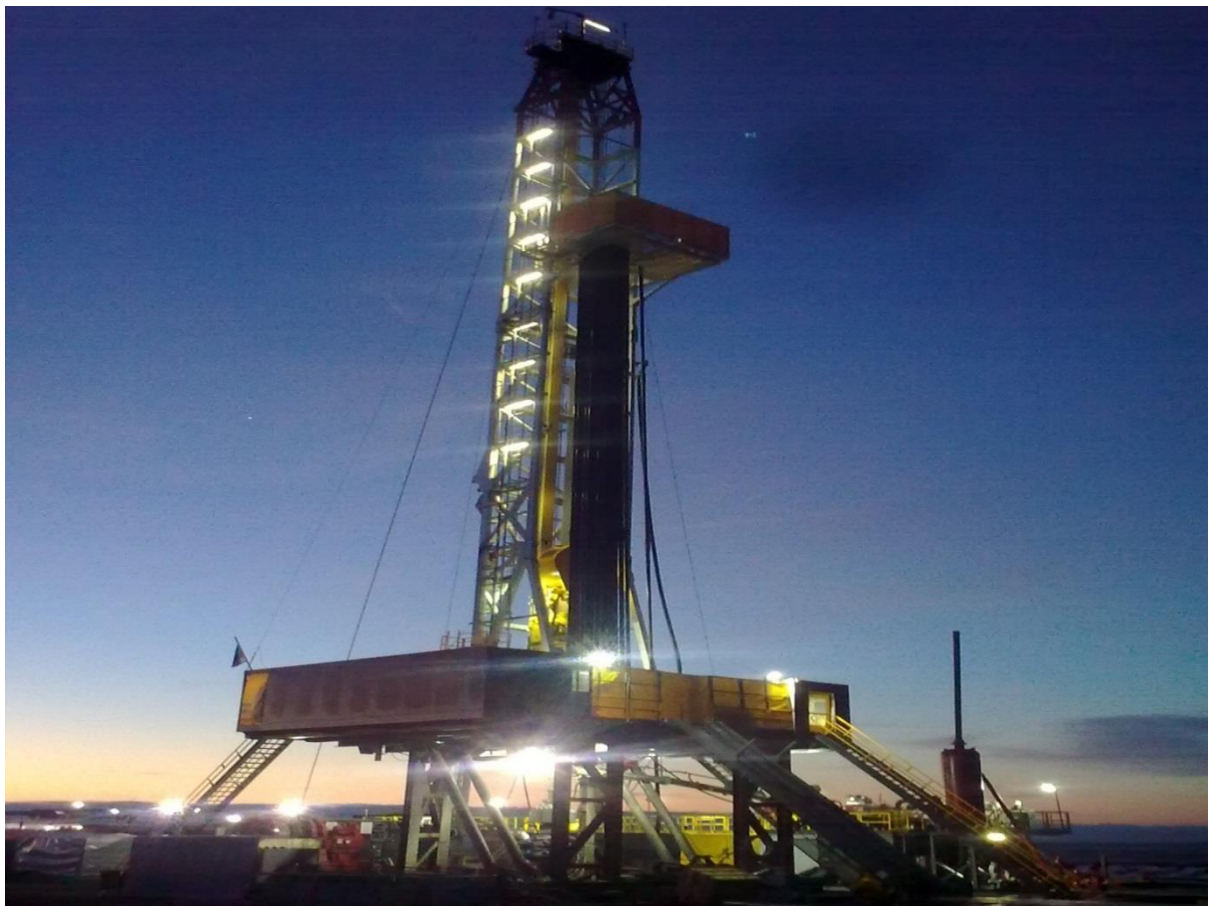
Transit transmission through the territory of Bulgaria for the period 2006-2015, including by countries, is shown in the diagram below:



The percentage distribution of cross-border transmission in 2015 by countries was:



3. NATURAL GAS STORAGE



Drilling Rig Chiren UGS – exploitation drill E-72

Pursuant to Licence No L-214-10/29.11.2006, issued by SEWRC, Bulgartransgaz EAD provides natural gas storage services by using its own underground gas storage (UGS) Chiren near the village of Chiren, Vratsa Municipality. The gas storage has 22 exploitation wells, a compressor station with 10 MW total installed capacity and other technological facilities necessary for ensuring injection, withdrawal and quality of the natural gas stored. The natural gas quantities stored in Chiren UGS cover mainly the seasonal fluctuations in domestic consumption and in the cases of changed contracted natural gas supplies. Currently under maximum filling, Chiren UGS is able to cover about 25-30% of the daily needs during the cold winter months. The injected/withdrawn natural gas quantities in/from the gas storage depend on the market conditions and the optimal technical capabilities of Chiren UGS in compliance with the rules for safe operation. Bulgartransgaz EAD and the natural gas companies who have clients with irregular consumption are obliged to maintain a strategic reserve related to the security of supplies and the covering the seasonal fluctuation. In 2015 the injected natural gas quantities were 295 mcm and the withdrawn - 291 mcm. Information on the performed injection, withdrawal and storage of natural gas by months is presented in the table below.

Withdrawn and injected natural gas quantities in 2014 and 2015, in mcm				
Month	Withdrawal		Injection	
	2014	2015	2014	2015
January	87	80	-	-
February	75	73	-	-
March	3	63	19	-
April	-	3	46	-
May	-	-	53	-
June	-	-	73	17
July	-	-	23	96
August	11	10	0	55
September	-	-	51	67
October	8	-	29	58
November	46	10	0	2
December	43	52	0	-
Total:	273	291	294	295

CAPACITIES DEMAND SCENARIOS AND SOURCES TO COVER DEMAND IN THE COUNTRY

1. NATURAL GAS DEMAND

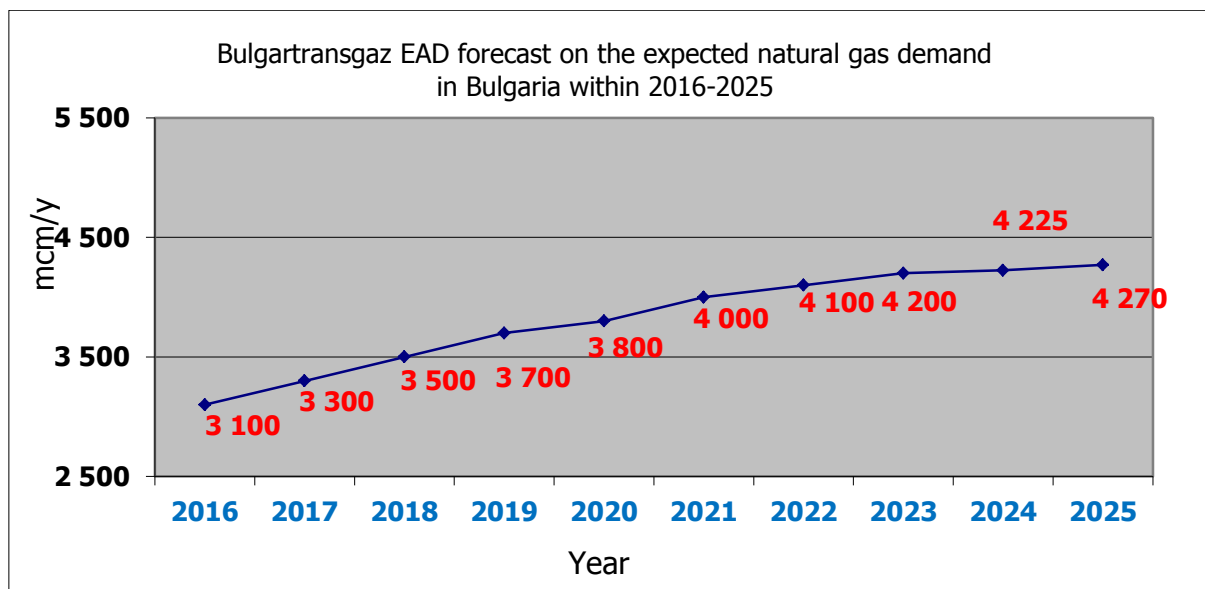
Bulgartransgaz EAD demand scenario has been developed on the basis of a macroeconomic model showing the dependence of gas consumption in the country on the main macroeconomic indicators and a comparative analysis of the gas market in both the EU and Bulgaria, and the expected increased consumption, as a result of the joining of new users and expanding the production capacities of the existing ones.

The relationship between the final and primary energy consumption (FEC and PEC) and the GDP growth for past periods have been analysed as well¹.

The main assumptions made based on an analysis of the past ten-year period, a comparative EU gas market analysis and the objectives of the Energy Strategy of Bulgaria² are the following:

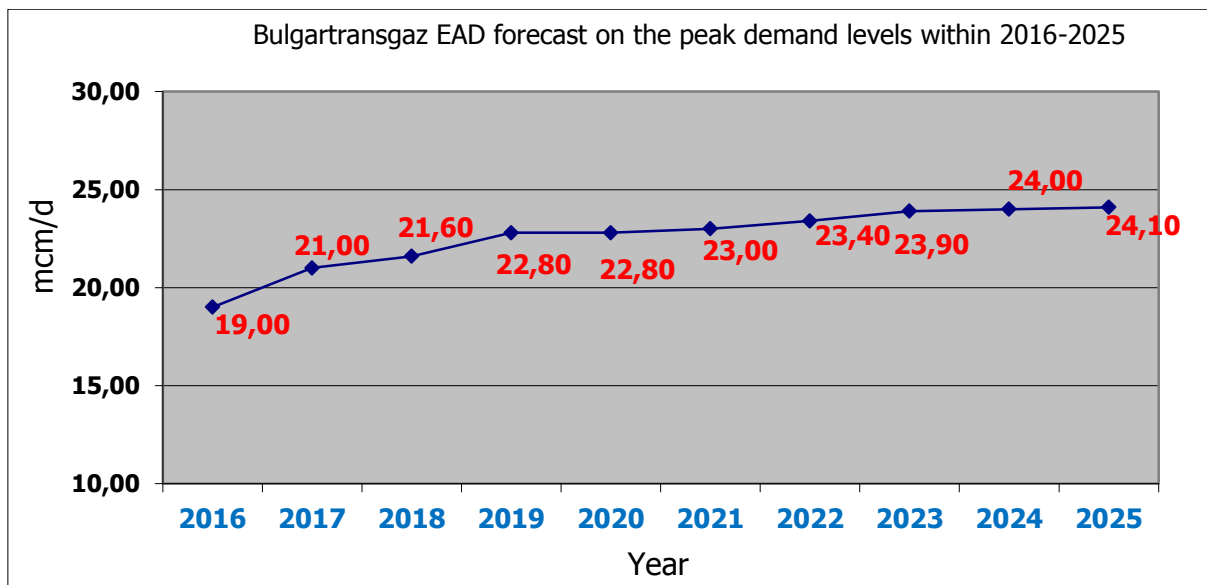
- Sustainable economic growth of GDP - between 2 and 3% annually;
- FEC/PEC ratio reaches up to and above 60% in 2024;
- The share of natural gas in PEC in 2024 reaches 19%, compared to about 13% in 2014.

The forecast on natural gas consumption prepared by Bulgartransgaz EAD for the period and the expected maximum peak daily demand levels during the winter months is indicated in the diagrams:



¹ National Statistical Institute, www.nsi.bg; Eurostat, www.epp.eurostat.ec.europa.eu

² Energy Strategy of Bulgaria by 2020 www.mi.government.bg

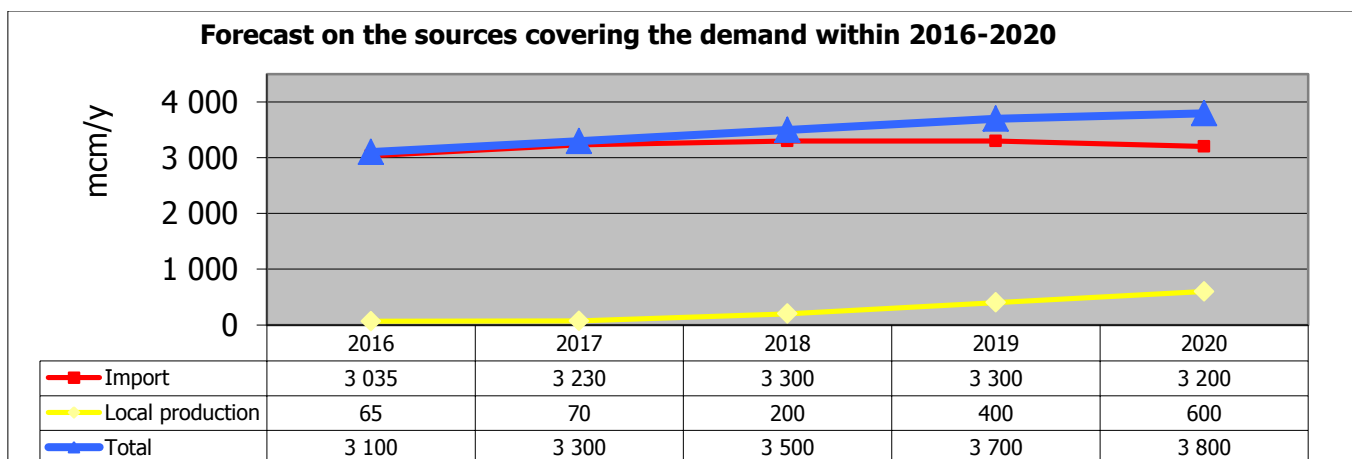


2. SUPPLY SOURCES COVERING DEMAND IN THE COUNTRY

In 2015 demand has been satisfied as follows:

- Imports from the Russian Federation – 2 910 mcm (97.4%);
- Local production – 176 mcm (2.6%).

The forecast for the sources covering demand for the period 2016-2020 is presented in the diagram below:



2.1 Import

By 2016 the natural gas import in the country comes from Russia by a single route - through the territories of Russia, Moldova, Ukraine and Romania. The natural gas mix from imports will be gradually supplemented by new sources, coming from new routes and suppliers as a result of implementation of the planned new gas projects and developed fields.

The basic alternative sources of import expected to become available within the considered

period are:

- Natural gas from sources of the Southern Corridor - the Caspian region, the Middle East and the Eastern Mediterranean, by realization of the Interconnection projects Greece-Bulgaria and Turkey-Bulgaria and implementation of the projects TAP and TANAP;
- LNG from various sources through the LNG facilities in Greece and Turkey, and the plans for capacity increase of the existing terminals, as well as construction of new ones;
- Natural gas from the gas hubs in Central and Western Europe through the planned new gas corridors between the Balkans and Central and Western Europe;
- Local production in Bulgaria;
- Local production in Romania;
- Russian natural gas through a new sea gas pipeline and Russian gas along the existing route;
- Natural gas produced from the Black Sea;

With the implementation of the interconnection projects and the increase of natural gas sources from domestic production will create conditions for real competition on the gas market and diversification of the sources and routes favouring the realization of the concept Gas Hub Balkan in Bulgaria. In practice this will enable the entry of new market participants traders of natural gas, which will contribute to the establishment of market conditions, new services and competitive prices.

2.2 Domestic production³

In the following 2-3 years the domestic production will continue to decrease as a result of the depletion of the existing fields. The forecast for domestic production growth after 2018 is based on the expected increase of natural gas consumption in the country and the region, and the large number of new concessions for exploration of gas fields, as the expectation for significant deposits is focused in particular on the gas fields in the region of the Black Sea.

Forecasts are also based on the expectations for development of the existing gas fields in the country by the following companies:

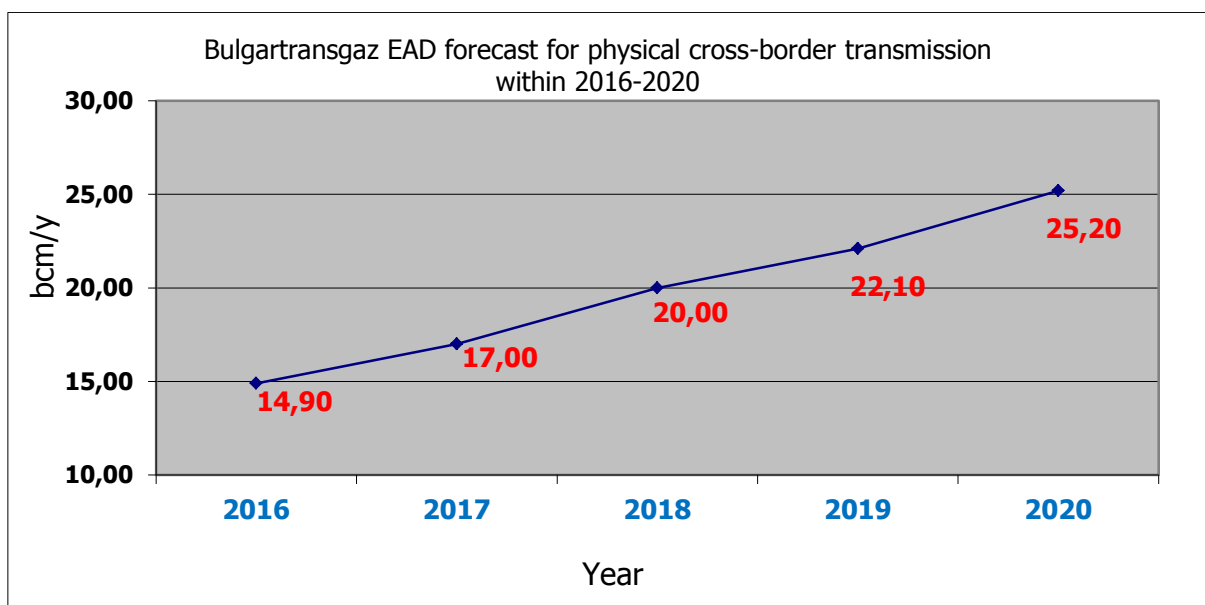
- Melrose Resources (acquired in 2012 by Petroceltic Ireland) - Block Galata, Kavarna field and Kaliakra field with total gas volume 1.7 bcm and daily production capacity reaching up to 1.2 mcm/d (440 mcm/y) and it should be noted that at present the capacity of the maritime deposits Kavarna and Kaliakra has strongly decreased as a result of depletion of the deposit;
- Gas-condensate field Koynare of Direct Petroleum (acquired by the Canadian company TransAtlantic), Block 'A- Lovech' including 4 sections. The expected resources according to the approved investment proposal by the Ministry of Environment and Water amount up to 36 bcm and so far only block 'A- Lovech' has been completely explored with estimate quantity of 13.7 bcm. The expected maximum resources of the other blocks amount to about 22 bcm (according to

³ The information on local production comes from the website of Petroceltic International Plc, and according to internal company documents and correspondence of Bulgartransgaz EAD with stakeholders, including with Exploration and Production of Oil and Gas AD.

preliminary data). The construction of connection between the gas field and Bulgartransgaz EAD national gas transmission network is forthcoming.

3. FORECAST ON THE DEMAND OF CAPACITY FOR CROSS-BORDER TRANSMISSION THROUGH BULGARTRANGAZ EAD EXISTING INFRASTRUCTURE

The forecast on demand of capacity for cross-border transmission in the next 5 years is based on the existing long-term contracts for transit transmission and the expected new booking of capacity resulting from creating new capacities available and cross-border points, including from the projects ITB, IBR, IGB and IBS. The forecast is shown in the following chart:



The forecast on booking capacity for cross-over transmission in the next 5 years by the gas transmission infrastructure users is for capacity between 5 and 10% greater than the above expected physical flow rates to/from the neighbouring countries.

SECURITY OF SUPPLY⁴

The calculation of the N-1 standard has been prepared for the period 2016-2020 according to Art. 9 of Regulation (EU) No 994/2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC of the Council (the Regulation):

The N-1 formula describes the capability of the technical capacity of the gas infrastructure to satisfy the total gas demand in the area under calculation in the event of disruption of the single largest gas infrastructure during a day of exceptionally high gas demand occurring with a statistical probability once in 20 years.

Pursuant to the regulation by 3 December 2014 at the latest, in the event of a disruption of the single largest gas infrastructure, the capacity of the remaining infrastructure should be able to supply the necessary gas quantities to satisfy the total gas demand in the area under calculation during a day of exceptionally high gas demand occurring with a statistical probability once in 20 years, i.e. $N-1 > 100\%$.

Two basic scenarios for fulfilment of the standard for infrastructure have been developed - basic (including the existing and forthcoming to be run into operation by 1.01.2017 infrastructure) and a basic assessment of the expected domestic production levels (based on the capacity of gas fields in operation in 2016) and target (considering the PCIs planned for construction and commissioning within the calculation period under Regulation No 347/2013 of the European Parliament and of the Council on guidelines for trans-European energy infrastructure and of other projects) and the optimistic assessment of the expected domestic production levels (based on issued exploration and production concessions).

Two formula for implementation of the standard for infrastructure shall be as follows:

$$N - 1(\%) = \frac{\sum_{m=1}^6 EP_m + S_{max} + P_{max} - I_{max}}{D_{max}} \times 100, N-1 \geq 100 \%$$

Where*:

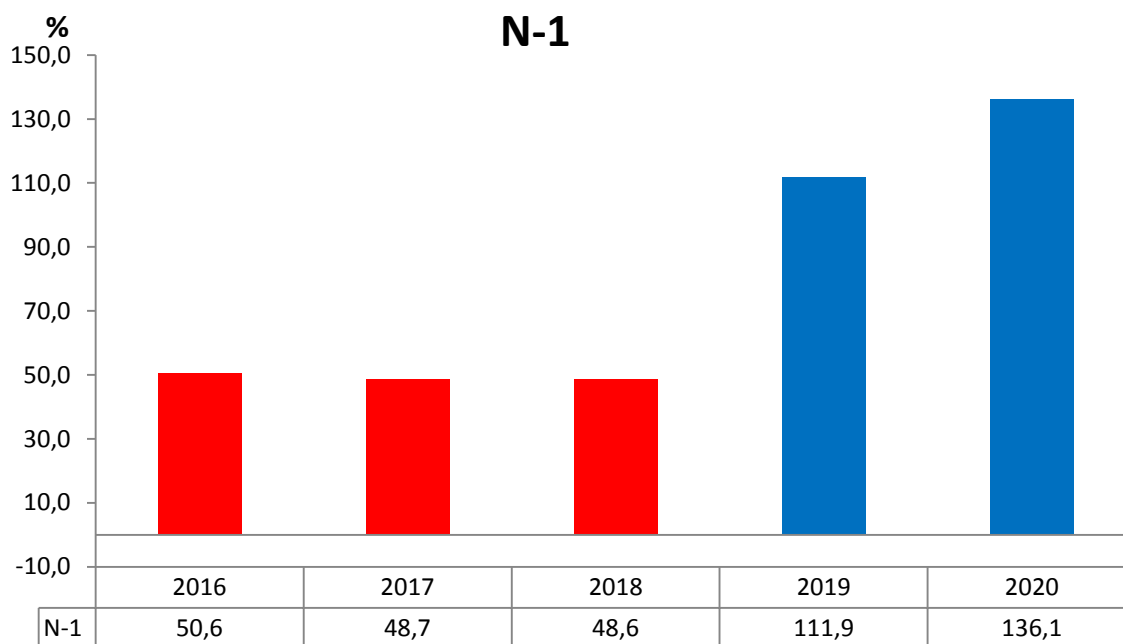
EP₁	Technical capacity of GMS Negru Voda 1, mcm/d
EP₂	Technical capacity for import through Interconnector Bulgaria-Serbia, mcm/d
EP₃	Technical capacity for transfer from the gas transmission network for transit transmission - GMS Ihtiman, including from Kulata/ Sidirokastro , mcm/d
EP₄	Technical capacity for import through Interconnector Turkey-Bulgaria, mcm/d
EP₅	Technical capacity for import through Interconnector Bulgaria-Romania, mcm/d
EP₆	Technical capacity for import through Interconnector Greece-Bulgaria, mcm/d
S_{max}	Withdrawal from UGS Chiren – the maximum possible, mcm/d
P_{max}	National gas production – the maximal possible production, mcm/d
D_{max}	National consumption – peak consumption, mcm/d

⁴ The information in this section was updated in conjunction with the update of the Prevention plan by the Ministry of Energy under Regulation (EU) 994/2010

Imax=EP₁	The single largest gas infrastructure - GMS Negru Voda 1m mcm/d
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The results of the N-1 formula for the basic scenario for the next five years are as follows:

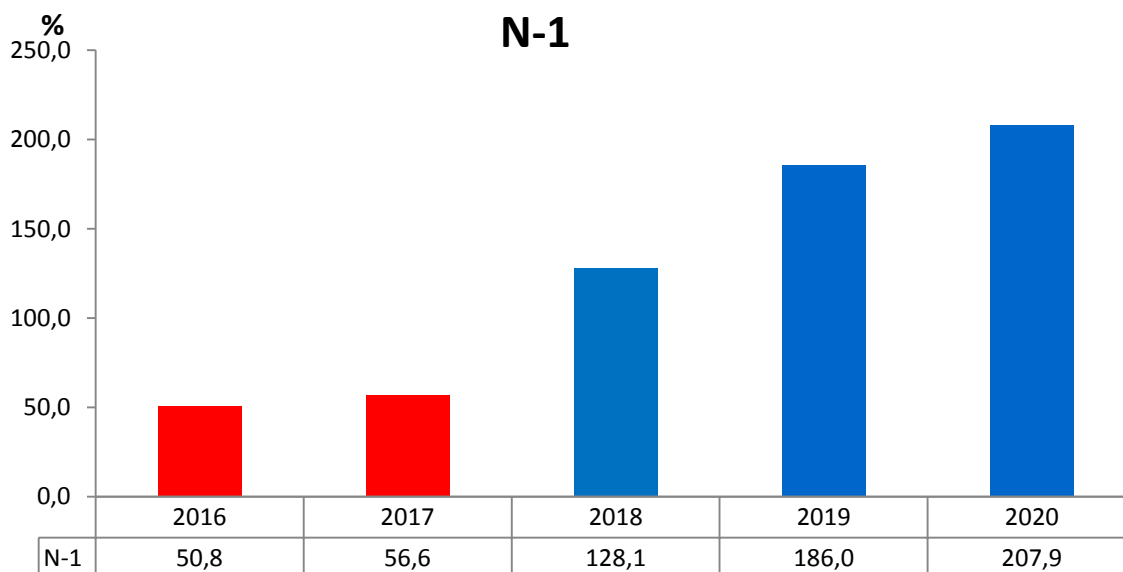
Year	Pmax	Smax	EP2	EP3	EP4	EP5	EP6	Dmax	EP1=Imax	N-1
2016	0,17	5,0	0,0	3,08	0,0	1,37	0,0	19,0	20,27	50,6
2017	0,78	5,0	0,0	3,08	0,0	1,37	0,0	21,0	20,27	48,7
2018	1,04	5,0	0,0	3,08	0,0	1,37	0,0	21,6	20,27	48,6
2019	1,30	5,0	0,0	6,00	0,0	4,10	9,1	22,8	20,27	111,9
2020	1,83	10,0	0,0	6,00	0,0	4,10	9,1	22,8	20,27	136,1



The results of the N-1 formula for the target scenario for the next five years are as follows:

Year	Pmax	Smax	EP2	EP3	EP4	EP5	EP6	Dmax	EP1=Imax	N-1
2016	0,17	5,0	0,0	3,08	0,0	1,4	0,0	19,0	20,27	50,8
2017	2,4	5,0	0,0	3,08	0,0	1,4	0,0	21,0	20,27	56,6
2018	4,2	5,0	4,9	3,08	9,1	1,4	0,0	21,6	20,27	128,1
2019	4,2	5,0	4,9	6,00	9,1	4,1	9,1	22,8	20,27	186,0

2020	4,2	10,0	4,9	6,00	9,1	4,1	9,1	22,8	20,27	207,9
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The calculations made by the formula N-1 for the infrastructure standard for the basic scenario show that in case of disruption of the single largest gas infrastructure (from Russia through Ukraine), the capacity of the existing infrastructure shall not be able to deliver the necessary gas quantities to satisfy the overall demand on the territory of the Republic of Bulgaria for a day of exceptionally high natural gas demand.

Also, in case of implementation of the projects "of common interest", Bulgaria will fulfil the infrastructure standard by the end of 2017.

Several major projects have been planned in order to fulfil the infrastructure standard, namely – a project for the modernization, rehabilitation and expansion of the existing gas transmission infrastructure (including the modernization of compressor stations) and projects for gas interconnections construction.

2016-2025 GAS INFRASTRUCTURE DEVELOPMENT PROJECTS



Welding of a high-pressure gas pipeline

The national combined gas operator Bulgartransgaz EAD shall bear the primary responsibility for the security, reliability, development and free access to the national gas infrastructure - the transmission network for natural gas transportation to customers in the country, the underground natural gas storage and the transmission network which is primarily designated for natural gas transit transmission through the territory of the Republic of Bulgaria. Gas infrastructure status and development are essential prerequisites for the development and liberalization of the domestic gas market. In addition, in its capacity of a combined gas operator in a member-state of the EU, Bulgartransgaz EAD has also obligations under the energy legislation to integrate the national gas transmission system with the regional and the European one in order to create a single, competitive, common European gas market.

The supply and demand analysis, the risk assessment, the requirements of the European energy legislation and the obligations of the combined gas operator to the public, determine the necessary investments planned to be made in the period 2016-2025.

The investments provided for the period 2016 - 2025 will contribute to achieving the following key objectives:

- 1. Increase and guarantee of the technical security, safety and reliability of the gas infrastructure and compliance with the requirements for environmental protection with regard to** the expected increasing gas demand in the country and the region by means of:
 - Investments for reconstruction, rehabilitations and overhauls of the transmission

networks including investments in the existing compressor stations, linear infrastructure and gas regulation and metering stations, and in UGS Chiren;

- Investments for construction of new facilities to the existing infrastructure necessary to enhance the efficiency of operation;
- Investments in ancillary infrastructure, including the fibre optic network.

2. Providing opportunity for development of competitive market and diversification of gas supply sources and routes, resulting in greater energy independence, opportunity for local shippers to access gas at various prices and an opportunity to create a regional gas hub, including spot market by means of:

- Construction of the necessary facilities to connect the existing gas transmission infrastructure with the future trans-European gas corridors and the Southern Gas Corridor projects (TAP - Trans-Adriatic Pipeline, TANAP – Trans Anatolian Natural Gas Pipeline, as well as other pan European projects), which envisage to ensure diversification of natural gas supply sources and the gas transmission routes to Europe;
- Connection of the gas transmission network of production companies in the country;
- Development and implementation of electronic systems for operations' control.

3. Ensuring the security of gas supplies to the country by means of:

- Investments in construction of interconnections to connect the gas transmission networks located outside the territory of the country.
- Investments for expansion of the underground gas storage, both regarding the withdrawal and the injection facilities, and the capabilities for storage of larger amounts of natural gas.

4. Access of new municipalities and end users to natural gas, which will contribute to improving the environmental protection, quality of life, energy efficiency and savings from cheaper fuel by means of:

- Expansion of the existing gas transmission networks to new regions of the country;
- Construction of new gas metering and gas regulation stations, providing an opportunity for connection of new end users to the gas transmission networks or to the gas distribution networks.

This chapter of the Plan constitutes structured information about the basic infrastructure planned for construction, expansion, reconstruction and modernization during the next ten years (and covers the period 2016-2025).

Considering the long-term period of investment planning - a ten-year period and its including in the Plan of the projects, which at present have no final investment decision and projects which development is related to the implementation of other international projects in the gas sector, for the purpose of greater clarity the Network Development Plan has been structured into 3 main groups, defining the particular sites and timetable for their implementation, and expected amount of the investments:

- o Investments on which decision for implementation in the period 2016 - 2018 has already been taken - Projects for development of the gas transmission and storage infrastructure with investment decision already taken - Table 1;

- Investments which implementation depends on the development of international projects implemented on the territory of the country - investments for development of the gas transmission and storage infrastructure depending on the development of international projects and third parties projects in the period 2016 – 2025 – Table 2;
- Projects for development of the gas transmission and storage infrastructure in the period 2016 - 2025 on which no investment decision has been taken but there are investment intentions on their implementation during the 10-year plan period - Table 3;

Additionally, in item 5 of this Section a more detailed description is provided of the projects of key significance to the process of liberalization, diversification of the natural gas supply sources and routes, development of the gas network in the region and contribution to the national economy.

1. NATURAL GAS TRANSMISSION AND STORAGE INFRASTRUCTURE DEVELOPMENT PROJECTS IN THE PERIOD 2016 - 2018 ON WHICH INVESTMENT DECISION HAS BEEN TAKEN

Investments for the more significant projects of the network on which a decision has been taken and which are scheduled for implementation in the period 2016 - 2018, are presented in consolidated form in Table 1. Implementation of some of the projects has commenced before 2016, but work on them will continue also during the period 2016-2018. For such projects only the estimated value of investment during that three-year period is indicated in the Table. The funds specified represent the funding that shall be ensured by Bulgartransgaz EAD.

Table 1

Natural gas transmission and storage infrastructure development projects in the period 2016 - 2018 by consolidated projects	Implementation schedule	Estimated value of investment in thousand BGN
I. 2016-2018 RECONSTRUCTIONS, REHABILITATIONS AND OVERHAULS		
1. Investments for Compressor stations:		
1.1. Gas transmission network for transit transmission		
Actions aimed at compressor stations meeting the requirements of the complex permits, including reconstruction of compressor stations Ihtiman (commissioned in 2015), Petrich – commissioning is due in 2016, Lozenets (Protocol of Findings Standard Form 15 has been signed in 2015), Strandja (Protocol of Findings Standard Form 15 has been signed in 2015) by integrating low-emission GTCU	2016	12 491
Overhauls of gas turbine engines, including planned repairs and inspections	2016-2018	18 849
1.2. National gas transmission network		
Modernization of automatic control system of GCU and station control system of CS Valchi dol and CS Polski Senovets	2016 - 2017	6 466
Reconstructions and rehabilitations of CS Polski Senovets and CS Valchi dol	2016 -2017	7 660
2. Investments in existing AGRSs		
2.1. National gas transmission network		
Reconstruction and modernization of AGRS, GRS and GMS: AGRS Lovech, GRS Devnya, AGRS Septemvri, GRS Sofia-4 Ivanyane, GRS Isperih, GRS Razgrad, AGRS Dobrich, AGRS Popovo etc.	2016-2018	6 707
3. UGS Chiren		
Reconstruction and rehabilitation of wells and ground facilities	2016 - 2017	16 879
II. INVESTMENTS FOR CONSTRUCTION OF NEW FACILITIES TO THE EXISTING INFRASTRUCTURE NECESSARY TO ENHANCE THE EFFICIENCY OF OPERATION		
1. National gas transmission network		
Construction of cleaning facilities (launch-receive	2016 - 2018	4 300

Natural gas transmission and storage infrastructure development projects in the period 2016 - 2018 by consolidated projects	Implementation schedule	Estimated value of investment in thousand BGN
traps) for gas pipeline branches Dimitrovgrad, Burgas, Devnia.		
2. Natural gas storage		
Construction of new wells and gas gatherings	2016 – 2017	13 418
Construction of compressor capacity in UGS Chiren and replacement and/or rehabilitation of ground facilities. Implementation of efficiency control system for 2 GMC; Technological parameters control system for 8 GMC; Reconstruction and expansion of the technological equipment control system at UGS Chiren	2016 - 2018	28 050
3. Investments in ancillary networks		
Optical cable main lines in the sections: from Botevgrad region to UGS Chiren, from VS Batultsi - VS Nikolaevo – GRS Pleven, VS Nikolaevo - CS Polski Senovets, CS Polski Senovets – CS Miladinovi – CS Valchi dol; CS Ihtiman to GMS Dupnitsa ; Dupnitsa – Kulata and in the sections VS Nikolaevo - CS Polski Senovets and Optic cable line on the existing route from the headquarters to Novi Iskar.	2016-2018	23 765
III. PROJECTS FOR PROVIDING CAPABILITY FOR CROSS-BORDER CAPACITY INCREASE		
Interconnection Bulgaria-Romania (Ruse-Giurgiu) – undercrossing of main and back-up pipe	2016	5 251
Construction of looping of transit gas pipeline to Turkey in the section CS Lozenets - CF Nedyalsko	2016-2017	47 383
IV. ACCESS OF NEW MUNICIPALITIES AND NEW END USERS TO NATURAL GAS		
1. Investments in projects for expansion of the existing gas transmission networks to new regions of the country		
High-pressure gas pipeline Chiren - Kozloduy - Oryahovo, AGRS Kozloduy and AGRS Oryahovo	2016 - 2018	7 522
Construction of new gas pipeline branches with AGRS to Svishtov, Panagyurishte and Pirdop, Bansko and Razlog	2016 - 2018	27 181
2. Investments for construction of new gas metering and gas regulation stations		
Construction of new GMSs and AGRSs - AGRS Ignatievo, GMS Chirpan, GMS Dermantsi 2, GMS Stambolovo, GMS Razgrad	2016-2018	2 338

Investments which implementation depends on the development of international projects implemented on the territory of the country are presented in Table 2;

2. INVESTMENTS IN THE DEVELOPMENT OF NATURAL GAS TRANSMISSION AND STORAGE INFRASTRUCTURE DEPENDING ON THE DEVELOPMENT OF INTERNATIONAL PROJECTS AND THIRD PARTIES PROJECTS IN THE PERIOD 2016-2025

Table 2

Investments for natural gas transmission and storage infrastructure in the period 2016 - 2025 by consolidated projects	Implementation schedule	Estimated amount of investment in thousand BGN
I. PROJECTS FOR PROVIDING OPPORTUNITY FOR DIVERSIFICATION OF GAS SUPPLY SOURCES AND ROUTES		
1. Interconnections		
Connection to Interconnection Greece-Bulgaria (IGB)	2016-2018	8 170
Connection to Interconnection Bulgaria-Serbia	2016-2018	3 970
Interconnection Turkey – Bulgaria (ITB)	2016-2019	100 224

These financial resources will be funded by Bulgartransgaz EAD.

3. NATURAL GAS TRANSMISSION AND STORAGE INFRASTRUCTURE DEVELOPMENT PROJECTS IN THE PERIOD 2016 - 2025 ON WHICH FINAL INVESTMENT DECISION IS TO BE TAKEN

In order to determine the subsequent realization of the following projects, preliminary studies will be carried out on the appropriateness and method of implementation and funding, principle technical solutions, scope, location, etc. These financial resources will be funded by Bulgartransgaz EAD.

Table 3

Natural gas transmission and storage infrastructure development projects in the period 2016 - 2025 on which no investment decision has been taken	Forecast implementation period	Estimated amount of investment in thousand BGN
1. Gas transmission network for natural gas transit transmission		
Actions aimed at achieving compliance of compressor stations with the requirements of the complex permits, including retrofitting gas turbine units with low-emission chambers – stage 2 – CS Strandja, CS Lozenets and CS Petrich	2016-2020	60 185
Retrofitting the fuel systems of 6 GTUs type THM 1304/11 with low-emission combustion chambers	2016 - 2020	16 050
Projects for rehabilitation and modernization of the existing transit transmission infrastructure	2016 - 2020	50 600
2. National gas transmission network		

Natural gas transmission and storage infrastructure development projects in the period 2016 - 2025 on which no investment decision has been taken	Forecast implementation period	Estimated amount of investment in thousand BGN
Actions aimed at achieving compliance of compressor station Kardam 1 with the requirements of the complex permits - retrofitting gas turbine units with low-emission chambers	2017-2018	6 000
Actions on construction of cleaning facilities /launch and receive traps/ of gas pipeline branches for Pernik, Pleven and Pazardzhik	2016-2019	2 960
Overhaul replacement of the section CS Valchi Dol – VS Preselka	2017-2018	28 000
Increasing the capacity of the gas pipeline branch Targovishte	2016-2017	5 600
Projects for rehabilitation, modernization and expansion of the existing national gas transmission infrastructure including overhaul replacement of the sections VS Batultsi – VS Kalugerovo, PF Beglej – VS Dermants, VS Dermantsi – PF Batultsi	2016-2020	94 330
3. Total for allocatin		
Study for replacement of unreliable transmission equipment in the compressor stations and UGS Chiren	2016 - 2019	5 440
4. Natural gas storage		
Expansion of UGS Chiren capacity	2016 - 2020	200 300

4. 2016 – 2025 INVESTMENT PROGRAM

This Section presents Bulgartransgaz EAD Investment Program for the period 2016-2025 divided into the following activities:

- **Pre-Investment preparation** – performance of activities and tasks justifying the technical and economic feasibility and ensuring conditions for legitimate realization of the projects planned and included in the long-term investment intentions of the Company, providing for the performance of the following main activities:
 - Examination and justification of the technical and economic feasibility of projects' implementation included in the long-term investment intentions of the Company;
 - Justification and specifying of the timing, main technical and economic parameters for the separate investment intentions;
 - Study of the opportunities for attracting grant funds from the EC for the separate investment intentions and applying for such grants;
 - Specifying the basic regulatory requirements applicable to the respective projects and ensuring their legitimate implementation;
 - Preparation of Terms of Reference;

- Preinvestment studies and surveys in order to take a decision on the implementation and funding of projects in the medium term.
- **Investments** - actions aimed at expansion, reconstruction, modernization and overhauls, grouped into three main sections;
 - Construction of new facilities;
 - Reconstruction, rehabilitation and overhauls of long-term tangible assets;
 - Delivery of machinery and equipment.

4.1 Three-year Investment Program (2016-2018) including investment activities on which final investment decision has been taken

in thousand BGN, VAT excluded

Program / Section	Total 2016	Total 2017	Total 2018
TOTAL Annual Pre-Investment Preparation and Investment Programs:	139 609	286 483	232 478
TOTAL Annual Pre-Investment Preparation Program	2 577	148 927	177 852
TOTAL Annual Investments Program	137 032	137 556	54 626
<i>SECTION I.1 - Construction of new facilities</i>	74 654	93 042	31 922
<i>Gas transmission network for transit transmission</i>	26 812	24 021	2 185
Linear part	25 182	22 231	0
Compressor stations, administrative and operating regions	89	100	0
Communication and information systems	1 541	1 690	2 185
<i>National gas transmission network</i>	21 604	40 504	13 618
Linear part	8 821	24 940	10 529
Compressor stations, administrative and operating regions	114	465	0
Communication and information systems	10 717	12 155	1 525
AGRS and GMS	1 952	2 944	1 564
<i>Natural gas storage</i>	12 798	13 260	14 080

Wells and gas gathering	11 498	2 540	0
Main technological installations and systems, operating unit	1 300	10 720	14 080
<i>Total for distribution by types of activities</i>	13 439	15 257	2 039
Linear part	2 110	0	0
Compressor stations, administrative and operating regions	9 902	12 990	0
Communication and information systems	1 427	2 267	2 039
<u>SECTION I.2 - Reconstruction, rehabilitation and overhauls of long-term tangible assets</u>	46 192	36 600	14 704
<i>Gas transmission network for transit transmission</i>	27 247	9 177	2 120
Linear part	2 961	2 685	320
Compressor stations, administrative and operating regions	24 286	6 492	1 800
<i>National gas transmission network</i>	7 234	18 826	12 034
Linear part	2 992	3 450	10 600
Compressor stations, administrative and operating regions	3 508	10 747	0
AGRS and GMS	734	4 629	1 434
<i>Natural gas storage</i>	10 821	6 058	0
Communication and information systems	700	0	0
Wells and gas gatherings	8 007	2 630	0
Main technological installations and systems, operating unit	2 114	3 428	0
<i>Total for distribution by types of activities</i>	889	2 540	550
Linear part	200	300	300
Compressor stations, administrative and operating regions	169	1 990	0
Communication and information systems	20	0	0

Chief Dispatching Division	500	250	250
<i><u>SECTION I.3 – Delivery of machinery and equipment</u></i>	16 187	7 914	8 000

4.2 2019-2025 Investment program, including mandatory investment activities ensuring capacity capabilities of the networks
in thousand BGN, VAT excluded

Program / Section	Total	Total	Total	Total	Total	Total	Total
	2019	2020	2021	2022	2023	2024	2025
TOTAL Annual Investment Program:	46 500	48 190	37 100	37 900	38 804	40 960	42 189
<i>SECTION I.1 - Construction of new facilities</i>	21 800	22 250	10 800	11 300	11 817	12 644	13 024
Gas transmission network for transit transmission	3 250	3 400	3 600	3 800	4 013	4 294	4 423
National gas transmission network	4 450	4 650	4 900	5 100	5 304	5 675	5 846
Natural gas storage	12 000	12 000	0	0	0	0	0
Total for distribution by types of activities	2 100	2 200	2 300	2 400	2 500	2 675	2 755
<i>SECTION I.2 - Reconstruction, rehabilitation and overhauls of long-term tangible assets</i>	17 200	17 940	18 300	18 600	18 987	20 316	20 926
Gas transmission network for transit transmission	10 500	10 900	10 900	11 000	11 200	11 984	12 344
National gas transmission network	4 050	4 250	4 500	4 600	4 692	5 020	5 171
Natural gas storage	800	840	850	900	953	1 020	1 050
Total for distribution by types of activities	1 850	1 950	2 050	2 100	2 142	2 292	2 361
<i>SECTION I.3 -Delivery of machinery and equipment</i>	7 500	8 000	8 000	8 000	8 000	8 000	8 240

4.3. 2016 - 2025 Investment program, including investment activities on which final investment decision is to be taken
in thousand BGN, VAT excluded

	Total 2016	Total 2017	Total 2018	Total 2019	Total 2020	Total 2021	Total 2022	Total 2023	Total 2024	Total 2025
TOTAL	2 577	148 927	177 852	149 920	104 000	73 000	72 000	42 000	42 000	57 000
Gas transmission network for transit transmission	642	42 117	81 300	59 000	44 000	10 000	10 000	10 000	10 000	24 000
National gas transmission network	1 485	43 870	35 352	29 720	40 000	60 000	60 000	30 000	30 000	31 000
Natural gas storage	300	60 000	60 000	60 000	20 000	1 000	1 000	1 000	1 000	1 000
Total for distribution	150	2 940	1 200	1 200	0	2 000	1 000	1 000	1 000	1 000

5. DESCRIPTION OF KEY PROJECTS

In the context of the European objectives for establishment of an interconnected and single European gas market, the infrastructure development in the Republic of Bulgaria is directly related to the positioning of the country as one of the gas hubs in Eastern Europe in line with the projects for Southern Gas Corridor development and the plans for gas infrastructure development in the region and Europe. The strategic objectives to improve the security of supply and diversification of gas supply sources occupy a central place in the European energy policy.

The new interconnections with Turkey, Greece, Serbia and Romania are key for the market integration. These projects will contribute to securing natural gas supply to the country and the region, creating real conditions to diversify sources and the routes and enabling the transmission of additional natural gas quantities to and through Bulgaria.

The regional gas infrastructure development is closely related with the plans to expand the storage capacity of the underground gas storage that is currently the only one in Bulgaria - Chiren UGS to provide services to the national and regional market, and the project on modernization and rehabilitation of existing natural gas transmission infrastructure to enhance its efficiency and reliability. The storage capacity could be also further increase by construction of new gas storage facility in the country.

Bulgartransgaz EAD priority as a combined gas operator is the effective implementation of the company's projects of common interest. The PCIs list⁵ published by the EC in November, 2015 includes the following infrastructure projects planned for construction on the territory on Bulgaria: Capacity expansion of the UGS Chiren; Rehabilitation, modernization and expansion of the existing gas transmission system; Interconnection Turkey – Bulgaria (ITB); Construction of a gas hub in Bulgaria; Easting Bulgaria; Project for construction of gas pipeline(s) to increase the interconnection capacity of the north semi-ring of the national gas transmission network of Bulgartransgaz EAD and the gas transmission network of Romania; Interconnection Greece-Bulgaria (IGB).

The implementation of all these projects is interrelated and aims at contributing to the efficiency and development of the common European gas network.

5.1 Connection with pan-European projects

5.1.1 Development of the gas infrastructure regarding the concept for the construction of a regional gas hub in Bulgaria – Balkan Hub

The concept for the construction of a gas distribution hub on the territory of Bulgaria is based on the idea that significant gas quantities to enter a real physical point in the region of Varna for further transport and gas trade will at the same time be organized at this point – a hub where each market participant could trade with natural gas at market principles. The idea of building a gas hub is supported by the strategic geographical location of Bulgaria, well-developed existing gas infrastructure for transmission and storage and the interconnection projects with Romania, Turkey, Greece and Serbia.

In the context of the European objectives for establishing an interconnected pan-European gas market, the realization of the gas hub concept is in line with the Southern Gas Corridor development projects as well as with the plans for the development of the European gas infrastructure to improve the security of supply and to diversify the supply sources. The

⁵ Official list of the Projects of Common Interest, webpage of the European Commission, Directorate Energy

project corresponds to the need of the region identified by the High Level Group on Central and South Eastern Europe Gas Connectivity and by the European Strategy for Energy Union.

Building a gas hub aims at construction of the necessary gas transmission infrastructure to connect the natural gas markets of the Member States in the region - Bulgaria, Greece, Romania, Hungary, Croatia, Slovenia and through them to the Member States in Central and Western Europe, as well as to the countries of the Energy Community - Serbia, Macedonia, Bosnia and Herzegovina, etc. thus contributing to achieving the major priorities of the European energy policy.

Natural gas quantities from various sources could enter the hub - Russian natural gas through a new offshore gas pipeline and along the existing route, natural gas produced in the Black Sea shelf - Bulgarian (from blocks Khan Asparuh, Silistar, Teres) and Romanian, natural gas from the Southern Gas Corridor sources (Caspian, Middle East and Eastern Mediterranean) and LNG from the terminals in Greece and Turkey.

In December 2015 the Bulgarian government and the European Commission agreed on the establishment of a joint working group which shall support the development of the trade concept, business and financial plan of the Balkan Gas Hub. The working group which was announced by Mr. Tomislav Donchev - Deputy Prime Minister for EU Funds and Economic Policies, and Klaus-Dieter Borchardt – Director Internal Energy Market of the European Commission, shall review the technical, legal, regulatory and financial aspects of the project. It shall focus on identifying solutions for the common challenges in developing a stable regulatory framework and trade environment aimed at facilitating the connection between Bulgaria and the rest of South-East Europe.

5.1.2 Eastring - Bulgaria

Eastring – Bulgaria is a subproject of the Eastring cluster project.

Eastring is a project for construction of a transport corridor through the territories of Slovakia, Hungary, Romania, Bulgaria, providing an opportunity for bi-directional natural gas supplies from alternatives sources. The project is envisaged to be realized between IP Velke Kapushani (existing interconnection point (IP) between the Slovak and the Hungarian gas transmission networks) and an IP with an outer EU border on the territory of Bulgaria, as the project comprises of construction of a new gas infrastructure by optimizing the existing one in the countries along the route of the corridor.

The Eastring concept, developed at this stage and included in the Ten-Year Network Development Plan of ENTSOG (TYNDP) 2015-2024 envisages the project to be developed in a joint and coordinated manner by the transmission operators of Slovakia, Hungary, Romania and Bulgaria, and it is presented in Appendix 1 of the Plan as a project cluster, as follows: Eastring – Bulgaria, Eastring – Romania, Eastring – Hungary, Eastring – Slovakia.

Different route options have been considered within the framework of project. Eastring is provided for two-staged implementation – the first one to be commissioned in 2019 ensuring 570 GWh/d capacity, and the second one in 2023 reaching a capacity of 1140 GWh/d.

Bulgartransgaz EAD is the company that is responsible for the realization of the Bulgarian section of the Eastring. For the Bulgarian territory for stage 1 of the project development (570 GWh/d capacity) a gas pipeline with DN 1400 and about 257 km length is envisaged to be constructed from a new entry/exit point on the Bulgarian-Romanian border to a new entry/exit point on an outer EU border on the territory of Bulgaria as well as the construction of new compressor capacities 88-90MW. For stage 2 of the project development (1140 GWh/d capacity) additional construction of two new compressor capacities has been

envisaged. A possibility to connect Eastring with the networks of Bulgartransgaz EAD with entry/exit capacity of 200 GWh/d has been envisaged.

5.1.3. Project for construction of gas pipeline(s) to increase the capacity of the Interconnection of the Northern semi-ring of the national gas transmission network of Bulgartransgaz network and the gas transmission system of Transgaz S.A., Romania – Bulgaria-Romania-Hungary-Austria transmission corridor

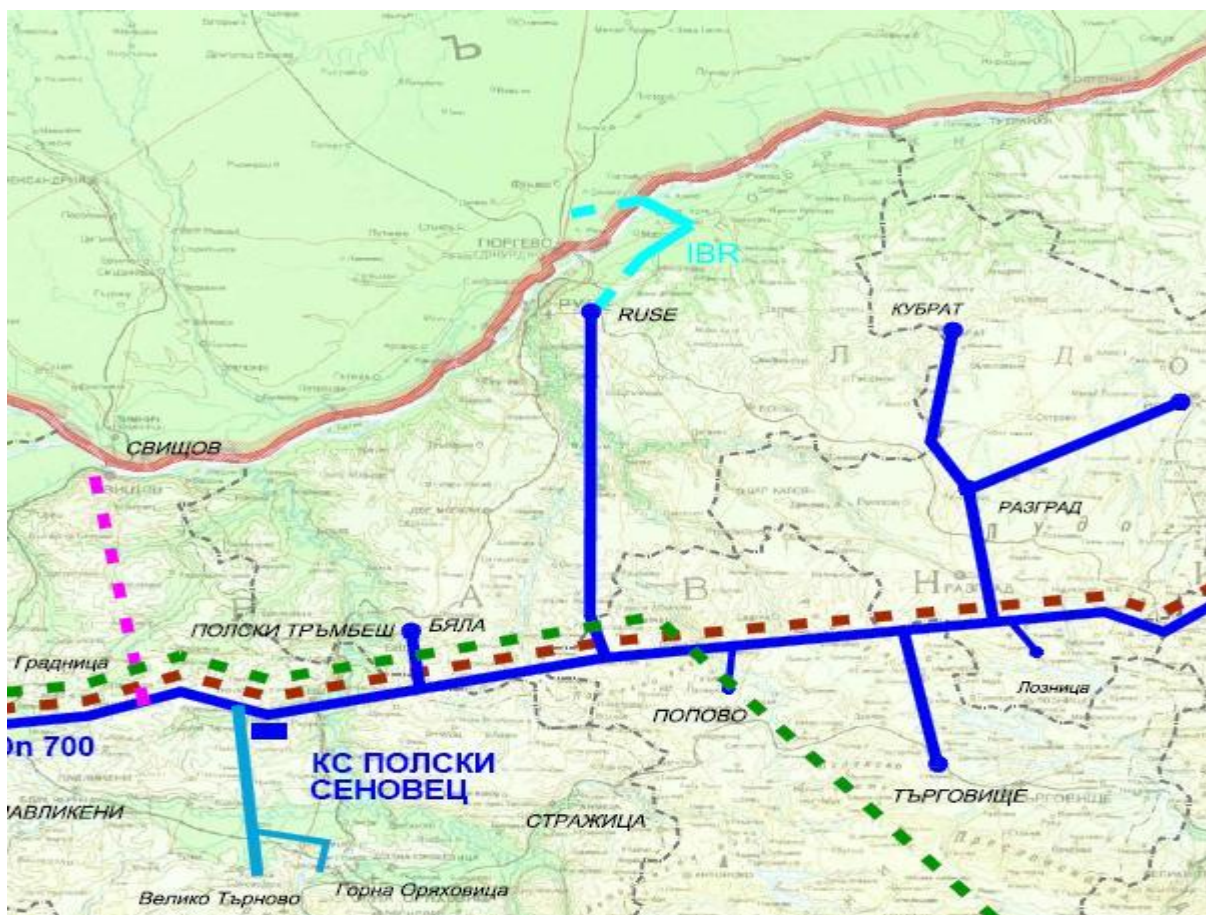
The project is part of the concept for coordinated development of the gas transmission networks of Bulgaria, Romania and Hungary (transmission corridor Bulgaria-Romania-Hungary-Austria) designed for a bi-direction natural gas transport.

On the Bulgarian territory the project will include construction of a new infrastructure and modernization and expansion of the existing one with a view of increasing the capacity of the Interconnection of the Northern semi-ring of the national gas transmission network of Bulgartransgaz network and the gas transmission system of Transgaz S.A., Romania.

The realization of the Bulgarian section together with the existing gas transmission system is expected to secure the technical possibility for natural gas supplies between 3-5 bcm/y between the planned entry points on the Bulgarian southern border and Romania and Hungary providing an opportunity to access the Central European Gas market.

5.2 New interconnections with the neighbouring countries

5.2.1. Interconnection Bulgaria-Romania (IBR)



The reverse flow interconnection Bulgaria–Romania aims at connecting the national gas transmission networks of Bulgaria and Romania. The project realization will achieve diversification of routes, interconnection and natural gas transmission to Romania using the planned new entry points with Turkey and Greece and the significant capacity available in the gas transmission system. Natural gas sourced from Romania can be supplied through the interconnection as well.

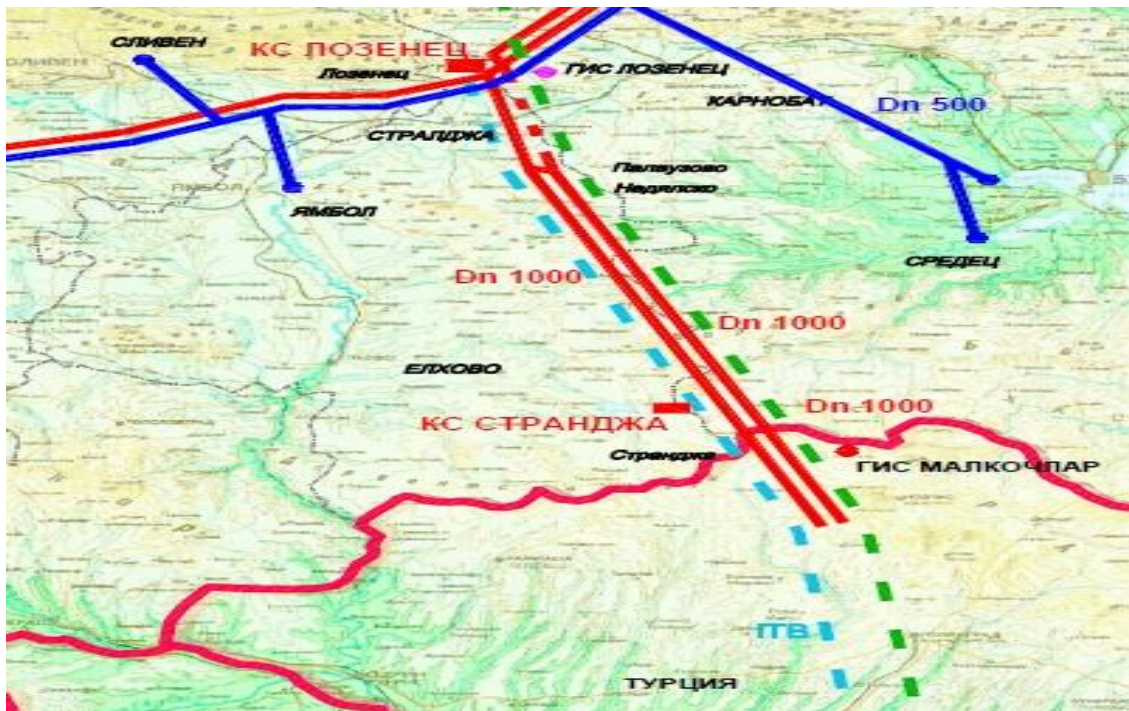
The project is being jointly implemented by Bulgartransgaz EAD and Transgaz S.A. in line with the Memorandum of Understanding signed on 01.06.2009.

The forecast total value of the project is set to 23 823 million euro. In line with EC Decision C(2010)5962 of 06.09.2010 both companies are the Beneficiaries of a grant under the European Energy Programme for Recovery (EPR) in the amount of 8.9 million euro.

The reverse flow interconnection is 25 km long of which 15 km on the Bulgarian territory, 7.5 km on the Romanian territory and 2.1 km of undercrossing through the Danube River. The maximum capacity of the interconnection is 1.5 bcm/y (in the direction from the Republic of Bulgaria to Romania), and the minimum is 0.5 bcm/y (in the direction from Romania to Bulgaria); the diameter of the pipe is Dn 500 mm and the operating pressure is Pn 50 bar.

The project is split in three parts: a Danube River undercrossing, terrestrial section on Bulgarian territory and terrestrial section on Romanian territory. The terrestrial section on the Bulgarian territory is built already. The optical cable under the river is laid. The gas pipeline is expected to be commissioned in 2016 after the construction works completion related to the main section under the Danube River.

5.2.2 Interconnection Turkey – Bulgaria (ITB)



The Interconnection Turkey - Bulgaria (ITB) is a project for the development of the interconnection of Bulgartransgaz EAD, Bulgaria, and Botas, Turkey, gas transmission networks to secure the possibility for diversification of gas supply sources, the supply partners and routes, thus increasing the security of supply in the region and the development of competition.

ITB represents a new onshore gas pipeline of a length of about 200 km (about 75 km on

Bulgarian territory), with a capacity of 3 bcm/y.

As part of the priority Southern gas corridor the project is a key one concerning the security and diversification of sources and routes to/through Bulgaria and the region.

The Interconnection Turkey – Bulgaria is a project of common interest according to Regulation (EU) 347/2013. A Grant to the amount of 190 000 Euro under the Connecting Europe Facility CEF-Energy was secured in 2015 for the Pre-Investment Study.

The Feasibility Study (FS) was prepared in 2015, and approved by Bulgartransgaz EAD, and it is a first step towards the ITB construction.

Consequently to the FS a comprehensive survey of ITB feasibility was conducted; recommendations on the selection of a gas pipeline route, technical studies, costs assessment, market needs assessment and analysis, a cost and benefit analysis, preliminary ESIA, project development schedule, preliminary Terms of Reference for the technical design, risk assessment, etc. were made.

The expected ITB construction and commissioning term is 2020.

5.2.3 Interconnection Bulgaria-Serbia (IBS)



The reverse Interconnection Bulgaria-Serbia aims at connecting the national gas transmission networks of Bulgaria and Serbia. The project is realised by the Ministry of Energy in its capacity of a Beneficiary under a procedure of financial aid within Operational Programme Development of the Competitiveness of the Bulgarian Economy 2007 – 2013 concerning the activities included in the project's first stage.

The project's realization will achieve diversification of routes, interconnection and natural gas transmission to Serbia using the planned new entry points with Turkey and Greece and the significant available capacity of the Bulgarian gas transmission system. At the same time, in crises it could be used for natural gas supply from Serbia.

In line with Regulation (EC) 347/2013 the Interconnection is one of the Bulgarian project of common interest.

According to preliminary technical information the length of the route Sofia - Dimitrovgrad - Nis is about 150 km of which about 61.6 km and the connection location to Bulgartransgaz

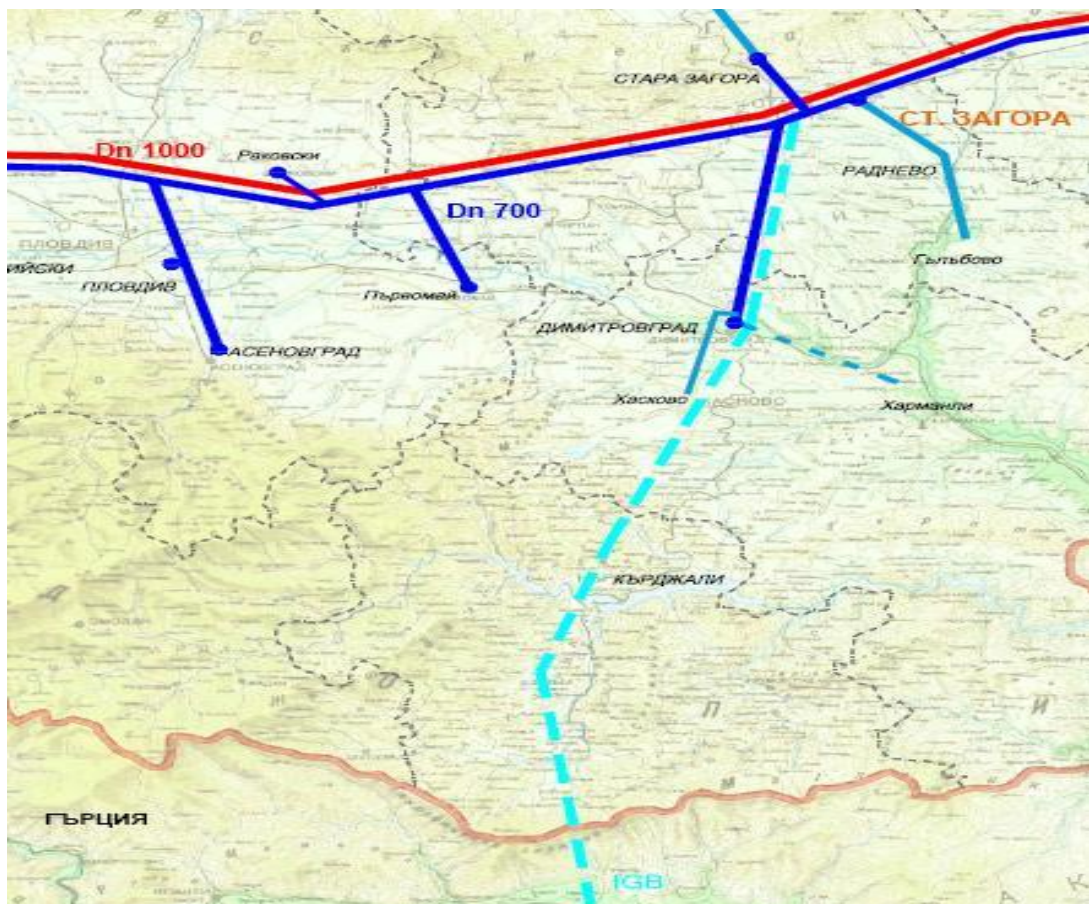
EAD gas transmission network is in the region of Novi Iskar. Minimum design annual capacity is about 1.8 bcm, and the maximum is 3.2 bcm.

Feasibility Study and field archaeological studies have been carried out along the gas pipeline route during the project's first stage. The required procedure on the acknowledgement of the gas pipeline route and sites has been completed and a Permit has been issued by the Agricultural Lands Commission to the Ministry of Agriculture and Food. Detailed Spatial Plan has – final draft been developed, approved by the National Expert Committee on Spatial Development and Regional Policy to the Ministry of Regional Development and Public Works. An investment design (stage – technical design) has been developed and approved by the Consultant under Art. 166, para. 1 of SDA. Archaeological surveys of all sites along the route have been carried out.

The second stage of the project will comprise of the procedures required for the grant of real rights over properties for the sites to the gas pipeline and establishment of easement for the gas pipeline line part, Building permit, Detailed Design, supply of materials and equipment, construction and installation works, and commissioning. A procedure for the grant of funding for the second stage of the project has been launched. The construction will be realized and financed under Operational Programme Innovations and Competitiveness 2014-2020.

The expected term of commissioning is the end of 2018.

5.2.4 Interconnection Greece-Bulgaria (IGB)



The Interconnection Greece-Bulgaria is designed to transport gas between Greece and Bulgaria whereas the interconnection with Bulgartransgaz EAD national gas transmission

network will be close to the city of Stara Zagora and with DESFA S.A. gas transmission network - in the region of Komotini. The project is developed by a joint investment company ICGB AD with shareholders Bulgarian Energy Holding EAD (50 %) and the Greek investment company IGI Poseidon (50%). Shareholders with equal stakes in IGI Poseidon are DEPA, Greece and Edison, Italy.

Co-financing is secured for the project under the European Energy Programme for Recovery in the form of financial aid. A mandate letter with the European Bank for Recovery and Development (EBRD) for the start of negotiations with a view to the financing of the construction stage has been signed.

The length of the gas pipeline Komotini-Dimitrovgrad-Stara Zagora is 182 km of which 151 km on the territory of Bulgaria and 31 km on the territory of Greece with pipe diameter of 32" (813 mm). Gas pipeline technical capacity is up to 3 bcm/y with an opportunity for increase up to 5 bcm/y with the construction of a compressor station.

Branches on the territory of Bulgaria to the area of the towns of Kardjali and Dimitrovgrad are envisaged.

An opportunity to connect IGB with TAP and DESFA S.A. gas transmission network on the territory of Greece is considered in connection with the development of the Southern Gas Corridor.

In line with Regulation (EC) 347/2013 the Interconnection Greece - Bulgaria is announced to be project of common interest.

The interconnection is expected to be constructed in 2018.

5.3. Increase of natural gas storage capacity

5.3.1 Expansion of Chiren UGS capacity

Chiren UGS has been the only gas storage on the territory of Bulgaria for 40 years. It is a key instrument for the functioning of the gas market in Bulgaria, covering seasonal fluctuations in natural gas consumption in the country by securing the necessary flexibility caused by the differences between the supplies and consumption and ensures emergency reserve. Chiren UGS is a crucial instrument ensuring the security of gas supplies. The project for expansion of the existing gas storage Chiren UGS provides for storage capacity staged increase – larger stored gas volumes, increased gas reservoir pressures accordingly and higher deliverability and injection rates. It is a PCI project.

According to the Technological Design on Chiren UGS operation and expansion completed in 2010 four options for expansion of the underground facility are developed, involving the gradual increase of reservoir pressure to 180 bar. The designer proposes as the most economically beneficial Option 3, i.e. Active gas of 1 bcm injection flow rate and 8-10 mcm/d withdrawal flow rate and maximum reservoir pressure up to 150 bar. These parameters are determined based on the analysis of the available geological, geophysical, well-logging and reservoir engineering information of Chiren geological structure and capacity capability of the surface equipment.

Additional studies in the period 2015-2017 are planned (3D seismic studies, geomechanical simulation and ground gas analysis) to make the gas storage expansion option more precise and increase to the maximum the reservoir pressure. The geo-mechanical simulation of the Chiren reservoir was completed at the time of the TYNDP. A surface gas analysis on the Chiren structure area is under way. The 3D field seismic studies on the Chiren structure area will be completed in 2016 and 2017.

A final selection for the Chiren UGS expansion will be made thereafter in terms of the next

stage of the project's implementation.

The objective of the project's realization is on one hand to create conditions guaranteeing the security of supply to the Bulgarian customers and the customers in the countries from the region, and on the other – the development of Chiren UGS as a commercial gas storage facility on an interconnected regional and pan-European market since Chiren UGS is an inseparable part of the regional gas system, consisting of interconnections, LNG terminals and storage facilities.

The planned development of gas projects in the region is a prerequisite for the market development, diversification and market integration increase and is related to the expansion of the Bulgaria's single gas storage.

In the medium term Chiren UGS emerges as a commercial storage facility playing an important role in developing competition on the regional gas market and securing additional flexibility for gas transmission networks on a regional level, with considerable contribution to congestion management and seasonal optimization of the use of gas transmission systems.

The advantage of Chiren UGS is that it is a storage facility in operation and the terms for its expansion are considerably shorter compared to the ones required for the construction of a new storage facility.

5.3.2 Opportunities for new gas storages in Bulgaria

To ensure the security of supply and encourage the gas market liberalization a study of the possibilities for new gas storage facility in Bulgaria is planned. The development of gas infrastructure in the region, including the projects from the Southern gas corridor, the planned gas interconnections and other big cross-border gas projects determine the need in the long run of securing additional storage capacity and the realization of gas storage facility projects accordingly.

Without excluding the gas storage facility in operation a new one could serve not only the national, but also the regional gas market after the planned construction of the new interconnections with neighbouring countries. It could be constructed in suitable geological structure –depleted gas fields (onshore or offshore), salt caverns or aquifer. It must however be kept in mind that the construction of a new underground gas storage from the start of the geological and research activities to its commissioning could take not less than 7-8 years.

5.4 Development of the existing network by the construction of new gas pipeline branches

The development of the existing network is an essential process in terms of creating opportunities for sustainable economic environment favourable for the development of Bulgarian economy. Besides supporting economy, the implementation of such projects is directly related to the development of the respective regions - in business and social aspect. The projects envisaged would increase the number of Bulgarian households with access to natural gas, would accelerate the process of gasification in the country and the improvement of energy efficiency. Moreover, temporary jobs will be provided in the process of their construction. In general, their implementation is associated with significant environmental effect - reducing harmful emissions from burning solid and liquid fuels.

5.4.1 Projects in progress

- **Construction of gas transmission pipeline to Kozloduy and Oryahovo**

The project included construction of 60 km high-pressure gas pipeline from Chiren to Kozloduy with a diameter of DN 350, 10 km gas pipeline from Kozloduy to Oryahovo with a diameter of DN 150 and two automatic gas regulation stations (AGRSs) in Kozloduy with a capacity of 40 000 m³/h and in Oryahovo with capacity of 5000 m³/h.

The project was envisaged to be funded by a grant under Kozloduy International Decommissioning Support Fund (KIDSF) to the amount of € 10 200 000. Bulgartransgaz EAD co-financing was to be € 4 372 000. The European Bank for Reconstruction and Development as an administrator of KIDSF in February, 2016 informed Bulgartransgaz EAD with a letter No. BTG-74-00-43/26.02.2016 on its decision to stop the project funding.

- **Gas pipeline branch Razlog - Bansko**

The gas pipeline expected length is 40 km, maximum flow rate 32 000 m³/h and diameter DN 250 and working pressure of PN 54 bar. The gas pipeline route is envisaged to pass along the northern slopes of the Pirin Mountains and cross road No. 19 Simitly - Razlog before resort Predela, continue along the southern slopes of the Rila Mountains to AGRS Razlog, then to the south, cross road No. 19 Simitly-Razlog and reach AGRS Bansko.

The project is financed with a grant financial assistance under the Kozloduy International Decommissioning Fund to the amount of EUR 4 840 000. Co-financing on behalf of Bulgartransgaz EAD is to the amount of EUR 4 840 000 and another EUR 780 000 will be invested to pay the state fees, the easement, compensations, etc.

A procedure to select a designer to prepare the technical and the detailed designed, Detailed Spatial Plan (DSP) and EIA is launched.

- **Gas pipeline branch Panagiuiriste - Pirdop**

The gas pipeline length is planned to be about 62 km, maximum capacity 25 000 m³/h and diameter DN 250 and operating pressure of PN 54 bar. The route of the gas pipeline branch is as follows: from Valve Station (VS) Vinogradets (or valve station Rosen), located on the southern semi-ring of the MGP (main gas pipeline) to AGRS west of the town of Panagiuiriste and a route from the town of Panagiuiriste to AGRS west of Pirdop.

The project is financed with a grant financial assistance under the Kozloduy International Decommissioning Fund to the amount of EUR 3 600 000. Co-financing on behalf of Bulgartransgaz EAD is to the amount of EUR 3 600 000 and another EUR 1 250 000 will be invested to pay the state fees, the easement, compensations, etc.

A Pre-Feasibility study has been carried out. A procedure in line with the EBRD's rules to select a designer to prepare the technical and the detailed designed, Detailed Spatial Plan (DSP) and EIA is launched.

- **Gas pipeline branch to the town of Svishtov**

The gas pipeline expected length is 39 km, diameter DN 200 and working pressure PN 54 bar. Power supply will be provided from the existing main gas pipeline, Northern semi-ring, from the Valve Station near the village of Patresh. Then the gas pipeline branch will reach the MGP to the AGRS, which will be located to the south of the town of Svishtov.

The project is financed with a grant financial assistance under the Kozloduy International Decommissioning Fund to the amount of EUR 2 360 000. Co-financing on behalf of Bulgartransgaz EAD is to the amount of EUR 2 360 000 and another EUR 600 000 will be

invested to pay the state fees, the easement, compensations, etc.

A Pre-Feasibility study has been carried out. A procedure in line with the EBRD's rules to select a designer to prepare the technical and the detailed designed, Detailed Spatial Plan (DSP) and EIA (if needed) is launched.

5.4.2 Possibilities for the construction of new gas pipeline branches.

- **Gas pipeline branch to the towns of Sopot and Hisarya**

The gas pipeline expected length is 54 km, 22 km of which with diameter DN 200 and 32 km DN 150. Power supply will be provided from the existing main gas pipeline, Southern semi-ring, to the west of Plovdiv-Karlovo road. Then the gas pipeline branch will reach AGRS near Hisarya and AGRS near Sopot. In addition to these municipalities, the branch will supply gas also to the town of Banya and the town of Karlovo.

The above described project for new gas pipeline branch is at the stage of exploitation activities to determine the scope, manner of execution, financing and making a final investment decision. The deadline for its implementation depend mostly on the assessment of its feasibility, considering also its social and economic effect for the region and the country.

- **Gas pipeline branch to the town of Vidin**

Regarding a letter expressing intention submitted by ASPA Consortium in the Ministry of the Regional Development and Public Works (MRDPW) concerning an investment project for a gas pipeline route to Vidin, the MRDPW filed in Bulgartransgaz EAD a letter Reg. No. BTG 24-00-754/15.02.2016 requesting a Project Proposal Form. Pre-Feasibilities Studies on the possibility of constructing a gas pipeline branch to Vidin, the mode of implementation, financing and the final investment decision are expected to be carried out.

Bulgartransgaz EAD is ready to assist in realizing all motivated and economically beneficial projects, which if well-motivated shall be included in the Pre-Investment or the Investment Programme at the next update thereof.

5.5. Major projects of reconstructions, rehabilitations and overhauls of gas infrastructure

5.5.1 Modernization, rehabilitation and expansion of the existing gas transmission infrastructure

Bulgartransgaz EAD implements a complex project for modernization, rehabilitation, and expansion of the existing gas transmission infrastructure on the territory of Bulgaria, including the following activities:

- Modernization and rehabilitation of compressor stations
- Inspections to determine and characterize the gas pipelines' condition
- Repair and replacement of gas pipeline sections following inspections
- Expansion and modernization of the existing network
- Implementation of systems for optimization of the management process of the network technical condition.

The modernization, rehabilitation and expansion of the existing gas transmission infrastructure will guarantee secure and reliable natural gas transmission, enhance the

efficiency, reliability and flexibility of the transmission system and provide the required capacities and pressures. The implementation of the activities planned will secure the technical capabilities for transmission of additional natural gas quantities through the territory of the country, coming in through the existing and new entry and exit points, and opportunities for diversification of the directions of transmission depending on the market interest.

The project for modernization, rehabilitation and expansion of the existing gas transmission infrastructure is a project of common interest and it is a priority for the Central and South Eastern Europe Gas Connectivity (CESEC) initiative.

Given the nature of the activities 2 stages of implementation covering the following activities can be distinguished:

Stage 1: Groups the initial project actions which have started in the period 2013-2015, currently under way and financed with company's own funds. The following activities fall in this stage:

- Stage 1: modernization of 4 compressor stations (CS) (CS Lozenets, CS Ihtiman, CS Petrich, CS Strandja) by integrating 6 low emission gas-turbine compressor units (GTCU). This stage is expected to be completed in mid-2016.
- Gas pipeline construction CS Lozenets – PF Nedyalsko as part of the activities for gas transmission network extension.
- Inspections.
- Implementation of systems for optimization of the management process of the network technical condition (PIMS and GIS).

Stage 2: Includes actions that are the main part of the project planned to be launched in 2016, representing the logical continuation of the overall project realization. The following activities fall in this stage:

- Stage 2: modernization of compressor stations by integrating 4 gas-turbine compressor units (GTCU) in 3 compressor stations (CS Lozenets, CS Ihtiman, CS Petrich).
- Rehabilitation and replacement of sections of the Northern semi-ring with a total length of 81 km.
- Inspections.
- Implementation of an additional software.

Stage 3: Conditional infrastructure required after the final investment decision on the realization of IBS Stage 2 related to a capacity increase of 1.8 to 2.4 bcm/y. This stage includes the infrastructure which realization and parameters are conditional, being connected to future decision whose Bulgarian project promoter is the Ministry of Energy. The infrastructure to be built includes a gas pipeline Gorni Bogorov –Novi Iskar with approximate length of 19 km, DN 700 and CS Bogorov – 20 MW.

5.5.2 Modernization, of compressor stations CS Lozenets, CS Ihtiman, CS Petrich, CS Strandja (Part of the project for modernization, rehabilitation and expansion of the existing gas transmission infrastructure)

The modernization of four of the compressor stations of Bulgartransgaz EAD gas transmission network for transit transmission is a key project, ensuring effective and

environmentally sound natural gas transportation. It is the first stage of the planned action for the modernisation of the existing compressor stations and is part of the project for the modernization, rehabilitation and expansion of the existing gas transmission infrastructure in Bulgaria. The large-scale project invested by Bulgartransgaz EAD enables the integration of low-emission gas turbine units, according to the European environmental legislation.

The scope of modernization consists of design, supply, installation and commissioning of six gas turbine units, modernization and expansion of the existing power supply systems, the automatic control systems of compressor stations and all other ancillary equipment.

The following compressor stations are subject to modernization:

- CS Strandja - installation of two new gas turbine compressor units (GTCUs);
- CS Lozenets - installation of two new GTCUs;
- CS Petrich - installation of one new GTCU;
- CS Ihtiman - installation of one new GTCU;

CS Strandja, CS Lozenets, and CS Ihtiman are commissioned. The deadline for commissioning CS Petrich is 2016.

The second stage of the CSs modernization is envisaged to be executed in the period 2016 – 2018. It includes the integration of 4 low emission GTCUs in 3 CSs (CS Petrich, CS Lozenets, and CS Ihtiman). Following the completion of the activities under Stage 2 (2016 - 2018) the verall modernisation of the CSs will be competed.

5.5.3 Modernization of GCUs existing automatic control systems (ACSs) and the station control system at CS Valchi dol and CS Polski Senovets

The objective of modernization is replacement of the existing automatic control systems of each GCU and the station control systems at CS Valchi dol and CS Polski Senovets with new ones, based on new modern technologies and components.

The upgraded control systems shall enable GCU and CS control from the control room and reduce to a minimum the presence of any staff in the gas compressor unit machine room. Therefore new uniform independent automatic control systems of GCU in compressor stations and new station control systems for CS operation shall be built.

At the end of 2014 a full engineering contract has been entered into and the CSs are expected to be completed and all GTCUs to be commissioned in stages at the end of 2017.

5.5.4 Construction of pigging facilities (launch and receive traps) for gas pipeline branches Devnya, Burgas and Dimitrovgrad

Currently there are no pigging facilities installed on these branches. The construction of launch and receiving traps will enable regular cleaning and in-line inspections to track the actual operating state of the transmission gas pipelines without any need of gas flow interruption and the maintenance of the design pressure as well.

5.5.5 Construction of Transit Gas Pipeline to Turkey (looping) in the section CS Lozenets - PF Nedyalsko (Part of the project for modernization, rehabilitation and expansion of the existing gas transmission infrastructure)

The expansion of the transit gas pipeline to Turkey in the section between Compressor station Lozenets and Pigging facility Nedyalsko is key to the development of the existing Interconnection between Bulgaria and Turkey and it part of the project for modernization, rehabilitation and expansion of the existing gas transmission infrastructure in Bulgaria.

The construction of the 20 km gas pipeline section in the section CS Lozenets - PF Nedyalsko is directly related to increasing the security of Bulgartransgaz EAD transmission system and will enable the transmission of additional quantities of gas through the transit gas pipeline in

the section between CS Lozenets and the Bulgarian -Turkish border. Looping construction is a technical prerequisite for the implementation of reverse flow, if necessary. Moreover, its implementation will create technical capabilities of system flexibility under various operations and modes, including the launch of cleaning devices and intelligent tools, carrying out repair works on gas pipelines without limitations on natural gas transit, improved hydraulics of the system.

The project is planned to start in 2016 and commissioned in 2017.

5.5.6 Laying of fibre optic network: from Ihtiman CS to Dupnitsa GMS Botevgrad – Batultsi - Chiren, Batultsi – Nikolaevo - Pleven, Nikolaevo – Polski Senovets, Polksi Senovets – VS Miladinovtsi – Targovishte and VS Miladinovtsi – CS Valchi Dol.

Laying of fibre optic network aims at increasing significantly the speed, quality and reliability of the communication with Bulgartransgaz EAD technological equipment along the route of the transmission pipelines thus creating the technical possibility for the IP realization IP - networks to carry technological information (including if needed the establishment of connection of modern permanent monitoring and security systems, remote control, etc.)

5.6 Interconnections between the national gas transmission network and the gas transmission network for transit transmission

Actions have been undertaken to allow a more efficient use of the overall technical capacity of Bulgartransgaz EAD gas transmission network targeted at the construction of technological connections and measuring stations between the national gas transmission network and the gas transmission network for transit transmission at two locations – close to Ihtiman CS, and Lozenets CS. The technological connection near Ihtiman CS AP1 is in service from the beginning of 2014. The technological connection at CS Lozenets with a capacity of 7.2 mcm/d is to be built in 2016.

The project implementation will enable transportation of natural gas from the national gas transmission network to the gas transmission network for transit transmission and vice versa and metering of the transported natural gas quantities.

DEVELOPMENT OF THE CAPACITY OF BULGARTRANGAZ EAD GAS INFRASTRUCTURE IN THE PERIOD 2016-2020

This section of the Ten-year network development plan aims at displaying the development of capacity of the gas infrastructure owned by Bulgartransgaz EAD as a result of the realization of the infrastructure projects and the modernization and rehabilitation of the existing infrastructure and facilities within this ten year period. Inasmuch as is at present there are still ongoing processes of specification of the sources and the routes for natural gas supplies to the territory of the Republic of Bulgaria, different options are possible about the degree of utilization of Bulgartransgaz EAD gas transmission networks.

The activities of the Company planned for the period 2016-2020 will provide the necessary infrastructure enabling gas flows reception for further transport from and to different regions. Bulgartransgaz EAD will provide the necessary cross-border capacity that would enable diversity of the directions of natural gas flow through the networks. The actual utilization of that capacity and the particular directions of flows will depend directly on the expectations for the gas market development in Europe and in the country.

As of 1 January, in million m ³ /d	2016	2017	2018	2019	2020
Zone National Gas Transmission Network (NGTN)					
Entry capacity	25,83	30,82	36,32	45,42	57,44
IP Negru voda 1	20,27	20,27	20,27	20,27	20,27
IBR		1,37	1,37	1,37	1,37
IGB				9,1	9,1
ITB					9,1
IBS			5,5	5,5	5,5
GMS Chiren/connection with UGS during production	3,1	3,6	3,6	3,6	3,6
Local production	2,5	2,5	2,5	2,5	2,5
Connection with NGTN (entry)	0	3,08	3,08	3,08	6
Exit capacity	40,50	45,46	50,96	60,06	72,08
IP Negru voda 1/Kardam*	12	12	12	12	12
Exit zone Bulgaria	22,76	22,76	22,76	22,76	22,76
IBR		4,56	4,56	4,56	4,56
IGB				9,1	9,1
ITB					9,1
IBS			5,5	5,5	5,5
GMS Chiren/connection with UGS during injection	2,66	3,06	3,06	3,06	3,06
Connection with GTNTT (exit)	3,08	3,08	3,08	3,08	6
Zone Gas Transmission Network for Transit Transmission (GTNTT)					
Entry capacity	62,36	62,36	62,36	62,36	65,28
IP Negru Voda 2,3/Kardam	58,28	58,28	58,28	58,28	58,28
IP Kulata/Sidirokastro*	1	1	1	1	1
Connection with NGTN (entry)	3,08	3,08	3,08	3,08	6
Exit capacity	58,25	61,33	66,13	66,13	69,05
IP Strandja/Malkoclar	45,13	45,13	49,93	49,93	49,93
IP Kulata/Sidirokastro	10,27	10,27	10,27	10,27	10,27

IP Jidilovo	2,58	2,58	2,58	2,58	2,58
Exit zone Bulgaria	0,27	0,27	0,27	0,27	0,27
Connection to the NGTN (exit)	0	3,08	3,08	3,08	6
IP Negru Voda 2,3/Kardam*	0	0	0	0	0

* Physical and/or commercial reverse flow capacity.

**These capacities of the entry and exit points are design ones and refer to each individual entry/exit independently and can in aggregate exceed the technical capacity of the infrastructure as a whole. Depending on the dynamic recalculation of capacity and the maximizing thereof in line with the requirements of Regulation (EU) 984/2013 concerning the capacity allocation mechanisms, the relevant firm and interruptible capacities will be determined for each point.

*** The new interconnections capacities (ITB, IGB, IBS and IBR) are according to design information as of April 2016 and are subject to change.

CONCLUSIONS

Bulgartransgaz EAD is a responsible company, operating in dynamically changing environment and endeavours to efficiently develop the infrastructure for transmission and storage of natural gas in Bulgaria in line with the national, Regional and European priorities, goals and strategies to achieve security, stability, diversification, market integration, competition and liberalisation.

The priority activities in the development of Bulgartransgaz EAD infrastructure in the period 2016 – 2025 are the maintenance of a technically good working, reliable and efficient main and auxiliary gas infrastructure, modernization, rehabilitation and expansion of the existing gas transmission networks and equipment, development of the interconnectivity, and expansion of the natural gas storage capacity.

During the period 2016-2025 the construction and commissioning of new gas interconnections with Turkey, Greece, Serbia and Romania are scheduled. Key cross-border gas pipelines are also planned to cross Bulgaria that will connect to the existing gas transmission system of Bulgartransgaz EAD. The realization of the company's plans will connect the gas infrastructure of Bulgaria to the single European natural gas market in the Caspian region, Central Asia, the Middle East, the Eastern Mediterranean basin and North Africa. This fact will ensure the natural gas supplies to the country and the region, creating real conditions for the diversification of the sources and routes of supply of natural gas to and through Bulgaria.

Directly linked to the intentions for development of the gas infrastructure in the region are the plans as well for the expansion of the existing gas storage facility Chiren and the modernization and rehabilitation of Bulgartransgaz EAD network. The realization of all of these projects is closely interconnected and aims at contributing to the efficiency and development of the single pan-European gas network.

Bulgartransgaz EAD plans to channel its investment activity to the construction of new branches as well thus creating the conditions to step up the gasification in the country with the relevant economic, social, environmental and other benefits for local communities. This will see the implementation of one of the principal priorities laid down in the Energy Strategy of the Republic of Bulgaria.

The expected outcome from the implementation of this TYNDP is significant increase in the quality and volume of the services offered by Bulgartransgaz EAD related to natural gas transport and storage which is in direct connection with the transformation of Bulgaria into a significant regional gas hub - a hub where technical capabilities shall be created for entry and exit of natural gas flows coming from various sources and along new routes. The Plan implementation at a corporate level will strengthen the successful business model of company development and in national and regional aspect, the gas operator will continue to ensure reliable natural gas transmission and storage both to society and industry, applying the best business practices.

Appendix 1

Key projects for new gas pipelines on the territory of the country and their connection to the existing gas transmission network

Nº	Project	Final Investment Decision (FID)	Term for completion	Contractor	Expected amount of the Bulgartransgaz EAD's investment	Funding	Length	Change of capacity/type	Notes
1	Interconnection Bulgaria-Romania (IBR)	yes	2016	Bulgartransgaz and Transgaz S.A.	~ 13 million € (23.8 million € - amount of the entire project)	€4.3 million European Energy Programme for Recovery (EEPR) / ~ € 8.5 million own	total 25km 15 km Bulgarian section and 2.1 km undercrossing	0.5-1.5 bcm constant bi-directional (entry-exit)	In a final construction stage.
2	Interconnection Turkey-Bulgaria (ITB)	no	2020	Bulgartransgaz and Botas	~ 133 million €	own and attracted external funding	~ 76 km Bulgarian section ~ 120 km Turkish section	3 bcm/y constant bi-directional (entry-exit)	Pre-investment study prepared. Preliminary Terms of Reference prepared.
3	Interconnection Greece-Bulgaria (IGB)	yes	2018	ICGB AD	~ 5 million € (220 million € *)	EEPR and Bulgartransgaz EAD own funds for the connection with the existing network	total 182 km, 151 km of which Bulgarian section	3 bcm/y - I stage 5 bcm/y - II stage entry (reverse in case of crises)	The main infrastructure shall be realized by ICGB AD. The project will be connected to Bulgartransgaz EAD's gas transmission network in the region of Stara Zagora.
4	Interconnection Bulgaria-Serbia (IBS)	yes	2018	Ministry of Energy (ME)	~ 2 million € (48 million € *)	OP Competitiveness and Bulgartransgaz EAD own funds for the connection with the existing network	total 150 km 62 km of which Bulgarian section	1.8 - 3.1 bcm/y exit (reverse in case of crises and main flow cessation)	It shall be realized by the ME, OP Competitiveness beneficiary. The project will be connected to Bulgartransgaz EAD's gas transmission network.
5	Concept for construction of a gas hub in Bulgaria - projects for new infrastructure and modernization of the existing infrastructure	no	2019-2022	Bulgartransgaz	~ up to 2 400 million €	own and attracted external funding	A group of projects for new gas transmission infrastructure and for modernization of the existing one, regarding the construction of a gas hub in Bulgaria	New capacity of 52.6 bcm/y exit	The projects are in a consideration stage.
6	Construction of a gas pipeline in Bulgaria regarding the construction of the Easting gas pipeline on the territory of Hungary and Romania	no	2019-2023	Bulgartransgaz	~ 700 million €	own and attracted external funding	258 km Dn 1400 with Working pressure - 75 bar + 60 MW new CS	20 bcm/y	The project is in a consideration stage.

Note:

* The values show the expected total amount of the projects that are developed by third parties the so-called "third party projects"

** The project has unspecified status - more information in item 5.1.1

