

# **2015 - 2024 TEN-YEAR NETWORK DEVELOPMENT PLAN OF BULGARTRANGAZ EAD**

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## **DEFINITIONS AND ABBREVIATIONS**

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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 a combined gas transmission operator in the Republic of Bulgaria

**EU** – European Union

**GDC** – Gas distribution company

**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)

**m<sup>3</sup> 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

**CP** – Construction Permit

**CIW** – Construction and Installation Works

**SMEs** – Small and medium-sized enterprises

**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 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 Bulgartrngaz EAD and used for performing transmission services;

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

**TAP** – Trans-Adriatic Pipeline – natural gas pipeline project, starting at Greece, crossing Albania and the Adriatic Sea and coming ashore in Southern Italy

**TANAP**– Trans-Anatolian Natural Gas Pipeline - natural gas pipeline project, starting at the Georgian-Turkish border, crossing Turkey to Europe

## **SOURCES USED**

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- 2020 Energy Strategy of the Republic of Bulgaria as of June 2011
- National Statistical Institute - GDP, PEC, EEC and other data, ([www.nsi.bg](http://www.nsi.bg))
- Data on natural gas consumption, Eurostat, ([www.epp.eurostat.ec.europa.eu](http://www.epp.eurostat.ec.europa.eu))
- 2001-2013 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](http://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](http://www.transgaz.ro))
  - DESFA S.A. ([www.desfa.gr](http://www.desfa.gr))
  - Botas ([www.botas.gov.tr](http://www.botas.gov.tr))
  - JP Srbijagas ([www.srbijagas.com](http://www.srbijagas.com))
  - GA-MA AD ([www.gama.com.mk](http://www.gama.com.mk))
  - DEPA, S.A. ([www.depa.gr](http://www.depa.gr))
  - ITGI ([www.edison.it](http://www.edison.it))
  - TAP ([www.trans-adriatic-pipeline.com](http://www.trans-adriatic-pipeline.com))
  - Shah Deniz ([www.bp.com](http://www.bp.com))
- Gas consumption forecast of Bulgargaz EAD, ([www.bulgargaz.com](http://www.bulgargaz.com))
- Planned quantities under activities distribution and gas supply to GDC within the Overgas Inc. AD Group in line with documents submitted to EWRC in connection with a companies merger through acquisition ([www.overgas.bg](http://www.overgas.bg))
- Information related to natural gas production in Bulgaria, webpage Petroceltic International Plc (the former Melrose Resources), ([www.petroceltic.com](http://www.petroceltic.com))  
Bulgartransgaz EAD 2015-2019 Business Programme, approved by Minutes No.69/13.01.2015 of a meeting of Bulgartransgaz EAD Management Board and Minutes No.3/23.01.2015 of Bulgartransgaz EAD Supervisory Board.
- Information from other internal company documents and correspondence with the stakeholders.
- Regional Investment Plan 2014-2023 Central and Eastern Europe
- Regional Investment Plan 2014-2023 South Corridor
- ENTSOG 2013-2022 Ten-Year Network Development Plan

## **INTRODUCTION**

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Bulgartransgaz EAD 2015-2024 Ten-year plan for development of the natural gas transmission and storage infrastructure sets out the vision for the corporate development of the Company as an independent gas 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 single interconnected gas market.

The TYNDP describes Bulgartransgaz EAD activities in the next ten years aimed at keeping and developing the reliability and efficiency of the existing gas transmission networks and storage facilities, as well as creating suitable conditions for the strengthening of an integrated and stable gas market.

The priority activities for development of Bulgartransgaz EAD infrastructure in the period 2015 – 2024 are the development of 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 characteristics of transmission networks and the company natural gas storage equipment. 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 liberalized natural gas market resulting in a wider choice including price-wise for all market participants.

Having regard to achieving full transparency and balance between the interests of TSOs and the other market participants, the TYNDP is subject to public consultation initialled by Bulgartransgaz EAD based on which the interrelations between the Company's projects and the development plans of the stakeholders can be considered in the Plan.

Pursuant to Art. 21, para 3, item 8 of the Energy Act, the State Energy and Water Regulatory Commission (SEWRC) shall approve the TYNDP and monitor its implementation.

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 prepares its TYNDP in line with Art. 81, para 1 of the Energy Act (EA) published in SG No: 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 for network development (GRIPs), as well as the Community-wide Network Development Plan developed by the European Network of Transmission System Operators for Gas (ENTSOG).

## **BULGARTRANSGAZ EAD PROFILE**

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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 Economy and Energy (MEE).

Bulgartransgaz EAD is currently undergoing a process of certification as an independent gas transmission operator. By its decision of 20.02.2015 the Energy and Water Regulatory Commission (EWRC) approved the draft decision on Bulgartransgaz EAD certification as independent transmission operator, and the draft decision has already been notified to the European Commission.

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

Bulgartransgaz EAD is a combined gas operator carrying out natural gas transmission and storage activities. The company is an owner and operator of:

- National gas transmission network with major function – natural gas transmission on the territory of Bulgaria to the natural gas distribution companies and industrial consumers;
- Gas transmission network for natural gas transit transmission with major function - natural gas transmission through the territory of Bulgaria to the neighbouring countries Romania, Turkey, Greece and Macedonia;
- Underground gas storage in Chiren (Chiren UGS) with a major function of natural gas storage covering seasonal swings in natural gas consumption and ensuring the security of supply in line with the N-1 standard implementation.

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

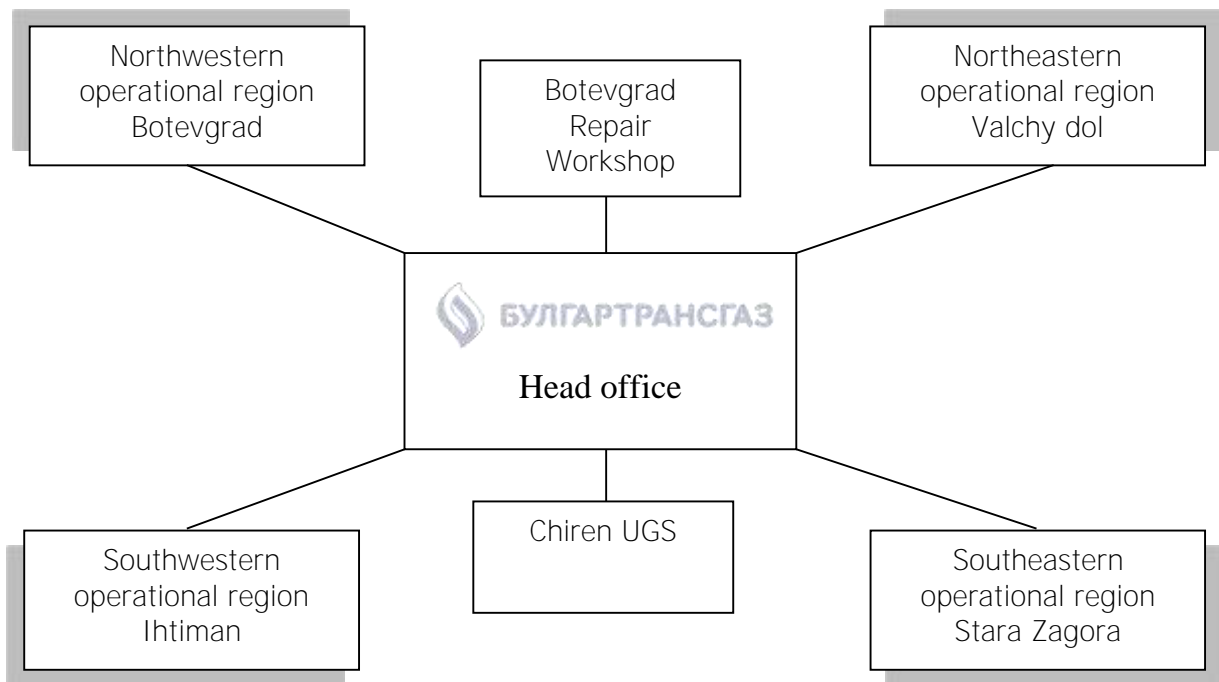
For natural gas transmission: Licenses No. L-214-06 and No. L-214-09 of 29.11.2006

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.

The company 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 (UGS) 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 structure of the Company includes a Head office and four operational regions - Northwestern operational region Botevgrad, Northeastern operational region Valchy 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 has played a key role and is responsible for the operation of the gas transmission system and the gas market development in the country and the region. Bulgartransgaz EAD strives constantly to improve the quality of the offered services and provide added value for the development of the gas market in Bulgaria. As a result of the sustainable business model, the company shows very good financial results which are expected to continue in future and are needed to ensure reliability and development of the natural gas transmission and storage infrastructure.

The Company pursues transparent, equal treating and responsible behaviour policy and aims at ensuring 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**

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**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 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 1700 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 945 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 214 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 and 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 between 0.5 mcm/d (minimum) to 4,2 mcm/d (maximum) for withdrawal, 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 commissioning in 2015);

**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 Provardia** – 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**



### 1. NATURAL GAS MARKET IN BULGARIA

Bulgartransgaz EAD transmission and storage activities are regulated and carried out on the basis of 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 along the direction Russia – Ukraine – Moldova – Romania. GMS Negru Voda 1 is currently the only entry to the gas transmission network for natural gas import, and 93.5% of the gas quantities required to cover the needs of the country in 2014 have entered thereby.

Natural gas produced domestically also enters in the gas transmission network, however the developed fields are of limited resource and have secured 6.5% of the annual domestic consumption in 2014. The NGTN has two points where gas pipelines of local production companies are connected – GMS Provadia where gas produced from the Black Sea shelf enters and GRS Pleven where minor quantities of gas produced in the inland of the country.

Quantities broken by sources of supply in 2014 are as follows:

<b>№</b>	<b>Type of supply</b>	<b>Quantity, mcm</b>	<b>Relative share</b>
1	Imported natural gas	2 546	93,5%
2	Local production	176	6,5%
TOTAL		2 722	100%

The main customers of the natural gas transmission service to connected customers and the

gas distribution networks in the country are the public supplier Bulgargaz EAD and Overgas Inc. AD. The major customer of the natural gas storage service is the public supplier.

On the basis of a long-term contract OOO Gazprom export had 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 Plc.

Since 2004 the company Melrose Resources Ltd. (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 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. Since 2012 a gradual decrease of the quantities produced locally due to field depletion has started. The last seismic studies of new territories in the Galata block showed 23% probability of the availability of new resources of 3,5 bcm of gas.

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 TransAtlantic), block **A-Lovech** with forecast resources of 13,7 bcm.

UGS Chiren plays a major role in providing natural gas in case of a shortage from the entry points of the national gas transmission network for the country, by covering the seasonal fluctuations in consumption and providing emergency reserve. It was constructed on the place of the already depleted gas condensate field of the same name.

Gas distribution is carried out by regional and local distribution companies, operating in accordance with a licensing regime and price regulation for the activities distribution and natural gas supply. Households and small and medium-sized enterprises (SMEs) are chiefly the customers of the gas distribution companies.

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.

• **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;

- o Non-household natural gas consumers, connected to the transmission network;
- o Non-household natural gas consumers, connected to the distribution networks;
- o Household natural gas consumers.

#### • **Market potential and development prospects**

Bulgartransgaz EAD operates in a rapidly changing natural gas market to achieve higher level of liberalisation of the market in Bulgaria 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 2015 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 contributing to the increase of the competition and will positively affect on natural gas consumers. The new gas interconnections will considerably increase the entry capacity to Bulgaria from Greece and Turkey and will also ensure the possibility for access to and supplies from LNG terminals from the 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: South Stream, which is currently suspended; The conceptual project for implementation of bi-directional natural gas supplies through the territory of Slovakia, Romania, Bulgaria, Hungary, Czech Republic and Austria - Eastring; transmission corridor Bulgaria-Romania-Hungary-Austria.

In conjunction with the enhanced study works of the local natural gas deposits and granted concessions for development of the deposits on the territory of the country (both surface and in the Black Sea shelf), 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, section Deventsy 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).

Currently UGS Chiren 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 development of the planned interconnections with Turkey, Greece, Romania and Serbia will enhance the market integration in the region and is a prerequisite UGS Chiren 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."

Stabilization and gradual increase of natural gas domestic consumption above the levels before 2009 are expected in the coming years.

The share of household gas supply in the country is still low compared to other gas markets, but with a continuous trend of increase. There is growth rate also in the consumption of compressed natural gas. Promotion of gasification by extending the gas transmission network to new regions and providing access to natural gas of new municipalities, distribution companies and new non-household customers is among the priorities in the Energy Strategy of Bulgaria.

Bulgaria has a strategic geographical location, well-developed gas infrastructure and by implementation of the planned new projects that are ongoing, has the potential to become one of the key elements in achieving diversification of the sources and routes of natural gas supply to the region.

## 2. NATURAL GAS MARKET IN THE REGION

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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. The reason is the shift towards 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 review of the natural gas markets in the neighbouring countries outlines the main trends for development of the regional gas market:

### **2.1 Greece<sup>1</sup>**

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 reverse flow to Bulgaria was carried out through this interconnection. As of January 1, 2014 the Bulgarian gas transmission system has capacity for physical gas transmission towards Bulgaria through this point to the amount of 3 mcm/d, of which 1 mcm/d firm capacity and 2 mcm/d interruptible.

Natural gas consumption in Greece has increased more than twice over the last decade, reaching up to 4 bcm/y in 2008. In 2009 and 2010, due to the severe economic slowdown, consumption has dropped significantly to 3.4 bcm/y and 3.7 bcm/y respectively, thus reaching levels above 4 bcm/y in 2011 and 2012. A significant share of natural gas consumption comes from electricity generation, averaging around 71% of demand between 1999 and 2009.

Most of consumption is covered by imports of LNG sources in local terminals; from the gas pipeline connection with Turkey and the gas pipeline connection with Bulgaria with a source of supply Russia.

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<sup>1</sup> *The review of the natural gas market in Greece was prepared on the basis of the World Bank Report, Eurostat, the site of the gas transmission operator, internal company documents and correspondence with DESFA S.A., and other sources referred to in the text.*

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 gas supply – with the Russian OOO Gazprom Export, the Algerian Sonatrach (LNG) and the Turkish Botas for natural gas supply with a total volume under these contracts of 4.2 bcm/y until 2016.

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, which does not utilize its full capacity and has reserves for increasing the quantities for gas storage and delivery.

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.

The Turkey-Greece Interconnector (ITG) has a potential to reach a capacity of 11.5 bcm/y. ([www.edison.it](http://www.edison.it)), as it is planned to be part of the Interconnector Turkey-Greece-Italy (ITGI). The development of this potential after the investment decision for selection of the project Trans-Adriatic Pipeline (TAP) for gas supplies in Europe by the Consortium Shah Deniz II remains unclear.

On June 28, 2013 the Consortium Shah Deniz II announced its selection of the TAP project as natural gas transmission route from the gas field of the same name to Europe and at the end of 2013 took the final investment decision on the second stage of the gas field development. According to the announcement, the supplies to Europe (Italy, Greece, Bulgaria) are expected to amount 10 bcm/y ([www.bp.com/en](http://www.bp.com/en)). They are expected to begin by the end of 2019 after TAP construction.

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.

## **2.2 Turkey<sup>2</sup>**

Consumption in Turkey in 2013 is about 45.6 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 only about 3% of domestic consumption within the period 1999 - 2009 by local production. Natural gas production in

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<sup>2</sup> *The review of the natural gas market in Turkey was prepared on the basis of the World Bank Report, the site of the gas transmission operator, internal company documents and correspondence with Botas, and other sources referred to in the text.*

2010 was 0.7 bcm/y. Turkey imports natural gas mostly from Russia. However, the share of Russian imported gas has been declining in recent years (54 % of imports in 2010), as Turkey diversifies its gas supply by importing from Iran and Azerbaijan, also by LNG mostly from Algeria and Nigeria. LNG capacity accounted roughly for 22 % of gas imports in 2010.

The existing gas infrastructure in the country is with cross-border capacity for import of 53 bcm/y. (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.

On December 17, 2013 the Consortium Shah Deniz II took the final investment decision on the second stage of the gas field development. The decision states that the Republic of Turkey can rely on additional 6 bcm/y supplied by the Azerbaijan company SOKAR after 2018 ([www.bp.com](http://www.bp.com))

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 currently Turkish Stream, considering the possibility a branch from it to be constructed to Bulgaria as part of its supply routes to EU countries. So far South Stream redirection through Turkey has not been officially confirmed.

In the event that the other new projects planned are implemented (e.g. a new gas pipeline from Iraq (10 bcm/y), the Southern 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.

In case of 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 and Aliaga), respectively with gas storage capacity - 153 and 168 mcm, 2 other gas storages - Sultanhanı (Aksaray) and Silivri (Marmara), respectively with capacity 1.5 and 2.7 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 and is expanding gas storage Silivri (Marmara) and by 2020 the total volume of gas stored in underground gas storage facilities on the territory of Turkey, together with the capacities of the two LNG terminals is expected to surpass 8.0 bcm. Turkey is implementing this ambitious program for natural gas storage in connection with the provision of additional gas flows that the country could receive from Russia if redirecting South Stream through Turkish territory.

Northwestern Turkey is a major natural gas consumer in the country. 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 to 5 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<sup>3</sup>**

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 (about 75% - 80% of consumption) and a significant number of gas storages.

Romania has nine (physical) 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. These quantities would be sufficient to meet demand in Romania for the next 50 years, while the production on a 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 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. 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 under contracts with Gazprom. Within the period 1990-2002 imports of natural gas from Russia were between 20-25% of total consumption in the country.

Over the past ten years demand declined from 18 bcm/y in 2006 to only 12,5 bcm/y in 2013, and only 1,1 bcm (9%) import from Russia. According to the forecasts of natural gas demand in Romania, published in the Regional Investment Plan "Southern Corridor" 2014-2023, its 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 of 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 deposits in the Black Sea, and transmission of Central European gas to South Eastern Europe. A major 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 - Armenia) with capacity of 7 bcm/y, as well as the project White Stream for Caspian gas supplies directly across the Black Sea from Georgia. (*World Bank*

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<sup>3</sup> *The review of the natural gas market in Romania was prepared on the basis of the World Bank Report, Eurostat, the site of the gas transmission operator, internal company documents and correspondence with Transgaz S.A.*

Report)

## **2.4 Macedonia<sup>4</sup>**

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 is under-utilized, with only about 16% load factor of the gas pipeline.

Since 2004 natural gas consumption has been increasing gradually but is still at a very low level, reaching about 160 mcm/y. 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.

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<sup>5</sup>**

Natural gas accounts for only 13% (2.5 bcm/y consumption in 2011) 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 2012 to be 2.9 bcm/y, and 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 Government of Serbia which will be revised shortly.

Natural gas supplies to Serbia are mainly imported from Russia which in 2011 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.

In order to ensure security of supply, Serbia relies on the South Stream project, while also being interested in various other alternative options for diversification of the sources and supply routes by storage and 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 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

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<sup>4</sup> *The review of the natural gas market in Macedonia was prepared on the basis of the World Bank Report, Eurostat, the site of the gas transmission operator, internal company documents and correspondence with GA-MA AD.*

<sup>5</sup> *The review of the natural gas market in Serbia was prepared on the basis of the World Bank Report, Eurostat, the site of the gas transmission operator, internal company documents and correspondence with Srbijagas.*

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. The circumstance is a key prerequisite for construction of the planned new interconnections between Bulgaria and Romania, Turkey, Greece, Serbia and the connectivity with the cross-border projects (South Stream and the Southern Gas Corridor projects).

On the other hand, the implementation of the planned infrastructure projects in the region 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 and thereby reduction of the energy dependence on a single supplier and/or route, thus enhancing significantly the security of supply in the region and respectively in Bulgaria.

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

## NATURAL GAS TRANSMISSION AND STORAGE

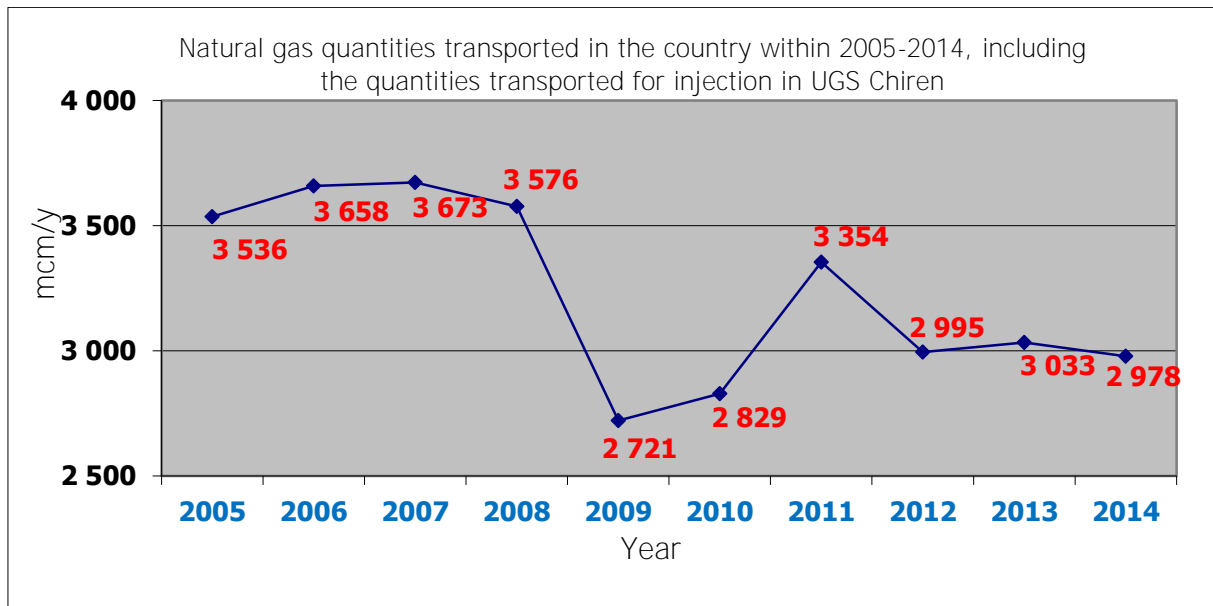
### 1. NATURAL GAS TRANSMISSION COVERING CONSUMPTION IN BULGARIA

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 2014 the natural gas quantities transported along the gas transmission network for the country amount to 2.978 mcm (including the quantities transported for injection in UGS Chiren), amounting to 1.8% decrease compared to the previous year.

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



The natural gas quantities indicated as delivered in the country from import and local production (2 722 mcm) and respectively the actually transported natural gas quantities (2 978 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.

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.

## 2. NATURAL GAS TRANSIT TRANSMISSION

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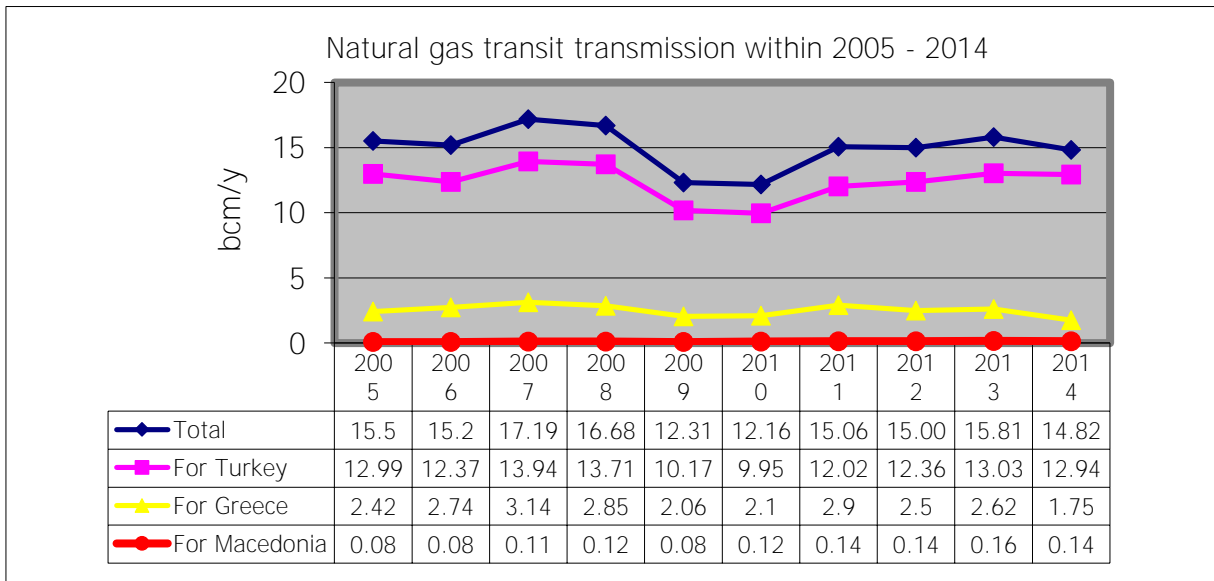


Bulgartransgaz EAD is an owner and operator of the gas transmission network for natural gas transit transmission through the territory of Bulgaria. The transit transmission of natural gas is performed through gas pipelines with a total length of 945 km and six compressor stations with total installed capacity 214 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.

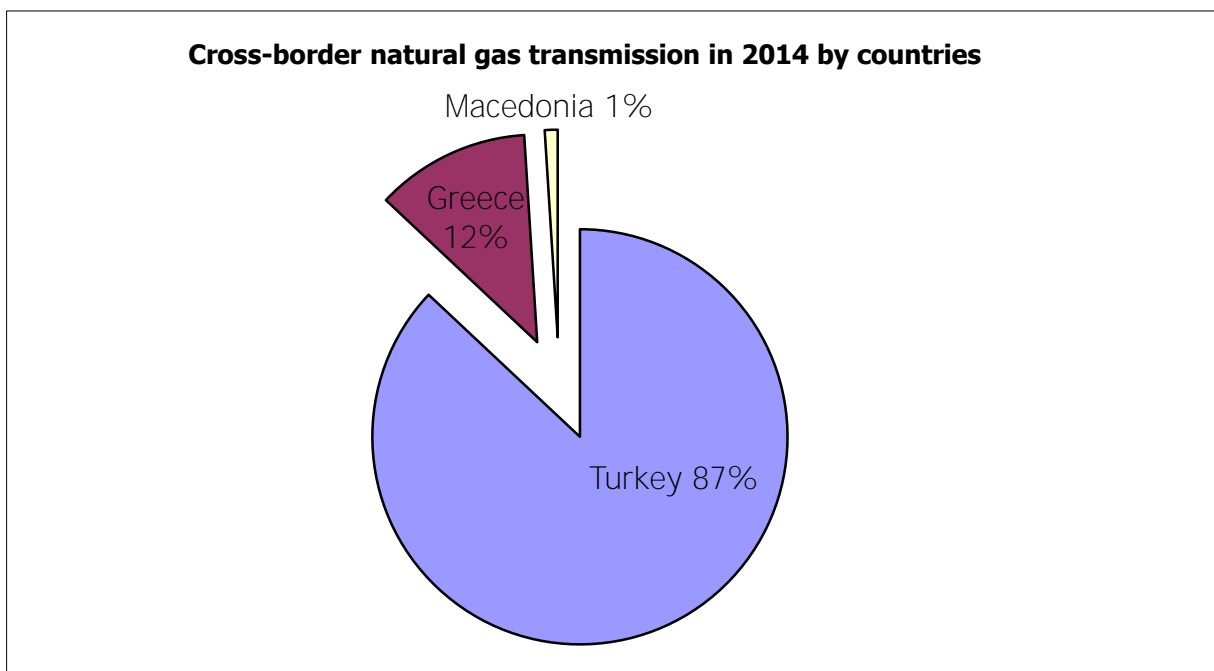
License No L-214-09/29.11.2006 for transmission has been issued by SEWRC for a period of 35 years enabling Bulgartransgaz EAD to carry out that activity.

The transited natural gas quantities in 2014 were 14,82 bcm or 6.3% less compared to 2013 (15,81 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 3,0 bcm/y; Macedonia 0.8 bcm/y.

Transit transmission through the territory of Bulgaria for the period 2005-2014, including by countries, is shown in the diagram below:



The percentage distribution of cross-border transmission in 2014 by countries was:



### 3. NATURAL GAS STORAGE

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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 UGS Chiren cover mainly the seasonal fluctuations in domestic consumption and in the cases of changed contracted natural gas supplies.

Currently under maximum filling, UGS Chiren 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 optimal technical capabilities of UGS Chiren in compliance with the rules for safe operation. The public supplier Bulgargaz EAD is required to maintain a strategic reserve and Bulgartransgaz EAD - to ensure capacity of the active gas of the gas storage facility with a view to storage of this reserve. In 2014 the injected natural gas quantities were 294 mcm and the withdrawn - 273 mcm. Information on the performed injection, withdrawal and storage of natural gas by months is presented in the table below.

<b>Withdrawn and injected natural gas quantities in 2013 and 2014, in mcm</b>				
Month	Withdrawal		Injection	
	2013	2014	2013	2014
January	90	87	-	-
February	74	75	-	-
March	42	3	-	19
April	-	-	-	46
May	-	-	56	53
June	-	-	72	73
July	-	-	97	23
August	2	11	71	0
September	-	-	39	51
October	-	8	-	29
November	-	46	-	0
December	30	43	-	0
<b>Total:</b>	<b>238</b>	<b>273</b>	<b>335</b>	<b>294</b>

## DEMAND SCENARIOS OF CAPACITIES SOURCES TO COVER DEMAND IN THE COUNTRY

### 1. NATURAL GAS DEMAND

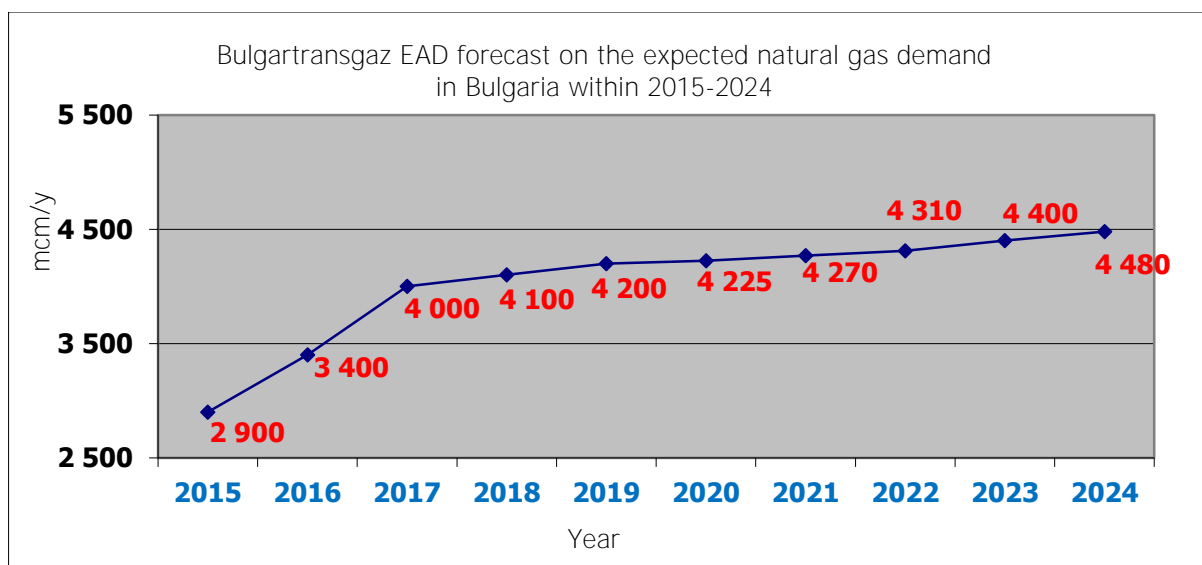
Bulgartransgaz EAD demand scenario has been developed on the basis of a macroeconomic model showing the dependence of gas consumption in the country on the main macroeconomic indicators and a comparative analysis of the gas market in the EU and the Bulgarian one.

The relationship between the final and primary energy consumption (FEC and PEC) and the GDP growth for past periods have been analysed as well<sup>6</sup>.

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 Bulgaria<sup>7</sup> are the following:

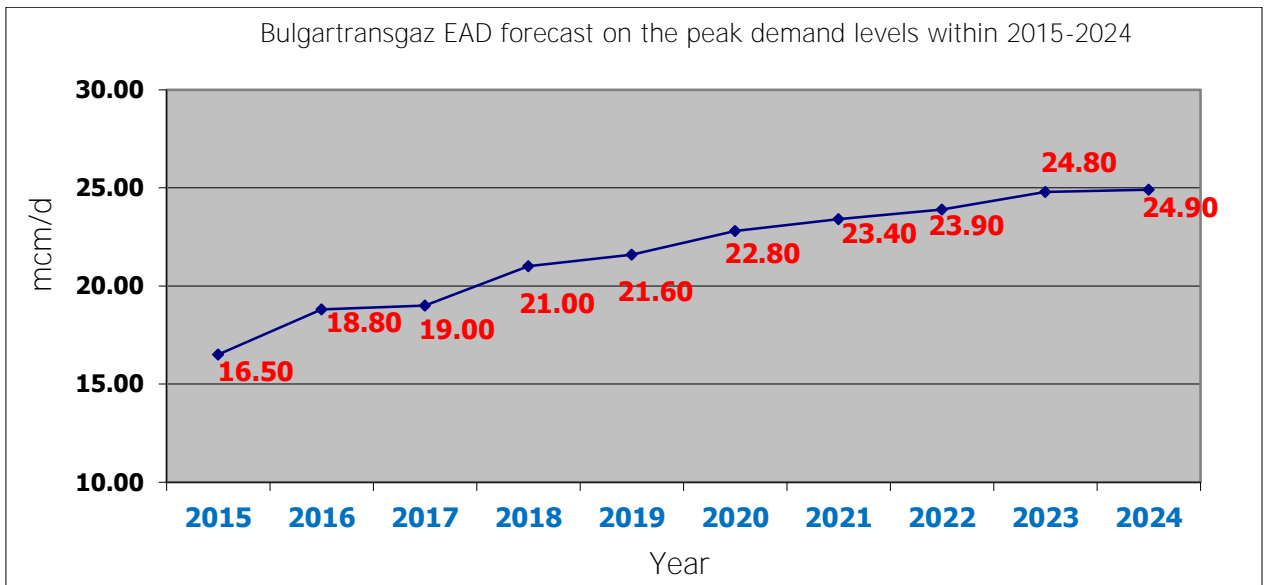
- Sustainable economic growth of GDP - between 2 and 6% annually;
- FEC/PEC ratio reaches up to and above 60% in 2024;
- The share of natural gas in PEC in 2024 is 19%, compared to about 13% in 2013.

**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 shall be as indicated in the diagrams:



<sup>6</sup> National Statistical Institute, [www.nsi.bg](http://www.nsi.bg); Eurostat, [www.epp.eurostat.ec.europa.eu](http://www.epp.eurostat.ec.europa.eu)

<sup>7</sup> Energy Strategy of Bulgaria by 2020 [www.mi.government.bg](http://www.mi.government.bg)

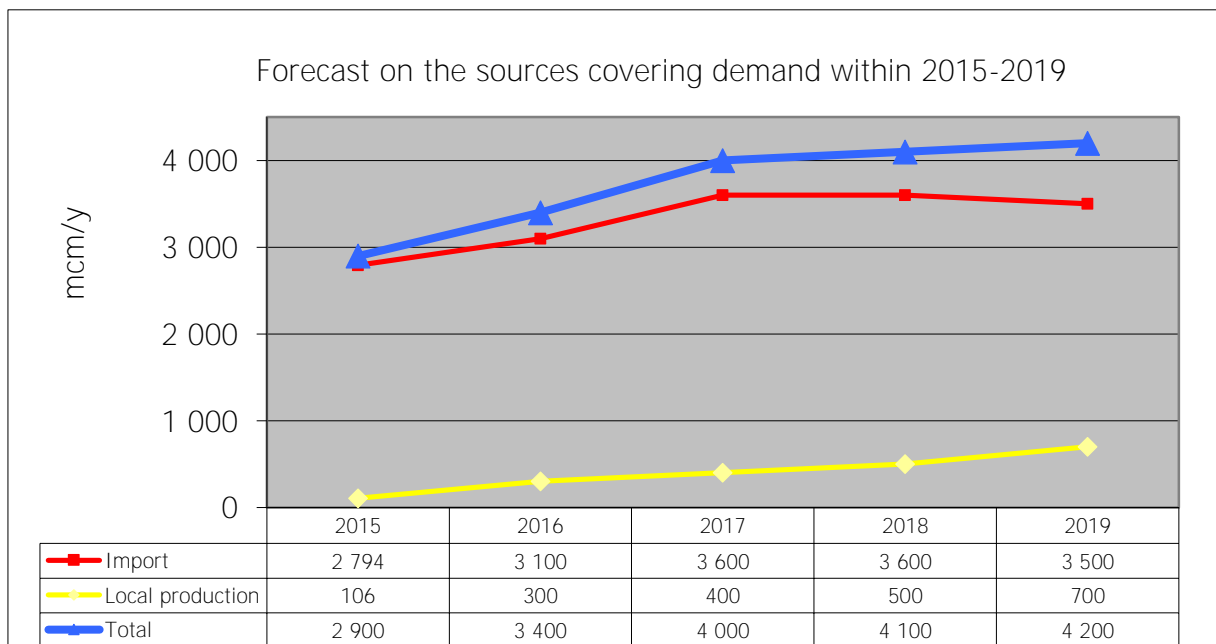


## 2. SUPPLY SOURCES COVERING DEMAND IN THE COUNTRY

In 2014 demand has been satisfied as follows:

- Imports from the Russian Federation – 2.546 mcm (93.5%);
- Local production – 176 mcm (6.5%).

The forecast for the sources covering demand for the period 2015-2029 is presented in the diagram below:



### 2.1 Import

By 2015 the natural gas imports 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 the sea gas pipeline South Stream and Russian gas along the existing route;
- Natural gas produced from the Black Sea;

The interconnection projects' implementation 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. 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 production<sup>8</sup>**

The forecast for domestic production growth 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 well as the expectations for significant deposits are 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

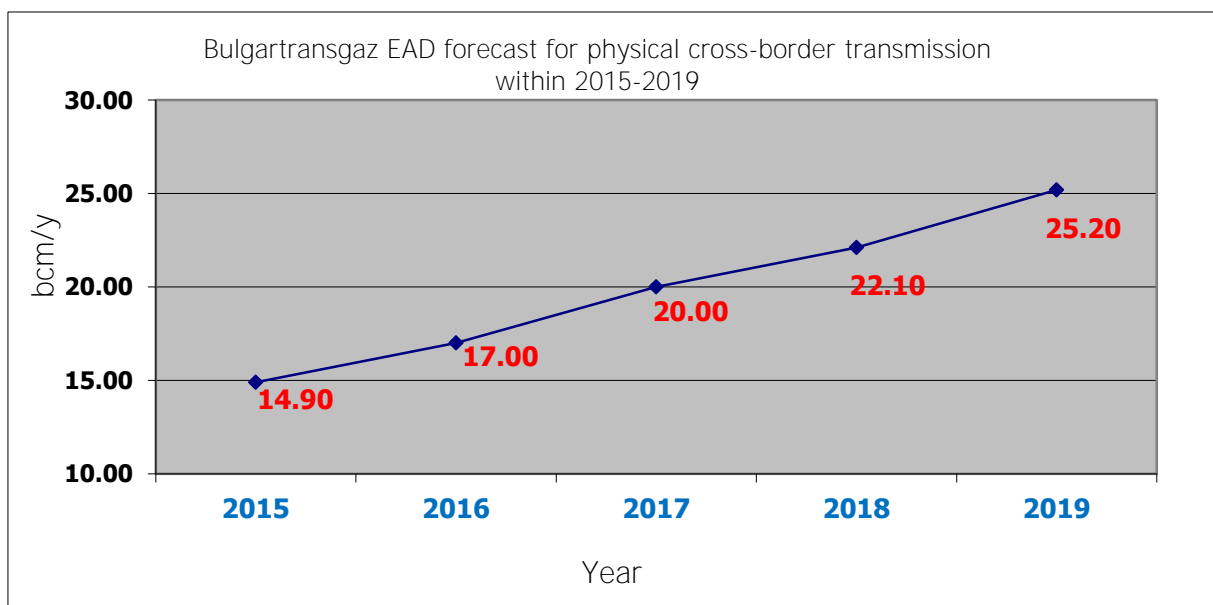
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<sup>8</sup> The information on local production comes from the website of Petroceltic International Plc, and according to internal company documents and correspondence of Bulgartransgaz EAD with stakeholders, including with Exploration and Production of Oil and Gas AD.

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 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 BULGARTRANSGAZ 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 the 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 SUPPLY<sup>9</sup>

The risk assessment for the period 2015-2019 according to Art. 9 of Regulation (EU) No 994/2010 of the European Parliament and the Council of October 20, 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC, was carried out on the basis of:

- Forecast on the peak consumption;
- Forecast on the natural gas domestic production;
- Expected new capacities following implementation of the new interconnections with Turkey, Greece, Romania and Serbia;
- New capacities planned following optimization of the existing exit points for operation in reverse flow regime.

**According to Art. 6 of Regulation 994/2010/EC (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.

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 (existing and forthcoming to be run into operation by 1.01.2015 infrastructure) and target (construction and run into operation of the projects of "common interest", as well as new fields from domestic production) under Regulation No 347/2013 of the European Parliament and of the Council on guidelines for trans-European energy infrastructure and of other projects).

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

$$N - 1 [\%] = \frac{\sum_{m=1}^7 EP_m + S_{\max} + P_{\max} - I_{\max}}{D_{\max}} \times 100, \quad N - 1 \geq 100 \%$$

Where\*:

<b>EP<sub>1</sub></b>	Technical capacity of GMS Negru Voda 1
<b>EP<sub>2</sub></b>	Technical capacity for import through Interconnector Bulgaria-Serbia
<b>EP<sub>3</sub></b>	Technical capacity for transfer from the gas transmission network for transit transmission - GMS Ihtiman, including Kulata/ Sidirokastro
<b>EP<sub>4</sub></b>	Technical capacity for import through Interconnector Turkey-Bulgaria
<b>EP<sub>5</sub></b>	Technical capacity for import through Interconnector Bulgaria-Romania

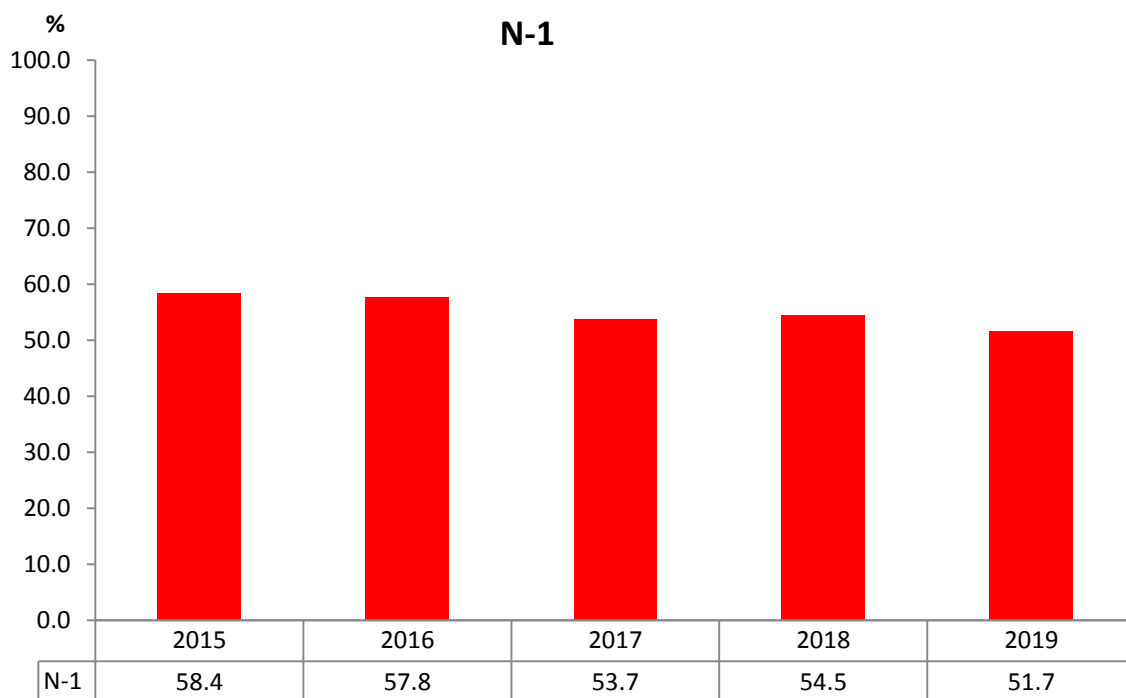
<sup>9</sup> The information in this section was updated in conjunction with the update of the Prevention plan by the Ministry of Energy under Regulation (EU) 994/2010

<b>EP6</b>	Technical capacity for import through Interconnector Greece-Bulgaria
<b>Smax</b>	Withdrawal from UGS Chiren – the maximum possible
<b>Pmax</b>	National gas production – the maximal possible production
<b>Dmax</b>	National consumption – peak consumption
<b>Imax=EP1</b>	The single largest gas infrastructure - GMS Negru Voda 1

\* All capacities in this section are in mcm/d

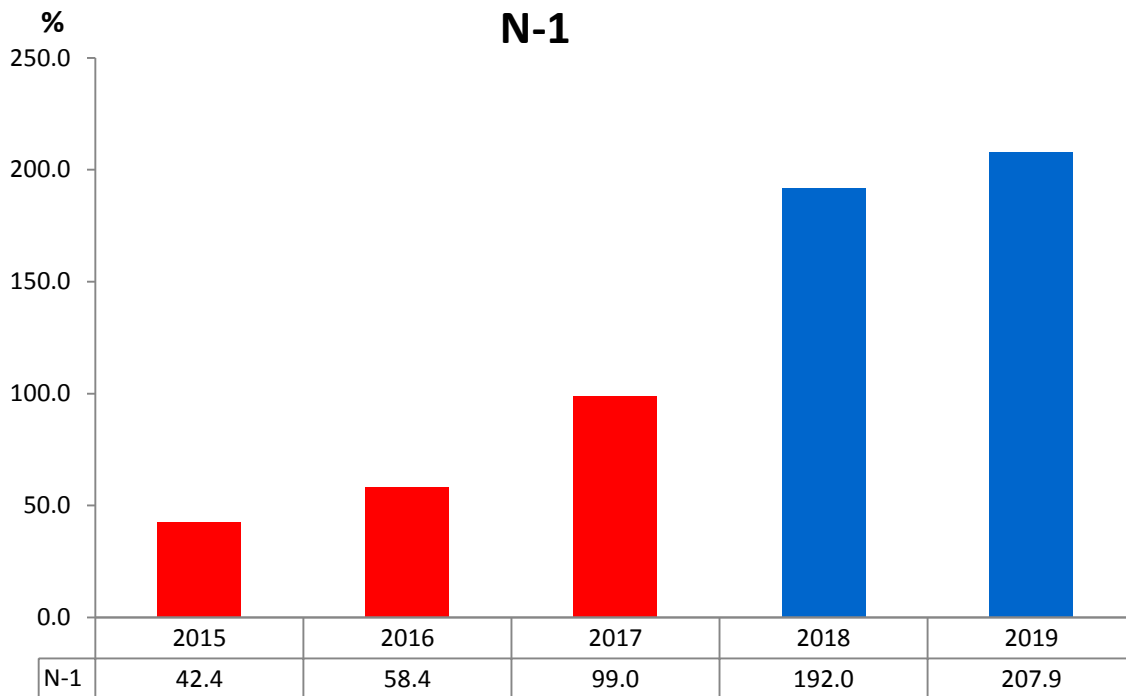
The results of the N-1 formula for the basic scenario for the next five years are as follows:

Year	Pmax	Smax	EP2	EP3	EP4	EP5	EP6	Dmax	EP1=Imax	N-1
2015	2,41	4,2	0,0	3,0	0,0	1,4	0,0	18,8	20,27	<b>58,4</b>
2016	2,41	4,2	0,0	3,0	0,0	1,4	0,0	19,0	20,27	<b>57,8</b>
2017	2,41	4,5	0,0	3,0	0,0	1,4	0,0	21,0	20,27	<b>53,7</b>
2018	2,41	5,0	0,0	3,0	0,0	1,4	0,0	21,6	20,27	<b>54,5</b>
2019	2,41	5,0	0,0	3,0	0,0	1,4	0,0	22,8	20,27	<b>51,7</b>



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
2015	2.4	4.2	0.0	0.00	0.0	1.4	0.0	18.8	20.27	<b>42.4</b>
2016	2.4	4.2	0.0	3.08	0.0	1.4	0.0	19.0	20.27	<b>58.4</b>
2017	4.2	4.5	4.9	3.08	0.0	4.1	0.0	21.0	20.27	<b>99.0</b>
2018	4.2	7.0	4.9	3.08	9.1	4.1	9.1	21.6	20.27	<b>192.0</b>
2019	4.2	10.0	4.9	6.00	9.1	4.1	9.1	22.8	20.27	<b>207.9</b>



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 natural gas demand on the territory of the Republic of Bulgaria for a day of exceptionally high gas demand.

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

Several major projects have been planned in order to fulfil the infrastructure standard, namely - related to modernization of the national gas infrastructure, modernization of compressor stations by integrating low-emission gas turbine units and projects for gas interconnections construction.

## **2015-2024 GAS INFRASTRUCTURE DEVELOPMENT PROJECTS**



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 country. Gas infrastructure status and development are essential prerequisites for the development and liberalization of the gas market in the country. 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 2015-2024.

The investments provided for the period 2015 - 2024 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 South Stream 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 production gas pipeline 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 10 years (and covers the period 2015-2024).

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 2015 - 2017 has already been taken - Projects for development of the gas transmission and storage infrastructure with investment decision already taken - Table 1;
- o 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 2015 – 2024 – Table 2;

- o Projects for development of the gas transmission and storage infrastructure in the period 2015 - 2024 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 2015 - 2017 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 2015 - 2017, are presented in consolidated form in Table 1. Implementation of some of the projects has commenced before 2015, but work on them will continue also during the period 2015-2017. For such projects only the estimated value of investment during that three-year period is indicated in the Table.

**Table 1**

Natural gas transmission and storage infrastructure development projects in the period 2015 - 2017 by consolidated projects	Implementation schedule	Estimated value of investment in thousand BGN
<b>I. 2015-2017 RECONSTRUCTIONS, REHABILITATIONS AND OVERHAULS</b>		
<b>1. Investments for Compressor stations:</b>		
<b>1.1. Gas transmission network for transit transmission</b>		
Actions aimed at compressor stations meeting the requirements of the complex permits, including reconstruction of compressor stations Ihtiman, Petrich, Lozenets, Strandja by integrating low-emission GTCU and retrofitting gas turbine units with low-emission chambers at CSs Provadia, Strandja, Kardam 2.	2015-2016	64,229
Overhauls of gas turbine engines, including planned repairs and inspections	2015-2017	16,409
<b>1.2. National gas transmission network</b>		
Modernization of automatic control system of GCU and station control system of CS Valchi dol and CS Polski Senovets	2015 - 2017	6,592
Reconstructions and rehabilitations of CS Polski Senovets and CS Valchi dol	2015 -2017	8,125
<b>2. Investments in existing AGRSs</b>		
<b>2.1. National gas transmission network</b>		
Reconstruction and modernization of AGRS, GRS and GMS: Devnya, Septemvry, Pernik, Ivanyane, Ruse - West, Isparih, etc.	2015-2017	5,354
<b>3. UGS Chiren</b>		
Reconstruction and rehabilitation of wells and ground facilities	2015 - 2016	16,625
<b>II. INVESTMENTS FOR CONSTRUCTION OF NEW FACILITIES TO THE EXISTING INFRASTRUCTURE NECESSARY TO ENHANCE THE EFFICIENCY OF OPERATION</b>		
<b>1. National gas transmission network</b>		
Construction of new metering lines of GRS Burgas, GRS Lovech, AGRS Sevlievo, etc.	2015-2017	1,354
Construction of cleaning facilities (launch-receive traps) for gas pipeline branches Dimitrovgrad, Burgas, Devnia.	2015 - 2017	2,662
<b>2. Natural gas storage</b>		
Construction of new wells and gas gatherings	2015 – 2017	19,620

<b>Natural gas transmission and storage infrastructure development projects in the period 2015 - 2017 by consolidated projects</b>	<b>Implementation schedule</b>	<b>Estimated value of investment in thousand BGN</b>
Construction of compressor capacity in UGS Chiren and replacement and/or rehabilitation of ground facilities	2015 - 2017	20,700
<b>3. Investments in ancillary networks</b>		
Optical cable main lines: from Botevgrad region to UGS Chiren, from VS Batultsi - VS Nikolaevo – GRS Pleven, from CS Ihtiman to GMS Dupnitsa and in the sections CS Polski Senovets - VS Miladinovtsi - AGRS Targovishte and VS Nikolaevo - CS Polski Senovets	2015-2017	15,368
<b>III. PROJECTS FOR PROVIDING CAPABILITY FOR CROSS-BORDER CAPACITY INCREASE</b>		
Interconnection Bulgaria-Romania (Ruse-Giurgiu) – undercrossing of main and back-up pipe	2015	5,149
Construction of looping of transit gas pipeline to Turkey in the section CS Lozenets - CF Nedyalsko	2015-2017	32,220
<b>IV. ACCESS OF NEW MUNICIPALITIES AND NEW END USERS TO NATURAL GAS</b>		
<b>1. Investments in projects for expansion of the existing gas transmission networks to new regions of the country</b>		
High-pressure gas transmission pipeline Dobrich-Silistra and AGRS Silistra	2015	823
High-pressure gas pipeline Chiren - Kozloduy - Oryahovo, AGRS Kozloduy and AGRS Oryahovo	2015 - 2016	9,289
Construction of new gas pipeline branches with AGRS to Svishtov, Panagyurishte and Pirdop, Bansko and Razlog	2015 - 2017	17,365
<b>2. Investments for construction of new gas metering and gas regulation stations</b>		
Construction of new GMSs and AGRSs - AGRS Ignatievo, GMS Chirpan, GMS Dermantsi 2, GMS Stambolovo, GMS Razgrad	2015-2016	1,806

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 2015-2024

**Table 2**

<b>Investments for natural gas transmission and storage infrastructure in the period 2015 - 2024 by consolidated projects</b>	<b>Implementation schedule</b>	<b>Estimated amount of investment in thousand BGN</b>
<b>I. PROJECTS FOR PROVIDING OPPORTUNITY FOR DIVERSIFICATION OF GAS SUPPLY SOURCES AND ROUTES</b>		
<b>1. Interconnections</b>		
Connection to Interconnection Greece-Bulgaria (IGB)	2015-2017	9,620
Connection to Interconnection Bulgaria-Serbia	2015-2017	4,000
Interconnection Turkey – Bulgaria (ITB)	2015-2019	100,386

3. NATURAL GAS TRANSMISSION AND STORAGE INFRASTRUCTURE DEVELOPMENT PROJECTS IN THE PERIOD 2015 - 2024 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.

**Table 3**

<b>Natural gas transmission and storage infrastructure development projects in the period 2015 - 2024 on which no investment decision has been taken</b>	<b>Forecast implementation period</b>	<b>Estimated amount of investment in<sup>10</sup> thousand BGN</b>
<b>1. Gas transmission network for natural gas transit transmission</b>		
Actions aimed at achieving compliance of compressor stations with the requirements of the complex permits, including retrofitting gas turbine units with low-emission chambers	2017-2019	60,000
<b>Retrofitting the fuel systems of 6 GTUs type THM 1304/11 with low-emission combustion chambers</b>	2015 - 2019	16,050
Projects for rehabilitation, modernization and expansion of the existing national gas transmission infrastructure	2015 - 2019	154,300

<sup>10</sup> The estimated amount of Bulgartransgaz EAD investment by projects for the respective period is specified.

<b>Natural gas transmission and storage infrastructure development projects in the period 2015 - 2024 on which no investment decision has been taken</b>	<b>Forecast implementation period</b>	<b>Estimated amount of investment in<sup>10</sup> thousand BGN</b>
<b>2. National gas transmission network</b>		
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/	2015-2017	2,950
<b>3. Investments in feasibility studies</b>		
Study for replacement of unreliable transmission equipment in compressor stations	2015 - 2018	5,440
<b>4. Natural gas storage</b>		
Expansion of UGS Chiren capacity	2015 - 2019	200,300

#### 4. 2015 – 2024 INVESTMENT PROGRAM

This Section presents Bulgartransgaz EAD Investment Program for the period 2015-2024 divided into the following activities:

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

#### 4.1. Three-year Investment Program (2015-2017) including investment activities on which final investment decision has been taken

in thousand BGN, VAT excluded

<b>Program / Section</b>	<b>Total 2015</b>	<b>Total 2016</b>	<b>Total 2017</b>
<b>TOTAL Annual Investment Program:</b>	137,162	135,151	72,199
<b><i>SECTION I.1 - Construction of new facilities</i></b>	39,237	84,654	54,633
<i>Gas transmission network for transit transmission</i>	8,514	22,963	3000
Linear part	6,507	22,713	3000
Compressor stations, administrative and operating regions	485	250	0
Communication and information systems	1,522	0	0
<i>National gas transmission network</i>	18,478	29,595	24,262
Linear part	9,242	15,829	16,462
Compressor stations, administrative and operating regions	30	0	0
Communication and information systems	3,143	10,456	6,300
AGRS and GMS	6,063	3,310	1,500
<i>Natural gas storage</i>	5373	19060	17670
Communication and information systems	3	0	0
Wells and gas gatherings	4,370	8,060	7,670
Main technological installations and systems, operating unit	1,000	11,000	10,000
<i>Total for distribution by types of activities</i>	6,872	13,036	9,701
Linear part	2,490	1,885	0
Compressor stations, administrative and operating regions	1,975	9,546	9696

<b>Program / Section</b>	<b>Total 2015</b>	<b>Total 2016</b>	<b>Total 2017</b>
Communication and information systems	2407	1,605	5
<b><i><u>SECTION I.2 - Reconstruction, rehabilitation and overhauls of long-term tangible assets</u></i></b>	86,937	41,769	10,566
<i>Gas transmission network for transit transmission</i>	71,124	20,154	4,450
Linear part	2,642	680	150
Compressor stations, administrative and operating regions	68,482	19,474	4,300
<i>National gas transmission network</i>	7,028	11,397	5,786
Linear part	2750	620	500
Compressor stations, administrative and operating regions	2,987	8,198	3,802
AGRS and GMS	1,291	2,579	1484
<i>Natural gas storage</i>	7387	9588	0
Communication and information systems	350	0	0
Wells and gas gatherings	6,434	9,588	0
Main technological installations and systems, operating unit	603	0	0
<i>Total for distribution by types of activities</i>	1,398	630	330
Linear part	463	130	330
Compressor stations, administrative and operating regions	415	0	0
Communication and information systems	20	0	0
Chief Dispatching Division	500	500	0
<b><i><u>SECTION I.3 – Delivery of machinery and equipment</u></i></b>	10988	8,728	7,000

#### 4.2. 2018-2024 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
	2018	2019	2020	2021	2022	2023	2024
<b>TOTAL Annual Investment Program:</b>	<b>33,056</b>	<b>34,000</b>	<b>35,990</b>	<b>37,100</b>	<b>37,900</b>	<b>38,804</b>	<b>40,960</b>
<i>SECTION I.1 - Construction of new facilities</i>	<i>8,873</i>	<i>9,800</i>	<i>10,250</i>	<i>10,800</i>	<i>11,300</i>	<i>11,817</i>	<i>12,644</i>
Gas transmission network for transit transmission	2,950	3,250	3,400	3,600	3,800	4,013	4,294
National gas transmission network	4,025	4,450	4,650	4,900	5,100	5,304	5,675
Natural gas storage	0	0	0	0	0	0	0
Total for distribution by types of activities	1,898	2,100	2,200	2,300	2,400	2,500	2,675
<i>SECTION I.2 - Reconstruction, rehabilitation and overhauls of long-term tangible assets</i>	<i>16,183</i>	<i>17,200</i>	<i>17,740</i>	<i>18,300</i>	<i>18,600</i>	<i>18,987</i>	<i>20,316</i>
Gas transmission network for transit transmission	10,130	10,500	10,700	10,900	11,000	11,200	11,984
National gas transmission network	3,673	4,050	4,250	4,500	4,600	4,692	5,020
Natural gas storage	700	800	840	850	900	953	1,020
Total for distribution by types of activities	1,680	1,850	1,950	2,050	2,100	2,142	2,292
<i>SECTION I.3 -Delivery of machinery and equipment</i>	<i>8,000</i>	<i>7,000</i>	<i>8,000</i>	<i>8,000</i>	<i>8,000</i>	<i>8,000</i>	<i>8,000</i>

**4.3. 2015 - 2024 Investment program, including investment activities on which final investment decision is to be taken**
**in thousand BGN, VAT excluded**

	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>
	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
<b>TOTAL</b>	<b>3,595</b>	<b>92,326</b>	<b>169,220</b>	<b>182,260</b>	<b>114,000</b>	<b>102,000</b>	<b>73,000</b>	<b>72,000</b>	<b>42,000</b>	<b>42,000</b>
Gas transmission network for transit transmission	470	18,266	100,000	118,000	94,000	30,000	10,000	10,000	10,000	10,000
National gas transmission network	2725	11,120	8,020	3,060	0	70,000	60,000	60,000	30,000	30,000
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	100	2,940	1,200	1,200	0	1,000	2,000	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 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 to market integration in the region. 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 increase further also by construction of new gas storage facility in the country, but this process from the stage of the study to the actual construction and run into operation would take at least 7-8 years.

Bulgartransgaz EAD priority as a combined gas operator is the effective implementation of the Bulgarian projects of the first list of "projects of common interest." The PCIs list<sup>11</sup> published by the EC on 14.10.2013 includes the following infrastructure projects planned for construction on the territory on Bulgaria: Rehabilitation and modernization of the existing gas transmission network, Interconnection Greece-Bulgaria (IGB), the Project to provide bi-directional capacity at the existing interconnection point between Greece and Bulgaria – Kulata/Sidirokasto (already implemented), the Interconnection Bulgaria-Serbia, the Project to expand the capacity of UGS Chiren, the Project for construction of new gas storage on the territory of Bulgaria and the Interconnection Turkey-Bulgaria (ITB).

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 Interconnection of Bulgartransgaz EAD gas transmission network with the South Stream project**

Project development by December 2014 provided for the construction of new gas transmission infrastructure for natural gas transport from Russia, through the Black Sea and the territory of Bulgaria to the Central parts of the European Union. A project company, **South Stream Bulgaria AD has been set up for the project's realization on the Bulgarian territory** where shareholders with equal shares are BEH EAD (50%) and OAO Gazprom (50%). The expectations were the gas pipeline to be connected to Bulgartransgaz EAD transit network in the region of the town of Provadia. There is currently uncertainty **concerning the project's future development concept.**

In the time of more active work on the project and prior to the statements about it being stopped, a route option for the territory of Bulgaria was chosen and the interconnection point with Bulgartransgaz EAD gas transmission networks was set. It is planned in the area

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<sup>11</sup> Official list of the Projects of Common Interest, webpage of the European Commission, Directorate Energy

of CS Provadia with two branches to the national gas transmission network with a maximum capacity of 3.3 bcm and the gas transmission network for transit transmission (GTNTT) with a maximum capacity up to 22 bcm/y.

Following the expressed intention to suspend the South Stream project and shift it through Turkey to a new gas hub on the Turkish-Greek border **OAO Gazprom** and the Turkish company Botas signed a Memorandum of Understanding concerning the possibility for new offshore gas pipeline to Turkey on 01 December 2014 with a capacity of 63 bcm/y, partly overlapping the South stream route. The working title of this gas pipeline is currently the Turkish Stream, and the possibility of building an offtake thereof to Bulgaria as part of supply routes to EU Member States is under consideration.

At the same time as of the beginning of April 2015 Bulgaria has not been officially informed of South Stream project being stopped, and the intergovernmental agreements of Russia with the countries along the route are in force.

The connection to the gas transmission network for transit transmission was scheduled for 2016, and to the national gas transmission network - for 2017.

### **5.1.2 Development of gas infrastructure in relation to the concept of a regional gas hub establishment in Bulgaria**

The idea of a gas hub establishment in Bulgaria was launched for the first time at governmental level on 10.12.2014 and on 12.12.2014 Bulgaria sent a formal proposal to the European Commission for establishment of a gas hub on the territory of the country by a letter to the **Vice-President of the European Commission for the Energy Union Maroš Šefčovič, specifying that the Republic of Bulgaria will rely on support and financial aid from the European Union and underlying that such a project can be implemented with priority together with the interconnections and be in line with the Juncker plan and the formation of European Energy Union, by contributing to improvement of the security of supply and diversification of the sources and routes.**

The establishment of a gas hub requires sources of natural gas supply and at the same time provision of the necessary infrastructure for transmission of these quantities through the territory of Bulgaria. The concept 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. The advantage of Bulgaria in view of the proposed project is the well-developed Bulgarian gas transmission infrastructure and the interconnectors with the neighbouring countries under construction.

Natural gas quantities from various sources could enter the hub - Russian natural gas through the sea gas pipeline South Stream, Russian gas 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. The idea of a gas hub establishment is supported by the strategic geographic location of Bulgaria, well-developed existing gas transmission and storage infrastructure and the interconnection projects with Romania, Turkey, Greece and Serbia, which can be used as an advantage also

for all partners in the EU and the region and by the hub establishment the necessary gas quantities can be provided at competitive market prices.

The idea of the hub is based on a real physical point near the city of Varna reached by gas pipelines of natural gas producers, to ensure unimpeded transit of significant gas quantities for further transportation, while at this point a gas trading venue shall be organized - a hub where every market participant could, if so wishes, carry out natural gas transactions.

Currently the gas hub concept, developed by Bulgartranzgaz EAD, comprises of the following projects:

- Construction of new infrastructure in two stages, consisting of 844 km gas pipelines of predominant diameter Dn 1200 from Varna to Oryahovo providing additional capacity of 42.6 bcm/y and two new compressor stations of total installed capacity 265 MW to provide the required transmission pressure. Stage I is expected to be realized by the end of 2019, and stage II by the end of 2022. The estimated investment amounts to EUR 2 100 million.
- Modernization of the existing network for transit transmission - by construction of 50 km loop Dn 1200 from Provadia to the village of Rupcha, replacement of 20 km (2x10 km) existing gas pipelines Dn 1000 from CS Strandzha to the border with Turkey, as well as increase of CS Strandzha capacity by 10 MW. The project implementation will provide 6 bcm/y new capacity to Turkey. It is planned to be constructed by the end of 2022. The estimated investment amounts to EUR 103 million.
- Modernization of the national gas transmission network, Northern semi-ring by construction of 383 km loop Dn 700 from CS Valchi Dol to Novi Iskar. By this project realization, 4 bcm/y new exit capacity will be provided in the directions Serbia (through IBS), Romania (through IBR) and UGS Chiren (for transmission at injection and withdrawal amounting up to 500 mcm/y). It is expected to be realized by the end of 2022. The estimated investment amounts to EUR 195 million.

The favourable development of the above new projects in the period 2019-2022 will provide total new transmission capacity of 52.6 bcm/y, which fully meets Bulgaria's ambition to become a significant gas hub (gas distribution hub) in Southeastern Europe.

The total amount of the investment for achievement of this objective is about EUR 2.4 billion.

### **5.1.3 Development of the gas infrastructure in Bulgaria in relation to the Eastring project**

The project for development of the gas infrastructure on the territory of Bulgaria in connection with the Eastring project on the territory of Romania and Hungary is at the conceptual stage and its realization will depend on the route option which is to be selected.

Eastring is envisaged to start from the existing CS Velke Kapushani in Slovakia, pass through the territory of Hungary and reach the Romanian-Bulgarian border near the village of Kardam. Various route options are being considered, according to which the gas pipeline length varies between 744 km and 1015 km, and the capacity between 20 and 40 bcm/y.

The concept, developed by Bulgartransgaz EAD at this stage, envisages the construction of a new gas pipeline from the region of the village of Strandzha near the border with Turkey to the region of the village of Kardam near the border with Romania of 258 km length, diameter Dn 1400 and operating pressure 75 bar, as well as construction of a new compressor station near the village of Strandzha with installed capacity of 60 MW.

The new gas pipeline capacity is 20 bcm/y and the estimated investment amounts to EUR 700 million.

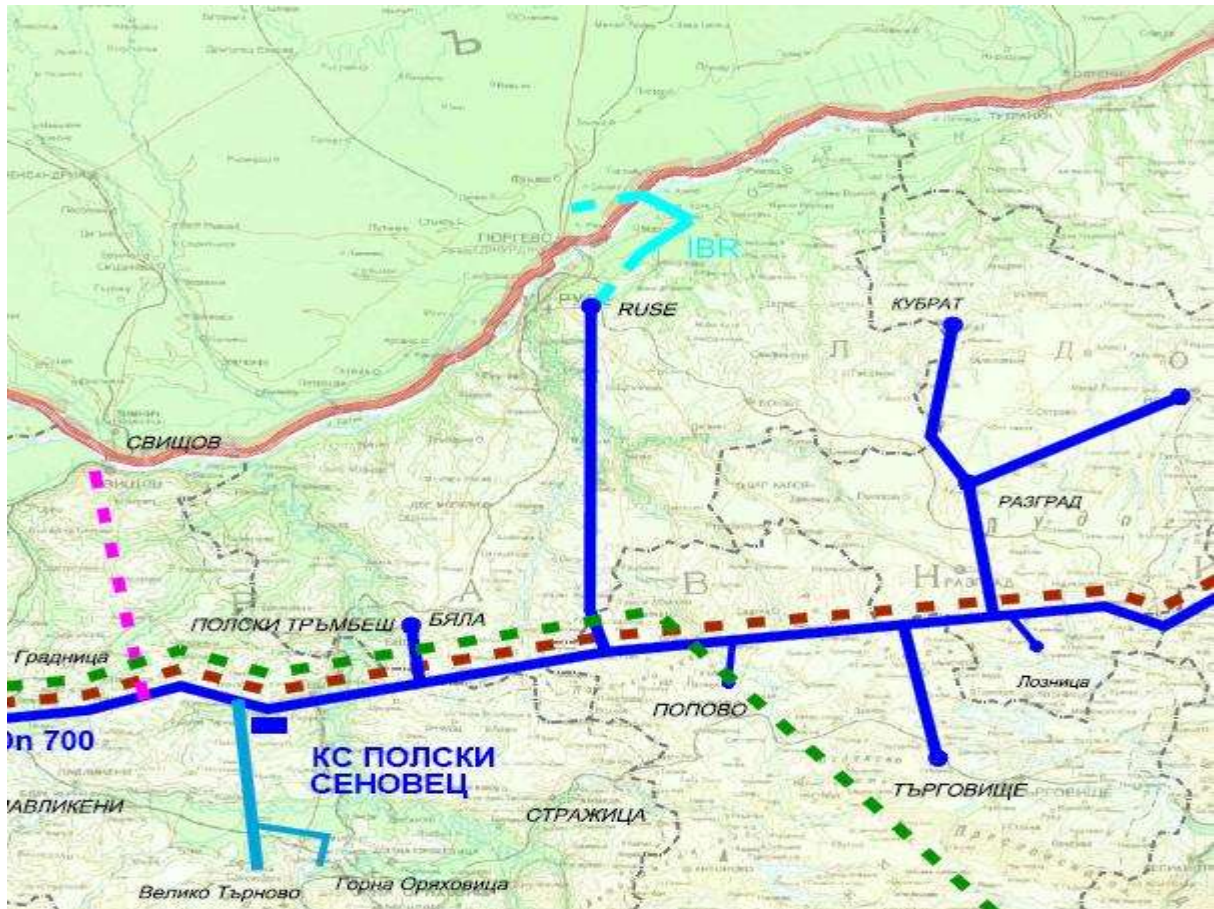
The expected time of completion is the mid 2022.

By implementation of the project, a corridor for natural gas supplies will be provided between Bulgaria, the gas markets of Central Europe, Western Europe and Turkey.

Bulgartransgaz EAD project is an entirely new infrastructure on the territory of Bulgaria. *The gas pipeline's capacity is completely new and does not affect the capacity under concluded long-term contracts for cross-border transmission.*

## 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 **Bulgartarnsgaz EAD** and **Transgaz S.A.** in line with the **Memorandum on Understanding signed on 01.06.2009 г.**

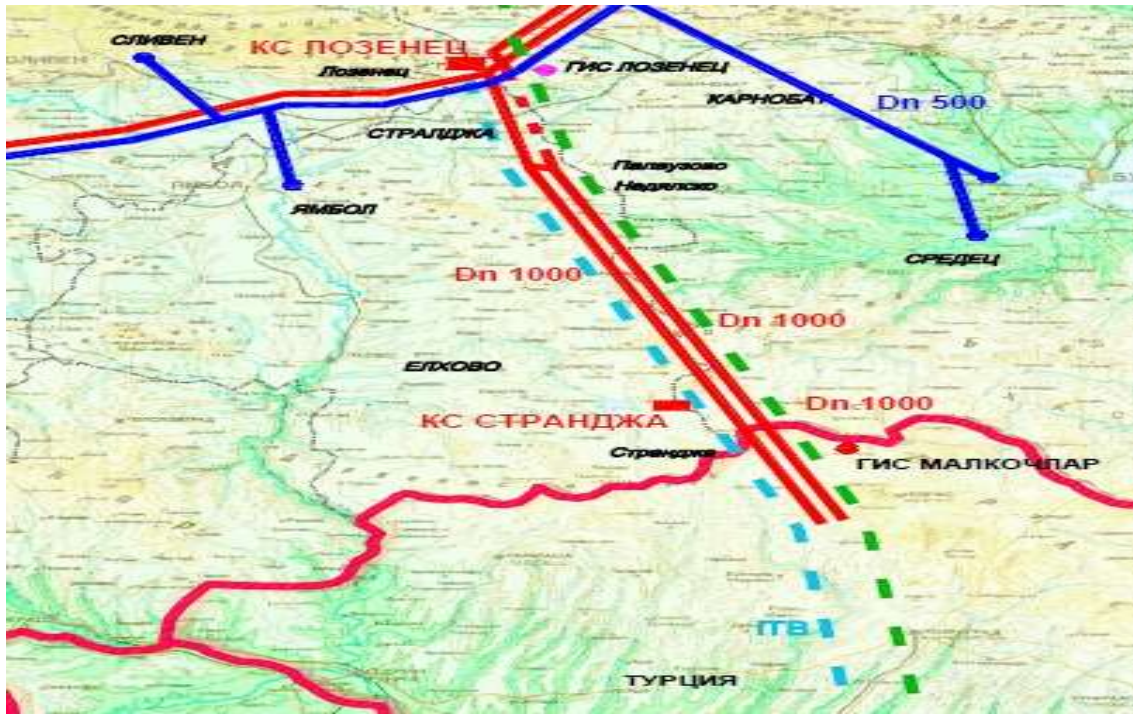
The forecast total value of the project is set to 23, 823 million euro. In line with EC Decision C(2010)5962 of 06.09.2010 both companies are the Beneficiaries of a grant under the European Energy Programme for Recovery (EEPR) in the amount of 8,9 million euro.

The reverse flow interconnection is 25 km long of which 15 km on the Bulgarian territory, 7.5 km on the Romanian territory and 2.5 km of underwater crossing 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: the underwater section crossing Danube, terrestrial section on Bulgarian territory and terrestrial section on Romanian territory.

The gas pipeline is scheduled to be constructed and run into operation in 2015.

### 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 and about **130 km** on Turkish), with a capacity of about 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.

ITB can secure access to all current and future entry points and sources of Turkey – Azerbaijan and other natural gas and LNG spot supplies from existing terminals in Turkey. Its realization is directly related to achieving the conditions required for the establishment of a competitive gas market, increase in networks flexibility and market integration.

Assessing the benefits from the realisation of the Interconnection Turkey - Bulgaria, the European Commission determined it to be on the Bulgarian gas projects of common interest **according to Regulation (EC) 347/2013**. On 21 November 2014 the European Commission published a list of activities selected to receive financial aid under the Connecting Europe Facility CEF-Energy. The ITB Feasibility Study draft is amongst them. The maximum amount of the financial assistance is EUR 190 000. The study will be realized in the second half of 2015 and based on the outcome thereof the final parameters of the project will be determined.

The expected construction and commissioning term is 2018.

### 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, and Bulgartransgaz EAD extends expert and technical assistance.

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.

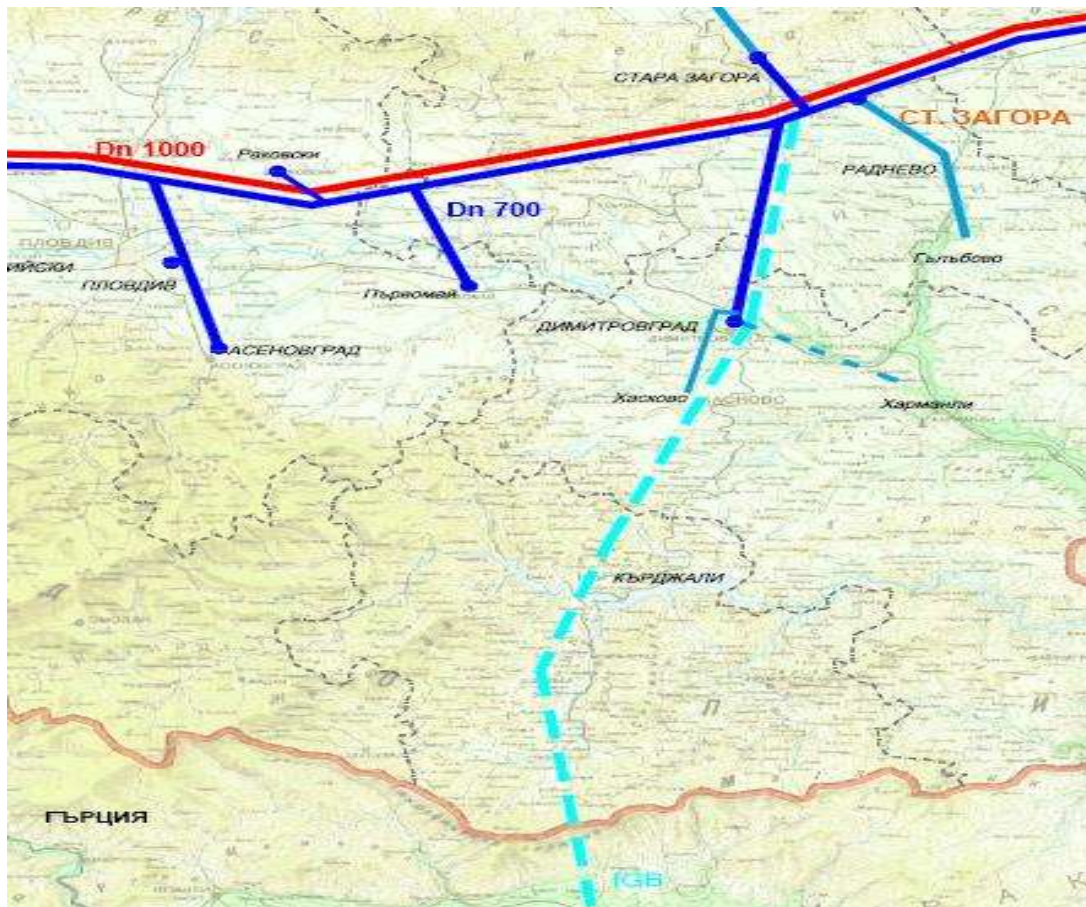
In line with Regulation (EC) 347/2013 the Interconnection is one of the Bulgarian project of common interest.

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 3,1 bcm.

Feasibility Study and field archaeological studies have been carried out along the gas pipeline route. 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. The development of Detailed Spatial Plan has been awarded – final draft and investment design (phases – technical and working design) and 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.

The expected term of commissioning is the end of 2017.

### 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 UGS Chiren capacity**

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.

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 (the Czech company MND) proposes as the most economically beneficial Option 3, i.e. Active gas of 1 billion normal cu m, injection and production flowrate of 8-10 million normal cu m and maximum reservoir pressure up to 150 bar. Such parameters are determined based on the analysis of the available geological, geophysical, logging and reservoir and engineering information of Chiren geological structure and capacity capability of surface equipment. Additional studies 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 project realization provides for the increase of the working gas volume up to 1 bcm and the injection and production rates up to 8 – 10 million m<sup>3</sup>/day.

The project was declared a project of common interest in Annex 7 of Regulation (EU) 347/2013 as part of cluster 6.20 Increase storage capacity in South-East Europe. The advantage of Chiren UGS that it is a storage facility in operation and the additional storage capacity could be realized in considerably shorter terms compared to those required for the construction of new storage facilities, in that context the project for its expansion represents the first stage of the regional storage capacity expansion conception.

The objectives 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.

In the medium term and the development of gas projects in the region and the increase in market integration, Chiren UGS emerges as a commercial storage facility playing an important role in the development of 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 Technological Design on Chiren UGS Operation and Expansion has been prepared and geological and geophysical studies and research work has been provided in the period 2015-2016 – Geomechanical simulation of Chiren reservoir, 3D field seismic studies on the area of Chiren structure and ground gas analysis on the area of Chiren structure.

#### **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.

The need of increasing storage capacity in Bulgaria and the region of South-eastern Europe has been identified by the European Commission and the project for the construction of new gas storage on the territory of Bulgaria has been announced in Regulation (EU) No 1391/2013 on guidelines for trans-European energy infrastructure as regards the Union list of projects of common interest.

#### **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 Silistra**

The gas pipeline from the town of Dobrich to the town of Silistra is under construction and is scheduled to be completed within 2014. It's length is 80 km, diameter DN 350 mm, working pressure Pn 54 bar and transmission capacity of 100 000 m<sup>3</sup>/h. The project also consists of AGRS with a capacity of 40 000 m<sup>3</sup>/h construction in the western industrial zone of Silistra.

Bulgartransgaz EAD is an investor of the project.

The Italian company S.A.L.P. SpA is Contractor of the construction and installation works of the project.

The project is funded by a grant under Kozloduy International Decommissioning Support Fund (KIDSF) to the amount of € 9.214 million. Bulgartransgaz EAD co-financing amounts to € 3.072.000. The European Bank for Reconstruction and Development is an administrator of KIDSF.

The gas pipeline is planned to be constructed and run into operation in 2015.

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

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 m<sup>3</sup>/h and in Oryahovo - with capacity of 5000 m<sup>3</sup>/h.

The project is funded by a grant under Kozloduy International Decommissioning Support Fund (KIDSF) to the amount of € 10.200.000 million. Bulgartransgaz EAD co-financing amounts to € 4.372.000. The European Bank for Reconstruction and Development is an administrator of KIDSF.

The gas pipeline is scheduled to be constructed and run into operation in 2016.

- **Gas pipeline branch Razlog - BANSKO**

The gas pipeline expected length is 40 km, maximum flow rate 32 000 m<sup>3</sup>/h and diameter DN 250 and operating 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.

- **Gas pipeline branch Panagurishte - PIRDOP**

The gas pipeline length is planned to be about 64 km, maximum capacity 25 000 m<sup>3</sup>/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) near the AGRS near the town of Panagurishte and route from the town of Panagurishte to the town of Pirdop and AGRS to south of them.

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.

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

The gas pipeline expected length is 36 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.

#### 5.4.3.2 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 village 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.

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

### **5.5.1 Modernization of Compressor Stations Strandja, Lozenets, Petrich and Ihtiman**

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. 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 sets of 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;

The deadline for commissioning of three of the upgraded compressor stations is the end of 2015 and CS Petrich is to be put into operation in 2016.

### **5.5.2 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 must 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 must be built.

At the end of 2014 a full engineering contract has been entered into and the Site is expected to be commissioned at the end of 2017.

### **5.5.3 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.

#### **5.5.4 Construction of Transit Gas Pipeline to Turkey (looping) in the section CS Lozenets - PF Nedyalsko**

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. 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 be run into operation by the end of 2016.

#### **5.5.5 Laying of fibre optic network: from Ihtiman CS to Dupnitsa GMS Botevgrad-Chiren, Batultsi-Nikolaevo-Pleven, Polski Senovets – Targovishte and Nikolaevo – Polski Senovets**

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 three locations – close to Ihtiman CS, Lozenets CS and Kardam CS. The technological connection near Ihtiman CS AP1 is in service from the beginning of 2014, and the technological connection BP2 is planned to be realized in 2015.

The capacity of the technological connections near near Lozenets CS and Kardam CS is of 7,2 mcm/d and the connections are scheduled to become operational at the beginning of 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 2015-2024**

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 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 2015-2024 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 enables 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 <sup>3</sup> /d	2015	2016	2017	2018	2019	2020-2024
Zone National Gas Transmission Network (NGTN)						
Entry capacity	<b>26,18</b>	<b>29,35</b>	<b>29,35</b>	<b>43,95</b>	<b>65,96</b>	<b>65,33</b>
IP Negru voda 1	20,27	20,27	20,27	20,27	20,27	10,27
IBR		0,08	0,08	0,08	0,08	4,56
IGB				9,1	9,1	9,1
ITB					9,1	9,1
IBS				5,50	5,50	5,50
South Stream					10	10
GMS Chiren/connection with UGS during production	3,5	3,5	3,5	3,5	3,5	4,8
Local production	2,41	2,41	2,41	2,41	2,41	6
Connection with NGTN (entry)	0	3,08	3,08	3,08	6	6
Exit capacity	<b>41,04</b>	<b>45,60</b>	<b>54,70</b>	<b>69,30</b>	<b>120,22</b>	<b>127,02</b>
IP Negru voda 1/Kardam*	12	12	12	12	60	60
Exit zone Bulgaria	22,76	22,76	22,76	22,76	22,76	22,76
IBR		4,56	4,56	4,56	4,56	4,56
IGB			9,1	9,1	9,1	9,1
ITB				9,1	9,1	9,1
IBS				5,50	5,50	5,50
GMS Chiren/connection with UGS during injection	3,2	3,2	3,2	3,2	3,2	10
Connection with GTNTT (exit)	3,08	3,08	3,08	3,08	6	6
Zone Gas Transmission Network for Transit Transmission (GTNTT)						
Entry capacity	<b>62,36</b>	<b>62,36</b>	<b>62,36</b>	<b>62,36</b>	<b>65,28</b>	<b>125,28</b>
IP Negru Voda 2,3/Kardam	58,28	58,28	58,28	58,28	58,28	58,28
South Stream						
IP Kulata/Sidirokastro*	1	1	1	1	1	1
IP Strandja/Malkoclar*						60
Connection with NGTN (entry)	3,08	3,08	3,08	3,08	6	6

Exit capacity	<b>58,27</b>	<b>61,36</b>	<b>66,16</b>	<b>66,16</b>	<b>69,07</b>	<b>129,07</b>
IP Strandja/Malkoclar	45,12	45,12	49,92	49,92	49,92	49,92
IP Kulata/Sidirokastro	10,27	10,27	10,27	10,27	10,27	10,27
IP Jidilovo	2,58	2,58	2,58	2,58	2,58	2,58
Exit zone Bulgaria	0,30	0,30	0,30	0,30	0,30	0,30
Connection to the NGTN (exit)	0	3,08	3,08	3,08	6	6
IP Negru Voda 2,3/Kardam*						60

\*\*\*\*\* 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) as well as the connectivity to the South Stream gas pipeline are according to design information as of April 2015 and are subject to change.

## CONCLUSIONS

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The 2015 – 2024 TYNDP of Bulgartransgaz EAD presents the plans for development of the infrastructure for natural gas transport and storage in Bulgaria in the next ten years as part of the single European gas infrastructure and the pan-European gas market.

Bulgartransgaz EAD is a responsible company, operating in dynamically changing realities and endeavors 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 2015 – 2024 are 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 2015-2024 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 **газопроводи** 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 planned 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 by 2020, approved by the Council of Ministers with Decision No.133 of 9 March 2011.

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

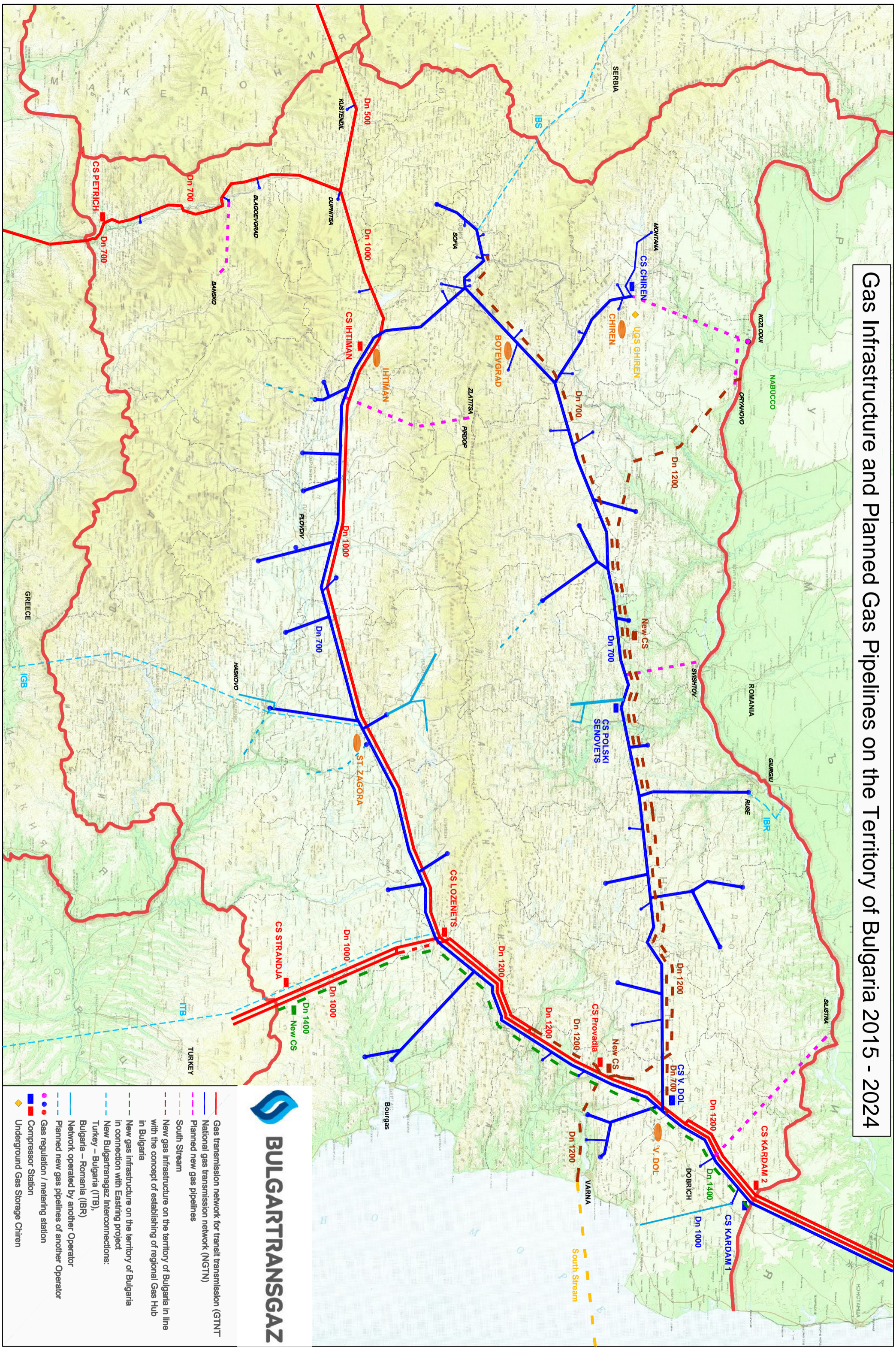
Nº	Project	Final Investment Decision (FID)	Deadline for completion	Contractor	Expected value of Bulgartransgaz EAD investment	Funding	Length	Change of capacity/type	Remarks
1	Interconnection Bulgaria - Romania (IBR)	yes	2015	Bulgartransgaz EAD and Transgaz S.A.	~ €13 million (€ 23,8 million -whole project value)	€4,3 million European Energy Program for Recovery (EPR)/~ € 8,5 million own funding	a total of 25 km, of which 15 km Bulgarian section 2,5 km Undercrossing	0,5-1,5 bcm/y permanent bi-directional (entry-exit)	At the final stage of construction.
2	Interconnection Turkey - Bulgaria (ITB)	no	2018	Bulgartransgaz EAD and Botas	~ € 50 million	own and attracted external funding	~ 75 km Bulgarian section ~ 120 km Turkish section	about ~3 bcm/y permanent bi-directional (entry-exit)	The project is at the stage of Pre-investment studies aimed at determining the specific realization parameters.
3	Interconnection Greece - Bulgaria (IGB)	no	2018	ICGB AD	~ € 5 million (€ 210 million*)	EEPR and Bulgartransgaz EAD own funding for connection to the existing network	a total of 182 km, of which 151 km Bulgarian section	3 bcm/y - I stage 5 bcm/y - II stage entry (reverse during crisis situations)	The main infrastructure shall be implemented by ICGB AD. The project will be connected to Bulgartransgaz EAD gas transmission network in the area of Stara Zagora.
4	Interconnection Bulgaria - Serbia (IBS)	no	2017	Ministry of Energy	~ € 2 million (€ 48 million*)	OP Competitiveness and Bulgartransgaz EAD own funding for connection to the existing network	a total of 150 km, of which 62 km Bulgarian section	1,8 - 3,1 bcm/y exit (reverse during crisis situations and disruption of the main flow)	Implemented by the ME, beneficiary of OP Competitiveness. The project will be connected to Bulgartransgaz EAD gas transmission network.
5	South Stream (connection to the gas transmission network)**	yes	2016/2017	South Stream Bulgaria AD	~ € 5 million	own funding	-	over 20 bcm/y entry	The main infrastructure in the Republic of Bulgaria shall be implemented by South Stream Bulgaria AD. The connection to Bulgartransgaz EAD gas transmission network is planned to be at entry point in the area of CS Provadia.
6	Concept for construction of gas hub in Bulgaria - projects for new infrastructure and modernization of the existing infrastructure	no	2019-2022	Bulgartransgaz EAD	~ 2 400 million €	own and attracted external funding	844 km new gas pipelines (mostly Dn 1200) + 265 MW new CS, loopings and replacement of 60 km existing gas pipelines and increase of CS Strandzha power by 10 MW along the network for transit transmission, looping 383 km Dn 700 along the	New capacity amounting to 52,6 bcm/y exit	The projects are in the conceptual stage.
7	Construction of a gas pipeline in Bulgaria with regard to the construction of the gas pipeline Easting on the territory of Hungary and Romania	no	2022	Bulgartransgaz EAD	~ 700 million €	own and attracted external funding	258 km Dn 1400 c Pp - 75 bar + 60 MW new CS	20 bcm/y	The project is in the conceptual stage.

Note:

\* These values represent the estimated total value of the projects developed by third parties, called "third party projects"

\*\* The project is of indeterminate status - for more information refer to item 5.1.1

# Gas Infrastructure and Planned Gas Pipelines on the Territory of Bulgaria 2015 - 2024



- Gas transmission network for transit transmission (GTTT)
- National gas transmission network (NGTN)
- Planned new gas pipelines
- South Stream
- New gas infrastructure on the territory of Bulgaria in line with the concept of establishing of regional Gas Hub in Bulgaria
- New gas infrastructure on the territory of Bulgaria in connection with Easting project
- New Bulgarttransgaz interconnections:
  - Turkey – Bulgaria (ITB),
  - Bulgaria – Romania (IBR)
- Network operated by another Operator
- Planned new gas pipelines of another Operator
- Gas regulation / metering station
- Compressor Station
- ◆ Underground Gas Storage Chiren