2017 - 2026 TEN-YEAR NETWORK DEVELOPMENT PLAN OF BULGARTRANSGAZ EAD

10 April, 2017

Approved with Decision under Protocol No.200/10.04.2017 of Bulgartransgaz EAD Management Board meeting

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1. DESCRIPTION OF KEY PROJECTS
2. MAP
The following definitions and abbreviations are used for the purposes of this document:

**AGRS** – Automatic Gas Regulation Station  
**LNG** – Liquefied Natural Gas  
**GMS** – Gas Metering Station  
**GPB** – Gas Pipeline Branch  
**GRS** – Gas Regulation Station  
**the Company** – Bulgartransgaz EAD is an independent combined gas operator in the Republic of Bulgaria  
**EU** – European Union  
**GDC** – Gas Distribution Company  
**ME** - Ministry of Energy  
**EWRC** – Energy and Water Regulatory Commission (formerly SEWRC)  
**BEH** – Bulgarian Energy Holding EAD  
**VS** – Valve Station  
**EEC** – End Energy Consumption  
**CS** – Compressor Station  
**PF** – Pigging Facility  
**MGP** – Main Gas Pipeline  
**TGP** – Transit Gas Pipeline  
**MPa** – Megapascal (unit of pressure)  
\[ m^3 \text{ or cubic meter} \] – 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 (200°C) and absolute pressure of 0.101325 MPa.  
**MW** – megawatt (unit for power)  
**EIA** – Environmental Impact Assessment  
**Natural Gas Transmission** – transport of natural gas through the gas transmission networks owned by Bulgartransgaz EAD  
**PEC**– Primary Energy Consumption  
**BP** – Building Permit  
**CIW** – Construction and Installation Works  
**SMEs** – Small and medium-sized enterprises  
**BSTC** – Black Sea Technological Company  
**UGS** – Underground Gas Storage  
**National Gas Transmission Network (NGTN)** – gas transmission network the main purpose of which is natural gas transmission to customers in Bulgaria connected thereto and
also to interconnection points. The NGTP is owned by Bulgartransgaz EAD and used for performing transmission services;

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

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

**ENTSOG** – European Network of Transmission System Operators for Gas

**CEF** – Connecting Europe Facility

**CESEC** - Central and South Eastern Europe Gas Connectivity

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

**IAP** – Ionian Adriatic gas pipeline

**TAP** – Trans-Adriatic Pipeline

**TANAP** – Trans-Anatolian Natural Gas Pipeline
SOURCES USED

- Ministry of Energy of the Republic of Bulgaria (www.me.government.bg)
- Energy and Water Regulatory Commission (www.dker.bg)
- National Statistical Institute - GDP, PEC, EEC and other data, (www.nsi.bg)
- 2001-2014 National energy balance of the Republic of Bulgaria,
- Public information related to the development of the gas market in the region, published on the web pages of the following companies:
  - Gazprom (www.gazprom.com)
  - DESFA S.A. (www.desfa.gr)
  - DEPA, S.A. (www.depa.gr)
  - Gastrade (www.gastrade.gr)
  - JP Srbijagas (www.srbijagas.com)
  - GAMA AD (www.gama.com.mk)
  - ICGB AD (www.icgb.bg)
  - ITGI (www.edison.it)
  - TAP (www.trans-adiatic-pipeline.com)
  - Shah Deniz (www.bp.com)
  - ANRE - National Energy Regulatory Authority (www.anre.ro)
  - Transgaz S.A. (www.transgaz.ro)
  - Romgaz (www.romgaz.ro)
  - CEPA - Romania’s Energy Crossroads – March 2016 – (www.cepa.org)
  - SOCAR – (www.socar.az)
  - BOTAS (www.botas.gov.tr)
  - Ministry of Foreign Affairs - Turkey's Energy Profile and Strategy (www.mfa.gov.tr)
  - World bank (www.worldbank.org)
  - ENTSOG (www.entsog.eu)
- Information related to natural gas production in Bulgaria, webpage Petroceltic International Plc (the former Melrose Resources), (www.petroceltic.com)
- Regional Investment Plan 2014-2023 Central and Eastern Europe
- Regional Investment Plan 2014-2023 South Corridor
- ENTSOG 2017-2026 Ten-Year Network Development Plan
- GIE – Gas Infrastructure Europe
- IEA - International Energy Agency
- IGU – International Gas Union, Working committee 2 - UGS
- EIA – U.S Energy Information Administration
- IENE – Institute of Energy for South – East Europe
- Turkish Policy Quarterly – 2015
- Platts
- Gas in Focus 2015/2016
- Eustream – Presentation – 21st Annual BBSPA Conference – April, 2015 Wien
- DEPA – Presentation – CEER Workshop – 12 September 2016 – Athens
- Information from other corporate documents and correspondence with stakeholders
Bulgartransgaz EAD’s Ten-year plan for development of the natural gas transmission and storage infrastructure has been developed for the period 2017-2026 and sets out the vision for the development of the company as an independent transmission operator. It is consistent with the major European, regional and national priorities, namely ensuring the security of supply of natural gas, ensuring the diversification of natural gas supply sources and routes and the creation of sustainable, liberalized and interconnected gas market and with the „winter package of measures to safeguard the energy security in the EU”, submitted in February 2016 by the EC.

The priority activities for development of Bulgartransgaz EAD infrastructure in the period 2017 – 2026 are aimed to improve and enhance the existing main and auxiliary gas transmission infrastructure and the associated equipment, its modernization, rehabilitation and expansion, the development of interconnectivity and the expansion of storage capacity. Their realization will give to Bulgaria the potential to become an important regional gas hub.

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

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

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

The national TYNDPs serve as the basis for development of the Gas Regional Investment Plans (GRIPs), as well as the Community-wide Network Development Plan (TYNDP) developed by the European Network of Transmission System Operators for Gas (ENTSOG).
Bulgartransgaz EAD is a sole owner joint stock company, registered on 15.01.2007 by a Decision of Sofia City Court. The owner of 100% of its shares is Bulgarian Energy Holding EAD whose principal is the Ministry of Energy (ME).

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

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

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

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

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

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


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

Bulgartransgaz EAD plays a key role and is responsible for the uniform management and reliable operation and efficient use of the natural gas transmission system, including the gas
pipelines, compressor stations, Chiren UGS for the development of the networks in accordance with the long-term gas sector forecast and development plans in compliance with the quality and quality reporting requirements, the networks’ development in accordance with the long-term forecasts and plans for gas supply development, maintenance, operation, management and development of the underground gas storage Chiren, non-discrimination of users with regard to natural gas transmission and storage. Apart from that, engineering, investment and service activities are carried out.

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

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

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

Compressor station Strandja

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

National gas transmission network (NGTN), gas transmission network the main purpose of which is natural gas transmission to consumers in Bulgaria connected thereto, comprising about 1,835 km main gas pipelines and high-pressure gas pipeline branches, three compressor stations – CS Kardam-1, CS Valchi Dol and CS Polski Senovets with total installed capacity of 49 MW, gas regulation stations, gas metering stations, electrochemical protection system, cleaning facilities, communications system, information system and other ancillary facilities. Its technical transmission capacity amounts to 7.4 bcm/y and the maximum working pressure is 54 bar.

Gas transmission network for transit transmission (GTNTT), gas transmission network the main purpose of which is natural gas transit transmission, used also for gas transmission to customers in Bulgaria connected thereto, comprising 930 km gas pipelines and six compressor stations – CS Kardam-2, CS Provadia, CS Lozenets, CS Strandja, CS Ihtiman and CS Petrich, with total installed capacity of 270 MW, electrochemical protection system, cleaning facilities, communication system, information system and other ancillary facilities. It mainly transports natural gas quantities from an entry point at the Bulgarian-Romanian border to the exit points to Turkey, Greece and Macedonia. Its technical capacity for natural gas transit transmission in total to the three directions amounts to 17.8 bcm/y and the maximum working pressure is 54 bar.

Bulgartransgaz EAD constructed and since 10.01.2014 has put into commercial operation a reverse flow station metering natural gas quantities between the transit and national gas
transmission networks GMS Ihtiman and by using it the Operator can transport natural gas quantities to networks users of the two networks.

The **Underground Gas Storage Chiren** was built on the lands of Chiren village based on the already depleted gas condensate field. It is equipped with specialized underground and surface facilities required to secure injection, production and quality of the stored gas. Chiren UGS has 23 operational wells and a compressor station with total installed capacity of 10 MW. The present storage capacity can provide storage of 550 mcm natural gas. The withdrawal and injection capacity according to the formation pressures and other factors is of 0.5 mcm/d (minimum) up to 3.4 mcm/d (maximum) for withdrawal, in case of emergency withdrawal the maximum capacity is up to 4.2 mcm/d at the following conditions – emergency situation, full gas storage reservoir and for a short time period (a maximum of 30 days), and 0.5 mcm/day (minimum) to 3.16 mcm/d (maximum) for injection.

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

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

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

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

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

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

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

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

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

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

**Entry-exit point GMS Chiren** – connection between the national gas transmission network and UGS Chiren.
1. NATURAL GAS MARKET IN BULGARIA

1.1 General Market Overview

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

Natural gas consumption in Bulgaria for 2016 is 3 068 bcm, which shows an increase of 3.6% compared to the consumption in 2015 (2 961 bcm). The growth in consumption is a result of increased exports by the industry and the decreasing prices of the natural gas due to the low oil and petroleum products prices that are cost factor in the long-term contracts with Russia.

Data of the Total Energy Balance of the NSI shows that the natural gas share in the end energy consumption (EEC) is 14.4% for 2015, approximately 1.2 % increase compared to 2014 (13.2%). The main natural gas consumers are trade companies from the Energy and Chemistry Sectors as well as the Distribution System Operators (DSO) being end suppliers.

There is a very high energy dependency in Bulgaria in 2016 regarding natural gas supplies – 97.7%. Based on forecast data the import dependency will continue to be within the limits of 97-98%.
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 by one main source – the Russian Federation. Natural gas reaches Bulgaria mainly following the route through the territories of Russia, Moldova, Ukraine and Romania.

As of 1 July, 2016 as a result of the conclusion of an Interconnection Agreement with DESFA S.A. for IP Kulata/Sidirokastro an alternative was provided and very small quantities of natural gas were imported in the country through IP Kulata/Sidirokastro by backhaul service. Currently the total import natural gas capacity from Greece is 3 mcm/d on interruptible base. There is a possibility to export gas and very small volume was realized.

As of Gas Year 2017/2018 starting on 1 October, 2017 natural gas can be supplied from Greece on firm base to the amount of 1 mcm/d.

Quantities broken by sources of supply in 2016 are as follows:

<table>
<thead>
<tr>
<th>№</th>
<th>Type of supply</th>
<th>Quantity, mcm</th>
<th>Relative share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Imported natural gas</td>
<td>2 997</td>
<td>97,7%</td>
</tr>
<tr>
<td>2</td>
<td>Local production</td>
<td>72</td>
<td>2,3%</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>3 069</td>
<td>100%</td>
</tr>
</tbody>
</table>

The natural gas storage capacity in Chiren UGS and local production are the main alternatives regarding the security of supply if the import from entry point Negru Voda 1/Kardam is suspended, as well as to meet the seasonal fluctuations in the consumption and to cover the winter peaks, however the storage capacity is insufficient to fully guarantee the security of supply if the import (main gas flow) is suspended on daily basis.

This factors provide for the insufficient level of liberalization and liquidity on the national gas market and a risk regarding the security of supply.

Main participants on the national gas market in Bulgaria are:

- Bulgartransgaz EAD – combined gas operator responsible for performing natural gas transmission and storage activities;
- Gas distribution companies – performing both natural gas public supply and distribution activities, they supply natural gas to end users connected to their networks. They are obliged to build and develop the gas distribution networks in compliance with the long-term business plans and terms and conditions as approved by EWRC;
- Bulgargaz EAD – natural gas public supplier in Bulgaria responsible for the natural gas delivery at prices and terms and conditions as approved by EWRC;
- Natural gas traders – make transaction for natural gas supply with the public supplier, end suppliers, users, other natural gas traders, production companies, natural gas storage companies and the combined operator;
- Non-household natural gas customers connected to the gas transmission networks;
- Household and non-household natural gas customers connected to the gas distribution networks.
Main customers of the company using the natural gas transmission services are the public supplier Bulgargas EAD, Overgas Inc. Ad, and some natural gas traders, users of the gas transmission network, including from/to Greece perform transmission. Network users are also companies which transport gas for their own connected facilities, Agropolichim AD being the largest company.

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

Bulgargas EAD is the leading customer using the natural gas storage service. In 2016 natural gas is also stored for natural gas traders. OOO Gasprom Export has the largest natural gas volume transported through the territory of Bulgaria to neighbouring countries and the transport is performed by private traders from/to Greece.

The natural gas distribution and supply to customers connected to distribution networks is carried out by regional and local gas distribution companies – mainly private companies operating in licence regime and price regulation conditions. Overgas Networks AD, Aresgas AD, Citygas Bulgaria EAD etc. have the biggest market share. Households, public-administrative users, small and medium traders and industrial users are the main customers of the gas distribution companies.

Production companies and 2 main groups of connected customers - gas distribution companies and non-household users are connected to Bulgartransgaz EAD gas transmission network.

The household gas supply share in the country is still very low compare to the EU countries but there is a tendency to increase in the following years. The consumption of compressed natural gas also shows an increase.

Local natural gas production in the period 2000-2004 is symbolic (below 1%) and results mostly from the fields of the company Oil and Gas Exploration and Production AD. Since 2004 the company Petroceltic Bulgaria EOOD (former Melrose Resources OOD) 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 Galata. As a result of the gradual development and operation of the field, local production increased significantly and reached its peak in 2011 – 443 mcm or 14% of domestic consumption. By contrast, local production in 2010 was only 74 mcm or 3% of domestic consumption for that year. A gradual decrease of the quantities produced locally started in 2012. Currently production from concessions in the country is limited and covers up to about 2 - 3% of annual consumption. Latest seismic studies of new water areas in Galata block show 23% chance of new resources of availability of 3.5 bcm gas.

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

1.2 Market potential and development prospects

Bulgartransgaz EAD owns and operates a well-developed natural gas infrastructure part of the common European gas network. The company operates in dynamic, constantly changing world and respectively European energy 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 Greece, Turkey and Serbia and the commissioned in the end of 2016 new interconnection with Romania. They will enable the supplies of natural gas from different sources thus in turn boosting the competition and will positively effect on natural gas consumers. The new gas interconnections will considerably increase the entry capacity towards Bulgaria from Greece, Turkey and will ensure the possibility for access to and supplies from LNG terminals.

The realization of Gas Hub Balkan is a priority at both national and corporative level as it has the potential to connect all main gas transmission projects of South East Europe and to ensure transparent and non-discriminatory access of the European users to largescale sources of supply. The basic design is supported by the European Commission.

The following other basic design gas projects are considered for the region which would affect market development, enhance diversification and security of gas supply and respectively infrastructure development: the project for implementation of bi-directional natural gas supplies through the territory of Slovakia, Romania, Bulgaria, Hungary, Czech Republic and Austria – Eastring; projects of the South Gas Corridor etc.

Regarding the intensive study works of the local natural gas deposits and granted concessions for development of the deposits on the territory of the country (both onshore and in the Black Sea shelf – the block Han Asparuh and block Silistar – in February 2016 a contract for prospecting and exploration of oil and gas has been signed with Shell for a term of 5 years), the expectations for the next 10-15 years are the share of local production to increase, including and after proving the resources in block "A-Lovech" – Koynare, Deventsi Section 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 Chiren UGS is considered mainly as a storage of local importance and a major tool in ensuring security of supply, but in the long term the prospects are its conversion into a commercial storage facility with a significant role in the development of competition and increase of the benefits for natural gas users in the integrated and interconnected regional market. The development of the planned interconnections with Turkey, Greece and Serbia will enhance the market integration in the region and is a prerequisite Chiren UGS to have 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." In 2016 a new deviated exploitation well E-72 was commissioned, thus marking the start of the process of modernization and expansion of Chiren UGS. In 2016 another new deviated exploitation well E-73 was drilled and its commissioning is scheduled for 2017.

To fully complete the project for the expansion of Chiren UGS another 10 exploitation wells are planned to be drilled to 2020, including the replacement of some of the surface equipment. The volume of active gas in the gas storage facility is hence expected to rise from 550 mcm to up 1 bcm. The daily deliverability will also increase up to 8-10 mcm/d.

Despite the relatively low share of end consumption gas is an important natural resource with a potential of increasing its share in the overall national energy consumption over the next years. The share of gas supplies to households in the country is still low compared to
other gas markets, however constantly on the rise. Encouraging the gasification by means of expanding the gas transmission network to new regions and securing access to natural gas to new municipalities, distribution companies and new non-household users is a priority of Bulgaria’s Energy Strategy, and Bulgartransgaz EAD activity accordingly.

Bulgaria has strategic geographic location, well-developed gas infrastructure and the implementation of the planned new projects which are currently ongoing, the country has the potential to become an important factor in diversifying the natural gas sources and routes for the region.

The described perspectives are the basis in achieving the goals and Bulgartrasngas EAD investment plans and they reflect the overall company policy.

2. NATURAL GAS MARKET IN THE REGION

The development of the natural gas market in the region is related to the expected growth of natural gas consumption in Bulgaria's neighbouring countries, based on one hand on the expected increased consumption and on the other - the existing contracts for natural gas supply from the Russian Federation to the Balkans, as well as the opportunities for natural gas supplies from new sources by the Southern Gas Corridor, the potential of local production. These expectations are in line with the plans for construction of new connections between the gas transmission systems of Bulgaria with Turkey, Greece and Serbia, continuing the construction of the infrastructure with Romania, establishing a gas distribution hub in Bulgaria and other important projects in the region.

In addition, natural gas advantages (economic, technological and environmental) resulted in the relatively rapid growth of its consumption in the last thirty years worldwide. This is laid down in the Europe 2020 Strategy where the main objectives of the EU 20:20:20 are set regarding the climate and energy which are based on the encouraging policy to transfer to less waste and waste-free technologies and in particular the replacement of the energy facilities in most industrial enterprises and those in the chemical industry towards the use of cleaner fuels as certainly natural gas is. The growing need of sustainable development of the transport sector also focuses on the use of methane as an alternative fuel. This requires a rapid construction of compressor stations on the territory of the Pan-European transport corridors. The measures mentioned shall contribute to overcoming the consequences of air pollution by reducing the emissions of carbon and nitrogen oxides.

The review of the natural gas markets in the neighbouring countries outlines the main trends for development of the regional gas market:

2.1 Greece

Currently our country has one interconnection point (IP) with Greece – Kulata/Sidirokastro. This interconnection serves mainly as an entry point enabling Greece to receive natural gas and during the January 2009 crisis physical reverse flow to Bulgaria was carried out through this interconnection. As a result of the Interconnection Agreement (IA) for IP Kulata/Sidirokastro signed between Bulgartransgaz EAD and DESFA S.A in June 2016 and a Protocol to the long-term contract for transit transmission with OOO Gazprom Export as of 1 July 2016, an alternative possibility have been provided for natural gas import in the country through reverse supplies on commercial basis e.g. backhaul and reverse transmission in reverse direction through the reverse connection of the modernized CS Petrich.
Natural gas consumption in Greece has increased more than twice over the last decade to reach up to 4 bcm/y for the period 2011 and 2012. In 2015 the consumption is 3.8 bcm/y as the electricity generation takes a significant part (58%).

The consumption is covered by imports of LNG sources in local terminals – 13%; from the gas pipeline connection with Turkey – 21% and the gas pipeline connection with Bulgaria with a source of supply the Russian Federation – 66%.

According to the forecasts of natural gas demand in Greece, published in the Regional Investment Plan "Southern Corridor" 2014-2023, the forecasted levels to be reached are up to around 5.5 bcm/y as of 2021.

The Greek company DEPA has three long-term contracts with foreign companies for natural gas supply – with the Russian OOO Gazprom Export – up to 3 bcm/y with deadline by 2026, the Algerian Sonatrach (LNG) - up to 0.68 bcm/y with deadline by 2021, and the Turkish Botas – up to 0.75 bcm/y with deadline by 2021 and the total volume under these contracts does not exceed 4.5 bcm/y. Currently above 90% of the natural gas import in the country is carried out under long-term contracts. Besides Sonatrach. DEPA S.A. has signed a contract with the Italian gas and petroleum company ENI for extraordinary natural gas supplies in case of a crisis or force majeure circumstances. Last year DEPA announced their plans to expand the gas distribution network in the country to meet the constantly increasing number of household clients in the period by 2018.

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

The project announced by the Greek company Gastrade for construction of a new LNG terminal in Aegean Sea - Alexandroupolis has a strategic location close to DESFA’s gas transmission network and it is ranked by the European Commission as project of common interest. In February 2017 one of the biggest international fleets – owner of tankers for LNG transport – Gas Log Ltd. acquired 20% of Gastrade and expressed its intention to invest in the project. Interest in the construction of this LNG terminal have expressed DEPA S.A., the American Cheniere Energy, and Bulgaria which studies the possibility to acquire 25% of the project via Bulgarian Energy Holding EAD but awaits the resorts of the pre-feasibility study related to the technical and financial parameters of the facility. The terminal has a design yearly capacity of 6.1 bcm and 170 000 m³ storage capacity. This natural gas quantities will balance the needs not only on the local market but on the Bulgarian, Romanian, Macedonian, Serbian and the Hungarian market. The project is considered on the back of the Bulgarian-Greek interconnection and the Trans – Adriatic gas pipeline. Countries producing LNG such as USA, Algeria, Qatar etc. and possibly Cyprus and Israel in future are amongst the potential sources of supply.

The final investment decision is to be taken by the end of 2017, and the terminal to be commercially commissioned in 2019.

The other project Aegean LNG in the Kavala region proposed by DEPA remained as a concept and did not receive support for EC funding.

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

A new procedure on the privatization of the Greek TSO DESFA S.A. is to be announced this
year following the failure of the transaction of the Azerbaijan state oil company SOCAR in 2016. The Dutch gas company Gasunie, the Belgium company Fluxys and the Romanian TRANSGAZ S.A. have interest in acquiring a percentage share. Currently the participation of SOCAR and the Italian Snam is not confirmed. The privatization is planned to be finalized by the end of 2017.

Part of the South Gas Corridor connecting Turkey-Greece-Italy is the project ITGI – Poseidon with capacity of 15 bcm/y. The realization of this project will give Italy and the European countries an opportunity for natural gas supply from the Caspian Sea or the Middle East. The project includes the following gas transmission sections:

**Turkish gas transmission network** – to be modernized so as to ensure the transit transmission of natural gas quantities envisaged for Italy and Greece.

**IGB** – Interconnection Greece-Bulgaria – when signing the final investment decision, there will be an option envisaged for the capacity of the Interconnection with Greece to be increased from the initial 3 bcm/y to 5.5 bcm/y and to reach 10 bcm/y at the next stage if the companies have economic interest. During the first market test of IGB (joint investment company with Bulgarian Energy Holding EAD shareholding 50% and IGI Poseidon S.A. - 50%) 9 non-binding offers were submitted for about 4.3 bcm/y in total for natural gas transmission from Greece to Bulgaria and approximately 1 bcm/y for firm reverse transmission in Bulgaria-Greece direction. Bulgarian private gas distribution companies, the Romanian company OMV Petrom, Azerbaijan oil company SOCAR (which took part in the development of Shah Deniz 2) etc. where amongst the companies which submitted nomination. Binding offers from 5 companies have been submitted and capacity of 1.57 bcm/y has been booked out of 2.7 bcm/y as announced in the second phase. Pursuant to the procedure the market test ends with the signature of agreements for preliminary capacity booking by the participants who have submitted offers following the approval of the respective allocation of the national regulatory authorities of Greece and Bulgaria. The European Commission has announced the IGB for a project of common interest (PCI) for the European Union. The construction will begin in the beginning of 2018 and it will connect the gas corridor North-South with the South Gas Corridor but no earlier than the end of 2019.

**ITG** - Interconnection Turkey-Greece is in operation as of November has a transport capacity of about 11.5 bcm/y.

**IGI** - Interconnection Greece-Italy – project for ground part of the gas pipeline with possibility to supply approximately 12 bcm/y, which will be realized by DESFA.

**IGI Poseidon** – offshore section of ITGI through Ionian Sea to connect the gas transmission systems of Greece and Italy where Edison and DEPA S.A. are equal partners. On 24 February, 2016 in Rome, Gazprom, DEPA S.A. and Edison SpA signed a Memorandum of Understanding (MoU) in the field of natural gas supply through Black Sea from Russia through third countries to Greece and from Greece to Italy via the south route to supply Russian gas for Europe. The agreement reflects the interest of the countries in this route and they commit to benefit as much as possible from the work carried out by Edison and DEPA within the ITGI Poseidon project.
The future of ITGI remained unclear after the investment decision on the selection of the project – Trans Adriatic gas pipeline (TAP).

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

Plans for TAP extension to the northwest are developed – the Ionian-Adriatic Gas Pipeline (IAP) to supply gas to Albania, Montenegro, Sothern Croatia, Bosnia and Herzegovina whereas the TAP consortium has signed a Memorandum of Understanding and cooperation with the TSOs of the respective countries - (BH-gas, Plinacro and Geoplin Plinovodi), and the Energy Ministries of Albania, Bosnia and Herzegovina, Croatia and Montenegro. Further political support for the construction of this branch TAP – IAP dates from May, 2013 when the governments of Albania, Bosnia and Herzegovina, Croatia and Montenegro signed a MOU in support of the two gas pipelines. In August 2016 the Parties signed a MOU with Azerbaijan State Oil and Gas Company SOCAR to build IAP. In February 2017, Montenegro and Albania received a joint grant to the amount of EUR 2.5 mln by the Western Balkans Investment Framework (WBIF) for conceptual design of the project. IAP implementation has been scheduled to begin in the second quarter of the year.

Both the existing gas pipeline between Bulgaria and Greece which in compliance with the requirements of Regulation (EC) 994/2010 as of January 1, 2014 provides the possibility (firm capacity) for gas transmission towards Bulgaria and the future Interconnector Greece-Bulgaria (IGB) are of key significance to the gas supplies from Shah Deniz gas field to Bulgaria, considering the intentions for connection between TEP and IGB near the town of
Komotini, Greece. In 2013 the public supplier Bulgargaz EAD and Consortium Shah Deniz signed a preliminary supply contract for 1 bcm/y for a term of 25 years and the first gas to Bulgaria is to supplied at the end of 2019, at the earliest. The contract comes into force after the final investment decision on the second stage of development of the Shah Deniz II field in the Caspian Sea signed on 17th December, 2013.

Planned gas transmission infrastructure connecting Europe with Shah Deniz II.
Source BP

2.2 Turkey

Consumption in Turkey in 2015 amounts to 43.6 bcm and it is expected to reach 59 bcm by 2020. BOTAS plans to increase the daily capacity of the Turkish gas transmission system in the next years to above 350 mcm/d (200 mcm/d currently).

Natural gas is 37.8% of total energy production in the country in 2015 with the main consumer being electricity generators and industrial and household consumers each having a share of above 20%. Demand is expected to continue to increase in future, as Turkey plans to develop more gas fired power plants. Household and industrial consumption are also expected to increase along with the construction of more distribution gas pipelines and expansion of the existing distribution networks following privatization of the distribution companies.

Turkey produces small amounts of natural gas, covering an insignificant part of the domestic consumption (about 1% in 2015). The country imports natural gas mostly from the Russian Federation through two routes – Trans Balkan Gas Pipeline and through Blue Stream. However, the share of Russian imported gas has been declining in recent years, as Turkey diversifies its gas supply by importing from Iran and Azerbaijan, also by LNG mostly from Algeria and Nigeria.

BOTAS has concluded long-term natural gas supply contracts as follows:
Algeria (LNG) – 4.4 bcm/y with a deadline by October 2024;
Nigeria (LNG) – 1.3 bcm/y with a deadline by October 2021;
Iran – 9.6 bcm/y with a deadline by July 2026;
Russian Federation (Black Sea) – 16 bcm/y with a deadline by the end of 2025;
Russian Federation (West Route) – 4 bcm/y with a deadline by the end of 2021;
Azerbaijan (Phase I) – 6.0 bcm/y with a deadline by April 2021;
Azerbaijan (Phase II) – 6.0 bcm/y as of 2018 with a deadline to 2033;
Azerbaijan – 0.15 bcm/y with a deadline to 2046.

Natural gas export from Russia to Turkey in 2015 reached 55.3% of the total natural gas imports in Turkey (48.4 bcm), from Iran (16.2%), Azerbaijan (12.7%), Algeria (8.1% through LNG), Nigeria (2.6% through LNG), and of LNG Spot market and other sources (5.1%).

The existing gas infrastructure in the country is with cross-border capacity for import of 53 bcm/y. In 2015 the imported natural gas quantities through gas pipelines represents 39.7% and are allocated as follows: 5.3 bcm/y from Azerbaijan, 7.8 bcm/y from Iran, 15.2 bcm/y from Blue Stream, 11.4 bcm/y from Russia through Bulgaria and approximately 7.5 bcm/y from LNG, (3.8 bcm/y from Algeria, 1.7 bcm/y from Qatar and 1.5 bcm/y from Nigeria etc.).

Turkey is one of the countries receiving LNG and from the Cheniere Energy - Sabine Pass in Louisiana. This would be sufficient to cover demand levels until 2018.

To compensate the ever-growing natural gas demand Turkey will rely on the construction of the Trans-Anatolian Gas Pipeline (TANAP) that is to transport gas from the Azeri field Shah Deniz II from the Georgian-Turkish border to the western Turkish border (1850 km, DN 1200). The first stage capacity is 16 bcm/y of which 10 bcm will be transit transported to the European market and 6 bcm are to cover the Turkish domestic consumption. The project is expected to be developed by the stage capacity increase up to 23 bcm/y by 2023, 31 bcm/y by 2026, reaching 60 bcm/y in its last stage. TANAP shareholding is 58% - the state oil and gas company of Azerbaijan (SOCAR), 30% - BOTAS and 12% - British Petroleum. In January, 2016 the TANAP consortium determined the makeup of the joint venture to build the section on the territory of the Turkish region Eskisehir to the Greek border, and in the end of 2016 the World Bank approved a grant to the amount of USD 800 mln and the companies engaged with the project implementation – Azerbaijan Southern Gas Corridor (SGC) and the Turkish company BOTAS in the beginning 2017 received respectively USD 400 mln for the realization of TANAP.

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

Following the statements made at political level by Russia on suspension of the project South Stream, on December 1, 2014 OAO Gazprom and the Turkish company BOTAS signed a Memorandum of Understanding on the possibility of construction of a new sea gas pipeline - Turkish Stream. In December 2016 Turkey and Russia signed the Act ratifying the Agreement on the construction of Turkish Stream gas pipeline. In February 2017 Russia officially ratified the Agreement which was approved beforehand by the Russian Parliament and the Council of the Federation. From Turkish side all required permits have been issued and there is readiness to start work on the project. The design capacity of the gas pipeline is 31.5 bcm/y. The route passes through the Black Sea aquaria from Russia to receipt terminal on the Turkish shore and initially it will consist of two gas pipelines, each having a capacity of 15.75 bcm/y for which the company South Stream Transport B.V. (100% owned by Gazprom) has construction contracts concluded with the Swiss Allseas Group. An option for the sea section has been envisaged to be expanded to four pipelines and to reach the maximum design capacity of 63 bcm/y. Under discussions are also options where branches of Turkish Stream can be build towards Bulgaria and Greece. The offshore section
construction is scheduled to begin within few months and the gas pipeline to be commissioned in the end of 2019.

Recently Russia expressed its readiness to review each project and excluded none of the routes which will have economic benefit for future natural gas supplies to EU countries.

In the event that the other new projects planned are implemented (e.g. a new gas pipeline from Iraq (10 bcm/y), the Southern Gas Corridor projects and the new LNG terminal on the South coast (10 bcm/y), Turkey will play more significant role not only as a transit country of Caspian gas but also as a supplying country and/or a transporter of additional natural gas quantities to the neighbouring countries in Europe due to its favourable geographic location since it is closely situated to above 70% of the world’s proven gas reserves. In case of continuously rising natural gas consumption, in the near future Turkey will need about 6.0-7.0 bcm active gas to be stored in underground gas storage facilities. In this regard, Turkey is implementing an ambitious program of expansion of existing storage facilities and construction of new ones on its territory. Together with the two constructed and operating LNG terminals (Marmara Ereglisi with an annual capacity of 8.2 bcm and 18 mcm daily capacity and Aliiaga with an annual capacity of 6 bcm and 16.5 mcm daily capacity), respectively with gas storage capacity – 172.2 and 156.8 mcm. The daily capacity of Marmara Ereglisi is envisaged in the next three years to reach up to 27 mcm. Currently the total daily capacity of both terminal amounts to about 34.5 mcm and efforts will be made for considerably increasing it of up to 43.5 mcm in the period by 2019.

In the end of 2016 turkey announced the first floating LNG re-gasification terminal ETKI (LNG) located close to Izmir and developed jointly with the French company ENGIE. The design capacity of facility is 5 bcm/y, 14 mcm/d and possibility to store 143 mcm natural gas. It is expected to support the LNG supplies mainly during the winter months.

Two gas storages operate on the territory of the country - Sultanhani (Aksaray) and Silivri (Marmara), respectively with capacity 1.5 and 2.66 bcm, and the total volume of active gas that can be stored in Turkey is currently about 4.5 bcm. Moreover, Turkey is constructing 3 new gas storage facilities Tuz Golu 1 UGS in salt cavern – 960 mcm, Tuz Golu 2 UGS in salt caverns – 2 040 bcm, Tarsus UGS– 1 bcm. The first stage of Tuz Golu UGS is envisaged to be completed by the end of 2017 with capacity of 20 mcm/d, and following the completion of the second phase in 2019 the daily capacity will reach up to 40 mcm.

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

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

In addition to the above, there is further potential for expansion of the interconnectivity between Bulgaria and Turkey, and MoU has been signed in March 2014 between the Ministry of Energy of the Republic of Bulgaria and the Energy and Natural Resources Ministry of Turkey. According to a preliminary evaluation, the economically feasible amount of additional capacity is within 3 bcm/y. The realization of this project would contribute significantly to the economic growth of both countries, as Turkey is an important transit hub in gas
transportation from the Caspian region, Central Asia and the Middle East.

2.3 Romania

Romania is characterized by well-developed gas infrastructure, high level of development of the distribution networks and underground natural gas storage facilities. It is distinguished by its gas industry with long-established traditions and significant domestic production (over 85% of the consumption) and 8 gas storages: Tirgu-Mures – with volume of active gas 300 mcm, Nades-Prod-Seleus – 50 mcm, Sarmase – 950 mcm, Cetatea de Balta –100 mcm, Biliuresti – 1.31 bcm, Urziceni –360 mcm, Ghercesti – 150 mcm and Balanceanca – 50 mcm. An expansion of Tirgu-Mures Nades-Prod-Seleus has been planned. Romania has gas storages with natural gas storage volume of more than 3 bcm active gas. Roman-Margineni Gas Storage is in project phase.

Nine cross-border gas pipelines pass through the territory of Romania - 5 with Ukraine, 3 with Bulgaria and 1 with Hungary, 6 of them being cross-border entry points and 3 exit points. The available import capacity at the Romanian gas transmission system amounts to 14.37 bcm/y. currently limited natural gas quantities can be exported through the interconnections Hungary-Romania and Romania-Moldova and towards Bulgaria following the complete construction of the IBR infrastructure. The Romanian part of the Trans Balkan Gas Pipeline through which Russia exports natural gas through Ukraine towards Romania and respectively towards Bulgaria, Greece and Turkey consists of three lines with total capacity of 25.18 bcm/y (Transit 1, Transit 2 and Transit 3) and Transit 2 and Transit 3 are connected with joint technological connections and operate in unified gas transport regime. In September 2016 a MoU within the CESEC initiative was signed between DESFA S.A., Bulgartransgaz EAD, NGTC TRANSGAZ S.A. and PJSC Ukratransgaz for bi-directional natural gas transmission.

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

The field "Neptune" in the Black Sea, being developed by the Romanian company OMV Petrom (a subsidiary of OMV Austria) and the American company ExxonMobil is in an advanced process of study. According to data from the initial drilling "Domino"-1, the field reserves have been estimated within the range of 42 to 84 bcm, with expected annual production levels of 6.5 bcm. In 2018 Romania plans to begin natural gas production from the Black Sea Shelf which according to preliminary studies shall ensure the energy independence of the country for at least ten years. Possibilities the quantities to be sold on the market in Central Europe and Turkey are also under consideration.

The balance of demand is met by imports of Russian gas based on long-term contracts with Gazprom. The import of natural gas from Russia is about 10% of total consumption in the country.

Over the past ten years demand declined from 18 bcm/y in 2006 to only 10.3 bcm/y in 2015. According to the forecasts of natural gas demand in Romania, published in the Regional Investment Plan "Southern Corridor" 2014-2023, it is expected to remain within the limits of up to 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 the Romanian TSO Transgaz S.A. Ten-Year Network Development Plan) are planned. Its implementation will provide a route for natural gas transmission from the deposits in the Black Sea, through the territory of Romania and Hungary to Baumgarten hub in Austria, and reversibility of the Interconnection of Romania with Hungary.

The project is part of the concept for coordinated development of the gas transmission networks of Bulgaria, Romania and Hungary (transmission corridor Bulgaria-Romania-Hungary-Austria - BRUA) for bi-directional natural gas transmission between the countries from sources of the Southern Gas Corridor and the deposits in the Black Sea, and transmission of Central European gas to South Eastern Europe. The existing part of this corridor is the new Interconnection Ruse-Giurgiu which was commissioned in the end of 2016 and the first natural gas quantities from Bulgaria were transported in January 2017. As part of BRUA different activities are to be carried out on Romanian territory including the construction of a new compressor station in the region of Podisor which aims to reach the working pressure of the Bulgarian gas transmission network and to ensure the required technical parameters for operation in optimal levels of the constructed IGB in direction towards Bulgaria. The project is in compliance with the requirements of the European Energy Union and the European Energy Strategy for interconnection of gas transmission systems between countries from the region.

The gas infrastructure development plans in Romania for the next years provide for full utilization of the capacity of the existing interconnector with Hungary (4 bcm/y), the LNG project AGRI (Azerbaijan - Georgia - Romania) with capacity of 7 bcm/y (2 bcm of which are provided for Romania), also the possibilities for LNG supply will be envisaged upon the construction of the planned LNG terminals with Greece and Croatia, the gas pipeline Eastring – transport corridor through the territory of Slovakia, Hungary, Romania and Bulgaria as well as the project White Stream – a branch of the South Caucasian gas pipeline for supplies directly across the Black Sea from Georgia.

### 2.4 Macedonia

The natural gas market in Macedonia is in the process of development and only the northern part of the country was gasified. Currently the only Interconnection of Macedonia is with Bulgartransgaz EAD gas transmission network for transit transmission with design capacity of 1 bcm/y delivering at present Russian natural gas for the needs of the country. Gas transmission is carried out by GA-MA AD, a shareholding company with two shareholders each holding 50% - the Macedonian state and the Macedonian company Makpetrol AD.

GA-MA AD has entered into long-term contract with ООО Gazprom Export with a possibility for natural gas supply of up to 800 cu m/y by 2030. The existing Macedonian gas infrastructure has a capacity of 800 mcm/y, under-utilized, with only about 18% load factor of the gas pipeline. It is planned to be expanded to 1.2 bcm/y. Natural gas consumption has been increasing gradually over the last years but remains still at a low level, reaching a 140 mcm/y at the end of 2015, whereas a material rise in consumption is expected. Natural gas is mostly used in industries (as final consumption) and by the district heating companies (heat production). Currently there is no constructed gas distribution network in Macedonia.

The Ministry of Economy of Macedonia estimated that natural gas consumption will increase significantly over the next few years after the construction and run into operation of new combined heat and power plants (CHP) in the country. Increase of gas consumption by households in the country was foretasted as well. Forecasts indicate that natural gas demand for the period by 2020 could in the most optimistic estimates reach about 1 bcm/y. Within
the framework of the CESEC initiative a project in a conceptual stage has been offered for interconnection between the existing gas transmission systems of Macedonia, Bulgaria and Greece. Another potential project, crossing the territory of Macedonia is TESLA, which at a conceptual phase envisages natural gas transport along Greece – Macedonia – Serbia– Hungary – Austria.

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

2.5 Serbia

Natural gas consumption in Serbia in 2015 amounts to 2.87 bcm/y, a growth of 18% compared to 2014. Industrial consumers account for 63% of the total consumption, followed by households (20%) and district heating companies (17%).

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

Natural gas supplies to Serbia are carried out through Hungary and Ukraine by import from Russia mostly which amounted to over 80% 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 by 2021. By virtue of the Intergovernmental Agreement of March 2013, ООО Gazprom Export and YugoRosGaz (50% Gazprom shareholding and shareholders JP Srbijagas - 25% and Central ME Energy & Gas AG - 25%), signed a contract for natural gas supply to Serbia by the end of 2021 in line with which 1.68 bcm were supplied in 2015.

To ensure enough natural gas quantities Serbia plans to expand the existing underground storage Banatski Dvor from 450 mcm to 1.2 bcm/y which will cover almost half of the annual consumption in the country. Currently the maximum daily production totals to 5 mcm/d. If this project is realized together with the Russian partners from Gazprom who own the control package of shares of the company Banatski Dvor (51% Gazprom and 49% JP Srbijagas), Serbia shall be able to compensate a possible natural gas shortage in the period by the end of 2019. The state gas company JP Srbijagas discusses the possibility as well to book additional natural gas quantities from gas storage facilities in Hungary. Serbia is interested in other alternatives for diversification of the supply sources and routes by new interconnections with the neighbouring gas markets and the project for a new LNG terminal in Croatia as well.

A significant project in this regard is the planned Interconnector Bulgaria-Serbia (IBS), which was announced by the EC for a PCI of the EU. In January 2017 a Memorandum of Understanding has been signed by the Energy Ministers of the two countries. The performance of the first project stage of the Bulgarian section was completed at the end of December 2015 with funds under the Operational Programme „Development of the competitiveness of the Bulgarian economy in 2007-2013“. Financing is envisaged for the second stage amounting to EUR 45 million under a procedure involving direct grants under Operational Programme „Innovations and competitiveness in 2014-2020“. Beneficiary in line with the programme is the Bulgarian Ministry of Energy. An important progress has also been achieved by the Serbian side in terms of securing the financing. Talks with the EC on the required funds under the EU pre-accession instruments are to be finalized.

The interconnection is expected to be completed and put into commission by the end of 2020.
In the medium term Bulgartransgaz EAD gas transmission system is expected to be able to provide the capacity and ability to deliver these alternative quantities upon realization of the other planned interconnections and international gas pipeline projects in the region.

2.6 Conclusions

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

The country has to date one main source of supply – the Russian Federation, which determines the high dependency on the Russian gas supply, and domestic production is minor. The availability of only one route of import of natural gas from Russia through Ukraine, Moldova and Romania influences negatively the security of supply to the country.

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

The realization of the project for a gas distribution hub in Bulgaria - gas hub Balkan, which was supported and approved by the EC will materially influence the gas market. In November 2016 a Memorandum of Understanding was further signed by Bulgartransgaz EAD and the Slovak gas operator Eustream, which addresses the possibility for a coordinated development of the project for the gas hub Balkan in line with the Eastring project. The document reflects the intentions of the two countries for a synchronized work on the two projects with a view of guaranteeing the security of supply in the region of Central and South-East Europe. Support is envisaged for the inclusion in the projects development process of other stakeholders. An important pre-condition for the realization of the gas distribution hub will also be the expansion of Chiren UGS, which is underway. Natural gas storage is the subject of a Memorandum of Understanding between SOCAR, Azerbaijan and Bulgartransgaz EAD signed in September 2014.

Bulgaria invested intensely over the last years in the rehabilitation, modernization and the increase in capacity of the existing gas infrastructure and will strive to be used in a maximum degree. All activities relating the development of the gas transmission system will continue over the period of this TYNDP as well.

Within the concept of increasing the energy security of EU, an improvement of the LNG supply to third countries is set out by building the infrastructure and ensuring domestic markets with an access to the global LNG market. Currently, the annual import capacity of the LNG terminals in Europe amounts to 208.96 bcm and is not completely filled up. Expanding the existing facilities with 76.85 bcm and the construction of new ones has been planned. Now the load level of receiving LNG terminals in Europe is about 30-40%. On the European market liquefied natural gas comes mainly from Algeria, Qatar, Oman, Yemen, Libya, Nigeria, Egypt, Trinidad and Tobago etc, and the last years have seen an expansion by the USA as well.

The measures of the European Commission in the so called "winter package" also envisage incentivizing and more efficient use of the existing gas storages by introducing better operation and optimization rules for the natural gas cross-border transmission. The data for 2015 shows that Europe has a storage capacity of about 146 bcm active gas.
According to data of the EC a slight decrease in natural gas demand in Europe is expected in the period by 2030 related to the EU 2030 energy and climate targets, while the rate of decrease in the domestic production will be higher. This determines the need of new sources of supply, which is an additional argument for the construction of new large infrastructure projects and terminals for liquid natural gas. The construction of new infrastructure is a necessary condition to decrease the dependency on one source and one route and to guarantee the security of supply, increase on market integration and the competitiveness.

The chart below shows data on the consumption, domestic production and sources of supply to Europe for the period 2005 - 2015 and an outlook for the same for the period 2015-2050:

Source: EC’s presentation and Eurostat

ENTSOG TYNDP for 2017-2026 includes a total of 234 projects, where the share of LNG projects is 13% (25 projects in total, 5 of which have final investment decision), 8% goes to natural gas storage facilities (28 projects in total, 3 of which have final investment decision) and 79% for gas infrastructure projects (186 projects in total, 26 of which have final investment decision).

Of all 234 projects, 101 are determined by the EC as PCIs, of which only 10 have final investment decision. The structural distribution is the following: LNG projects – 8, gas storage facilities – 6 and gas infrastructure projects – 87. The EC is to adopt a Third list of PCIs in 2018.

The second EC’s report on the status of the energy union published in February 2017 states that Europe is moving closer and closer to achieving the objectives set for the period by 2020 in terms of greenhouse gas emissions, the energy efficiency and the renewables.
The realization in the next years of PCIs in the power and natural gas sectors will have priority, and funds in the amount of 5.35 billion euros under the CEF are expected to be invested therein.

The implementation of the planned infrastructure projects in the country and the region will result in stable integration of the gas market and ensure the connectivity with the gas hubs in Central and Eastern Europe and will facilitate the access to sources from the Southern Gas Corridor. Favourable conditions for diversification will be created thus reducing the energy dependence.
1. NATURAL GAS TRANSMISSION COVERING CONSUMPTION IN BULGARIA

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

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

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

In 2016 the natural gas quantities transported along the gas transmission network for the country amount to 3 387 mcm (including the quantities transported for injection in UGS Chiren), amounting to an increase compared to the previous 2015 (3 256 mcm), as a result of the increased consumption.

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

![Natural gas quantities transported in 2007-2016, including for clients and for injection in Chiren UGS](image)

The natural gas quantities indicated as delivered in the country from import and local production (3 069 mcm) and respectively the actually transported natural gas quantities (3 387 mcm) differ due to the fact that the transmission activity also includes:
1. Quantities transported for injection in UGS Chiren;
2. Difference between the injected and withdrawn quantities in UGS Chiren;
3. Difference in the natural gas quantity under pressure in the gas transmission system (linepack);
4. Technological losses, technological differences in the class of accuracy of the metering devices, etc.

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

2. NATURAL GAS TRANSIT TRANSMISSION

Compressor station Lozenets

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

The transported quantities meet 100% of consumption in Macedonia, about 70% of consumption in Greece and about 35% - 40% of consumption in Turkey.

The transited natural gas quantities in 2016 were 14.62 bcm or 8.2% more compared to 2015 (13.51 bcm). The maximum technical capacity for natural gas transit transmission to all three directions amounted to 17.8 bcm and to the respective countries was as follows: Turkey 14 bcm/y; Greece 3 bcm/y; Macedonia 0.8 bcm/y.

Transit transmission through the territory of Bulgaria for the period 2007-2016 is shown in
The percentage distribution of cross-border transmission in 2016 by countries was:
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 23 exploitation wells, a compressor station with 10 MW total installed capacity and other technological facilities necessary for ensuring injection, withdrawal and quality of the natural gas stored. The natural gas quantities stored in Chiren UGS cover mainly the seasonal fluctuations in domestic consumption and in the cases of changed contracted natural gas supplies. Currently under maximum filling, Chiren UGS is able to cover about 25-30% of the daily needs during the cold winter months. The injected/withdrawn natural gas quantities in/from the gas storage depend on the market conditions and the optimal technical capabilities of Chiren UGS in compliance with the rules for safe operation. Bulgartransgaz EAD and the natural gas companies who have clients with irregular consumption are obliged to maintain a strategic reserve related to the security of supplies and the covering the seasonal fluctuation.

319 mcm were injected in 2016 and 342 mcm were produced. Information on injection and withdrawal in months is given in the below table.
## Withdrawn and injected natural gas quantities in 2015 and 2016, in mcm

<table>
<thead>
<tr>
<th></th>
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<tbody>
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<td>January</td>
<td>80</td>
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<td>-</td>
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<tr>
<td>February</td>
<td>73</td>
<td>83</td>
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<td>March</td>
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<td>10</td>
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<td>September</td>
<td>-</td>
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<td>October</td>
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<td>58</td>
<td>25</td>
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<tr>
<td>November</td>
<td>10</td>
<td>21</td>
<td>2</td>
<td>-</td>
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<tr>
<td>December</td>
<td>52</td>
<td>57</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>291</strong></td>
<td><strong>342</strong></td>
<td><strong>295</strong></td>
<td><strong>319</strong></td>
</tr>
</tbody>
</table>
CAPACITIES DEMAND SCENARIOS AND SOURCES TO COVER DEMAND IN THE COUNTRY

1. NATURAL GAS DEMAND

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

The relationship between the final and primary energy consumption (FEC and PEC) and the GDP growth for past periods have been analysed as well.\(^1\)

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\(^2\) are the following:

- Sustainable economic growth of GDP - between 2 and 3% annually;
- FEC/PEC ratio reaches up to and above 60% in 2024;
- The share of natural gas in PEC in 2025 reaches 19%, compared to 14% in 2015.

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

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2. SUPPLY SOURCES COVERING DEMAND IN THE COUNTRY

In 2016 natural gas demand has been satisfied as follows:

- Imports from the Russian Federation – 2,910 mcm (97.4%);
- Local production – 72 mcm (2.3%).

The forecast for the sources covering demand for the period 2017-2021 is presented in the diagram below:

2.1 Import

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

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

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

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

2.2 Domestic production

In the following 2 years the domestic production is expected to remain at the levels of about 75 – 80 mcm as a result of the partial depletion of the existing fields. The forecast for domestic production growth after 2019 is based on the expected increase of natural gas consumption in the country and the region, and the large number of new concessions for exploration of gas fields, as the expectation for significant deposits is focused in particular on the gas fields in the region of the Black Sea.

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

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

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3 The information on local production comes from the website of Petroceltic International Plc, and according to internal company documents and correspondence of Bulgartransgaz EAD with stakeholders, including with Exploration and Production of Oil and Gas AD.
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 creating new capacities available and cross-border entry and exit points, including from the projects ITB, IGB, IBS and IBR. The forecast is shown in the following chart:
SECURITY OF SUPPLY

The calculation of the N-1 standard has been prepared for the period 2017-2021 according to Art. 9 of Regulation (EU) No 994/2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC of the Council (the Regulation):

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

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

Two basic scenarios for fulfilment of the standard for infrastructure have been developed - basic (including the existing and forthcoming to be run into operation by 1.01.2017 infrastructure) and a basic assessment of the expected domestic production levels (based on the capacity of gas fields in operation in 2017) and target (considering the PCIs planed for construction and commissioning within the calculation period under Regulation No 347/2013 of the European Parliament and of the Council on guidelines for trans-European energy infrastructure and of other projects) and the optimistic assessment of the expected domestic production levels (based on issued exploration and production concessions).

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

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

Where:

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>EP&lt;sub&gt;1&lt;/sub&gt;</td>
<td>Technical capacity of GMS Negru Voda 1, mcm/d</td>
</tr>
<tr>
<td>EP&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Technical capacity for import through Interconnector Bulgaria-Serbia, mcm/d</td>
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<tr>
<td>EP&lt;sub&gt;3&lt;/sub&gt;</td>
<td>Technical capacity for transfer from the gas transmission network for transit transmission - GMS Ihtiman, including from Kulata/Sidirokastro, mcm/d</td>
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<tr>
<td>EP&lt;sub&gt;4&lt;/sub&gt;</td>
<td>Technical capacity for import through Interconnector Turkey-Bulgaria, mcm/d</td>
</tr>
<tr>
<td>EP&lt;sub&gt;5&lt;/sub&gt;</td>
<td>Technical capacity for import through Interconnector Bulgaria-Romania, mcm/d</td>
</tr>
<tr>
<td>EP&lt;sub&gt;6&lt;/sub&gt;</td>
<td>Technical capacity for import through Interconnector Greece-Bulgaria, mcm/d</td>
</tr>
<tr>
<td>S&lt;sub&gt;max&lt;/sub&gt;</td>
<td>Withdrawal from UGS Chiren – the maximum possible, mcm/d</td>
</tr>
<tr>
<td>P&lt;sub&gt;max&lt;/sub&gt;</td>
<td>National gas production – the maximal possible production, mcm/d</td>
</tr>
<tr>
<td>D&lt;sub&gt;max&lt;/sub&gt;</td>
<td>National consumption – peak consumption, mcm/d</td>
</tr>
<tr>
<td>I&lt;sub&gt;max&lt;/sub&gt;</td>
<td>The single largest gas infrastructure - GMS Negru Voda 1 mcm/d</td>
</tr>
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</table>
The results of the N-1 formula for the basic scenario for the next five years are as follows:

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</thead>
<tbody>
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<td>0,0</td>
<td>3,08</td>
<td>0,0</td>
<td>0,15</td>
<td>0,0</td>
<td>16,7</td>
<td>20,27</td>
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<tr>
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<td>0,22</td>
<td>5,0</td>
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<td>0,0</td>
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<td>0,0</td>
<td>17,2</td>
<td>20,27</td>
<td>49,2</td>
</tr>
<tr>
<td>2019</td>
<td>0,55</td>
<td>5,0</td>
<td>0,0</td>
<td>3,08</td>
<td>0,0</td>
<td>0,15</td>
<td>0,0</td>
<td>18,2</td>
<td>20,27</td>
<td>48,2</td>
</tr>
<tr>
<td>2020</td>
<td>0,82</td>
<td>5,0</td>
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<td>3,08</td>
<td>0,0</td>
<td>1,37</td>
<td>0,0</td>
<td>19,3</td>
<td>20,27</td>
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<tr>
<td>2021</td>
<td>1,10</td>
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<td>6,00</td>
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<td>1,37</td>
<td>0,0</td>
<td>20,3</td>
<td>20,27</td>
<td>66,4</td>
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</table>

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

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<tbody>
<tr>
<td>2017</td>
<td>0,21</td>
<td>5,0</td>
<td>0,0</td>
<td>3,08</td>
<td>0,0</td>
<td>0,15</td>
<td>0,0</td>
<td>16,7</td>
<td>20,27</td>
<td>50,7</td>
</tr>
<tr>
<td>2018</td>
<td>0,22</td>
<td>5,0</td>
<td>0,0</td>
<td>3,08</td>
<td>0,0</td>
<td>0,15</td>
<td>0,0</td>
<td>17,2</td>
<td>20,27</td>
<td>49,2</td>
</tr>
<tr>
<td>2019</td>
<td>0,55</td>
<td>5,0</td>
<td>0,0</td>
<td>3,08</td>
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<td>0,15</td>
<td>0,0</td>
<td>18,2</td>
<td>20,27</td>
<td>48,2</td>
</tr>
<tr>
<td>2020</td>
<td>0,82</td>
<td>5,0</td>
<td>0,0</td>
<td>3,08</td>
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<td>0,0</td>
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<td>20,27</td>
<td>100,6</td>
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<tr>
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<td>9,1</td>
<td>1,37</td>
<td>9,1</td>
<td>20,3</td>
<td>20,27</td>
<td>183,1</td>
</tr>
</tbody>
</table>
The calculations made by the formula N-1 for the infrastructure standard for the basic scenario show that in case of disruption of the single largest gas infrastructure (from Russia through Ukraine), the capacity of the existing infrastructure shall not be able to deliver the necessary gas quantities to satisfy the overall demand on the territory of the Republic of Bulgaria for a day of exceptionally high natural gas demand.

Also, in case of implementation of the projects "of common interest", Bulgaria will fulfil the infrastructure standard by the end of 2019.

Several major projects have been planned in order to fulfil the infrastructure standard, namely – a project for the modernization, rehabilitation and expansion of the existing gas transmission infrastructure (including the modernization of compressor stations) and projects for gas interconnections construction with the neighbouring countries and connections between the NGTN and the GTNTT and the project for the expansion of Chiren UGS and/or for a new gas storage facility.
The national combined gas operator Bulgartransgaz EAD bears the responsibility for the security, reliability, development and free access to the national gas infrastructure - the transmission network for natural gas transportation to customers in the country, the underground natural gas storage and the transmission network which is primarily designated for natural gas transit transmission through the territory of the Republic of Bulgaria. Gas infrastructure status and development are essential prerequisites for the development and liberalization of the domestic gas market. In addition, in its capacity of a combined gas operator in a member-state of the EU, Bulgartransgaz EAD has also obligations under the energy legislation to integrate the national gas transmission system with the regional and the European one in order to create a single, competitive, common European gas market.

The supply and demand analysis, the risk assessment, the requirements of the European energy legislation and the obligations of the combined gas operator to the public, determine the necessary investments planned to be made in the period 2017-2026.

The investments provided for the period 2017 - 2026 will contribute to achieving the following key objectives:

1. Increase and guarantee of the technical security, safety and reliability of the gas infrastructure and compliance with the requirements for environmental protection with regard to the expected increasing gas demand in the country and the region by means of:
   - Investments for reconstruction, rehabilitations and overhauls of the transmission
networks including investments in the existing compressor stations, linear infrastructure and gas regulation and metering stations, and in UGS Chiren;
- Investments for construction of new facilities to the existing infrastructure necessary to enhance the efficiency of operation;
- Investments in ancillary infrastructure, including the fibre optic network.

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

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

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

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

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

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

This chapter of the Plan constitutes structured information about the basic infrastructure planned for construction, expansion, reconstruction and modernization during the next ten years and covers the period 2017 - 2026.

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:

- Investments on which decision for implementation in the period 2017 - 2019 has already been taken - Projects for development of the gas transmission and storage infrastructure with investment decision already taken - Table 1;
 Investments which implementation depends on the development of international projects implemented on the territory of the country - investments for development of the gas transmission and storage infrastructure depending on the development of international projects and third parties projects in the period 2017 – 2026 – Table 2;

 Projects for development of the gas transmission and storage infrastructure in the period 2017 - 2026 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 2017 - 2019 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 2017 - 2019, are presented in consolidated form in Table 1. Implementation of some of the projects has commenced before 2016, but work on them will continue also during the period 2017-2019. For such projects only the estimated value of investment during that three-year period is indicated in the Table. The funds specified represent the funding that shall be ensured by Bulgartransgaz EAD.
Table 1

<table>
<thead>
<tr>
<th>Natural gas transmission and storage infrastructure development projects in the period 2017 - 2019 by consolidated projects</th>
<th>Implementation schedule</th>
<th>Estimated value of investment in thousand BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. 2016-2018 RECONSTRUCTIONS, REHABILITATIONS AND OVERHAULS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1. Investments for Compressor stations:</strong></td>
<td></td>
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<tr>
<td><em>1.1. Gas transmission network for transit transmission</em></td>
<td></td>
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<tr>
<td>CS Kardam 2 – own water supply for industrial needs; CS Provadia – warehouse with local cleaning equipment for fresh and wasted oil; CS Kardam – shelter for compressor engines and wooden containers with spare parts; CS Ihtiman – educational and practice centre; Monitoring of the state and execution of repair works of the roofs and cement site for the technological equipment at CS Provadia; Reprogramming of industrial controllers in KPY 0,4/20 at CSs; Retrofitting the fuel systems of 2 GTUs, type THM 1304/11 (CS Kardam and CS Strandja) with low emission fuel chambers and SCS modernization; CS Kardam – emergency diesel generator; Recovery of the anti-corrosion coating of the back-up supply 20 kV at CS Ihtiman – VA Trakya; CS Ihtiman and CS Petrich – repair of buildings; Reconstruction of local lights at CS Ihtiman and CS Petrich</td>
<td>2017-2019</td>
<td>11 626</td>
</tr>
<tr>
<td>Overhauls of gas turbine engines, type ДТ70П, including planned repairs and V3 inspections of GTCUs, type THM 1304</td>
<td>2017-2019</td>
<td>19 501</td>
</tr>
<tr>
<td><em>1.2. National gas transmission network</em></td>
<td></td>
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</tr>
<tr>
<td>Modernization of automatic control system of GCU and station control system of CS Valchi dol and CS Polski Senovets</td>
<td>2017</td>
<td>4 727</td>
</tr>
<tr>
<td>Reconstructions and rehabilitations of CS Polski Senovets and CS Valchi dol</td>
<td>2017-2018</td>
<td>7 660</td>
</tr>
<tr>
<td><strong>2. Investments in existing AGRSs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>2.1. National gas transmission network</em></td>
<td></td>
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</tr>
<tr>
<td>Reconstruction, reorganization and modernization of AGRS, GRS and GMS: AGRS Lovech, GRS Devnya, AGRS Septemvri, GRS Sofia-4 Ivanyane, GRS Isperih, GRS Razgrad, GRS Dobrich, GRS Popovo etc.</td>
<td>2017-2018</td>
<td>3 857</td>
</tr>
<tr>
<td>Modernization and activities for the automatization of GRS and major AGRS overhauls</td>
<td>2017-2019</td>
<td>1 320</td>
</tr>
<tr>
<td><strong>3. UGS Chiren</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Natural gas transmission and storage infrastructure development projects in the period 2017 - 2019 by consolidated projects

<table>
<thead>
<tr>
<th>Description</th>
<th>Implementation schedule</th>
<th>Estimated value of investment in thousand BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction and rehabilitation of wells and surface equipment – 3D field seismic studies; prevention works of the productive area of wells; a project for the modernization of wells telemetric system</td>
<td>2017 - 2019</td>
<td>9,912</td>
</tr>
<tr>
<td>Overhaul, modernization and reconstruction of major technological installations and systems at Chiren UGS – decrease in vibrations of gas motor compressors; replacement of pipings of gas motor compressors closed and open cycle</td>
<td>2017-2018</td>
<td>4,542</td>
</tr>
</tbody>
</table>

**4. National gas transmission network**

<table>
<thead>
<tr>
<th>Description</th>
<th>Implementation schedule</th>
<th>Estimated value of investment in thousand BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery of the operating pressure of the gas pipeline branch Pravets; Replacement of gas pipeline in the section PF Beglej – VA Dermantsi – VA Batultsi – VA Kalugerovo; Reconstruction of gas pipeline branch Vratsa 1, including replacement of sections and construction of receive chamber at Chiren UGS by displacement of the existing chamber at GRS Vratsa; Increase of the capacity of gas pipeline branch Targovishte</td>
<td>2017-2019</td>
<td>66,867</td>
</tr>
</tbody>
</table>

**5. Transit gas pipelines**

<table>
<thead>
<tr>
<th>Description</th>
<th>Implementation schedule</th>
<th>Estimated value of investment in thousand BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction of protection equipment and overhaul of PF Stryama</td>
<td>2017-2018</td>
<td>2,642</td>
</tr>
</tbody>
</table>

**II. INVESTMENTS FOR CONSTRUCTION OF NEW FACILITIES TO THE EXISTING INFRASTRUCTURE NECESSARY TO ENHANCE THE EFFICIENCY OF OPERATION**

**1. National gas transmission network**

<table>
<thead>
<tr>
<th>Description</th>
<th>Implementation schedule</th>
<th>Estimated value of investment in thousand BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of cleaning facilities (launch-receive chambers) for gas pipeline branches Dimitrovgrad, Burgas, Devnia, Pernik.</td>
<td>2017 – 2019</td>
<td>5,560</td>
</tr>
</tbody>
</table>

**2. Natural gas storage**

<table>
<thead>
<tr>
<th>Description</th>
<th>Implementation schedule</th>
<th>Estimated value of investment in thousand BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of new well and gas gathering</td>
<td>2017</td>
<td>691</td>
</tr>
<tr>
<td>Technological parameters control system of 8 gas motor compressors; Design and construction of a system separating formation fluids and the blown gas as a result of the wells gas gathering drainage and the remaining technological equipment of Chiren UGS</td>
<td>2017 – 2019</td>
<td>5,350</td>
</tr>
</tbody>
</table>

**3. Investments in ancillary networks**

---

4 3D field seismic studies are part of PCI 6.20.2 Chiren UGS capacity increase. Grant funds have been approved therefor under the CEF.
Natural gas transmission and storage infrastructure development projects in the period 2017 - 2019 by consolidated projects

<table>
<thead>
<tr>
<th>Implementation schedule</th>
<th>Estimated value of investment in thousand BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT platform implementation in line with the requirements of the Third Energy Package</td>
<td>2017-2019</td>
</tr>
</tbody>
</table>

**III. PROJECTS FOR PROVIDING CAPABILITY FOR CROSS-BORDER CAPACITY INCREASE**

Construction of looping of transit gas pipeline to Turkey in the section CS Lozenets - CF Nedyalsko | 2017-2019 | 38 227 |

**IV. ACCESS OF NEW MUNICIPALITIES AND NEW END USERS TO NATURAL GAS**

1. Investments in projects for expansion of the existing gas transmission networks to new regions of the country

Construction of new gas pipelines with AGRS to Svistov, Panagyurishte and Pirdop and to Bansko and Razlog⁵ | 2017-2019 | 27 012 |

2. Investments for construction of new gas metering and gas regulation stations

Construction of new GMSs and AGRSs - AGRS Ignatievo, GMS Chirpan and purchase of existing assets to develop the gas market | 2017-2019 | 4 707 |

Investments whose 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 2017-2026

<table>
<thead>
<tr>
<th>Investments for natural gas transmission and storage infrastructure in the period 2017 - 2026 by consolidated projects</th>
<th>Implementation schedule</th>
<th>Estimated amount of investment in thousand BGN (VAT excluded)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. PROJECTS FOR PROVIDING OPPORTUNITY FOR DIVERSIFICATION OF GAS SUPPLY SOURCES AND ROUTES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Interconnections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Connection of the Interconnection Greece-Bulgaria (IGB) to the national network</td>
<td>2018-2019</td>
<td>8 160</td>
</tr>
<tr>
<td>1.2 Connection with the national network of the Interconnection Bulgaria-Serbia</td>
<td>2018-2019</td>
<td>3 950</td>
</tr>
</tbody>
</table>

⁵ Co-funding under international fund Kozloduy – Grant 057 has been received for projects implementation
Investments for natural gas transmission and storage infrastructure in the period 2017 - 2026 by consolidated projects

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Implementation Schedule</th>
<th>Estimated Amount of Investment in thousand BGN (VAT excluded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3 Interconnection Turkey – Bulgaria (ITB)⁶</td>
<td>2017-2020</td>
<td>146 657</td>
</tr>
</tbody>
</table>

The financial resources under items 1.1 and 1.2 of Table 2 will be funded by Bulgartransgaz EAD.

Concerning the PCI under item 1.3. - Interconnection Turkey – Bulgaria (ITB) the table shows 50% of the total expected project value. Different forms and financing, including EU’s financial instruments and programmes will be sought to fully fund the project.

3. NATURAL GAS TRANSMISSION AND STORAGE INFRASTRUCTURE DEVELOPMENT PROJECTS IN THE PERIOD 2017 - 2026 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>
<thead>
<tr>
<th>Natural gas transmission and storage infrastructure development projects in the period 2017 - 2026 on which no investment decision has been taken</th>
<th>Forecast implementation period</th>
<th>Estimated amount of investment in thousand BGN (VAT excluded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gas transmission network for natural gas transit transmission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1. Actions aimed at achieving compliance of compressor stations with the requirements of the complex permits – stage 2 – CS Ihtiman, CS Lozenets and CS Petrich⁷</td>
<td>2017-2021</td>
<td>77 932</td>
</tr>
<tr>
<td>1.2. Retrofitting the fuel systems of 4 GTUs at CS Provadia, type THM 1304/11, with low-emission combustion chambers</td>
<td>2018 - 2020</td>
<td>20 000</td>
</tr>
<tr>
<td>2. National gas transmission network</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1. Actions aimed at achieving compliance of compressor station Kardam 1 with the</td>
<td>2018-2019</td>
<td>6 000</td>
</tr>
</tbody>
</table>

₆ ITB is a PCI in the meaning of regulation (EU) 347/2013, included under number 7.4.2 in the Second PCI list

⁷ The activities are part of Phase 2 of PCI Necessary modernization, rehabilitation and expansion of the existing gas transmission infrastructure listed as PCI 6.8.2 in the second PCI List. The value of the activities was confirmed by a pre-investment study with a technical and economic analysis conducted in 2016-2017 which was co-funded under the CEF Programme (Grant No INEA/CEF/ENER/M2015/1119568).
### Natural gas transmission and storage infrastructure development projects in the period 2017 - 2026 on which no investment decision has been taken

<table>
<thead>
<tr>
<th>Requirements of the complex permits - retrofitting gas turbine units with low-emission chambers</th>
<th>Forecast implementation period</th>
<th>Estimated amount of investment in thousand BGN (VAT excluded)</th>
</tr>
</thead>
</table>

2.2. Actions on construction of cleaning facilities /launch and receive traps/ of gas pipeline branches for Pleven and Pazardzhik

| 2017-2019 | 2 010 |

2.3. Overhaul replacement of the section CS Valchi Dol – VS Preselka

| 2017-2020 | 14 600 |

### 3. Total for allocation

3.1. Gas hub Balkan

| 2017 - 2018 | 1 800 |

### 4. Natural gas storage

4.1. Expansion of Chiren UGS capacity

| 2018 - 2024 | 218 261 |

The funds under items 1.2, 2.1 and 2.2 of Table 3 are Bulgartransgaz EAD forecast for the required financing.

The actions under items 1.1 and 2.3 are part of PCI 6.8.2 „Modernization, rehabilitation and expansion of the existing gas transmission infrastructure“, and the table shows 50% of the total estimated value of the actions. Different forms and means of financing, including EU’s financial instruments and programmes will be sought to cover its full cost.

The funds under item 3.1 of Table 3 represent a financing to be secured by Bulgartransgaz EAD for the implementation of the feasibility study for the project for the gas hub Balkan. It represents 50% of the total value of the Action, and financing under the CEF programme has been approved for the other 50%.

Concerning PCI under 4.1. – Chiren UGS capacity expansion, the table shows 50% of project’s total estimated value. Different forms and means of financing, including EU’s financial instruments and programmes will be sought to cover its full cost.

### 4. 2017 – 2026 INVESTMENT PROGRAM

This Section presents Bulgartransgaz EAD Investment Program for the period 2017-2026 divided into the following activities:

- **Investments** - actions aimed at expansion, reconstruction, modernization and overhauls, grouped into three main sections;

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8 The activity is part of Phase 2 of PCI Necessary modernization, rehabilitation and expansion of the existing gas transmission infrastructure listed as PCI 6.8.2 in the second PCI List. The estimated value provided in able 3 of the activity is to be confirmed following the completion of the design of the section. It has been approved to receive a Grant under the CEF Programme.

9 PCI under Regulation (EU) 347/2013 listed under No 6.25.4. in the second PCI List.

10 PCI under Regulation (EU) 347/2013 listed under No 6.20.2. in the second PCI List.
- Construction of new facilities;
- Reconstruction, rehabilitation and overhauls of long-term tangible assets;
- Delivery of machinery and equipment.

### 4.1 Three-year Investment Program (2017-2019) including investment activities on which final investment decision has been taken

in thousand BGN, VAT excluded

<table>
<thead>
<tr>
<th>Program / Section</th>
<th>Total 2017</th>
<th>Total 2018</th>
<th>Total 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL Annual Investment Programme</td>
<td>92 590</td>
<td>122 202</td>
<td>95 619</td>
</tr>
<tr>
<td>SECTION I.1 - Construction of new facilities</td>
<td>47 131</td>
<td>44 307</td>
<td>44 411</td>
</tr>
<tr>
<td>Gas transmission network for transit transmission</td>
<td>30 818</td>
<td>10 363</td>
<td>5 094</td>
</tr>
<tr>
<td>Linear part</td>
<td>29 467</td>
<td>8 528</td>
<td>254</td>
</tr>
<tr>
<td>Compressor stations, administrative and operating regions</td>
<td>25</td>
<td>36</td>
<td>75</td>
</tr>
<tr>
<td>Communication and information systems</td>
<td>1 326</td>
<td>1 799</td>
<td>4 765</td>
</tr>
<tr>
<td>National gas transmission network</td>
<td>11 058</td>
<td>17 927</td>
<td>26 203</td>
</tr>
<tr>
<td>Linear part</td>
<td>2 663</td>
<td>12 239</td>
<td>17 821</td>
</tr>
<tr>
<td>Compressor stations, administrative and operating regions</td>
<td>60</td>
<td>499</td>
<td></td>
</tr>
<tr>
<td>Communication and information systems</td>
<td>6 338</td>
<td>4 299</td>
<td>6 352</td>
</tr>
<tr>
<td>AGRS and GMS</td>
<td>1 998</td>
<td>891</td>
<td>2 030</td>
</tr>
<tr>
<td>Natural gas storage</td>
<td>1 326</td>
<td>3 195</td>
<td>2 000</td>
</tr>
<tr>
<td>Wells and gas gathering</td>
<td>1 171</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main technological installations and systems, operating unit</td>
<td>155</td>
<td>3 195</td>
<td>2 000</td>
</tr>
<tr>
<td>Total for distribution by types of activities</td>
<td>3 929</td>
<td>12 821</td>
<td>11 115</td>
</tr>
<tr>
<td>Linear part</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressor stations, administrative and operating regions</td>
<td>1 394</td>
<td>10 477</td>
<td>10 905</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Communication and information systems</td>
<td>2 444</td>
<td>2 344</td>
<td>210</td>
</tr>
</tbody>
</table>

**SECTION I.2 - Reconstruction, rehabilitation and overhauls of long-term tangible assets**

<table>
<thead>
<tr>
<th>Gas transmission network for transit transmission</th>
<th>32 461</th>
<th>67 770</th>
<th>43 708</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Linear part</th>
<th>2 144</th>
<th>1 179</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressor stations, administrative and operating regions</td>
<td>10 935</td>
<td>18 289</td>
<td>2 013</td>
</tr>
<tr>
<td><strong>National gas transmission network</strong></td>
<td>10 528</td>
<td>36 178</td>
<td>39 565</td>
</tr>
<tr>
<td>Linear part</td>
<td>3 291</td>
<td>25 344</td>
<td>39 065</td>
</tr>
<tr>
<td>Compressor stations, administrative and operating regions</td>
<td>5 604</td>
<td>7 425</td>
<td></td>
</tr>
<tr>
<td>AGRS and GMS</td>
<td>1 634</td>
<td>3 409</td>
<td>500</td>
</tr>
<tr>
<td><strong>Natural gas storage</strong></td>
<td>7 738</td>
<td>7 049</td>
<td>1 130</td>
</tr>
<tr>
<td>Communication and information systems</td>
<td>510</td>
<td>190</td>
<td></td>
</tr>
<tr>
<td>Wells and gas gatherings</td>
<td>4 739</td>
<td>4 043</td>
<td>1 130</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main technological installations and systems, operating unit</th>
<th>2 190</th>
<th>2 816</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total for distribution by types of activities</strong></td>
<td>1 415</td>
<td>5 075</td>
</tr>
<tr>
<td>Linear part</td>
<td>480</td>
<td>2 660</td>
</tr>
<tr>
<td>Compressor stations, administrative and operating regions</td>
<td>435</td>
<td>1 915</td>
</tr>
</tbody>
</table>

| Chief Dispatching Division                                | 500   | 500   | 500   |

**SECTION I.3 – Delivery of machinery and equipment**

| 12 998 | 10 125 | 7 500 |
4.2 2020-2026 Investment program, including mandatory investment activities ensuring capacity capabilities of the networks

<table>
<thead>
<tr>
<th>Program / Section</th>
<th>Total 2020</th>
<th>Total 2021</th>
<th>Total 2022</th>
<th>Total 2023</th>
<th>Total 2024</th>
<th>Total 2025</th>
<th>Total 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL Annual Investment Program:</td>
<td>81 605</td>
<td>79 390</td>
<td>37 900</td>
<td>38 804</td>
<td>40 960</td>
<td>42 189</td>
<td>43 454</td>
</tr>
<tr>
<td>SECTION I.1 - Construction of new facilities</td>
<td>23 300</td>
<td>23 250</td>
<td>11 300</td>
<td>11 817</td>
<td>12 644</td>
<td>13 024</td>
<td>13 414</td>
</tr>
<tr>
<td>Gas transmission network for transit transmission</td>
<td>3 750</td>
<td>3 400</td>
<td>3 800</td>
<td>4 013</td>
<td>4 294</td>
<td>4 423</td>
<td>4 555</td>
</tr>
<tr>
<td>National gas transmission network</td>
<td>5 450</td>
<td>5 650</td>
<td>5 100</td>
<td>5 304</td>
<td>5 675</td>
<td>5 846</td>
<td>6 021</td>
</tr>
<tr>
<td>Natural gas storage</td>
<td>12 000</td>
<td>12 000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total for distribution by types of activities</td>
<td>2 100</td>
<td>2 200</td>
<td>2 400</td>
<td>2 500</td>
<td>2 675</td>
<td>2 755</td>
<td>2 838</td>
</tr>
<tr>
<td>SECTION I.2 - Reconstruction, rehabilitation and overhauls of long-term tangible assets</td>
<td>50 305</td>
<td>47 640</td>
<td>18 600</td>
<td>18 987</td>
<td>20 316</td>
<td>20 926</td>
<td>21 553</td>
</tr>
<tr>
<td>Gas transmission network for transit transmission</td>
<td>10 500</td>
<td>10 900</td>
<td>11 000</td>
<td>11 200</td>
<td>11 984</td>
<td>12 344</td>
<td>12 714</td>
</tr>
<tr>
<td>National gas transmission network</td>
<td>37 155</td>
<td>33 950</td>
<td>4 600</td>
<td>4 692</td>
<td>5 020</td>
<td>5 171</td>
<td>5 326</td>
</tr>
<tr>
<td>Natural gas storage</td>
<td>800</td>
<td>840</td>
<td>900</td>
<td>953</td>
<td>1 020</td>
<td>1 050</td>
<td>1 082</td>
</tr>
<tr>
<td>Total for distribution by types of activities</td>
<td>1 850</td>
<td>1 950</td>
<td>2 100</td>
<td>2 142</td>
<td>2 292</td>
<td>2 361</td>
<td>2 432</td>
</tr>
<tr>
<td>SECTION I.3 - Delivery of machinery and equipment</td>
<td>8 000</td>
<td>8 500</td>
<td>8 000</td>
<td>8 000</td>
<td>8 000</td>
<td>8 240</td>
<td>8 487</td>
</tr>
</tbody>
</table>

in thousand BGN, VAT excluded
5. DESCRIPTION OF KEY PROJECTS

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

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

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

Bulgartransgaz EAD priority as a combined gas operator is the effective implementation of the company’s projects of common interest. The PCIs list published by the EC on 18 November 2015 (the Second PCIs list) includes the following infrastructure projects planned for construction on the territory on Bulgaria: Capacity expansion of the UGS Chiren; the Required rehabilitation, modernization and expansion of the Bulgarian gas transmission system; Interconnection Turkey – Bulgaria (ITB); Construction of gas hub Balkan; Easting Bulgaria; Project for construction of gas pipeline(s) to increase the interconnection capacity of the north semi-ring of the national gas transmission network of Bulgartransgaz EAD and the gas transmission network of TRANSGAZ S.A., Romania; Interconnection Greece-Bulgaria (IGB).

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

5.1 Connection with pan-European projects

5.1.1 Development of the gas infrastructure regarding the concept for the construction of a regional gas hub in Bulgaria – Balkan gas hub (PCI 6.25.4.)

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

In the context of the European objectives for establishing an interconnected pan-European gas market, the realization of the gas hub concept is in line with the Southern Gas Corridor

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development projects as well as with the plans for the development of the European gas infrastructure to improve the security of supply and to diversify the supply sources. The project corresponds to the need of the region identified by the High Level Group on Central and South Eastern Europe Gas Connectivity (CESEC) and by the European Strategy for Energy Union.

The concept of building the gas hub Balkan has been included in the EC’s list of PCIs of 18 November 2015 under number PCI 6.25.4 (Infrastructure to allow the development of the Bulgarian gas hub), in cluster 6.25, including alternative projects for supply of gas from new sources and new routes to Central, Eastern, and South-Eastern Europe – „Cluster infrastructure to bring new gas to the Central and South-Eastern European region with the aim of diversification”.

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

Natural gas quantities from various sources could enter the gas hub - Russian natural gas through a new offshore gas pipeline and along the existing route, natural gas produced in the Black Sea shelf - Bulgarian (from blocks Khan Asparuh, Silihtar, 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 gas hub concept includes several key elements forming the project:

- New natural gas sources;
- Optimal use of the existing has transmission networks and Chiren UGS;
- Modernization and expansion of the existing infrastructure;
- New infrastructure for the gas hub.

In December 2015 the Bulgarian government and the European Commission agreed on the establishment of a joint working group which shall support the development of the trade concept, business model and financial plan of the gas hub Balkan. In the period December 2015 – June 2016 a series of meeting were held to assess the legal, regulatory, and financial aspects of the project in Sofia and Brussels. The main tasks of the JWG are focused on identifying solutions for the required technical infrastructure, the main natural gas sources, and the main exit directions and potential markets of supply. A wide range of issues have been discussed relating to regulatory framework and trade environment aimed at facilitating the connection between Bulgaria and the rest of South-East Europe. An Investors Round Table on the project has been organized in September 04 – 06, 2016, in Varna, Bulgaria, whose objective was to present to the stakeholders the gas hub Balkan concept approved by the JWG.

Concerning the next step of the project relating to the need of conducting a detailed feasibility study the required documents have been filed for co-financing under the CEF Call 2016-2 and Action „Feasibility Study for the project for gas hub Balkan” has been approved for grant at a value of EUR 920,500.

5.1.2 Eastring – Bulgaria (PCI 6.25.1)

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

The Eastring concept, developed at this stage and included in the Ten-Year Network Development Plan of ENTSOG (TYNDP) 2017-2026 envisages the project to be developed in a joint and coordinated manner by the transmission operators of Slovakia, Hungary, Romania and Bulgaria, and it is presented in Appendix 1 of the Plan as individual local projects, as follows: Eastring – Bulgaria, Eastring – Romania, Eastring – Hungary, Eastring – Slovakia.

Different route options have been considered within the framework of project. Eastring is provided for two-staged implementation – the first one to be commissioned in 2019 ensuring 570 GWh/d capacity, and the second one in 2025 reaching a capacity of 1140 GWh/d.

Bulgartransgaz EAD is the company that is involved in the realization of the Bulgarian section of the Eastring. For the Bulgarian territory for stage 1 of the project development (570 GWh/d capacity) a gas pipeline with DN 1400 and about 257 km length is envisaged to be constructed from a new entry/exit point on the Bulgarian-Romanian border to a new entry/exit point on an outer EU border on the territory of Bulgaria as well as the construction of new compressor capacities 88-90 MW. For stage 2 of the project development (1140 GWh/d capacity) additional construction of two new compressor capacities has been envisaged. A possibility to connect Eastring with the networks of Bulgartransgaz EAD with entry/exit capacity of 200 GWh/d has been envisaged.

To realize the project Bulgartransgaz EAD and Eustream signed in June 2016 a Memorandum of Understanding, stating that the two Parties will cooperate and analyze the prospects for development of the gas markets to identify the expected demand for capacity of the Eastring gas pipeline. In July 2016, a MoU on the Eastring project was signed in Bratislava between the Bulgarian Ministry of Energy and the Slovak Ministry of Economy. The two Parties to the document support the project in line with the EU acquis and acknowledge the need of coordinated work for the realization of the project.

The Eastring project will contribute to increasing the security of supply in the region of Central, Eastern and South-Eastern Europe, ensure access to alternative natural gas sources and represent an important step in the process of completing the single European energy market.

The feasibility study for the Eastring project is expected. It will be carried out with the financial support under the CEF programme thanks to the decision made within CEF Call 2016-2.

5.1.3. Project for construction of gas pipeline(s) to increase the capacity of the Interconnection of the Northern semi-ring of the national gas transmission network of Bulgartransgaz network and the gas transmission system of

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12 The Project of Bulgartransgaz represents entirely new infrastructure on the territory of Bulgaria. The gas pipeline capacity is entirely new and does not concern capacity under signed long-term cross border transmission contracts.
Transgaz S.A., Romania – Bulgaria-Romania-Hungary-Austria transmission corridor (PCI 6.8.4)

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

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

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

5.2 New interconnections with the neighbouring countries

The reversible Interconnection Romania – Bulgaria (IBR) was commissioned at the end of 2016, linking the national gas transmission networks of Bulgaria and Romania. Finalizing the project achieved the diversification of the routes, interconnection and transport of natural gas to Romania using the planned new entry points with Turkey and Greece and the substantial available capacity of the gas transmission network. The project has been implemented by Bulgartransgaz EAD and TRANSGAZ S.A. jointly in line with a MoU, signed on 01.06.2009.

The construction of a compressor station on the territory of Romania (a commitment of Romania) is required, to equalize the pressures of the gas transmission networks of the two countries, to ensure the full project’s capacity for supply from Romania to Bulgaria.
5.2.1 Interconnection Turkey – Bulgaria (ITB), PCI 7.4.2

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

ITB represents a new onshore gas pipeline of a length of about 200 km (about 75 km on Bulgarian territory), with a capacity of 3 bcm/y.

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

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

The Feasibility Study (FS) was prepared in 2015, and approved by Bulgartransgaz EAD early in 2016, and it is a first step towards the ITB construction.

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

The expected ITB construction and commissioning term is 2020.
The reverse Interconnection Bulgaria-Serbia aims at connecting the national gas transmission networks of Bulgaria and Serbia. The project is realised by the Ministry of Energy in its capacity of a Beneficiary under a procedure of financial aid within Operational Programme Development of the Competitiveness of the Bulgarian Economy 2007 – 2013 concerning the activities included in the project’s first stage.

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

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

According to data from the technical design the length of the route Sofia - Dimitrovgrad - Nis is about 170 km of which about 62.2 km and the connection location to Bulgartransgaz EAD gas transmission network is in the region of Novi Iskar. Minimum design annual capacity is about 1.8 bcm, and the maximum is 3.2 bcm.

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

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

5.2.3 Interconnection Greece-Bulgaria (IGB), PCI 6.8.1

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 and with the TAP gas pipeline in the region of Komotini, Greece. 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 S.A., 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 constriction stage has been signed. A state guarantee, which has been renewed in 2015, 2016 and 2017 and whose current amount is BGN 220 million is envisaged for the realization of the project.

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 and is listed in the first place in the list of priority projects within the CESEC initiative.

In line with the update project timetable, construction is expected to start in 2018 Q1 and be commissioned at the beginning of 2020.

5.3. Increase of natural gas storage capacity

5.3.1 Expansion of Chiren UGS capacity (PCI 6.20.2)

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

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

Additional studies are planned (3D seismic studies, geomechanical simulation and ground gas analysis) to make the gas storage expansion option more precise and increase to the maximum the reservoir pressure. The geo-mechanical simulation of the Chiren reservoir was completed at the time of the TYNDP. A surface gas analysis on the Chiren structure area was completed in May 2016. The 3D field seismic studies on the Chiren structure area will be completed in 2017 and 2018.

A final selection for the Chiren UGS expansion will be made thereafter in terms of the next stage of the project’s implementation.

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

To implement the activities involving the expansion of Chiren UGS (PCI 6.20.2), Bulgartransgaz EAD applied for co-financing under the CEF programme. On 23 October 2015 Grant Agreement No. INEA/CEF/ENER/M2015/1029442 for “3D field seismic studies on
Chiren structure area, part of PCI 6.20.2 Chiren UGS capacity expansion, encompassing the following activities has been signed:

- 3D field seismic studies on Chiren structure area;
- Quality control of the 3D field seismic studies and processing of the data acquired.

The amount of the grant is 50% of the value of the Action – EUR 3 900 000.

In 2016 Bulgartransgaz EAD applied for co-financing of action „Preparatory activities, part of PCI 6.20.2 Chiren UGS capacity expansion – „Implementation of software product for the modelling and determining of optimal operating regime of Chiren UGS with a view of its expansion” at a total expected value of EUR 260 000 (amount of the grant 50% of the action’s value – EUR 130 000). The proposal was recommended for funding. Grant Agreement No INEA/CEF/ENER/M2016/1147252 was signed and enforced on 03.11.2016 and currently the implementation of the action is underway.

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

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

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

### 5.3.2 Opportunities for new gas storages in Bulgaria

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

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

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

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

### 5.4.1 Projects in progress

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

  The project is financed with a grant financial assistance under the Kozloduy International Decommissioning Fund to the amount of EUR 4 840 000. Co-financing on behalf of Bulgartransgaz EAD is to the amount of EUR 4 840 000 and another EUR 750 000 will be invested to pay the state fees, the easement, compensations, etc.

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

- **Gas pipeline branch Panagjurishte - Pirdop**

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

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

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

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

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

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

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

### 5.4.2 Possibilities for the construction of new gas pipeline branches.
• Gas pipeline branch with AGRS to the towns of Sopot and Hisarya

The gas pipeline branch is expected to be with a diameter of DN 200 mm and 32 km DN 150, and its inputs to come from the existing main gas pipeline, the Southern semi-ring, between the road /Plovdiv – the village Stroevo – Malak Chardak – Golyam Chardak/ and the gas pipeline branch to Plovdiv, located at about 4 km east from the main road /the town of Karlovo – Plovdiv/, and the AGRSs to be in the vicinity of the town of Sopot and Karlovo (or one AGRS for the two towns), and in Hisarya, and a branch to the village of Banya and Kaloyanovo. The branch could further supply gas also to the municipalities of Sopot and Hisarya, the town of Banya, Karlovo and the village of Kaloyanovo.

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. Its implementation depend mostly on the assessment of its feasibility, considering also its social and economic effect for the region and the country.

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

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

5.5.1 Modernization, rehabilitation and expansion of the existing gas transmission infrastructure, PCI 6.8.2

The project for the modernization, rehabilitation, and expansion of the existing gas transmission infrastructure on the territory of Bulgaria is a PCI project (PCI 6.8.2) and a project determined to be a priority project for the Central and South Eastern Europe Gas Connectivity - CESEC).

PCI 6.8.2 is a complex project for the modernization, rehabilitation, and expansion of the existing gas transmission infrastructure on the territory of Bulgaria, including the following types of activities:

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

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

Given the nature of the activities 2 stages of implementation covering the following activities can be distinguished:
Phase 1: Groups the initial project actions which have started in the period 2013-2015, currently under way and financed with company’s own funds. The following activities fall in this stage:

- Stage 1: modernization of 4 compressor stations (CS) (CS Lozenets, CS Ihtiman, CS Petrich, CS Strandja) by integrating 6 low emission gas-turbine compressor units (GTCU). This stage was completed in June 2016.

- Gas pipeline construction CS Lozenets – PF Nedyalsko as part of the activities for gas transmission network extension. The implementation of this stage started in 2016 and it is expected to be completed in mid-2018. Detailed information is available in 5.5.4 below.

- Inspections.

- Implementation of systems for optimization of the management process of the network technical condition (PIMS and GIS). All activities on the PIMS software implementation were executed in the end of 2016. The implementation of GIS was finalized in February 2017.

Phase 2: Includes actions constituting a main part of the project were launched in 2016, representing the logical continuation of the overall project realization following the implementation of Phase 1. Phase 2 covers the following activities:

- Stage 2: modernization of compressor stations by integrating 4 gas-turbine compressor units (GTCU) in 3 compressor stations (CS Lozenets, CS Ihtiman, CS Petrich). This stage was launched in the end of 2016 with the signing of a contract for pre-feasibility studies.

- Rehabilitation and replacement of sections of the Northern semi-ring with a total length of 81 km.

- Inspections.

- Implementation of an additional software.

BULGARTRANSGAZ apply for co-financing under the CEF Mechanism to implement the activities under Phase 2. In 2016 Action No 6.8.2-0055-BG-S-M-15 Preparatory activities in connection with the implementation of PCI 6.8.2. Necessary rehabilitation, modernization and expansion of the Bulgarian transmission system received a grant under the CEF Mechanism. In April 2016 a Grant Agreement (GA) INEA/CEF/ENER/M2015/1119568 was signed. Pursuant to the GA the grant amount is 50% of the Action value – up to EUR 850 000 (eight hundred and fifty thousand) and it consist of three activities:

- **Activity 1** “Preparatory activities in connection with the rehabilitation (reinforcement) of the Northern semi-ring of the gas transmission system” (58 km gas pipeline section: PF Beglesh – VA Dermantsi – VA Batultsi – VA Kalugerovo). Detailed information is available in 5.5.5. below.

- **Activity 2** “Preparatory activities for the modernization of 3 compressor stations” by integrating low emission gas compressor turbine units (CS Lozenets, CS Ihtiman and CS Petrich). Detailed information is available in 5.5.9. below.

- **Activity 3** “In-line inspection of two gas pipeline sections. In March 2016 a public procurement was launched for the selection of a contractor to implement the activity. On 14.07.2016 a contract with the selected contractor was signed having as subject "In-line inspection with geometric tool and MFL technology or
equivalent of two sections of the gas transmission network of Bulgartransgaz EAD, section PF Kardam – PF Losenets with outer diameter DN 1220 (48") and a length of 184 km and section PF Batultsi – PF Vratsa with outer diameter 520 (20") and a length of 37 km”. All field works were completed in November 2016. The contract has been finalized in December 2016 and a handover and acceptance protocol has been signed and a certificate of conformity has been issued.

Within the second Call for project proposals for 2016 under the Connecting Europe Facility – CEF - Programme, Bulgartransgaz EAD applied for a co-funding of an action: "Preparatory activities related to the rehabilitation of the gas transmission system in the section PF Valchi dol - VA Preselka, part of PCI 6.8.2” with an estimated value of EUR 182 000. The action aims to execute the preparatory phase of the activity related to the replacement of a gas pipeline section with 23 km length. The action will also cover the completion of the pre-investment phase, the design phase and obtaining the required permits for launching the construction works. The action applied for funding and currently a Grant Agreement is to be signed in order to draw the plan.

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

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

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

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

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

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

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 Nedylsko (Part of the Phase 1 of PCI 6.8.2 "Necessary modernization, rehabilitation and expansion of the existing gas transmission infrastructure")

The expansion of the transit gas pipeline to Turkey in the section between Compressor station Lozenets and Pigging facility Nedylsko is key to the development of the existing Interconnection between Bulgaria and Turkey and it part of PCI 6.8.2. For modernization,
rehabilitation and expansion of the existing gas transmission infrastructure in Bulgaria.

The construction of the 20 km gas pipeline section in the section CS Lozenets - PF Nedyalsko is directly related to increasing the security of Bulgartransgaz EAD transmission system and will enable the transmission of additional quantities of gas through the transit gas pipeline in the section between CS Lozenets and the Bulgarian -Turkish border. Looping construction is a technical prerequisite for the implementation of reverse flow, if necessary. Moreover, its implementation will create technical capabilities of system flexibility under various operations and modes, including the launch of cleaning devices and intelligent tools, carrying out repair works on gas pipelines without limitations on natural gas transit, improved hydraulics of the system.

In 2016 a contract was signed and the construction works started and on 05.07.2016 a Building Permit No. РС–32 was issued. Temporary warehouse facilities are built and in 2017 the necessary supplies are planned to be carried out and the implementation of the construction and installation works shall be launched. The project is planned to be commissioned in 2018.

5.5.5 Replacement of the gas pipeline section “PF Beglej – VA Dermantsi – VA Batultsi – VA Kalugerovo” (Part of Phase 2 of PCI 6.8.2 “Necessary modernization, rehabilitation and expansion of the existing gas transmission infrastructure“)

The replacement of the gas pipeline section “PF Beglej – VA Dermantsi – VA Batultsi – VA Kalugerovo”, DN 700 commissioned in two stages in 1973 and 1975 is part of the North semi-ring of the national gas transmission network (NGTN) is related to the features found as a result of the inline inspections and a limitation imposed within the maximum acceptable work pressure of 44 bar compare to the design pressure of 54 bar. The project realization will ensure the reliable operation of the system and the necessary capacity for natural gas transmission.

The preparatory works related to the rehabilitation (reinforcement) of the North semi-ring of the gas transmission network (pipeline section PF Beglej – VA Dermantsi – VA Batultsi – VA Kalugerovo, length - 58 km) are co-funded under the CEF Programme in line with Grant Agreement No INEA/CEF/ENER/M2015/1119568. In April 2016 a public procurement for the selection of a Contractor for the design activities was announced. On 14.10.2016 a contract was signed having as subject “Preparatory works related to the rehabilitation (reinforcement) of the North semi-ring of the gas transmission network including pre-investment studies and an investment study for construction “Replacement of a main gas pipeline in the section PF Beglej – VA Dermantsi – VA Batultsi – VA Kalugerovo”. The Activities under the contract are envisaged to be completed in the end of 2017 and as a result BULGARTRANSGAZ EAD shall have the set of documents required to received Building Permit and will be able to continue with the construction works in the section.

5.5.6. Reconstruction of a gas pipeline branch Vratsa 1 including replacement of sections and construction of a receiving chamber at Chiren UGS by replacement of the existing chamber at GMS Vratsa.

The reconstruction aims to increase the natural gas transport reliability in the national gas transmission network. Equalizing the diameter of the entire gas pipeline section “Gas Pipeline Branch (GPB )Vratsa-1” (from pigging facility (PF) Batultsi-1 to Chiren UGS) is envisaged and a new receiving chamber at Chiren UGS is to be build and thus conditions will be provided to perform pigging activities and inline inspections. The receiving chamber will be dismantled from the existing receiving PF (GMS Vratsa – new) and set on new terrain designed for
receiving PF located at the place prior to the connection of GB Vratsa-1 with Chiren UGS. A valve assembly is envisage to be built near to valve assembly (VA) No 4. The new VA shall divide section VA Tsarevets to Chiren UGS into two shorter sections thus facilitating the pigging activities.

5.5.7 Increasing the capacity of gas pipeline branch Targovishte

Due to the increased natural gas quantities for transmission to the connected users which exceeds the design quantities, the GPB Targovishte capacity shall be increased. This can be achieved by replacing with a greater diameter the existing gas pipeline. Optic fibre line is also envisaged to be built up.

5.5.8 Overhaul of gas turbine engines (GTE) DT70P including planned repair works and V3 inspections of GTCU THM 1304

All GTE have the so called resource in-between repair works in working hours (resource until inspection) and general technical resource in working hours which are in line with the respective operational documents and the aim is to ensure the operational reliability, safety, efficiency and preservation of the operational parameters of the GTE. Following the expiry of the resource in-between repair works which is 20 000 hours for DT70P, and 40 000 hours for THM 1304 an overhaul shall be carried out to recover the mechanical, ecological and gas dynamic parameters, as well as to ensure its safety and reliable operation in the future (following the overhaul) working hours until reaching the general technical resource which is 100 000 hours for all engines.

5.5.9 Activities aligning compressor stations with the requirements of the complex permits, stage 2 – CS Lozenets, CS Petrich, CS Ihtiman (Part of Phase 2 of PCI 6.8.2. "Necessary modernization, rehabilitation and expansion of the existing gas transmission infrastructure")

The activity is part of the overall concept related to the implementation of PCI 6.8.2 Necessary modernization, rehabilitation and expansion of the Bulgarian gas transmission system which aims at improving the transmission system’s efficiency, reliability and flexibility, providing technical capabilities for transmission of additional natural gas quantities through the territory of the country, in relation to the planned new entry and exit points. The project aims to adapt the existing gas infrastructure on the territory of Bulgaria to the new market requirements and new realities, in the context of the infrastructure development plans in the region.

The Action focusses mainly on the modernization of 3 compressor station by integrating 4 low emission gas turbine compressor units (GTCU).

The preparatory activities for modernization of 3 compressor stations (CS Lozenets, CS Petrich, CS Ihtiman) by integrating low emission GTCU is co-financed under the CEF programme under GA No INEA/CEF/ENER/M2015/1119568. In April 2016 a public procurement for the selection of a Contractor for the design activities was announced. On 15.11.2016 a contract was signed having as subject "Preparatory (pre-investment) study including technical and economic analysis of the status of the technical equipment of 3 compressor stations - CS Lozenets, CS Petrich, CS Ihtiman and the need of modernization". The activities under the contract are to be completed in mid-2017.

Based on the results from the technical and economic analysis it will be possible to proceed with the next stage of the implementation, namely design, supply and installation of 4 low emission gas turbine compressor units (GTCU), which will be integrated within the
compressor capacities of CS Lozenets, CS Petrich, CS Ihtiman.

5.5.10 Reducing the vibrations in the pipeline tie-in of gas engine compressors (GEC) and technological line from GEC to Second sand damper in UGS Chiren

The realization of the construction “Reducing the vibrations in the pipeline tie-in of GEC and technological line from GEC to Second sand damper in UGS Chiren” aims to reduce the vibrations in the technological equipment of Chiren UGS within limits lower than 10 mm/s by construction and installation works and repairs and removing the deviations registered in the operation of the injection pipelines in Chiren UGS.

5.5.11 Replacement of pipelines at open GEC cycle

The open cycle has a cyclic operational activity (draining the water from the pipelines as means against contamination during the cold period of the year as well, they are to be filled in as to be in operation for the hot period) and as a result the internal wall of the pipelines is highly corrosive. During operation big chunks of rust come off which block the nozzles of the cooling towers and the heat exchangers and create prerequisites for the GEC breakdown due to overheating. This is the main reason which requires the replacement of the pipelines.

5.6 Construction of new objects to the existing infrastructure require to increase the operational efficiency

5.6.1 Implementation of IT platform in compliance of the requirements of the Third Energy Package

The scope of “Implementation of IT platform in compliance of the requirements of the Third Energy Package” envisaged the implementation of procurements such as: “Supply of commercial dispatching software” and “Selection of capacity booking platform at domestic points”. The implementation of these procurements will introduce software applications securing the commercial dispatching activities, related to the capacity nomination and allocation, nominations, matching procedures etc. related to BULGARTRANSGAZ EAD main business activity – natural gas transport and the relationships TSO – network user.
This section of the Ten-year network development plan aims at displaying the development of capacity of the gas infrastructure owned by Bulgartransgaz EAD as a result of the realization of the infrastructure projects and the modernization and rehabilitation of the existing infrastructure and facilities within this ten year period. Inasmuch as is at present there are still ongoing processes of specification of the sources and the routes for natural gas supplies to the territory of the Republic of Bulgaria, different options are possible about the degree of utilization of Bulgartransgaz EAD gas transmission networks.

The activities of the Company planned for the period 2017-2021 will provide the necessary infrastructure enabling gas flows reception for further transport from and to different regions. Bulgartransgaz EAD will provide the necessary cross-border capacity that would enable diversity of the directions of natural gas flow through the networks. The actual utilization of that capacity and the particular directions of flows will depend directly on the expectations for the gas market development in Europe and in the country.

<table>
<thead>
<tr>
<th>As of 1 January, in million m³/d</th>
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<th>2018</th>
<th>2019</th>
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<th>2021</th>
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<td><strong>Entry capacity</strong></td>
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<td>IBS</td>
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<td>IP Jidilovo</td>
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<td>6</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

* Physical and/or commercial reverse flow capacity.

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

*** The new interconnections capacities (ITB, IGB, IBS and IBR) are according to design information as of March 2017 and are subject to change.
Bulgartransgaz EAD is a responsible company, operating in dynamically changing environment and endeavours to efficiently develop the infrastructure for transmission and storage of natural gas in Bulgaria in line with the national. Regional and European priorities, goals and strategies to achieve security, stability, diversification, market integration, competition and liberalisation.

The priority activities in the development of Bulgartransgaz EAD infrastructure in the period 2017 – 2026 are the maintenance of a technically good working, reliable and efficient main and auxiliary gas infrastructure, modernization, rehabilitation and expansion of the existing gas transmission networks and equipment, development of the interconnectivity, and expansion of the natural gas storage capacity.

During the period 2017 – 2026 the construction and commissioning of new gas interconnections with Turkey, Greece and Serbia are scheduled. Key cross-border gas pipelines are also planned to cross Bulgaria that will connect to the existing gas transmission system of Bulgartransgaz EAD. The realization of the company’s plans will connect the gas infrastructure of Bulgaria to the single European natural gas market in the Caspian region, Central Asia, the Middle East, the Eastern Mediterranean basin and North Africa. This fact will ensure the natural gas supplies to the country and the region, creating real conditions for the diversification of the sources and routes of supply of natural gas to and through Bulgaria.

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

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

The expected outcome from the implementation of this TYNDP is significant increase in the quality and volume of the services offered by Bulgartransgaz EAD related to natural gas transport and storage which is in direct connection with the transformation of Bulgaria into a significant regional gas hub - a hub where technical capabilities shall be created for entry and exit of natural gas flows coming from various sources and along new routes. The Plan implementation at a corporate level will strengthen the successful business model of company development and in national and regional aspect, the gas operator will continue to ensure reliable natural gas transmission and storage both to society and industry, applying the best business practices.
<table>
<thead>
<tr>
<th>№</th>
<th>Project</th>
<th>Final Investment Decision (FID)</th>
<th>Deadline for completion</th>
<th>Contractor</th>
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<th>Funding</th>
<th>Length</th>
<th>Change of capacity/ type</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interconnection Turkey - Bulgaria (ITB)</td>
<td>no</td>
<td>2020</td>
<td>Bulgartransgaz EAD and Botas</td>
<td>~ € 150 million</td>
<td>own and attracted external funding</td>
<td>~ 75 km Bulgarian section; ~ 120 km Turkish section</td>
<td>3 bcm/year - 3 stage (entry-exit)</td>
<td>No investment study proposed. Preliminary ToR prepared.</td>
</tr>
<tr>
<td>2</td>
<td>Interconnection Greece - Bulgaria (ISGB)</td>
<td>yes</td>
<td>beginning of 2023</td>
<td>ICGB AD</td>
<td>~ € 4.4 million (€ 220 million*)</td>
<td>OPEE and Bulgartransgaz EAD own funding for the connection to the existing network</td>
<td>a total of 182 km of which 62.2 km Bulgarian section</td>
<td>3 bcm/year - 1 stage (entry-exit)</td>
<td>Implemented by the ME, beneficiary of OPEE Competitiveness. The project will be connected to Bulgartransgaz EAD gas transmission network.</td>
</tr>
<tr>
<td>3</td>
<td>Interconnection Bulgaria - Serbia (IBS)</td>
<td>yes</td>
<td>2020</td>
<td>Ministry of Energy</td>
<td>~ € 2 million (€ 48 million*)</td>
<td>OPEE Competitiveness and Bulgartransgaz EAD own funding for the connection to the existing network</td>
<td>a total of 170 km of which 62.2 km Bulgarian section</td>
<td>1.8 - 3.1 bcm/year (reverse during crisis situations and disruption of the main flow)</td>
<td>Implemented by the ME, beneficiary of OPEE Competitiveness. The project will be connected to Bulgartransgaz EAD gas transmission network.</td>
</tr>
<tr>
<td>4</td>
<td>Necessary modernization, rehabilitation and expansion of the existing gas transmission network</td>
<td>no</td>
<td>2020</td>
<td>Bulgartransgaz EAD</td>
<td>~ € 121 million</td>
<td>own and attracted external funding</td>
<td>Tarndol replacement - 81 km; expansion of the existing network - 18 km; repair and modernization of CS-10 (GTCU) - 20 km; gas pipeline Lutsko - Nikopoly - Tetibaka; modernization of CS-10 (GTCU) - 20 km; connection to the existing network - 158 km</td>
<td>3.5 bcm/year - 2 stage (entry-exit)</td>
<td>Complex, multicomponent project implemented in 3 phases covering: - Repair and replacement of gas pipeline sections - 81 km; - Expansion and modernization of the existing gas transmission network - 18 km; - Modernization and rehabilitation of compressor stations - 158 km; - Additional studies (3D seismic studies, geomechanical simulation and a surface gas analysis) are carried out to specify the expansion option and at the time of preparing the plan, the Geomechanical simulation of the Chiren reservoir and the surface gas analysis are completed and in 2017 and 2018 3D field seismic studies on the Chiren structure area will be carried out.</td>
</tr>
<tr>
<td>5</td>
<td>Concept for construction of a gas hub in Bulgaria - Gas Hub Balkan</td>
<td>no</td>
<td>2022</td>
<td>Bulgartransgaz EAD</td>
<td>~ 1.4 - 2.4 billion ***</td>
<td>own and attracted external funding</td>
<td>New gas transmission infrastructure - 15.75 bcm/year</td>
<td>The project is in the conceptual stage.</td>
<td></td>
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<tr>
<td>6</td>
<td>Construction of a gas pipeline in Bulgaria with regard to the construction of the gas pipeline乙从中国 to the territory of Hungary and Romania</td>
<td>no</td>
<td>2021 (Phase 1)</td>
<td>Bulgartransgaz EAD</td>
<td>~ 700 million €</td>
<td>own and attracted external funding</td>
<td>256 km Do 1400 x 9 Fl - 75 bar + 80 MPA new CS</td>
<td>20 km/year</td>
<td>The project is in the conceptual stage.</td>
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<tr>
<td>7</td>
<td>Expanding the capacity of Chiren UGS</td>
<td>no</td>
<td>2024</td>
<td>Bulgartransgaz EAD</td>
<td>~ € 223 million</td>
<td>own and attracted external funding</td>
<td>The project provides for the increase of the working gas volume of up to 3 bcm/year and increasing the withdrawal and injection flow rate up to 3.5 mcm/day</td>
<td>Increasing the working gas volume with 3 bcm/year and increasing the withdrawal and injection flow rate with up to 3.5 mcm/day</td>
<td>Additional studies (2D seismic studies, geomechanical simulation and a surface gas analysis) are carried out to specify the expansion option and at the time of preparing the plan, the Geomechanical simulation of the Chiren reservoir and the surface gas analysis are completed and in 2017 and 2018 3D field seismic studies on the Chiren structure area will be carried out.</td>
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</tbody>
</table>

Note: * These values represent the estimated total value of the projects developed by third parties, called "third party projects"
** The project is in the conceptual stage - for more information refer to item 5.1.1
*** The estimated value is to be specified by the forthcoming feasibility study

APPENDIX 1

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

<table>
<thead>
<tr>
<th>№</th>
<th>Project</th>
<th>Final Investment Decision (FID)</th>
<th>Deadline for completion</th>
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<td>3 bcm/year - 1 stage (entry-exit)</td>
<td>Implemented by the ME, beneficiary of OPEE Competitiveness. The project will be connected to Bulgartransgaz EAD gas transmission network.</td>
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<td>Necessary modernization, rehabilitation and expansion of the existing gas transmission network</td>
<td>no</td>
<td>2020</td>
<td>Bulgartransgaz EAD</td>
<td>~ € 121 million</td>
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<td>3.5 bcm/year - 2 stage (entry-exit)</td>
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