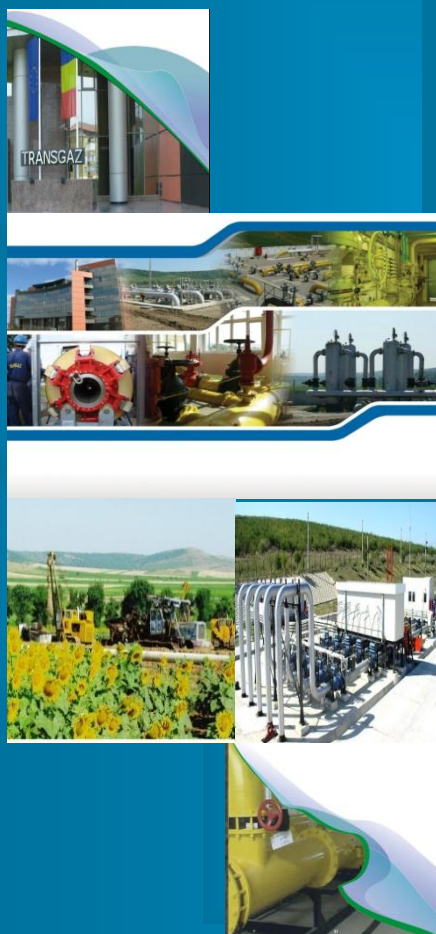


**SNTGN TRANSGAZ SA MEDIAŞ**



**Development Plan for  
the National Gas Transmission  
System**

**2014 - 2023**



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## 1. INTRODUCTION

For compliance with article 22 of the European Directive EC/73/2009, regarding the obligation of all EU operators of gas transmission systems to create **10 year Development Programs**, Transgaz, as technical operator of the National Gas Transmission System of Romania, prepared the **Development Plan for the gas transmission system for 2014-2023**.

This document aims at introducing the actions for the development of the Romanian gas transmission network and the major projects that the company envisages over the next 10 years. Our goal is to achieve a maximum level of transparency with respect to the development of the National Gas Transmission System (NTS) in order for the market players to be informed in a timely manner about the existing and planned transmission capacities, in order for the investment decisions regarding the gas transmission network to respond to the market demands, following public consultations.

**The Development Plan for the National Gas Transmission System (NTS) for 2014-2023**, prepared according to **art. 125, paragraph (6) of Power and Gas Law no. 123/2012**, with the objectives as established in Romania's Energy Strategy for 2011-2035 and the Energy Pact of May 2013, is compliant with the European energy policy for:

- ensuring reliability of gas supply;
- increasing national gas transmission network interconnectivity with the European network;
- increasing the flexibility of the national gas transmission network;
- the liberalisation of the gas market;
- creating the integrated gas market in the European Union.

**According to the laws, this document shall be approved by the National Energy Regulatory Authority (ANRE) and shall be annually updated.**

As transmission system operator certified under the provisions of the Third Energy package, TRANSGAZ is a member of ENTSG (European Network of Transmission System Operators for Gas), an entity where the company works together with all the EU gas transmission system operators in order to establish a common regulatory framework and a common development strategy and vision at European level, meant to achieve an integrated energy market.

In this context, while preparing The Development Plan for the National Gas Transmission System for 2014-2023, we aimed at coordinating the Plan with the development plans of the other operators in the region.

The development projects described in this development plan have been identified following detailed analyses and evaluations made by the company during the last six months, and take into consideration the newest evolutions of the trends and supply scenarios of the European gas market.

As a result, some of the identified projects are not currently included in the 10 year European network development plan (TYNDP), but Transgaz will make sure that they will be included in the next edition of the European plan to be developed in this year's spring.

Security of gas supply is underlying any energy policy – any serious disorder leading to gas supply disruptions entails significant consequences for the economies of the EU member states. In order to strengthen this reliability, the EU states need to diversify their energy vectors and energy sources, but also to act for the revision of the gas transmission infrastructure.

A sustainable development of the gas transmission infrastructure in Romania involves an ample investment programme that would allow for the NTS to be in line with the transmission and operating demands of the European gas transmission network.

In the context of the geopolitics and geostrategy of the European energy routes, Romania benefits from the advantages of the geographical location on important gas transmission corridors and access to major gas resources recently discovered in the Black Sea, aspect which leads to the need of an efficient exploitation of these opportunities.

Through **the 10-year Development Plan for the National Gas Transmission System**, Transgaz proposes major investments for the strategic and sustainable development of the Romanian gas transmission infrastructure and its compliance with the requirements of relevant European regulations.

## 2. COMPANY PROFILE

The National Gas Transmission Company “TRANSGAZ” SA established under Government Decision no. 334/28 April 2000, following the restructuring of the former National Gas Company “ROMGAZ” SA, is a Romanian legal entity, with the legal form of joint stock company and operates according to the Romanian laws and its bylaws.

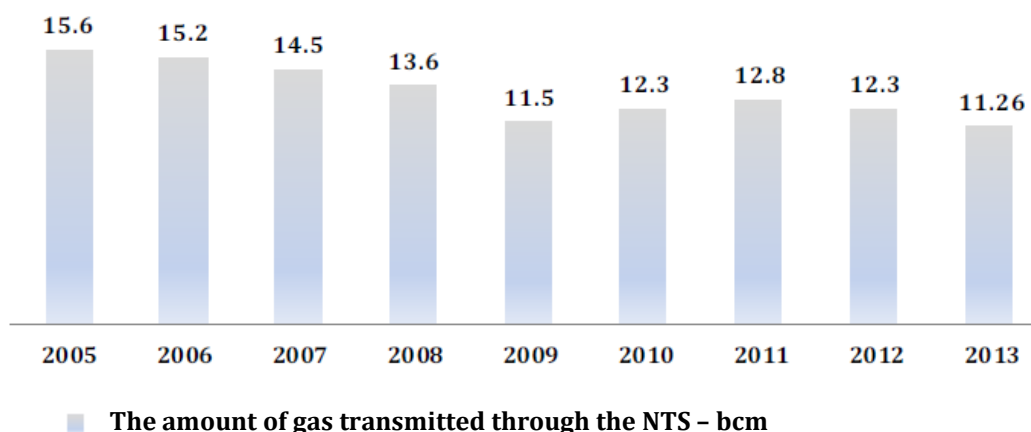
Transgaz is the technical operator of the National Gas Transmission System (NTS) ensuring the execution of the national strategy regarding the internal and international gas transmission and dispatching with efficiency, transparency, safety, non-discrimination and competitiveness, as well as the research and project development in its field, in compliance with the provisions of the European and national laws, the quality, performance, environment and sustainable development standards.

Transgaz operates the NTS based on the Concession Agreement concluded with the National Agency for Mineral Resources (ANRM), valid until 2032, the National Gas Transmission System being state owned.

### *Gas transmission*

The gas transmission activity is carried out by Transgaz based on the gas transmission system operating licence no. 1933/20.12.2013, issued by the National Energy Regulatory Authority (ANRE) and valid until 8 July 2032.

Gas transmission is ensured through over 13,000 km of pipelines and connections for gas supply, with diameters between 50 mm and 1,200 mm, at pressures between 6 bar and 63 bar.



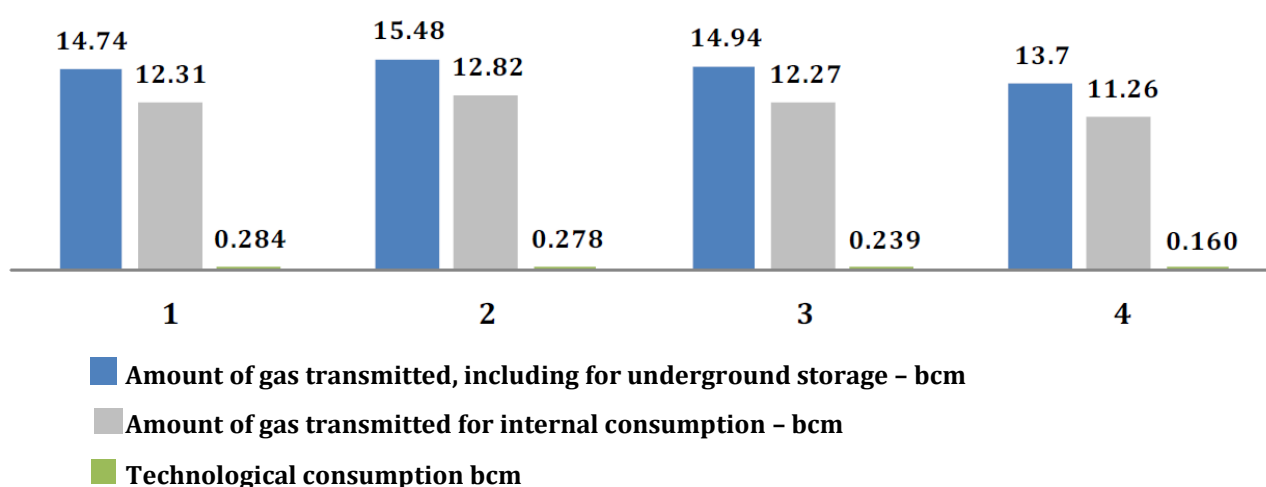
**Chart 1 The amount of gas transmitted through the NTS during 2005-2013**

Source: Transgaz Plan of Administration for 2013-2017

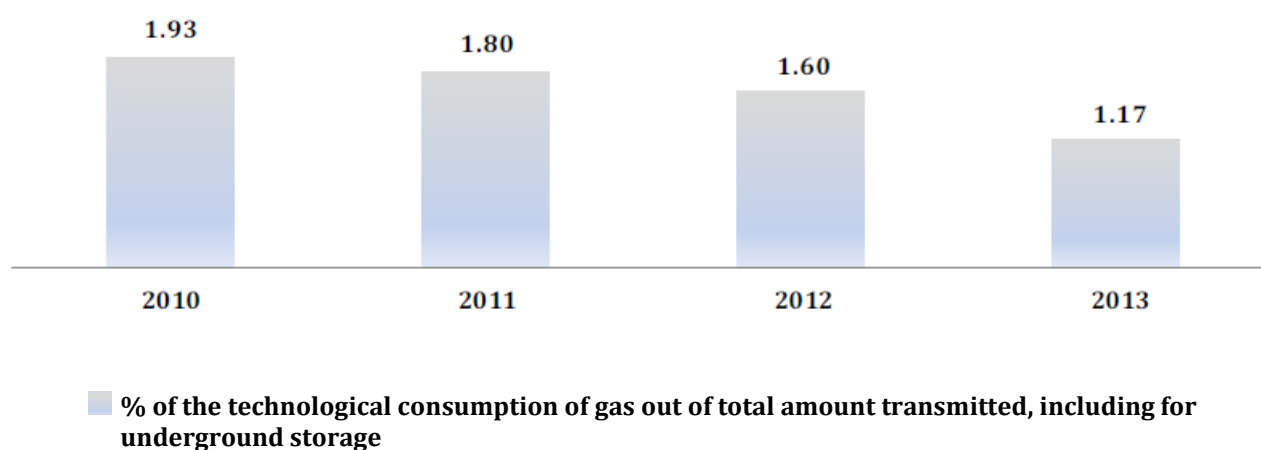
Note: The transmitted amounts do not include the amounts injected from the NTS into the underground storage facilities

Year	um	2010	2011	2012	2013
Gas transmitted, including the amounts for underground storage	bcm	14.74	15.48	14.94	13.70
Gas transmitted for internal consumption	bcm	12.31	12.82	12.27	11.26
Technological consumption	bcm	0.284	0.278	0.239	0.160
% of the technological consumption from the total amount of gas transmitted, including gas for underground storage	%	1.93	1.80	1.60	1.17

**Table 1 – The share of the technological consumption in the total amount of transmitted gas, including gas for underground storage**



**Chart 2 The evolution of the transmitted amount of gas, including for underground storage and technological consumption during 2010-2013**



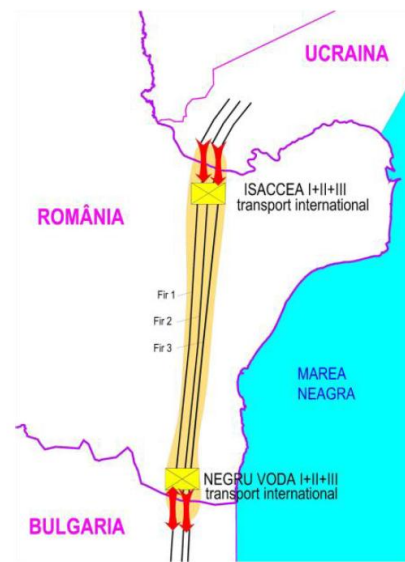
**Chart 3 The share of the technological consumption in the total amount of transmitted gas during 2010-2013**

## International gas transmission

The activity of gas transmission is carried out by Transgaz based on the operating licence for the gas transmission system no. 1933/20.12.2013, issued by the National Energy Regulatory Authority (ANRE) and valid until 8 July 2032.

At present, the international transmission of gas is carried out in the South-Eastern part of Romania (Dobrogea), where the Romanian section of pipelines between Isaccea and Negru Vodă is included in the Balkan corridor of international gas transmission from the Russian Federation to Bulgaria, Turkey, Greece and Macedonia.

On the route mentioned above, north of Isaccea, there are 3 interconnections with the similar pipelines for international transmission of gas existing in Ukraine, and south of Negru Vodă there are also 3 interconnections with the pipelines for international transmission of gas from Bulgaria.



F

**Fig. 1 - Pipelines for gas international transmission**

The international gas transmission is carried out exclusively through pipelines that are not connected to the National Transmission System.

<b>LINE I:</b>	Dn = 1000 mm L = 182 km Technical capacity = 5.27 bcm/year International transmission of gas for Bulgaria
<b>LINE II:</b>	Dn = 1200 mm L = 181 km Technical capacity = 10 bcm/year International transmission of gas for Turkey, Greece and Macedonia
<b>LINE III:</b>	Dn = 1200 mm L = 181 km Technical capacity = 10 bcm/year International transmission of gas for Turkey, Greece and Macedonia

**Table 2 - Dedicated pipelines that are not connected to the National Gas Transmission System**

At present, the gas transmission through the three dedicated pipelines is not subject of the European regulations on third party access and is carried out based on the government agreements and contracts concluded with the foreign partners, precisely with OOO "Gazprom Export" and Bulgargaz EAD.

Transgaz aims at resolving all the contractual issues, in order to provide the market with the entire gas transmission capacity, in compliance with the European regulations.

**The operation** of the National Gas Transmission System by Transgaz mainly consists of the following activities: commercial balancing; contracting the gas transmission services; dispatch and technological conditions; metering and monitoring gas quality; gas odorization; regulating, authorizing and licensing – technical and commercial regulations, international gas transmission.

The company may also carry out other related activities for supporting the core business, according to the applicable laws and its own bylaws, but it is not entitled to gas trading activities.

Transgaz establishes together with ANRM a minimal investment programme for a period of five years. The minimal investment programme contains three categories of investments:

- investments for the development of the NTS;
- investments for the modernisation of the NTS installations and equipment;
- works for upgrading and increasing the safety in operation of the gas transmission pipelines.

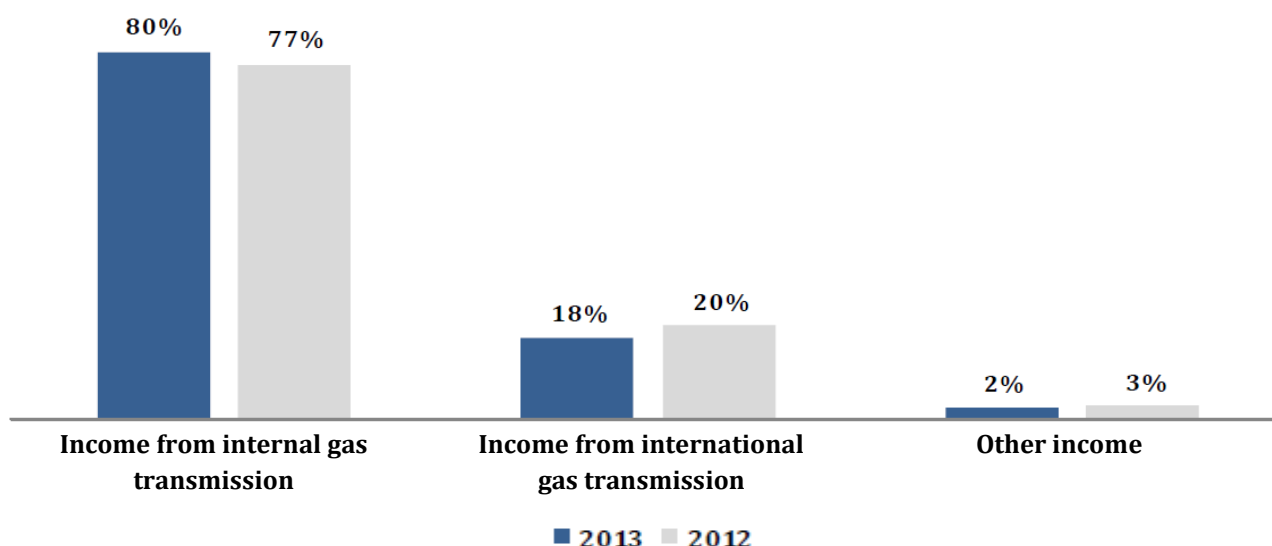
Along with this minimal investment programme, Transgaz is also creating an investment programme that, together with the investment objectives under the minimal programme, also contains other investment objectives regarding the modernisation of the NTS, as they are established in the company's medium - and long - term development strategy and in the annual investment programs, respectively.

The minimal investment programme for 2012 – 2016 was approved by the Romanian Government in September 2012 and included in Addendum no. 5 of the Concession Agreement concluded between Transgaz and ANRM and published in the Official Gazette on 4 October 2012.

The company's income is generated from the internal and international gas transmission activity and from connection fees, services and project development, from penalties charged to clients and other related services.

Quality represents a constant preoccupation both for Transgaz and for ANRE. For the purpose of monitoring the gas transmission services, based on specific indicators and minimal performance levels, starting with 1 January 2007, the **Performance Standard for the gas transmission services** entered into force, **approved as Annex 1 to ANRE Decision no. 1361/13.12.2006**. This standard establishes the obligations of the gas transmission system operator in relation with the network users, with the persons applying for access to the NTS and with the ANRE.





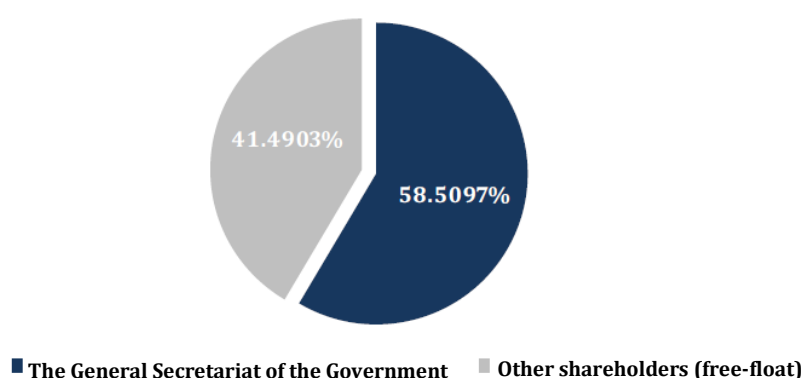
*Chart 4 – Structure of operating income*

### Shareholding

The public offering of 10%, in 2008 and of 15%, in 2013 of Transgaz share capital, through the Bucharest Stock Exchange, contributed to the increase in capitalization and the development of the capital market in Romania, thanks to the dynamics of the sector in which the company activates.

	Number of shares	Percentage
The General Secretariat of the Government	6,888,840	58.5097%
Other shareholders (free-float)	4,885,004	41.4903%
<b>Total</b>	<b>11,773,844</b>	<b>100.0000%</b>

*Table 3 –Transgaz Shareholding*



*Chart 5 – The present structure of Transgaz shareholders*

At nearly 6 years from the public offering, after the stock market capitalization, Transgaz is ranked as the 6<sup>th</sup> company in the top 100 companies listed at BVB (Bucharest Stock Exchange) and is included in the composition of the main stock indexes, which proves the force and durability of TGN stocks, sustained of course by the economic, financial, technical and social

performances that the company acquired, but also by the ambitious development strategy of the company for the next years.

## Organisation

Transgaz is administrated in a unitary system, through the Board of Administration.

There is a **separation** between the non-executive function (non-executive director) and the executive one (directors) – a mandatory separation in the case of joint stock companies whose annual financial standing is subject to a legal audit obligation.

The Board of Administration has delegated the management of the company to the director - general of Transgaz. The director - general of Transgaz represents the company in its relations with third parties and is responsible for taking all the general management, within the limits of the company's core business and in compliance with the exclusive competences under the law or the Articles of Association, the Board of Administration and the General Meeting of the shareholders.

**Transgaz** is composed of functional entities (departments, divisions, offices, compartments, etc.) and production entities (9 regional offices, one branch office, sectors, laboratories, workshops, etc.), established based on the structural norms approved by the Board of Administration.



*Fig. 2 – Map of territorial structure of SNTGN Transgaz SA Medias*



**The main components of the National Gas Transmission System are:**

- 13,112 km of main transmission pipelines and connections for gas supply, of which 553 km of pipelines for the international transmission of gas;
- 1,119 gas regulating - metering stations;
- 6 gas metering stations for international transmission;
- 3 metering stations for imported gas (Isaccea, Medieșu Aurit, Csanadpalota);
- 5 gas compressor stations with a total power of 32 MW (GCS);
- 1,007 cathodic protection stations (CPS);
- 48 valve stations / technological nodes.

The National Transmission System is represented by the main pipeline, as well as by the related installations, equipment and fittings, operated at pressures between 6 bar and 63 bar, through which the gas is taken over from the production fields or imported and transported for delivery to internal gas market customers, for export, international transmission, etc.

In order to be able to operate the NTS, which is state-owned, Transgaz pays a royalty fee every trimester, representing 10% of the income from gas domestic and international transmission.

**The total design capacity of the NTS is of approximately 30 bcm/year (not including the international gas transmission pipelines, which have a total design capacity of 27.7 bcm/year and a total technical capacity of 21.35 bcm/year, at the current operating pressure).**

**The domestic and international gas transmission capacity** is ensured through the network of pipelines and gas supply connections with diameters ranging from 50 to 1,200 mm and pressures between 6 bar and 63 bar.

**The compression capacity** is ensured by 5 gas compressor stations, located on the main transmission routes, which have an installed power of approximately 32 MW, with an annual compressor capacity of 5.5 bcm.

An analysis of the main units of the NTS, in terms of service life:

Service life	Transmission pipelines (km)	Supply connections (km)	Regulating -Metering Stations (RMS)
> 40 years	5,182	219	127
30 - 40 years	2,583	170	51
20 - 30 years	1,064	191	69
10 - 20 years	1,043	553	463
< 10 years	1,431	675	530
<b>TOTAL</b>	<b>11,287</b>	<b>1,808</b>	<b>1,119 RMS</b>
	<b>13,112</b>		

*Table 4: Analysis of the main units of the NTS, in terms of service life*

Although the asset base is aged, over 71% of the 13,112 km of gas transmission pipelines requiring upgrading and modernisation, the technical state of the NTS is maintained at a proper level as a result of the fact that its operation is (i) *carried out under a maintenance system that is mostly preventive, planned and corrective* and (ii) *is sustained by annual investment, development and modernisation programs, that also include the minimal investment programs provided in the Concession Agreement.*

At present, the NTS is equipped with 1,007 cathodic protection stations. Cathodic protection greatly reduces the piping corrosion speed, thus increasing operation safety and reliability and the service life of the buried metal pipelines. The technical norms on the classification and service life of the assets establish a normal service life for the pipelines with cathodic protection that is twice as long (40-60 years) as that of the pipelines with no cathodic protection.

Approximately 5.6% of the total NTS pipelines/connections, representing 734 km of pipelines/connections, do not have cathodic protection. Of these, 205 km already have design themes/technical designs/execution contracts for cathodic protection.

Of the 1,119 regulating and metering stations, approximately 5% have been the subject of investment, development and modernisation programs in the last years, while the rest of the regulating and metering stations still need upgrading and modernisation works to be integrated in an automatic control and monitoring system – SCADA.

Of the metering directions in use, 948 are the subject of the SCADA system implementation. During 2010-2013, the compressor stations Șinca, Onești and Dealu Frumos underwent stages of rehabilitation/modernisation works.

Compressor stations	Compressor group	Commissioning month/year	Amortisation period	Technical state
VINȚU	G1	III 1966	12 years	Functioning – worn and obsolete
	G2	III 1966	12 years	
ȘINCA	G1	II 1974	12 years	Functioning – needs modernisation of the technical installations
	G2	II 1974	12 years	
	G3	II 1974	12 years	
	G4	II 1974	12 years	
DEALU FRUMOS	G1	VI 1987	12 years	Functioning – needs analysis for identifying a gas transmission system that is adapted to the technical characteristics of the station.
	G2	XI 1987	12 years	
	G3	XI 1987	12 years	
	G4	I 1998	12 years	
ONEȘTI	G1	VIII 1976	12 years	Functioning – needs modernisation of the technical installations
	G2	IV 2007	12 years	
SILIȘTEA	G1	XII 1980	12 years	Functioning – needs modernisation of the technical installations
	G2	XII 1980	12 years	
	G3	V 1999	12 years	

**Table 5 – Present situation at the compressor stations Șinca, Onești, Siliștea, Vințu and Dealu Frumos.**



All these components of the NTS ensure the taking over of the gas from producers/suppliers and its transmission to the consumers/distributors or storage facilities.

### **Cross-border interconnection points**

At present, the gas imports to Romania are ensured through 3 cross-border interconnection points:

#### **UKRAINE**

##### **Orlovka (UA) – Isaccea (RO)**

Diameter = 1,000 mm

Capacity = 8.6 bcm/year

$P_{\max} = 55$  bar

##### **Tekovo (UA) – Medieșu Aurit (RO)**

Diameter = 700 mm

Capacity = 4 bcm/year

$P_{\max} = 70$  bar

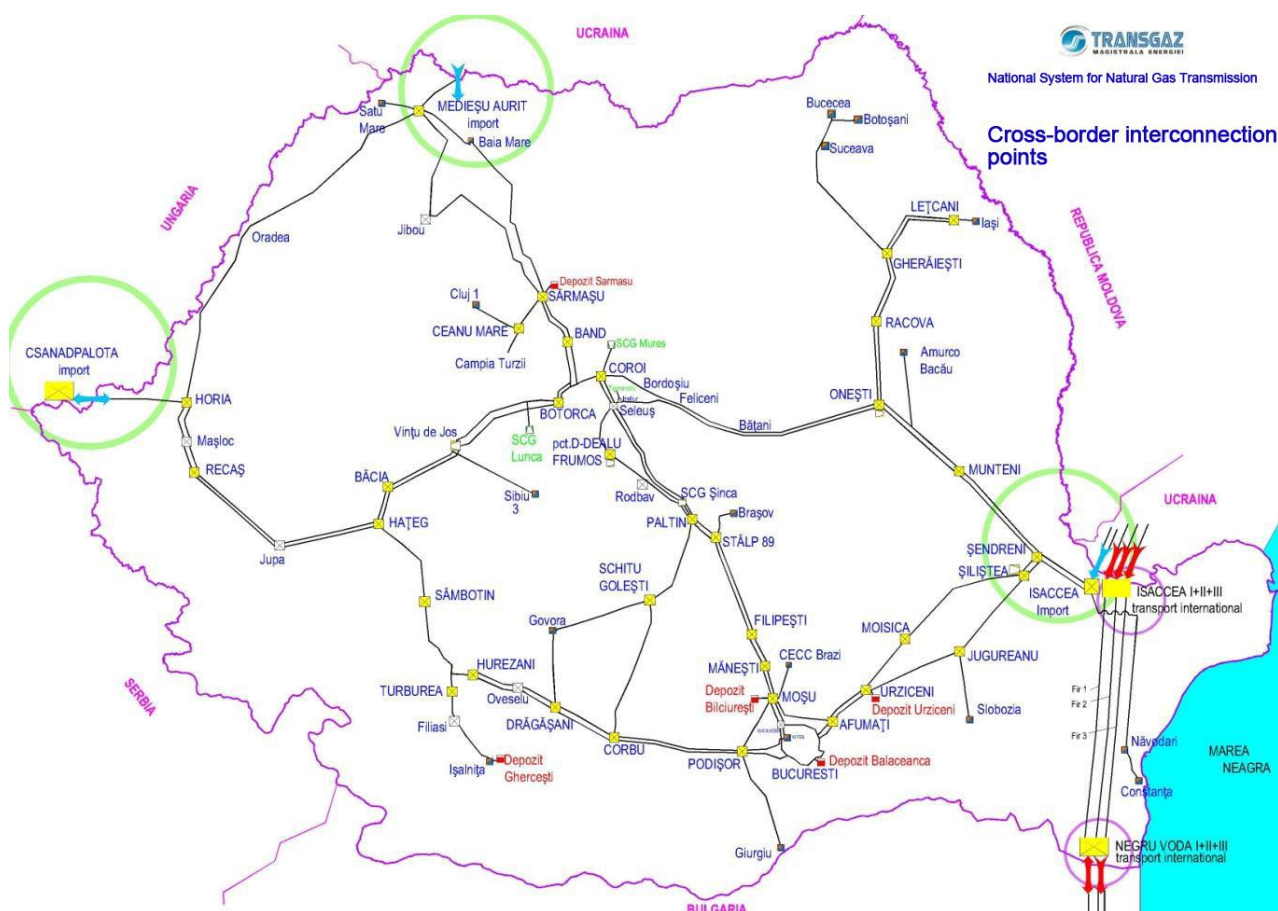
#### **HUNGARY**

##### **Szeged (HU) – Arad (RO)- Csanadpalota**

Diameter = 700 mm

Capacity = 1.75 bcm/year

$P_{\max} = 63$  bar



**Fig. 4 – NTS cross-border interconnection points**

Interconnection point	System operator 1	System operator 2	Physical technical capacity GWh/day (July 2013)	Conversion factor in mcm/day
Negru Vodă I	Transgaz SA	Bulgartransgaz	151	11.19-11.22
Negru Vodă II-III	Transgaz SA	Bulgartransgaz	602	
Csanadpalota	FGSZ	Transgaz SA	51	11.19
Mediesu Aurit (RO) – Tekovo (UA)	Ukrtransgas	Transgaz SA	113	11.17
Isaccea (RO) – Orlovka (UA)	Ukrtransgas	Transgaz SA	251	11.17
Isaccea (RO) – Orlovka (UA) (I+II+III)	Ukrtransgas	Transgaz SA	753	11.19

**Table 6 – Technical characteristics of the cross-border interconnection points**

## 4. ROMANIAN AND REGIONAL GAS MARKET

### 4.1 Romanian gas market

The present structure of the Romanian<sup>1</sup> gas market includes:

- 1 operator of the National Transmission System – SNTGN TRANSGAZ SA MEDIAȘ;
- 6 gas producers: Romgaz, OMV Petrom, Amromco Energy, Rafless Energy, Lotus Petrol, Foraj Sonde;
- 2 underground storage operators: Romgaz and Depomureș;
- 41 distribution economic operators – the largest being Distrigaz Sud Retele Srl and E.ON Gaz Distribuție SA;
- 41 suppliers operating on the regulated gas market;
- 45 suppliers operating on the competitive gas market.

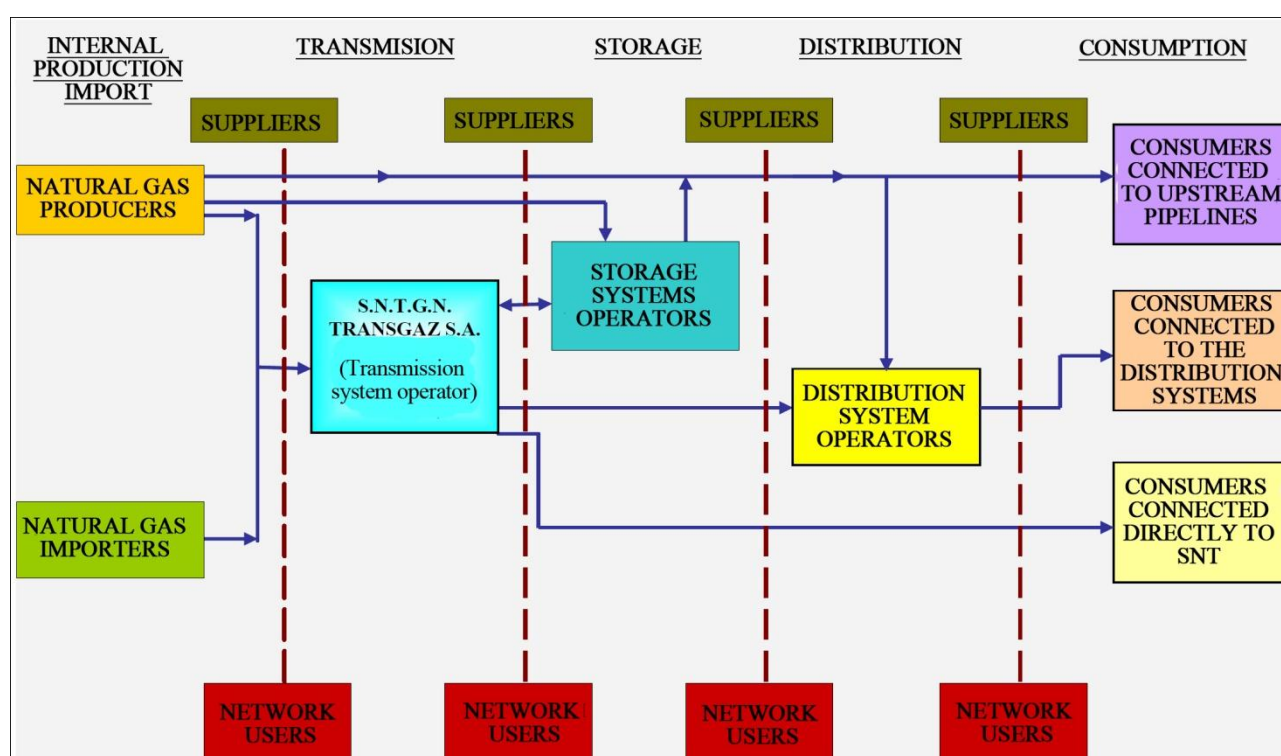


Fig. 5 – Diagram representation of the Romanian gas market

The internal gas market has two components:

- **the competitive segment**, which includes:
  - *wholesale market* which functions based on: (i) bilateral contracts between the gas economic operators, (ii) transactions on centralized markets managed by the operator of the gas market or the operator of the balance market, whichever the case, and (iii) other types of transactions or contracts.
  - *retail market* where the suppliers sell gas to final clients through contracts with negotiated prices.
- **regulated segment** which includes the natural monopoly activities, the related activities and gas supply at a regulated price, based on the ANRE approved frame agreements.

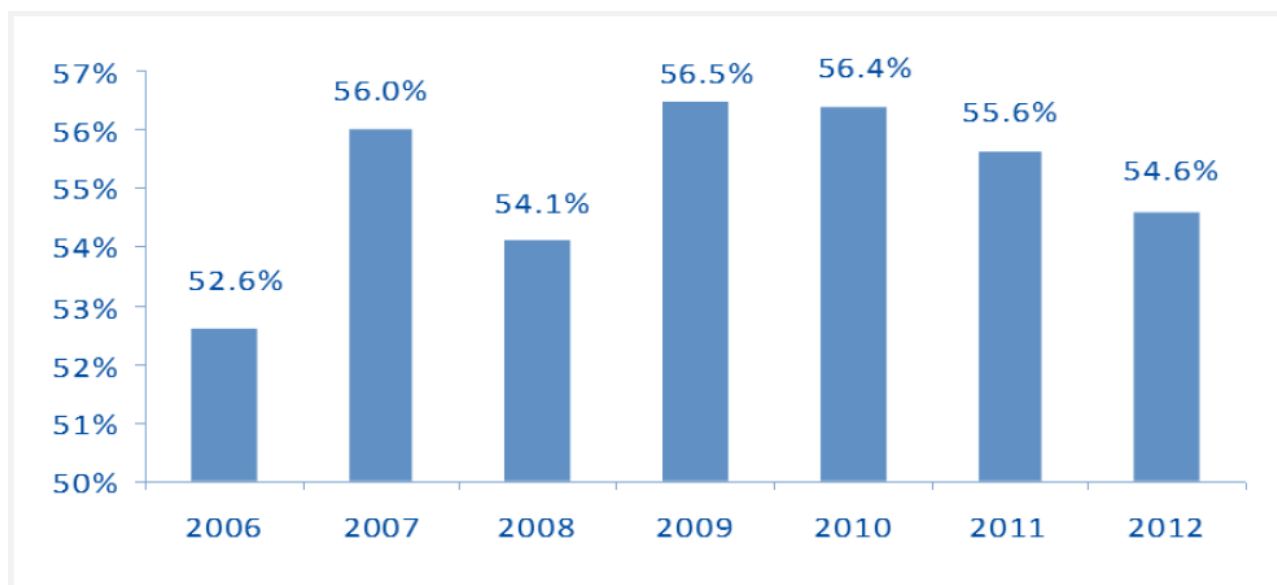
<sup>1</sup> The 2013-2017 Plan of Administration of SNTGN Transgaz SA Mediaș



The increase of the competitive market share is achieved gradually by ensuring access to this market for more participants, suppliers and final clients. The final clients can choose their supplier and can directly negotiate purchase agreements with the supplier.

The Romanian gas market has been gradually opened starting with 2001, from 10% of the total consumption, reaching 100% in January 2007 for industrial consumers.

For domestic consumers, the gas market was liberalized in July 2007 and at present, according to the provisions of Directive 2009/73/EC, the national market is 100% open.



**Chart 6 – Degree of internal gas market opening(%)**

*Source: ANRE 2006-2012 Annual Reports, ANRE Monthly Report of monitoring the internal gas market in December 2012*

In December 2012, the real degree of market opening was 54.61%, meaning that 54.61% of the consumers (in terms of volume) have actively chosen their supplier, being eligible consumers, the rest being considered captive consumers<sup>2</sup>.

#### **The development of the internal gas market aims at:**

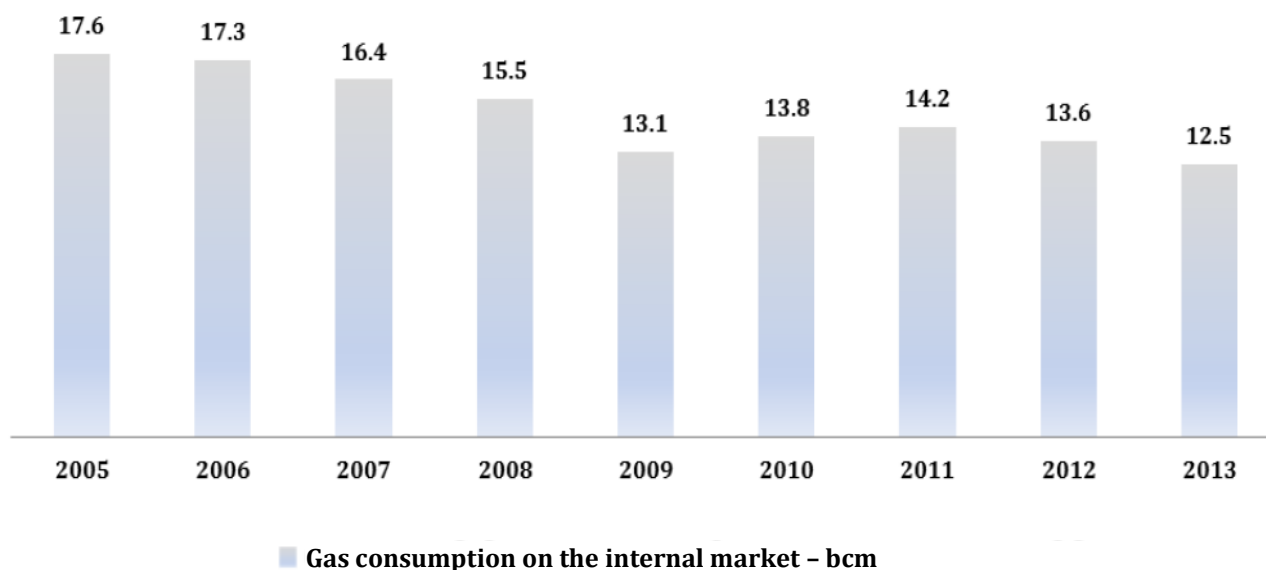
- the development of competition between gas suppliers;
- continuing to implement “cap” pricing methods;
- stimulating the opening and/or the rehabilitation of gas deposits, in order to increase the internal production of gas and limit the dependency on imports;
- diversification of the import/export sources.

**Transgaz**, as technical operator of the NTS, represents the turntable in ensuring the security of gas supply to the country and in the correct functioning of the national gas market.

<sup>2</sup> Romania’s Energy Strategy 2011-2035

#### 4.1.1 2005-2013 internal production and consumption

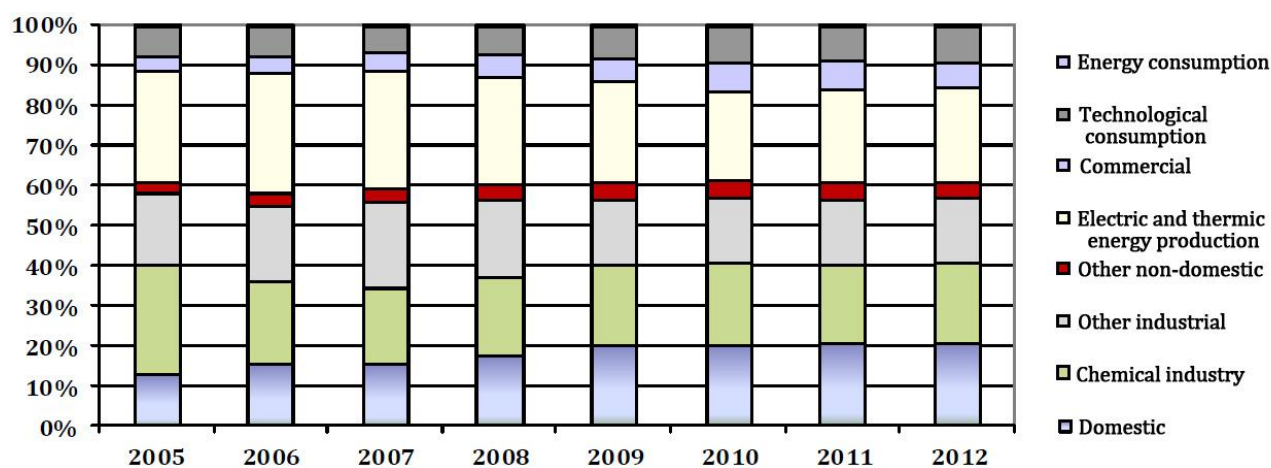
The gas **consumption** on the Romanian market during 2005-2013, expressed in bcm, is as follows:



**Chart 7 – Gas consumption on the Romanian market during 2005-2013**

Source: National Dispatching Centre and 2013-2017 Plan of Administration of SNTGN Transgaz, as well as public sources

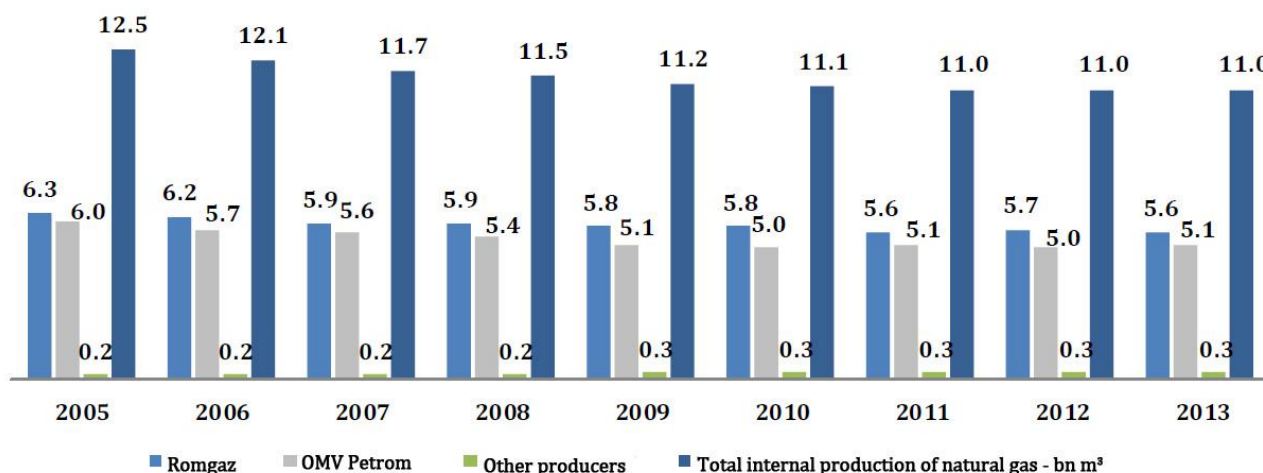
The structure of **gas consumption** based on final consumers, during 2005-2012:



**Chart 8 – The structure of gas consumption based on consumer categories**

Source: Annual Reports of THE ANRE

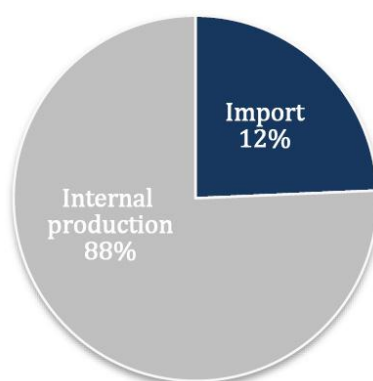
**The domestic production of gas (bcma) during 2005-2013, based on the main producers, is as follows:**



**Chart 9 - The internal production of gas based on the main producers during 2005 – 2013**  
 Source: Internal – Dispatching Centre and 2013-2017 Plan of Administration of SNTGN Transgaz SA

**In 2013, the domestic gas production** included in consumption represented **~88%** of the total sources. 97.72% of gas is produced by the two large producing companies, Romgaz and OMV Petrom, while the rest of 2.28 % is represented by other producers.

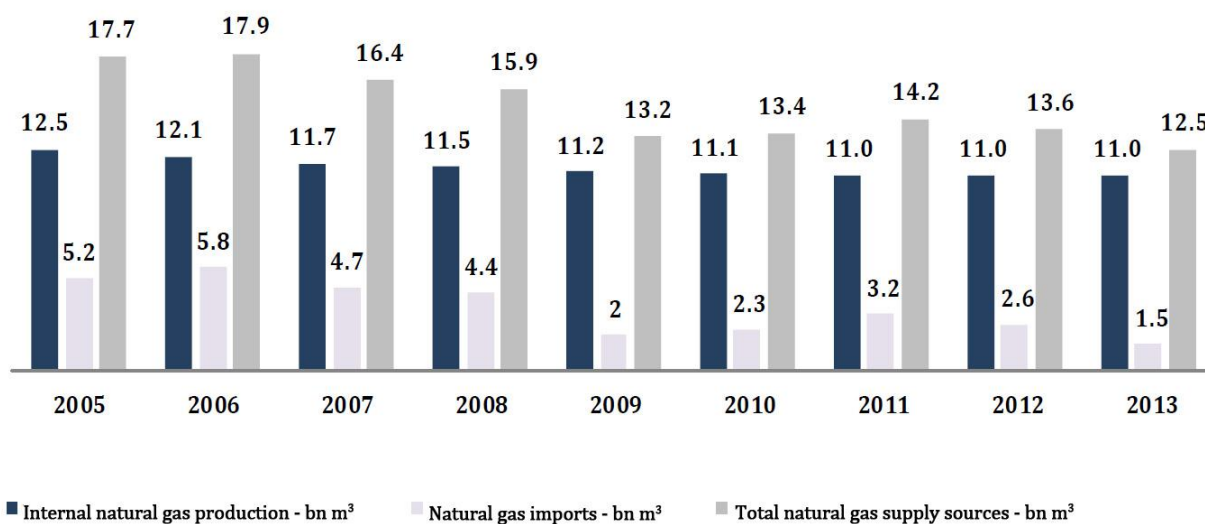
**The imports of gas** which were included in the consumption for **2013** represented **12%**.



**Fig. 6 – Percentage of internal production and imports in year 2013**  
 Source: 2013-2017 Plan of Administration of SNTGN Transgaz SA

#### 4.1.2 2005 - 2013 gas supply sources



The supply sources to cover gas consumption (bcm/a) during 2005 - 2013 are as follows:





**Chart 10 – Gas supply sources over the period 2005 – 2013**

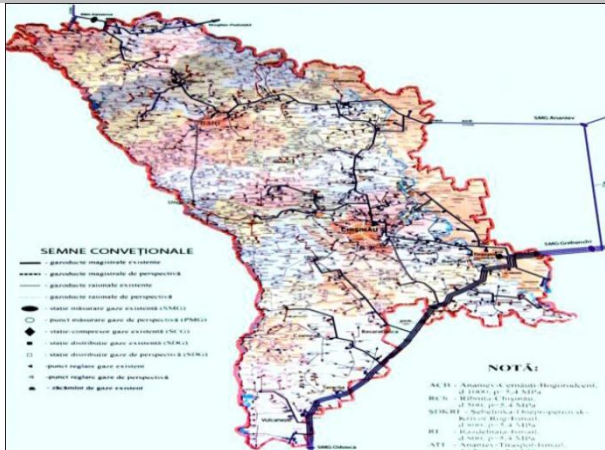
Source: Dispatching Centre and 2013-2017 Plan of Administration of SNTGN Transgaz SA

## 4.2 Regional gas market and gas supply possibilities

Infrastructure of the neighbouring countries	
	
	Transmission operators
	Transmission system length
	Compressor stations power
	Interconnections
	Storage
	Transmission operators
	Transmission system length
	Compressor stations power
	Interconnections
	Storage

	
Transmission operators	1 FGSZ
Transmission system length	5,564 km
Compressor stations power	188 MW
Interconnections	Beregdaroc – Ukrtransgas (UA) Mosonmagyaróvár – OMV Gas (AT) Kiskundorozsma – Srbijagas (RS) Csanadpalota – Transgaz (RO) Dravaszerdahely – Plincro (HR)
Storage	Zsana – E.ON Foldgaz Storage Hajuszoboszlo - E.ON Foldgaz Storage Pusztaedrics - E.ON Foldgaz Storage Kardosku - E.ON Foldgaz Storage
	
Transmission operators	Ukrtransgas branch of Naftogaz
Transmission system length	Naftogaz – 39,800 km of pipelines (367,000 km of gas distribution networks)
Compressor stations power	Transmission: 263 MW Storage: 10 MW
Interconnections with Romania	Orlovka – Isaccea (RO) Tekovo – Medieșu Aurit (RO)
Storage	Naftogaz – 13 underground storage facilities with a capacity of 32 bcm



 <p><b>SEMNE CONVENTIONALE</b></p> <ul style="list-style-type: none"> <li>— gazoducte magistrale existente</li> <li>— gazoducte magistrale de perspectivă</li> <li>— gazoducte locale existente</li> <li>— gazoducte locale de perspectivă</li> <li>— stații de compresoare gaze existente (CMC)</li> <li>— stații de compresoare gaze de perspectivă (CMC)</li> <li>— stații de distribuție gaze existente (SDC)</li> <li>— stații de distribuție gaze de perspectivă (SDC)</li> <li>— puncte de reglare gaze existente</li> <li>— puncte de reglare gaze de perspectivă</li> <li>— stații de gaze existente</li> </ul> <p><b>NOTĂ:</b></p> <p>SC 11 - Anunțarea și aprobarea proiectelor de lege nr. 1/2011      SC 12 - Anunțarea și aprobarea proiectelor de lege nr. 2/2011      SC 13 - Anunțarea și aprobarea proiectelor de lege nr. 3/2011      SC 14 - Anunțarea și aprobarea proiectelor de lege nr. 4/2011      SC 15 - Anunțarea și aprobarea proiectelor de lege nr. 5/2011      SC 16 - Anunțarea și aprobarea proiectelor de lege nr. 6/2011      SC 17 - Anunțarea și aprobarea proiectelor de lege nr. 7/2011      SC 18 - Anunțarea și aprobarea proiectelor de lege nr. 8/2011      SC 19 - Anunțarea și aprobarea proiectelor de lege nr. 9/2011      SC 20 - Anunțarea și aprobarea proiectelor de lege nr. 10/2011</p>	
Transmission operators	1 Moldovagaz (transmission and distribution)
Transmission system length	1,600 km (20,000 km of distribution)
Compressor stations power	4 compressor stations
Interconnections	With Romania – in progress

**Table 7 – Regional gas market**



**Fig. 7 – Map of Romania's neighbouring countries and the length of the gas transmission system**

### Gas consumption, imports and domestic production of the neighbouring countries:

Country	Gas consumption in 2011, of which:	Gas imports	Domestic production	Future projects
Bulgaria	3.002	2.564	0.438	<ul style="list-style-type: none"> <li>Interconnecting the gas transmission network of Bulgaria with Turkey, Serbia and Romania;</li> <li>The reversibility of the gas flow with Romania and Greece;</li> <li>The construction of the international transmission pipeline South Stream and its connection to the internal gas transmission network;</li> <li>Greece – Bulgaria interconnection.</li> </ul>
Serbia	2.667	2.15	0.517	<ul style="list-style-type: none"> <li>Interconnection with <b>Romania on the Mokrin – Arad route</b>;</li> <li>Interconnections with Bosnia and Herzegovina on the Novo Selo-Bijeljina route;</li> <li>Interconnection with Bulgaria on the Nis-Dimitrovgrad direction;</li> <li>Construction of the Banatski Dvor storage unit (capacity between 800 mcm and 1 bcm of gas);</li> <li>Construction of the Itebej storage unit (capacity between 800 mcm and 1 bcm of gas).</li> </ul>
Hungary	10.483	8.019	2.464	<ul style="list-style-type: none"> <li>The achievement of the Szeged – Arad interconnection reverse flow project answers the needs for integration of the regional markets with the European market, opening the possibility to supply Central and Western Europe with gas from Eastern and Southern Europe.</li> <li>For the diversification of supply sources, Hungary adhered to AGRI. The projects for interconnection with Slovenia and Croatia and increasing the transmission capacity between the East and the West of Hungary are important.</li> </ul>
Ukraine	55.76	36.4	19.36	<ul style="list-style-type: none"> <li>Because of the South Stream Project altering the gas transmission route from Russia to Europe, Ukraine has to look for other supply sources, taking into account the AGRI and LNG Odessa projects and other sources from the Middle East, using the transmission infrastructure from the Balkan area, including Romania.</li> <li>Therefore, Ukraine began negotiations with Romania, Germany and Turkey for the annual purchasing of 2 – 3.5 bcm of gas from each of these countries, in order to reduce the imports from Russia.</li> </ul>
Republic of Moldavia	1.18	1.18	-	<ul style="list-style-type: none"> <li>The Republic of Moldavia is dependent on gas <b>imported</b> from a single source and actively participates to the interconnection of its own gas transmission system with the similar system of Romania, a project that will grant access to other gas supply sources.</li> </ul>

*Table 8 - Gas consumption, imports and domestic production of the neighbouring countries*



### **4.3 The conclusions of the regional gas market analysis**

All the information about the neighbouring countries' gas markets shows an important dependency of these markets on import gas sources.

If up until recently the only gas supply source for these countries was Russia, today, through the planning and partial implementation of new infrastructure projects, the neighbouring countries seek to diversify these sources, in order to increase the reliability of exploitation and to ensure competitive prices.

The orientation of the gas transmission system operators from neighbouring countries towards creating new cross-border transmission capacities, or increasing the already existing ones, clearly shows the preoccupation for an important increase in interconnectivity in a European region where there is still much to be done for a perfectly integrated market:

- **Ukraine** recently completed the reverse flow with Hungary and is currently implementing the project for reversing the flows with Slovenia;
- **Hungary** has planned investments for developing the gas transmission capacities between the Eastern and Western parts of the country, but is also planning to implement a North-South corridor which would link Slovakia and Croatia.
- **Serbia** will benefit from the South Stream project, but is also looking for other supply sources other than Russian, by planning interconnections with Bosnia and Herzegovina and Romania.
- **Bulgaria** in its turn, besides the South Stream, is making efforts to execute the Greece – Bulgaria interconnection and a new interconnection with Turkey in order to benefit from the Caspian gas and to transmit gas towards the Central European markets.

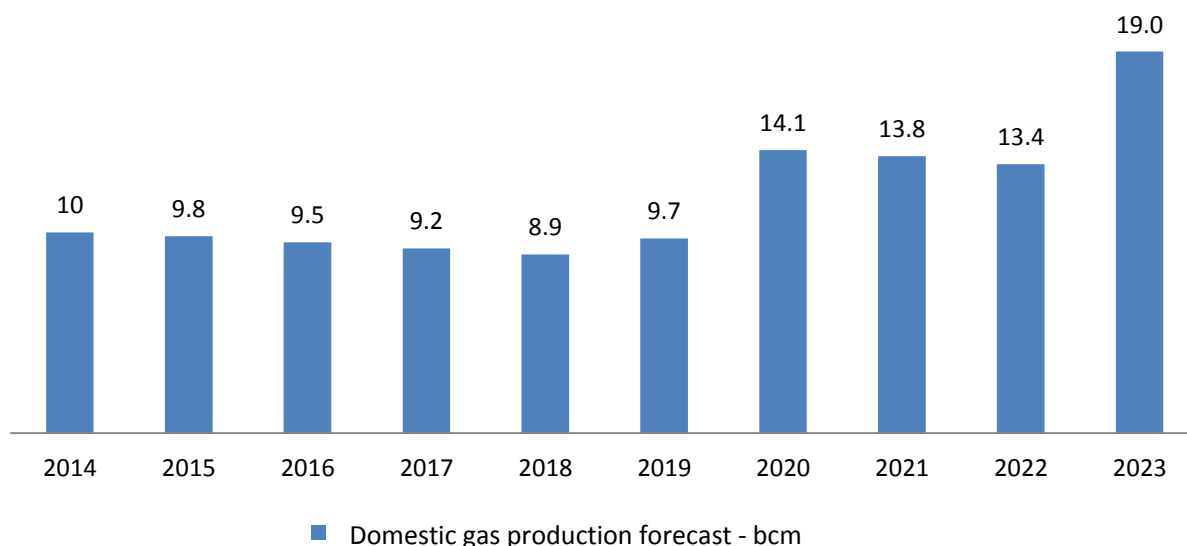
In this context, **Romania** has the largest market and is also the least dependent on gas imports. Adding to this the favourable geostrategic position, the recently discovered resources in the Black Sea, as well as the potential future given by shale gas, Romania could play a defining role in the region.

As such, the gas transmission infrastructure probably becomes the most important factor, and **Transgaz** is currently facing a major challenge: the development – in the least amount of time possible – of gas transmission corridors ensuring the necessary interconnectivity at European level and enough gas transmission potential for the use of the resources on the internal and regional markets.

## 5. 2014 – 2023 FORECASTS

### 5.1 Domestic gas production forecast

For the period 2014 – 2019 the domestic gas forecast is based on the Europe Oil&Gas Market Forecasts to 2019 (BUSINESS MONITOR INTERNATIONAL) study, and for the 2019 – 2023 domestic gas production forecast it was maintained the same descending trend plus the quantities of gas estimated to be withdrawn from the Black Sea.



*Chart 11 – 2014 - 2023 domestic gas production forecast*

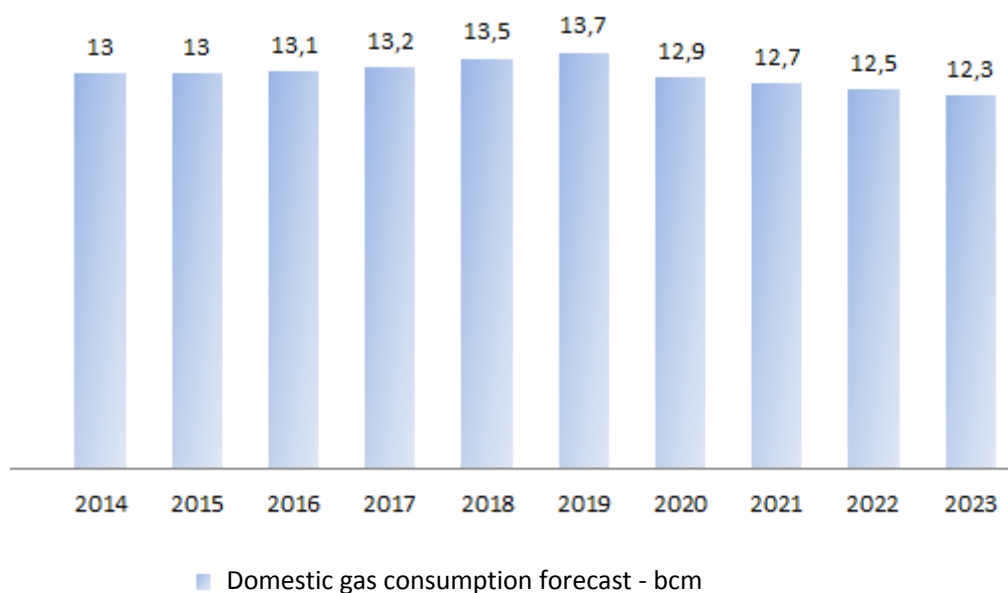
### 5.2 Domestic gas consumption forecast

Gas resources for domestic consumption come from the domestic production and imports.

Gas sources for domestic consumption over the next 10 years are difficult to estimate, but domestic production tends to decrease while the imports tend to increase.

The two sources may vary considerably depending on:

- the imported gas price evolution;
- the possible external conflicts;
- the government policies of Romania;
- tapping into the gas reserves from the Black Sea.



*Chart 12 – 2014 - 2023 domestic gas consumption forecast*

### Considerations to be taken into account:

#### Forecast assumptions:

- for 2014 - 2019, the gas quantities regarding consumption were published in the Europe Oil&Gas Market Forecasts to 2019 (BUSINESS MONITOR INTERNATIONAL) study;
- for 2019 - 2023, a decrease of gas deliveries is foreseen, mainly because of the increase in gas price both for household and industry, this increase being at least of 1 – 5% per year.
- for 2019 - 2023, it is foreseen a technological consumption decrease by 0.03% every year;
- the decrease in internal production would need to be compensated by additional gas from imports;
- these deficits may, however, be covered, totally or partially, from other sources, which could also be exported:
  - gas from the Black Sea
  - shale gas;
- the possible exports from the above-mentioned sources have not been taken into consideration.

## 6. SECURITY OF GAS SUPPLY

In order to meet the requirements of European Regulation no. 994/2012, art. 9, Transgaz shall ensure until 3 December 2014, the completion of all the necessary measures, so that, in case the “main infrastructure” is affected, the capacity of the remaining infrastructure, determined according to the N-1 formula, may satisfy the gas demand necessary for the calculated area for one day of peak consumption demand (the peak daily consumption demand over the last 20 years).

The obligation to ensure that the remaining infrastructure has the capacity to satisfy the total gas demand mentioned above is considered to be observed in the case that the competent authority, Transgaz, proves in the preventive action plan that a supply disruption can be sufficiently compensated and in due time through proper measures based on market demand.

The following assumptions were considered for the calculation of the N-1 formula:

- the size of the market, classic consumption scenario;
- network configuration;
- local gas production;
- the forecasted capacity for the new interconnections;
- the forecasted capacity after the reverse flow optimisation.

**The N-1 formula** describes the technical capacity of the gas transmission infrastructure to satisfy the total gas demand of Romania in the case that the single main gas network is affected, for one day of exceptionally high demand, recorded statistically once every 20 years.

The gas infrastructure includes the gas transmission network, including interconnections, as well as the production facilities, LNG and storage facilities connected to the relevant area.

The technical capacity<sup>3</sup> of all the other gas infrastructures, available in the case that the single main gas infrastructure is affected, must be at least equal to the daily total gas demand for the relevant area, during one day of exceptional high gas demand, recorded statistically once every 20 years.

The result of the N-1 formula must be equal to at least 100%.

The calculation method for the N-1 formula:

$$N - 1[\%] = \frac{EP_m + P_m + S_m + LNG_m - I_m}{D_{max}} \times 100, N - 1 \geq 100\%$$

where:

*Definitions regarding demand*

“D<sub>max</sub>”: daily gas demand (in mcm per day) in Romania during a day with exceptionally high demand, statistically recorded once every 20 years.

<sup>3</sup> According to article 2, paragraph (1), letter 18 of Regulation (EC) no. 715/2009, “technical capacity” means the maximum firm capacity that the transmission system operator can offer to the network users, taking account of system integrity and the operational requirements of the transmission network.

### Definitions regarding offer

“EP<sub>m</sub>”: the entry point technical capacity (mcm/day), other than production, LNG and storage facility entry points, symbolized by P<sub>m</sub>, S<sub>m</sub> and LNG<sub>m</sub>, meaning the sum of the technical capacities in all border entry points, capable of supplying Romania with gas;

“P<sub>m</sub>”: the maximum technical capacity for production (mcm/day) means the sum of the daily maximum production capacities of all the gas production facilities, capable of supplying Romania with gas;

“S<sub>m</sub>”: the maximum technical capacity for withdrawal (mcm/day) means the sum of the daily maximum capacities for withdrawals from all the storage facilities, that can be supplied to the Romanian entry points, taking account the physical properties of each of them;

“LNG<sub>m</sub>”: the maximum technical capacity of LNG facilities (mcm/day) means the sum of the maximum daily technical capacities for withdrawal from all the LNG facilities in Romania, taking into consideration critical elements, such as unloading, additional services, temporary storage and the regasification of LNG, as well as the technical capacity for extraction;

“I<sub>m</sub>”: means the technical capacity of the single main gas infrastructure (mcm/day), with the highest supply capacity for Romania. If several infrastructures are connected to the same infrastructure upstream or downstream and cannot be operated separately, these are considered as a single gas infrastructure. RO L 295/18 Official Gazette of the European Union 12.11.2010.

**The result of the N-1 formula calculated for Romania is as follows:**

$$N - 1[\%] = \frac{EP_m + P_m + S_m + LNG_m - I_m}{D_{max} - D_{eff}} \times 100, N - 1 \geq 100\%$$

$$N - 1[\%] = \frac{39,38+28,50+27,10+0-23,59}{72,0-0} \times 100, N-1 \geq 100\%$$

$$N-1[\%] = 99.1527\%$$

**Therefore: N-1<100%**

### Definition regarding demand

“D<sub>eff</sub>”: means the part (in mcm/day) of D<sub>max</sub> which, in the case of supply disruptions, can be covered in a sufficient manner and in due time by means of market measures regarding demand, according to article 5 , paragraph (1), letter (b) and article 6, paragraph (2).

### Explanations regarding the used values

#### a) Terms regarding demand:

$$D_{max} = 72.0 \text{ mcm/day}$$

$$D_{eff} = 0.0$$

#### b) Terms regarding offer (capacity):

$$EP_m = 39.38 \text{ mcm/day}$$

$$P_m = 28.60 \text{ mcm/day}$$

$$S_m = 27.10 \text{ mcm/day}$$

$$LNG_m = 0 \text{ mcm/day}$$

$$I_m = 23.59 \text{ mcm/day}$$

At EP<sub>m</sub> value determination, the Isaccea Import, Medieșu Aurit and Csanadpalota entry points were considered as follows:

Entry point	Entry point capacity [m <sup>3</sup> /day]	Entry point capacity [mcm/day]
Isaccea Import entry point	23,590,656	23.59
Medieșu Aurit Import entry point	10,992,000	10.99
Csanadpalota entry point	4,800,000	4.80
<b>Total</b>		<b>39.38</b>

*Table 9 - Gas import points*

**Note:**

- For P<sub>m</sub>, the production potential was considered, and not the technical capacity (70.22 mcm/day). We consider that this approach ensures a correct image offered by the N-1 standard, the technical capacity mentioned not being achieved due to decreased domestic production;
- This document represents an evaluation made by SNTGN Transgaz SA Mediaș;
- The official calculation of the N-1 formula is the exclusive task of the Competent Authority assigned for applying Regulation (EU) no. 994/2010.

## 7. DEVELOPMENT PATHS FOR THE NATIONAL GAS TRANSMISSION SYSTEM (NTS)

### Overview

The physical structure of the National Gas Transmission System offers the possibility to identify and construct transmission corridors that would meet the gas supply safety requirements for the consumption areas in the country and create possibilities for the transfer through the Romanian system of gas quantities from the systems of the neighbouring countries, as a requirement imposed by the liberalisation of the gas markets and the European regulations.

The Romanian gas transmission system consists mainly of the following transmission corridors:

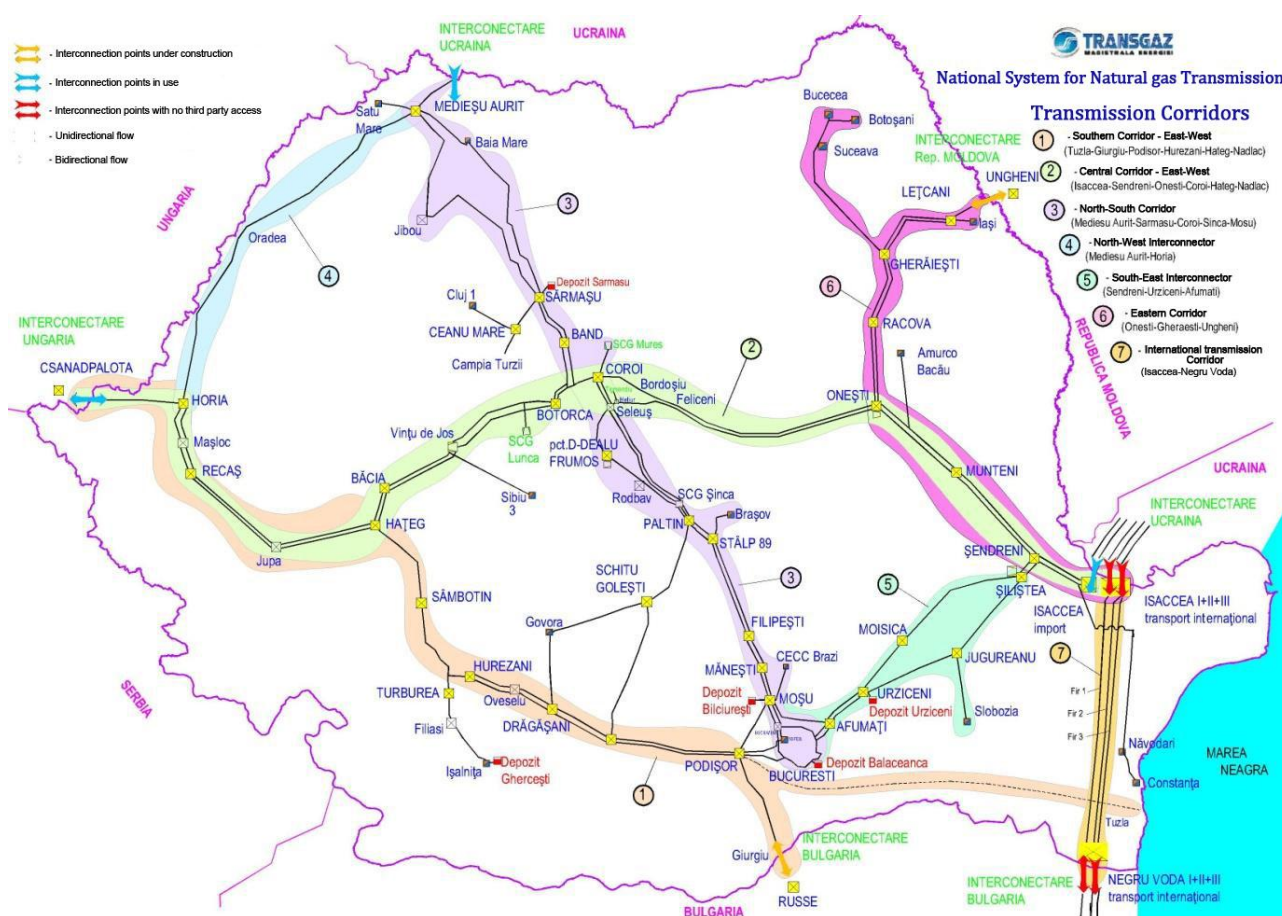


Fig. 8 – Gas transmission corridors of NTS

### Southern Corridor 1– East-West

At present, the corridor pipelines ensure:

- gas import through the Csanadpalota interconnection point with Hungary, at a capacity of 1.75 bcm /year;
- taking over the domestic gas production from the sources in Oltenia;
- gas supply for the consumption in the Western and Southern-Bucharest areas.



The development of this transmission corridor aims both at increasing transmission capacity of the cross-border interconnection points with Hungary (at 4.4 bcm/year at Csanadpalota-Horia) and with Bulgaria (to 1.5 bcm/year at Giurgiu-Russe) and the bidirectional physical transmission of gas from the Black Sea deposits to the internal consumption areas and to the cross-border interconnection points of this corridor. Development means both rehabilitation of some of the existing pipelines, construction of new pipelines and compressor stations building in certain locations (Horia, Hațeg, Corbu).

### **Central Corridor 2 East-West**

At present, the corridor pipelines ensure:

- gas import through the Csanadpalota interconnection point with Hungary, at a capacity of 1.75 bcm/year;
- gas import through the Isaccea interconnection point with Ukraine, at a capacity of 8.6 bcm/year;
- taking over the internal gas production from the sources in Ardeal;
- gas supply for consumption in the Eastern and Western areas.

The development of this transmission corridor aims both at increasing transmission capacity of the cross-border interconnection point with Hungary (at 4.4 bcm/year at Csanadpalota-Horia) and the bidirectional physical transmission of gas between this point and the cross-border interconnection point with Ukraine (Isaccea). In this regard, it is needed to rehabilitate some of the existing pipelines of this corridor and to construct new pipelines and to create new compressor stations or to upgrade some of the existing ones (Onești, Coroi, Vințu, Hațeg, Horia).

### **Corridor 3 North-South**

At present, the corridor pipelines ensure:

- gas import through the Medieșu Aurit interconnection point with Ukraine, at a capacity of 4.0 bcm/year;
- taking over the gas production from the sources in Ardeal;
- storing gas in the internal underground storage facilities;
- gas supply for the consumption in the Northern, Central and South-Eastern-Bucharest areas.

### **Interconnection 4 North-West**

At present, the interconnection corridor pipelines ensure:

- transmission of imported gas from the Medieșu Aurit interconnection point with Ukraine to the Csanadpalota-Horia interconnection point with Hungary;
- gas supply for the consumption of the Western-Oradea area.



## **Interconnection 5 South-East**

At present, the interconnection corridor pipelines ensure:

- transmission of imported gas from the Isaccea interconnection point with Ukraine to the Bucharest consumption area and the related underground storage facilities (Bilciurești, Urziceni, Bălăceanca);
- gas supply for the consumption of the South-Eastern-Urziceni area.

## **Eastern Corridor 6**

At present, the corridor pipelines ensure gas transmission from the Isaccea interconnection point to the North Moldavia consumption area.

The development of this transmission corridor aims at ensuring physical bidirectional interconnection with the Republic of Moldavia (at Ungheni). For this purpose, some of the pipelines existing on this corridor require rehabilitation. On the other hand, the construction of new pipelines and the creation of compressor stations, or the upgrading of some of the existing ones (Onești, Gherăiești) is needed.

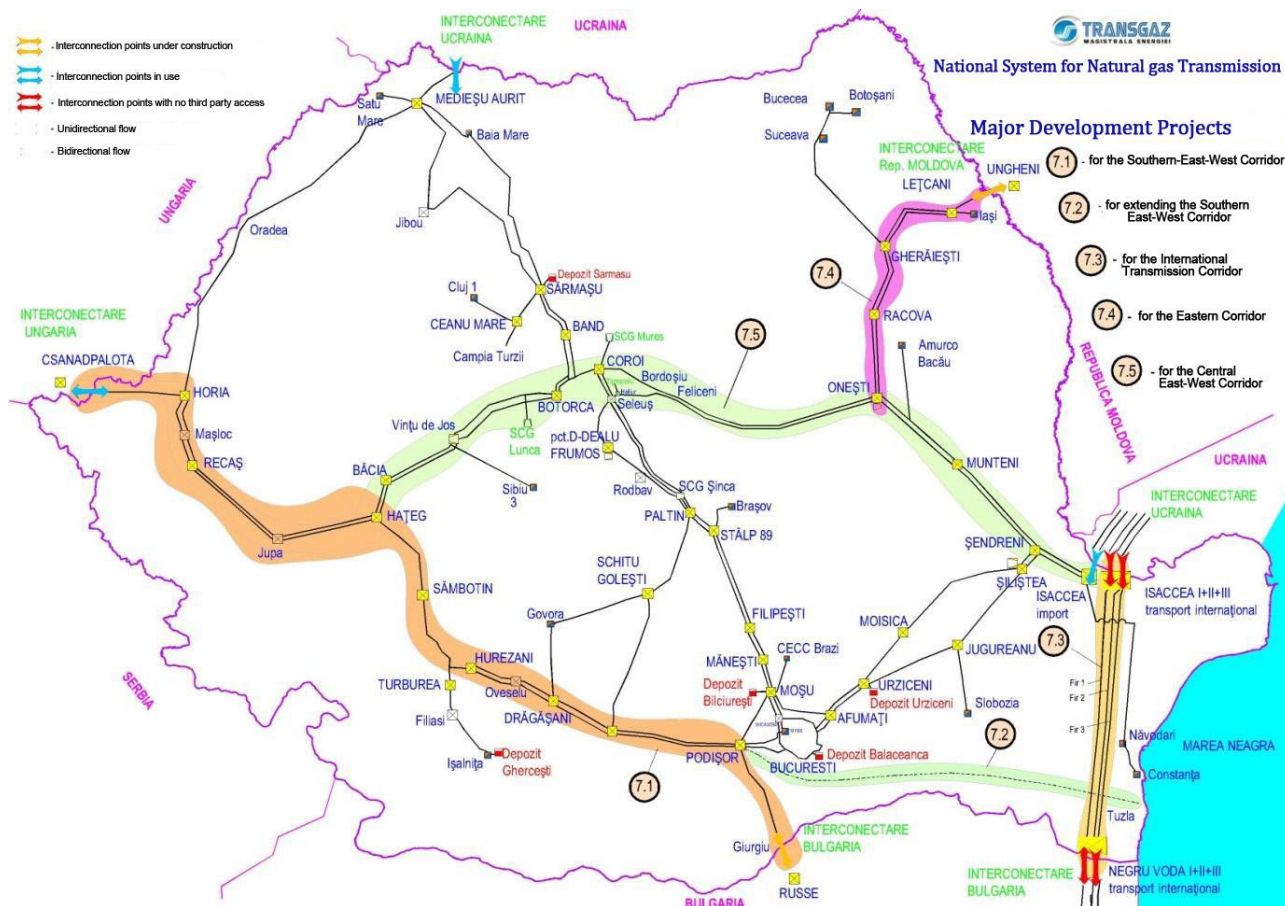
## **International Transmission Corridor 7**

At present, the corridor pipelines ensure international transmission of gas from Russia, via Ukraine, through the Isaccea I+II+III interconnection point, towards Greece and Turkey, via Bulgaria, through the Negru Vodă I+II+III interconnection point.

The development of this transmission corridor aims at ensuring physical interconnection with the Romanian gas transmission system and bidirectional flows at the Isaccea and Negru Vodă cross-border interconnection points.

## MAJOR PROJECTS

The present development plan for the Romanian gas transmission system consists of large scale projects meant to reconfigure the gas transmission network, which, although extended and complex, was designed at a time when the main goal was to supply gas to large industrial consumers and to provide them with access to the resources concentrated mostly in the middle of the country and in Oltenia, and to the sole import source.



**Fig. 9 - Map of major NTS projects**

The identification of the NTS projects that need to be developed was based on the main requirements the system has to meet under the present dynamics of the regional gas market.

Taking into account the latest evolutions and trends in the European gas transmission routes, two new important sources for gas supply are clearly emerging: **Caspian gas** and **the recently discovered Black Sea gas**.

Therefore, the projects planned by the company and described in this chapter, aim at:

- ensuring a proper interconnectivity with the neighbouring countries;
- creating regional gas transmission routes to ensure gas transmission from new supply sources;
- creating the necessary infrastructure for taking over and transmitting Black Sea gas to the Romanian market and other markets in the region;
- extending the gas transmission infrastructure to improve gas supply to deficient areas;
- creating the single integrated European market.

In this context, it is very important for Transgaz to implement the described projects on a short notice, in order to connect the Central European markets to these resources and to redefine itself as an important gas transmission operator.

The geostrategic position and the primary energy resources can support Romania's becoming a key player in the region, provided it keeps pace with the technological progress and succeeds in obtaining the necessary financing.

Therefore, by the envisaged projects meant to upgrade and develop the gas transmission infrastructure, by the smart network control, automation, communication and management system implementation, the company intends to maximize energy efficiency on the entire chain of activities and to create an efficient, reliable and flexible smart gas transmission system.

The **"smart energy transmission system"** concept applicable to the **"smart gas transmission systems"** will enhance network management which will also deal with smart tool safety and use issues regarding pressure, flow, metering, in-line inspection, odorization, cathodic protection, anticipative reactions, enhancing the system's operating flexibility, safety and integrity, generating the energy efficiency increase.

## ***7.1 Development on the Romanian territory of the National Gas Transmission System on the Bulgaria - Romania - Hungary - Austria Corridor***

Presently, the implementation of a major project range allowing for the diversification of Europe's gas supply sources by the transmission of Caspian gas to Central Europe is under way in Europe:

- enhancement of the South Caucasus Pipeline;
- building of the Trans-Anatolian Pipeline (TANAP);
- building of the Trans Adriatic Pipeline (TAP);
- building of the interconnection Greece - Bulgaria (IGB).

The implementation of these projects creates the possibility to transmit Caspian gas to the southern border of Romania.

Under these conditions, the National Transmission System needs to be adjusted to the new perspectives, by extending the transmission capacities between the existing interconnection points of the Romanian gas transmission system with the Bulgarian system (at Giurgiu) and the Hungarian system (at Nădlac).



***Fig. 10 - The interconnection points of the Romanian gas transmission system with the Bulgarian and Hungarian systems***





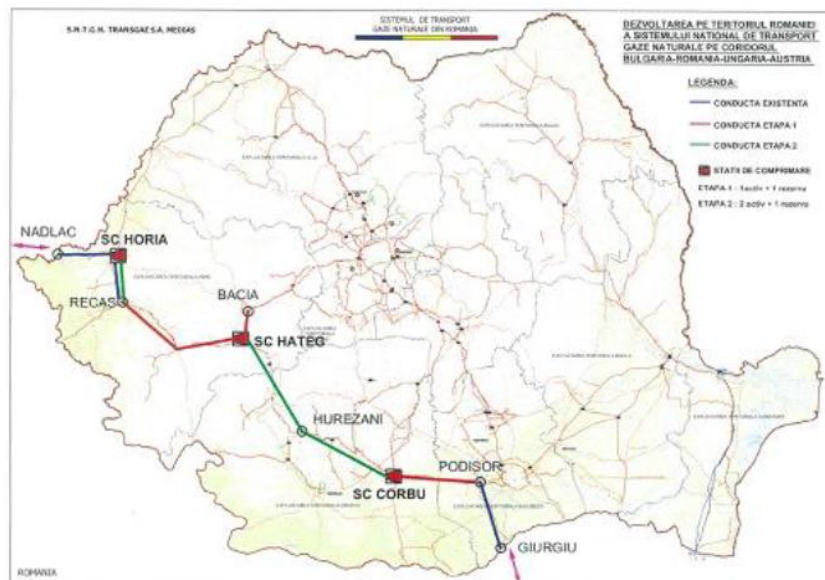
Therefore, the project was not included in the European TYNDP 2013 – 2022. However the European Commission took a last minute decision to include it in the list of the projects of common interests for granting an alternative for the diversification of the sources of supply for the member states impacted by the deselecting of the Nabucco project:

- **Project of common interest:** 7.1.5;
- **Project proposed for the following list of PCI having number:** TRA-N-358;
- **Priority corridor:** Southen Gas Corridor.

In conclusion, the project is a PCI and will be included also in the new edition of the TYNDP under preparation and in the following list of PCI to be adopted by the European Commission in 2015.

According to the development plan envisaged by Transgaz, the project aims at ensuring the physical possibility for permanent bidirectional flows between the interconnections with Bulgaria and Hungary and consists of the following:

- pipeline Podișor-Corbu 32" x 55 bar x 81 km;
- pipeline Băcia-Hățeg-Jupa-Recaș 32" x 55 bar x 167 km;
- three compressor stations (CS Corbu, CS Hățeg I and CS Horia I), with a total installed power of approximately  $P_{inst} = 49.5$  MW;
- pipeline Corbu-Hurezani-Hățeg 32" x 55 bar x 250 km;
- pipeline Recaș-Horia 32" x 55 bar x 47 km;
- enhancing the Horia Metering Station.



**Fig. 12 – The Bulgaria – Hungary corridor**

After completion of the project, the gas transmission capacity to Hungary will be of 4.4 bcm/year and of 1.5 bcm/year to Bulgaria.

### Project development schedule:

Development stages	Stage/Indicative completion date
Pre-feasibility study	completed
Feasibility study	June 2015
Technical documentation for issuance of building permit	January 2016
Issuance of building permits	February 2016
Taking the final investment decision	2016
Building	February 2019
Commissioning/starting of operation	April 2019

**Completion deadline: 2019**

**Total investment value** resulted from the Transgaz studies is estimated at **EUR 560 million**.

### Cost breaking down:

New transmission pipelines	EUR 414 million	~74%
Compressor stations	EUR 146 million	~26%
<b>TOTAL</b>	<b>EUR 560 million</b>	

Considering the status of project of common interest, Transgaz intends to obtain a EU grant under the Connecting Europe Facility.

In this respect an application was submitted during the first session for submission of grant requests for the engineering studies of the three compressor stations included in the project. The estimated value of these studies amounts to approximately EUR 3 million, the grant value possibly reaching 50% of this amount.

We shall try to obtain grants under the Connecting Europe Facility also for works during the 2015 grant request submission session. To this effect it is analyzed the possibility to cross-border allocate the cost according to Regulation (EU) No. 347/2013.

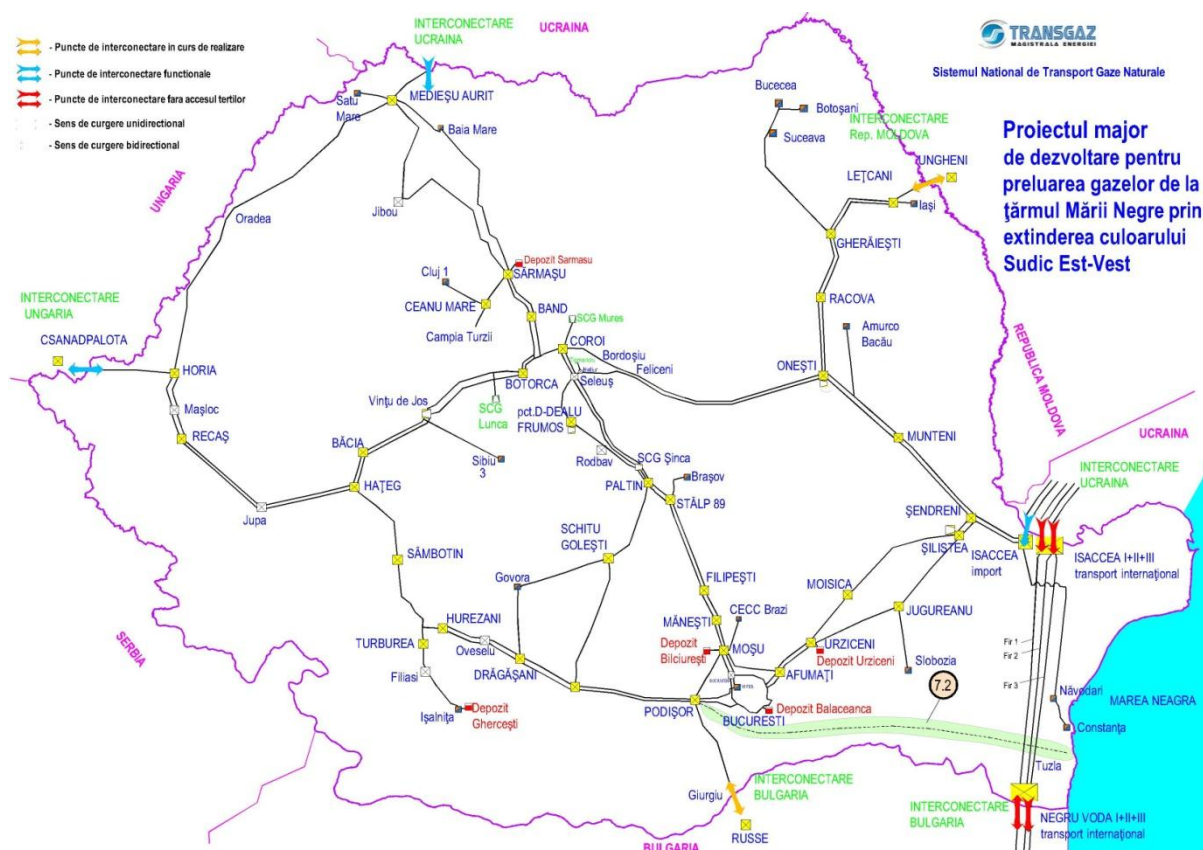
## ***7.2 Development on the Romanian territory of the Southern Transmission Corridor for taking over the Black Sea gas***

While Europe becomes more dependent on imported gas, access to new sources becomes an vital necessity.

The studies and evaluations made until now have shown important gas deposits in the Black Sea.

Under the circumstances, the development on the Romanian territory of a gas transmission infrastructure from the Black Sea shore to the border with Hungary represents one of TRANSGAZ major priorities.

The project became a priority for Transgaz in the second half of 2013, based on the necessity to ensure adequate transmission capacities to bring Black Sea gas on the Central European markets.



**Fig. 13 – Map of the major development project for taking over the gas from the Black Sea shore by extending the Southern East-West corridor**

This is a new project and was not included in the TYNDP 2013 – 2022 (prepared in 2012) referring to the building of a transmission pipeline from the Black Sea shore to the Podișor technological node (Giurgiu County) that would link the offshore gas available at the Black Sea shore with the BULGARIA – ROMANIA – HUNGARY – AUSTRIA corridor.

The project will be included in the 2015 – 2024 edition of the TYNDP (currently under preparation) and will be also proposed to be included in the second Union list of projects of common interest.

- **Project proposed for the following list of PCI having no.:** TRA-N-362;
- **Priority corridor:** Southern Gas Corridor.

The Tuzla – Podișor pipeline, approximately 247 km long, shall be designed for a maximum pressure of 55 bar and shall be telescopic, with diameters of 48" (Dn 1200) and 40" (Dn 1000).

#### **Indicative project development schedule:**

Development stages	Stage/Indicative completion date
Pre-feasibility study	completed
Feasibility study	July 2015
Technical documentation for issuance of building permits	January 2016
Issuance of building permits	March 2016
Taking the final investment decision	Beginning of 2016
Building	February 2019
Commissioning/starting of operation	April 2019

**Completion deadline:** 2019 – depending on the upstream offshore projects completion schedules

**Estimated investment value** rises to **EUR 262.4 million**.

The importance of the project at European Union level consists of the possibility to direct off-shore gas towards Bulgaria and Hungary through the interconnections at Giurgiu – Ruse (with Bulgaria) and Nădlac – Szeged (with Hungary).

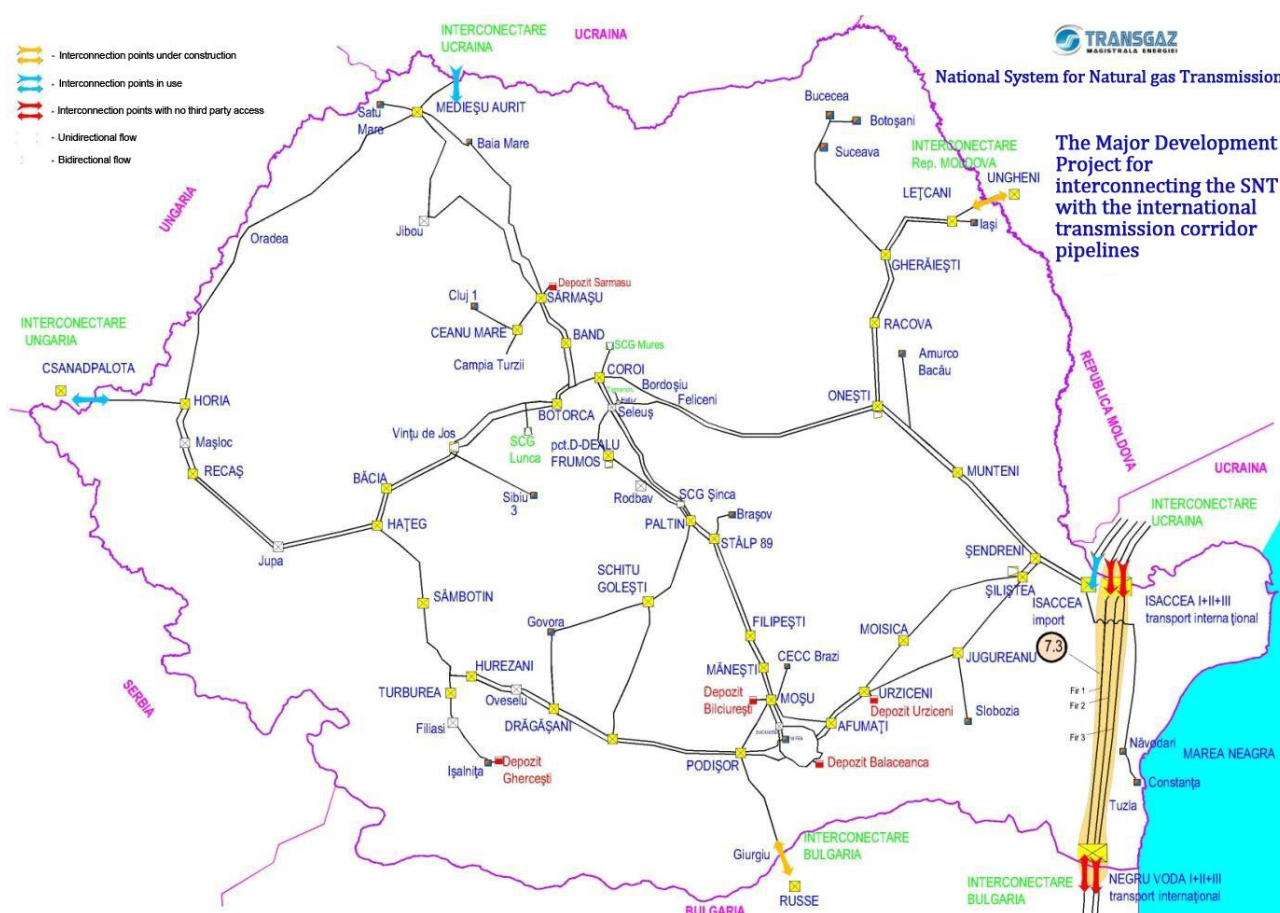
If the project is included in the following list of Projects of Common Interest to be adopted in the autumn of next year, Transgaz will submit an investment request for obtaining a grant under the CEF for the works.

### ***7.3 Project for interconnecting the national transmission system with the international gas transmission pipelines***

This project is very important considering the following:

- the implementation of this project would resolve the main causes of the infringement proceedings launched by the European Commission against Romania, both for the breach of Regulation (EC) No. 715/2009 (*inter alia*, not providing the market with the maximum capacity of the transit pipelines) and for the breach of the regulation (EU) no. 994/2010 (not ensuring permanent bidirectional flow at the cross-border interconnection points);
- The transmission contracts relating to the total capacity of international gas transmission lines I and II will expire on 31 December 2016 and on 31 December 2015, and for making these transmission capacities available to the market, by creating the link between these two pipelines and the national transmission system, access is granted to several shippers of the Romanian and the regional market;
- The project also becomes necessary in the context of the need to take over the newly discovered Black Sea gas, by the Romanian transmission system, in order to be used on the Romanian and the regional markets.





**Fig 14 – Map of the major project for the development of the NTS interconnection with the international transmission pipelines**

Therefore, Transgaz has a special interest in implementing this project:

- (i) in order to eliminate the possibility for the European Commission to charge extremely high penalties;
- (ii) for ensuring substantial income by the use of these capacities, after the take or pay contracts have expired.

The project was initially intended strictly for emergency situations in which gas flow from Ukraine would be diminished significantly or even interrupted. For such situations, by the investments foreseen, it is provided the possibility to transmit gas flows from the Romanian transmission system to Bulgaria or vice versa.

Considering the regulatory and commercial requirements, the project had to be approached differently in order that, by its implementation, it may ensure bidirectional flow between the NTS and transit line 1 under normal operation conditions.

Th his effect the technical solution was reconsidered. We detail below the new technical solution.

### Description of the project:

The project will consist in the following:

- modernization and extension of the Siliștea compressor station;
- modernization and extension of the Onești compressor station;
- modifications within the Isaccea metering station;

- repair of the Cosmești – Onești (66.2 km) and Siliștea - Șendreni (11.3 km) pipeline sections.

Transgaz has initiated the pre-feasibility study, and the execution works are estimated to be completed in 2018.

**Completion deadline: 2018**

**The estimated investment value is rising to EUR 65 million.**

**Cost breaking down:**

Modernization and extension of the Siliștea CS	EUR 27.5 million
Modernization and extension of the Onești CS	EUR 27.5 million
Modifications within the Isaccea GMS	EUR 1 million
Repair of pipeline sections	EUR 9 million
<b>TOTAL</b>	<b>EUR 65 million</b>

The project is part of the "***Development on the Romanian territory of the Central Transmission Corridor for taking over gas from the Black Sea shore***" project and is included in the current list of projects of common interest.

This project is included in the 2013 – 2023 edition of the TYNDP and is part of the first Union list of projects of common interest:

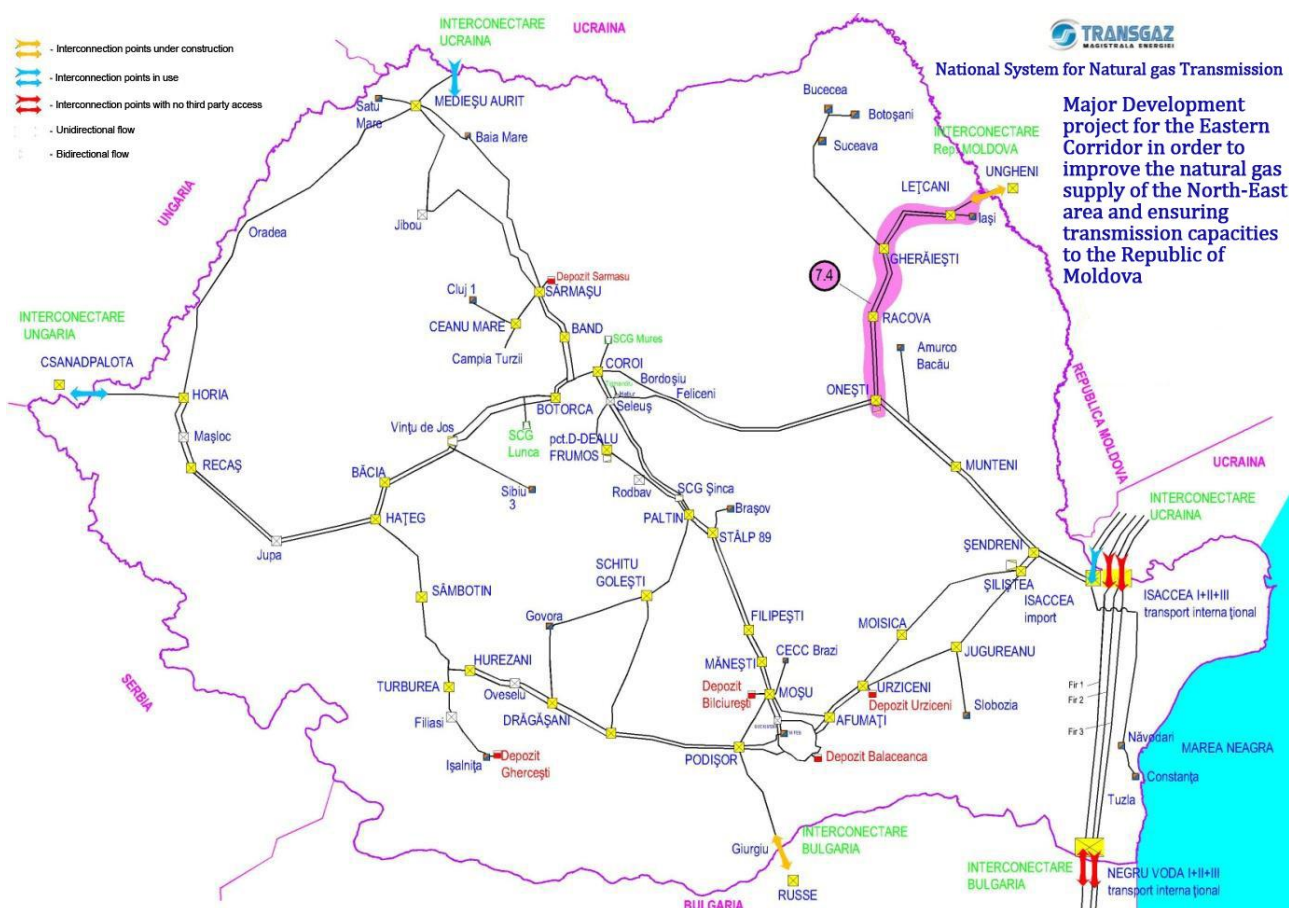
- **Project of common interest:** 6.15;
- **Project proposed for the following list of PCI having no.:** TRA-N-139;
- **Priority corridor:** NSI EAST.

Considering the modification of the technical solution the European Commission's approval was requested for the updating of the project specifications.

Regarding the financing, Transgaz intends to obtain grants under the CEF during the 2015 request submission session.

#### ***7.4 Project for NTS developments in North-East Romania for enhancing gas supply to the area and for ensuring transmission capacities to the Republic of Moldavia***

Taking into account the need for improving gas supply to the North-East Romania and also keeping in mind the perspective offered by the new interconnection pipeline between Romania and the Republic of Moldavia to offer transmission capacities to the Republic of Moldavia, a series of developments need to be performed in the Romanian gas transmission system to ensure the required technical parameters.



**Fig. 15 – NTS developments in the North-Eastern area of Romania**

For enhancing the implementation process and obtaining EU regional development funds under the existing programmes, the project was divided into 2 subprojects.

### Stage I - Gherăești – Lețcani gas transmission pipeline

The purpose of this pipeline is to provide gas to the Iași – Botoșani consumption zone. At the sizing of the pipeline (50 bar and 60 km) the transmission of certain gas volumes in the Ungheni direction (the Republic of Moldavia) was also considered.

Development stages	Stage/Indicative completion date
Pre-feasibility study	completed
Feasibility study	November 2014
Technical documentation for issuance of building permits	February 2015
Issuance of building permits	March 2015
Building	October 2015
Commissioning/starting of operation	December 2015

**The estimated value of stage I is of EUR 33 million.**

## Stage II – Development of the NTS transmission capacity for ensuring gas flow in the Romania – Republic of Moldavia direction

### Description of the project:

- building of two compressor stations (Onești, Gherăiești);
- building of the Onești - Gherăiești gas transmission pipeline 103 km long.

Development stages	Stage/Indicative completion date
Solution study	completed
Feasibility study	March 2015
Technical documentation for issuance of building permits	September 2015
Issuance of building permits	December 2015
Building	May 2017
Commissioning/starting of operation	June 2017

### Cost breaking down:

Onești - Gherăiești gas transmission pipeline	EUR 52 million	~68%
Compressor stations	EUR 25 million	~32%
<b>TOTAL etapa II</b>	<b>EUR 77 million</b>	

### Project completion deadline: 2017

**Total estimated investment value is EUR 110 million.**

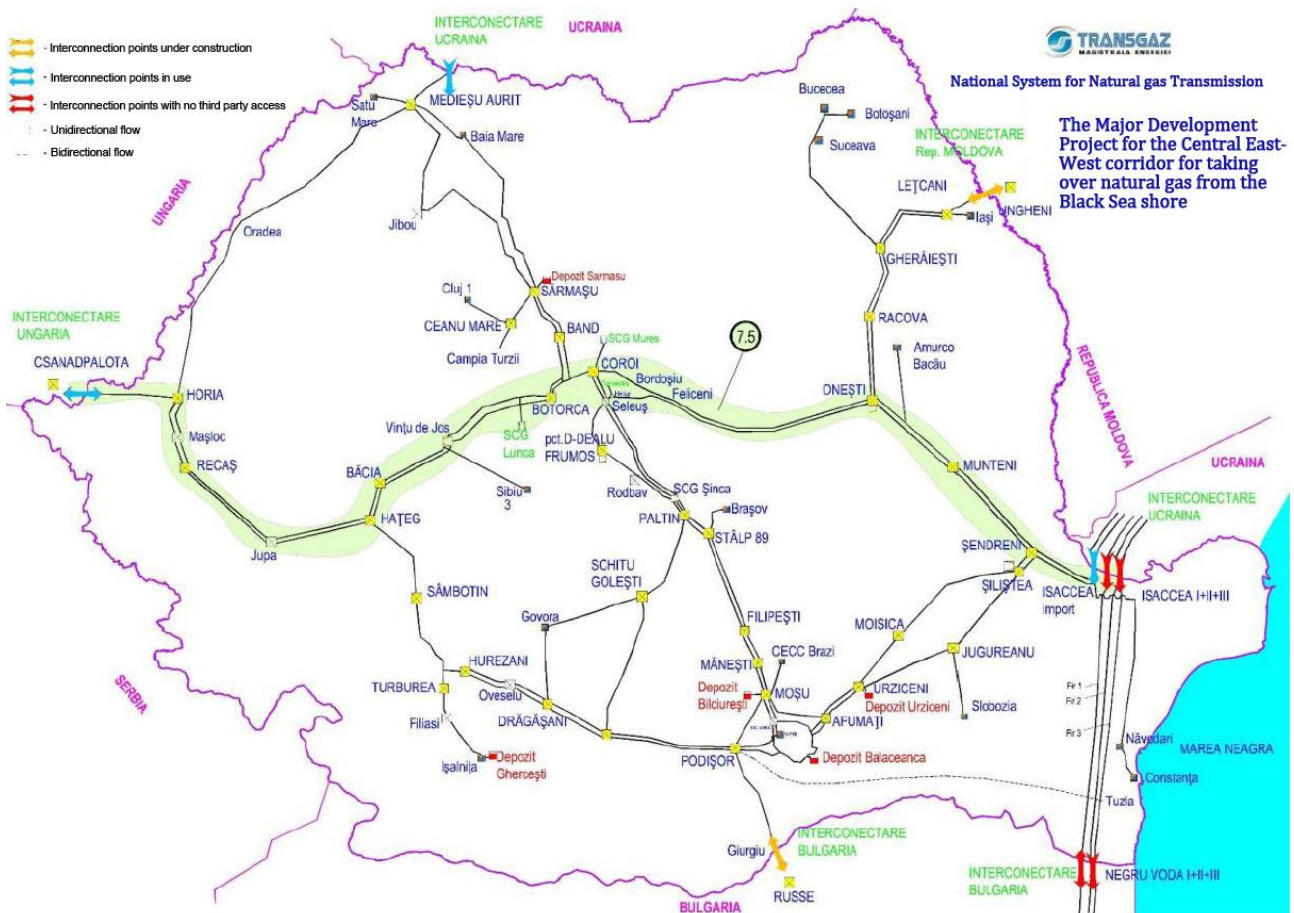
By this project, a transmission capacity of 1.5 bcm/year will be ensured at the interconnection point between the gas transmission systems of Romania and the Republic of Moldavia.

The project is of national interest and was included in the 2015 – 2024 issue of the TYNDP.

Regarding the funding, we remain reserved toward the possible inclusion of the project in the following list of projects of common interest, since the project does not bring any benefit for two EU member states. Therefore it is intended the submission of some applications for obtaining co-financing from the European Funds for Regional Development.



## 7.5 Development on the Romanian territory of the Central Gas Transmission Corridor for taking over the Black Sea gas



**Fig. 16 – Development of the Central Corridor**

Based on the available Black Sea gas volumes, the development of the gas transmission capacity on the Isaccea - Şendreni - Oneşti - Coroi – Hăţeg - Horia central corridor is envisaged on the long term.

The development of this gas transmission corridor involves the following:

- rehabilitation of the NTS existing pipelines, in total length of approximately 400 km;
- replacing the NTS existing pipelines or building new pipelines installed in parallel with the existing pipelines;
- development of 4 or 5 new compressor stations, with a total installed power of 66 – 82.5 MW:
  - CS Oneşti, located in Bacău County, near the present compressor station;
  - CS Coroi, located in Mureş County, near the Coroi Technological Node;
  - CS Hăţeg II, located in Hunedoara County, near the Hăţeg Technological Node;
  - CS Horia II, located in Arad County, near the Horia Gas Metering Station
  - CS Băţani, located in Covasna County (optional).

Transgaz has initiated a pre-feasibility study regarding the development of the **Central Gas Transmission Corridor**, and with a view to enhance and streamline the implementation process and the possibilities to obtain EU grants, the **Central Gas Transmission Corridor** was divided into three projects by the implementation of which the objectives established for the building of this gas transmission corridor will be met.

**The three projects are:**

1. Interconnection of the national transmission system with the international transmission system and ensuring reverse flow at Isaccea (project 7.3 in this TYNDP of the national gas transmission system).
  - **Project of common interest:** 6.15;
  - **Project proposed for the following list of PCI having no. :** TRA-N-139;
  - **Priority corridor:** NSI EAST.
2. Ensuring reverse flow on the Romania-Hungary interconnection:
  - **Project of common interest:** 6.14;
  - **Project proposed for the following list of PCI having no. :** TRA-N-126;
  - **Priority corridor:** NSI EAST.

The project will consist of:

- A new Băcia – Hațeg – Horia gas transmission pipeline approximately 220 km long;
  - Two new gas compressor stations located on the route.
3. NTS development between Onești and Băcia :
    - **Project proposed for the following list of PCI having no.:** TRA-N-384.
    - **Priority corridor:** NSI EAST

The project will consist of:

- Repair of some pipeline sections;
- Replacement of some of the existing pipelines with new pipelines with a larger diameter and higher operating pressure;
- One or two new gas compressor stations.

**Completion deadline: 2023**

**Estimated investment value is of EUR 544 million.**

**We underline that the building of this corridor depends on the evolution of the capacity demand and on the results of the exploration of the sources of gas in the Black Sea or in other onshore blocks, a final investment decision being possible only the demand of additional capacity is confirmed by booking agreements and contracts.**

Below there is a summary of the costs and benefits of the projects presented:



No.	Project	Estimated value	Completion date	Importance of project
1	Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor	559.7	2019	<p>After completion of the project, the gas transmission capacity to Hungary will be of 4.4 bcm/year and of 1.5 bcm/year to Bulgaria.</p> <p>The importance of the project at European Union level is reflected by the nomination of the project “Gas Pipeline from Bulgaria to Austria via Romania and Hungary” on the list of Projects of Common Interest (PCI), for the transmission of gas from the Caspian Sea Region.”</p>
2	Development on the Romanian territory of the <b>Southern Transmission Corridor</b> for taking over the gas from the Black Sea shore	262.4	2019	<p>The importance of the project at European Union level consists of the possibility to direct off-shore gas towards Bulgaria and Hungary through the interconnections at Giurgiu – Ruse (with Bulgaria) and Nădlac – Szeged (with Hungary).</p>
3	Interconnection of the national transmission system with the international gas transmission pipelines  <b>Investments amounting to EUR 35.5 million are also found in the project regarding the development of the Central Corridor. (Project 5).</b>	65	2018	<p>Therefore, Transgaz has a special interest to implement this project:</p> <ul style="list-style-type: none"> <li>▪ <i>to eliminate the possibility for the European Commission to impose extremely expensive financial penalties;</i></li> <li>▪ <i>for ensuring income as high as possible by putting to good use these capacities, after the take or pay contracts expire.</i></li> </ul> <p>We mention the fact that this project is part of the Union’s first list of projects of common interest.</p>
4	<b>NTS developments in North-East Romania</b> for improving the gas supply in the area, as well as for ensuring transmission capacities to the Republic of Moldavia	110	Stage I-2015 Stage II-2017	<p>By this project a transmission capacity of 1.5 bcm/year will be ensured at the interconnection point between the transmission systems of Romania and the Republic of Moldavia</p>
5	Development on the Romanian territory of the Central Transmission Corridor for taking over the gas from the Black Sea shore  <b>Investments amounting to EUR 35.5 million are also found in the project regarding the development of the NTS Interconnection with the transit pipelines. (Project 3).</b>	544	2023	<p>Depending on the increase in gas production available from the Black Sea off-shore, additional development of the network is considered:</p> <p>A secondary route through central Romania and a new interconnection with Hungary.</p> <p>On this route the existing pipeline sections will be rehabilitated, additional pipeline sections and 4-5 compressor stations will be built.</p>
	<b>TOTAL (2014-2025)</b>	<b>~ EUR 1.51 bn</b>		

*Table10 – Cost-benefit balance for the Major Projects*

## **PROJECT BENEFITS**

By ensuring the link between different gas supply sources and the European market, the mentioned investment projects contribute to achieving the European Union goals, the main benefits of their execution being summarized as follows:

- integration of the gas market and the interoperability of the regional gas transmission systems;
- the convergence of the gas prices in the region;
- eliminating congestion in the gas transmission in Bulgaria – Romania – Hungary direction;
- the increase in flexibility of the European gas transmission system by creating bidirectional flow interconnections;
- by interconnecting the BULGARIA – ROMANIA – HUNGARY – AUSTRIA corridor with the Black Sea, the European Union shall practically have access to a new source of gas;
- the increase in competition on the European gas market by diversifying sources, transmission routes and active companies in this region;
- the increased security of gas supply;
- reducing the degree of dependence on the Russian gas imports;
- encouraging the renewable energy development in the region (especially wind and solar energy), taking into account the possibility of using gas as a backup choice for renewable energies, which leads to the significant increase in sustainability for the proposed projects.

Objective	D mm	L km	Estimated value (mil. Euro)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor	800	545	559.7	18.57	141.97	148.86	123.74	123.66	2.93	-	-	-	-
Development on the Romanian territory of the Southern Transmission Corridor for taking over the gas from the Black Sea shore	1000/ 1200	285	262.4	3.11	7.27	75.68	75.58	100.33	0.44	-	-	-	-
Project for interconnecting the national transmission system with the international gas transmission pipelines	800	80	65	-	-	-	20	45	-	-	-	-	-
Project for NTS developments in North-East Romania for improving gas supply in the area, and for ensuring transmission capacities to the Republic of Moldavia	700	163	110	-	33	50	27	-	-	-	-	-	-
Development on Romanian territory of the Central Transmission Corridor for taking over the gas from the Black Sea shore	800	780	544	-	-	-	-	45	54	100	100	100	145
<b>TOTAL</b>			1,505.6*	21.68	182.24	274.54	246.32	278.49*	57.37	100	100	100	145

\*The amount of EUR 35.5 million represents joint investments for projects 3 and 5 (see table 10, page 48)

**Table 11 - Major Projects planning for 2014-2023**

## 7.6 Comparison TYNDP 2013 – 2022 / Development Plan for the National Gas Transmission System 2014 – 2023

**TYNDP 2013 – 2022** comprises the following priority projects of TRANSGAZ, the operator of the gas transmission system:

1. Interconnector Bulgaria - Romania;
2. Integration of gas transit and transmission network - reverse flow at Isaccea;
3. Reverse flow at Negru Voda;
4. Reverse flow on the Interconnector Romania - Hungary;
5. The AGRI project (the Romanian section – the East – West Pipeline).

**TYNDP 2013 – 2022** is the result of a process initiated in the spring of 2012, most of which being performed in 2012. Therefore, it does not include the **Development Plan for the National Gas Transmission System 2014 – 2023 Major Projects**.

Some of the **TYNDP 2013 – 2022** projects were **redefined** as **Development Plan for the National Gas Transmission System 2014 – 2023** major projects, and those which will be completed this year were included into the **NTS Modernization and Development Programme for 2014**.

No.	TYNDP 2013 – 2014 Projects	Development Plan for the National Gas Transmission System 2014 – 2023	NTS Modernization and Development Programme for 2014
1	Interconnector Bulgaria - Romania		Line I to be completed in 2014.
2	Integration of gas transit and transmission network - reverse flow at Isaccea	Interconnecting the national transmission system with the pipelines for international gas transmission pipelines	
3	Reverse flow at Negru Voda I		Completed in 2013
4	Reverse flow on the Interconnector Romania - Hungary	Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor	
5	The AGRI project (the Romanian section – the East – West Pipeline)	Development on the Romanian territory of the Southern Transmission Corridor for taking over the gas from the Black Sea shore	

To comply to EU requirements on ensuring energy security, following discovery of important gas deposits in the Black Sea and the shale gas long-term perspective, Transgaz outlined in the **Development Plan for the National Gas Transmission System 2014 – 2023** a strategy for redefining the internal gas transmission routes based on the national and international medium- and long-term gas flow remodelling.

The projects proposed in the **Development Plan for the National Gas Transmission System 2014 – 2023** are the following:

1. Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor;
2. Development on the Romanian territory of the Southern Transmission Corridor for taking over the gas from the Black Sea shore
3. Project for interconnecting the national transmission system with the pipelines for international gas transmission pipelines
4. Project for NTS developments in North-East Romania for improving gas supply in the area and for ensuring transmission capacities to the Republic of Moldavia;
5. Development on the Romanian territory of the Central Transmission Corridor for taking over the gas from the Black Sea shore.

Since this definition of the **Major Projects** of SNTGN Transgaz SA appeared after the publication of the **TYNDP 2013 – 2022**, our Company took the necessary steps for their inclusion into the European TYNDP, whose preparation started this summer.

## **7.7 Financing methods**

Any organization must adjust to the environment where it operates, maintaining at the same time its internal cohesion and reducing to a minimum the uncertainties related to the transformations of the internal and external environment. In order for the organization to maintain its identity following its adjustment efforts, its development must be planned as thoroughly as possible, and this plan must be periodically revised.

**The moment when an investment is decided**, no matter its nature and size, is of great importance in the life of the organization, and is **one of the managerial decisions which weighs the most, is full of responsibility, because investments aim at the long term strategic objectives of the company and its sustainable development.**

The financing methods taken into account for the execution of the major NTS development plans for 2014 – 2023 consist of:

- Internal sources;
- External sources.

The value related to the NTS Development plan for 2014-2023, estimated at EUR 1.5 billion, shall be covered 35% from own sources, i.e. approximately EUR 525 million, and 65%, i.e. EUR 975 million, from external sources.

The own sources shall consist mainly of depreciation and net profit appropriated for investments.

The external sources shall consist of grants, loans from financial and banking institutions or bond issues.

Of the major projects presented in the NTS Development Plan, the project “**Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor**”, described in chapter 7.1, estimated at EUR 560 million, is included in the list of Projects of Common Interest (PCI) and is envisaged to be potentially financed by Connecting Europe Facility 2014-2020.



**The project for the NTS development in North-East Romania meant to improve gas supply in the area and ensure gas transmission capacities to The Republic of Moldavia,** described in chapter 7.4, and estimated at a value of EUR 110 million, is proposed by Transgaz to be financed by European funds related to the financial period 2014-2020.

Transgaz is making sustained efforts to obtain grants for funding the other investment projects impacting the modernisation, upgrading and development of NTS infrastructure.

By considering the internal sources and external sources as methods for funding the projects proposed by Transgaz for the NTS development during 2014-2023, as they are presented in chapters 7.1 – 7.5, the aim was to obtain a financing mix that would ensure the lowest cost related to the funding of the development programme.

## **8. SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM - SCADA**

An important action for the improvement of the company's operational quality and efficiency is the implementation of the Supervisory Control and Data Acquisition System (SCADA), which is required according to art. 130, point c. of the Electric Energy and Gas Law no. 123/2012.

As the technical operator of the NTS, Transgaz has the obligation to increase the security of gas supply. In this regard, Transgaz has initiated the procedure for the implementation, maintenance and development of a SCADA-type data monitoring, control and acquisition system.

The completion of the SCADA implementation (completion of stage III – final stage) is extremely important, given the fact that this IT system will allow for:

- A real time transmission of technical data (pressure, flow, temperature, gas quality, calorific power) at the national dispatching centre;
- An improvement of TRANSGAZ capacity to control and react rapidly and efficiently to any potential interruption risk, contributing to the increase in the security of NTS operation;
- ensuring the conditions necessary to offer NTS entry / exit short - term gas transmission services and to execute the contracts related to this type of services, according to Regulation (EC) No. 715/2009.

By means of the SCADA system, the following physical locations shall be connected, in terms of data transmission /control from/to the national gas transmission system (NTS):

- Mediaş National Dispatching Centre;
- Bucharest Gas Dispatching Centre;
- 9 dispatching centres of the regional offices;
- 948 regulation-metering stations (RMSs) – exit points from the NTS;
- 106 line valves – located on the routes of the gas transmission pipelines;
- 39 technological nodes;
- 5 compressor stations;
- 6 gas stations for international transit (2 physical locations);
- 2 gas import stations – entry points in the NTS.

The total value of the project amounts to EUR 35,911,221.66, VAT excluded. It is being implemented based on non-refundable financing amounting to 56.105% of the total eligible value, under the Sectoral Operational Programme “Increasing the Economic Competitiveness” – financing contract no. 5T / 3 July 2012, code SMIS 37763.

According to the contract, the SCADA project is to be implemented in three stages. The first two stages have already been completed and the third stage is to be completed on 30 April 2015.

## 9. CONCLUSIONS

Romania seeks to become an energy turntable in Eastern Europe, a hub for the regional energy transmission networks, as well as an energy supplier.

The three major directions of action in order for Romania to gain this position are presented in the ***Energy Pact***, concluded in May 2013, namely:

- the interconnection of the gas and electricity networks and the creation of the physical and institutional infrastructures necessary to operate a liquid energy market;
- the development of new internal gas sources and the integration on the regional power markets;
- the consistency with the European energy policies, boosting the negotiation ability in the EU institutions and cooperating with other member states in sustaining common strategic objectives.

**The energy sector** can become a real **"engine for economic growth"**. With its important resources and opportunities offered by the geographical positioning, Romania can secure for itself a high degree of energy security and regional integration.

The cross-border interconnection of networks is nowadays a priority in the Romanian energy policy. Any development scenario for gas or electric energy production, or import from external sources, needs a **proper transmission infrastructure**.

In this regard and in order to ensure the compliance with the requirements of the European Union policy in the energy sector for the period up to 2023, based on three fundamental objectives: **energy security, sustainable development and competitiveness**, Transgaz administration plan for 2013-2017 has contemplated the increase in the level of NTS reliability to ensure the interoperability with the neighbouring systems, the development, upgrading and modernisation of the gas transmission infrastructure, the improvement of the efficiency and the interconnection with the gas transmission systems of the neighbouring countries.

By achieving the objectives established in **The 10-year Development Plan, 2012-2023**, Transgaz wishes to become a gas transmission operator on the international gas market, with a national gas transmission system that is modern, intelligent, integrated at the European level and with a modern management system, in line with the international performance standards and regulations.

Given the important dependence of the European energy market on the Russian and Middle East energy imports, the recently discovered gas deposits in the Black Sea play a crucial role in terms of the Romanian energy security, the consolidation of Romania's position as an important player in the EU as a producer and exporter of energy, the integration of the country on the major gas transmission European routes and the increase in the country's economic welfare for the future decades.

On the 2023 horizon, with the necessary interconnections, Romania will have several options for gas imports: through the regional terminals for liquefied gas (LNG) from Greece, Croatia and Poland, the Romanian market will be able to purchase gas from the Levantine Basin (West Mediterranean); through the interconnection Bulgaria – Romania, Caspian gas will be

imported from the Southern Gas Corridor; through Bulgaria as well, additional Russian gas could be imported, through the South Stream gas pipeline.

**Aware of this responsibility, Transgaz management is on the brink of starting one of the largest and most important programmes for the development of the Romanian gas transmission infrastructure over the last 20 years, with investment projects estimated at EUR 1.51 billion and meant to create new transmission routes, essential not only to render efficient the recently discovered Black Sea gas on the internal and regional markets, but also in order to have Romania integrated into the major cross-border routes of the European South-Eastern/North-Western Corridor.**

**The capability of the company to adapt and be prepared to cope with the requirements of the Romanian gas resources, in the following years, will be one of the biggest challenges for a Romanian company (not only state - owned) over the last two decades.**

**The ability of the company to implement this investment programme will not only ensure the use of essential economic resources for the welfare of Romania, on the short and long run, but it will also be a litmus test meant to prove the foreign investors that Romania is able to create favourable conditions for developing and attracting foreign investments.**

**Petru VADUVA**  
**Director General**