

# SNTGN TRANSGAZ SA

## DEVELOPMENT PLAN FOR THE NATIONAL GAS TRANSMISSION SYSTEM 2024-2033

2024



## CONTENTS

<b>1. INTRODUCTION</b> .....	<b>3</b>
1.1 Update and additions to the 2022-2031 TYNDP.....	5
<b>2. COMPANY PROFILE</b> .....	<b>7</b>
2.1 The company's core business.....	7
2.2 Shareholding.....	8
2.3 Organization and management.....	9
<b>3. DESCRIPTION OF THE NATIONAL GAS TRANSMISSION SYSTEM</b> .....	<b>10</b>
<b>4. ROMANIAN AND REGIONAL GAS MARKET</b> .....	<b>12</b>
4.1 Romanian gas market.....	12
4.2 Natural gas market in the region and possibilities for natural gas supply.....	14
4.3 The conclusions of the regional gas market analysis.....	23
<b>5. GAS CONSUMPTION, PRODUCTION AND STORAGE</b> .....	<b>26</b>
5.1 Gas consumption.....	26
5.1.1 2014-2023 gas consumption history.....	26
5.1.2 Seasonal consumption and consumption peak.....	26
5.1.3 Gas consumption forecasts 2024-2033.....	27
Conclusion.....	28
5.2 Gas production.....	29
5.2.1 2014-2023 gas production history.....	29
5.2.2 Forecast of the domestic gas production 2024-2033.....	29
5.3. Underground gas storage.....	31
5.3.1 Current context of the underground gas storage activity.....	31
<b>6. SECURITY OF GAS SUPPLY</b> .....	<b>34</b>
<b>7. DEVELOPMENT PATHS FOR THE NATIONAL GAS TRANSMISSION SYSTEM (NTS)</b> .....	<b>38</b>
7.1 Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor (BRUA) - phase II.....	39
7.2 Development on the Romanian territory of the Transmission Corridor for taking over the Black Sea gas (Tuzla – Podișor).....	40
7.3 Extension of the bi-directional gas transmission corridor Bulgaria – Romania - Hungary – Austria (BRUA Phase III).....	42
7.4 Romania – Serbia Interconnection – interconnection of the national gas transmission system with the similar gas transmission system in Serbia.....	43
7.5 Development/Upgrading of the gas transmission infrastructure in the North-Western part of Romania	44
7.6 Increasing the natural gas transmission capacity of the Romania-Bulgaria interconnection on the Giurgiu –Ruse direction.....	45
7.7 Eastring-Romania.....	47
7.8 Monitoring, control and data acquisition system for cathodic protection stations related to the National Gas Transmission System.....	48
7.9 Development of the SCADA system for the National Gas Transmission System.....	49
7.10 Upgrading of Isaccea 2 GMS and Negru Voda 2 GMS for bidirectional flow on T2 pipeline.....	51
7.11 Upgrading of Isaccea 3 and Negru Voda 3 GMS for bidirectional flow on T3 pipeline.....	52
7.12 The interconnection of the NTS to the LNG Terminal located on the Black Sea shore.....	54
7.13 The LNG terminal located on the Black Sea shore.....	55
<b>8. DIRECTIONS FOR THE DEVELOPMENT OF THE NATURAL GAS STORAGE SYSTEM</b> .....	<b>56</b>
I. DEPOGAZ PLOIEȘTI-MAJOR STORAGE PROJECTS.....	56
8.1 Increasing the daily extraction capacity at the Bilciuresti Storage Facility - Upgrading the infrastructure of the natural gas storage system-Bilciuresti.....	56
8.2 Increasing the underground natural gas storage capacity of the Ghercești storage facility.....	58
8.3 New underground natural gas storage facility in Fălticeni (Moldova).....	59

8.4 Increasing underground natural gas storage capacity at the Sărmășel storage facility (Transylvania) .	60
8.5 Upgrading of the natural gas storage infrastructure – Bălăceanca.....	62
II. DEPOMURES TÂRGU-MURES-MAJOR STORAGE PROJECT.....	63
8.6. Storage unit –Depomureș.....	64
<b>9. DEVELOPMENT DIRECTIONS FOR THE HYDROGEN TRANSPORT .....</b>	<b>66</b>
9.1 The hydrogen market in Romania .....	66
9.2 Hydrogen production in Romania .....	66
9.3 Hydrogen consumption in Romania .....	67
9.4 The estimation of hydrogen consumption .....	67
9.5 Transgaz projects for hydrogen transport .....	69
<b>9.5.1 Gas transmission infrastructure repurposing projects for hydrogen transport .....</b>	<b>70</b>
9.5.1.1 Upgrading of the Isaccea - Jupa pipeline for hydrogen transport.....	70
9.5.1.2 Upgrade of the Giurgiu - Nădlac pipeline for hydrogen transmission.....	71
9.5.1.3 Upgrade of the Black Sea - Podișor pipeline for hydrogen transmission .....	72
9.5.1.4 Upgrade of the Onești - Ungheni pipeline for hydrogen transmission.....	73
9.5.1.5 Upgrade of the Romania - Serbia interconnection for hydrogen transmission.....	73
9.5.1.6 Upgrade of the Coroi-Medioșu Aurit pipeline for hydrogen transmission .....	74
9.5.1.7 Upgrade of the Negru Voda - Isaccea pipeline for hydrogen transmission.....	75
9.5.1.8 Upgrading the Vadu - T1 pipeline for hydrogen transmission.....	76
<b>9.5.2 Dedicated Hydrogen transmission line development projects .....</b>	<b>76</b>
9.5.2.1 Hydrogen transmission line in the direction Giurgiu-Podișor-Bibești-Jupa-Horia-Nădlac .....	76
9.5.2.2 Hydrogen transmission line on the Black Sea - Podișor direction.....	77
<b>10. ANALYSIS OF MAJOR PROJECTS .....</b>	<b>79</b>
I. Analysis of major gas transmission projects.....	79
10.I.1 Status of Projects.....	79
10.I.2 Cost of Projects .....	80
10.I.3 Planning the implementation of Transgaz' natural gas transmission projects for the period 2024-2033	86
10.I.4 Benefits of Natural Gas Transmission Projects .....	87
II. Analysis of major storage projects.....	88
10.II.1. Status of Projects according to the Final Investment Decision (FID): .....	88
10.II.2. Cost of Major Storage Projects.....	88
10.II.3 Planning of storage projects for the period 2024-2033 .....	90
III. Analysis of major hydrogen transmission projects .....	90
10.III.1 Status of Projects .....	90
10.III.2 Cost of Hydrogen Transmission Projects .....	91
10.III.3 Planning the implementation of Transgaz's hydrogen transport projects for the period 2024-2033	93
10.III.4 Benefits of Hydrogen Transmission Projects .....	93
10.1 Comparison ENTSOE TYNDP 2022 / Development Plan for the National Gas Transmission System 2024	94
– 2033 (Transgaz TYNDP) .....	94
<b>11. FINANCING OPTIONS .....</b>	<b>96</b>
<b>12. MAJOR PROJECTS COMPLETED (TYNDP 2022-2031).....</b>	<b>97</b>
<b>13. DO MINIMUM AND DO MAXIMUM SCENARIOS .....</b>	<b>99</b>
<b>14. THE 2024 – 2026 INVESTMENT DEVELOPMENT AND MODERNIZATION PLAN .....</b>	<b>101</b>
<b>15. CONCLUSIONS .....</b>	<b>110</b>
<b>Definitions and abbreviations.....</b>	<b>112</b>

## 1. INTRODUCTION

According to the provisions of Art. 22 of European Directive EC/73/2009 on the obligation of all EU gas transmission system operators to prepare **TYNDPs**, Transgaz, as the technical operator of the National Gas Transmission System of Romania, prepared the **Development Plan for the gas transmission system for 2024-2033 (TYNDP 2024-2033)**.

This document presents the development directions of the Romanian gas transmission network and the major projects that the company envisages over the next 10 years. The goal is to achieve a maximum level of transparency with respect to the development and upgrading 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 2024-2033**, prepared according to **Electricity and Gas Law no. 123/2012**, as further amended and supplemented, with the national objectives proposed by the draft National Energy Strategy 2025-2035 with 2050 horizon, by the updated National Integrated Energy and Climate Change Plan 2021-2030 (NIIECP), by the National Recovery and Resilience Plan (NRRP) and by the National Hydrogen Strategy 2023 -2030 (SNH), is compliant with the European energy policy for:

- ensuring safety of gas supply;
- increasing interconnectivity between the national gas transmission network and the European network;
- increasing the flexibility of the national gas transmission network;
- the liberalization of the gas market;
- creating the integrated gas market in the European Union
- ensuring the connection of third parties to the gas transmission system, according to specific regulations, within the limits of transmission capacities and compliant with the technological regimes;
- ensuring the gas supply to the Romanian towns;
- ensuring the connection to the natural gas network of new investments which generate work places;
- the development of the transmission system so that it is compatible with the gradual blending of hydrogen into natural gas in line with European targets, based on detailed analyses including relevant technical and economic aspects;
- development of the societal strategy for coupling hydrogen ecosystems and industrial centres to the integrated EU Hydrogen Backbone;
- ensuring a phased transition to climate neutral activity and strengthening resilience to climate change;
- meeting national and international (climate) requirements and regulations/National Integrated Energy and Climate Change Plan.

## **The Development Plan for the National Gas Transmission System (NTS) for 2024-2033:**

- (a) present the major development projects of the natural gas transmission system over the next ten years;
- (b) defines the investments in the natural gas transmission system that the company has decided to make in the next three years (IDMP 2024-2026).

While preparing the **TYNDP 2024-2033**, Transgaz has considered and analysed both the existing situation and the projected future for natural gas demand and production. The evolution of natural gas production, supply, import and export was analysed, taking into account the development of transmission and distribution systems, the planned development of gas storage facilities and the forecasted use of hydrogen in industry and transport.

Transgaz is a member of ENTSO-G (The European Network of Natural Gas Transmission System Operators) and when developing the Plan for the Development of the National Gas Transmission System for the period 2024-2033, the coordination with the TYNDP, GRIPs and 10-year development plans of the regional natural gas transmission operators was aimed at.

For the sustainable development of the natural gas transmission infrastructure in Romania, Transgaz proposes an extensive investment plan through the **TYNDP** enabling the alignment of the NTS with European transmission and operation requirements complying at the same time with the requirements of European regulations in the field of environmental protection and carbon footprint mitigation.

In this regard, Transgaz aims:

- to promote investment projects which contribute to the achievement of a sustainable gas transmission system in safety conditions stipulated in the applicable laws, with the limitation of the impact on the environment and the population;
- to carry out projects in such a way that the impact on the natural and anthropogenic environment is minimal;
- to execute projects in such a way that the impact on biodiversity is minimal
- carrying out the investment projects needed to connect and adapt the national gas transmission system to the European Hydrogen Backbone network.

**According to the legal provisions, TYNDP 2024-2033 is subject to the approval of the National Regulatory Authority for Energy (ANRE).**

**This document represents the update and supplementation of the Plan for the Development of the NTS for the period 2022-2031, as approved by ANRE by Decision 1956/04.08.2023.**

## 1.1 Update and additions to the 2022-2031 TYNDP


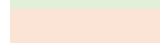
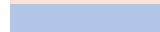
- update the Major Projects List in Chapter 1 following the completion of works or the introduction of new projects;
- updating of Chapters 2, 3, 4, 5 and 6 with the dates as at the end of 2023;
- updating of project completion values and deadlines due to completion of pre-feasibility, feasibility, FEED studies or conclusion of contracts and introduction of new projects - Chapter 7;
- update of values and completion dates of storage projects under Chapter 8;
- introduction of a new chapter - Chapter 9 - Development directions for hydrogen transport;
- update of Chapter 10 - Analysis of major projects;
- update of Chapter 11 - Financing options;
- update chapter 12 - Major projects completed ;
- update of Chapter 13 - Do minimum and Do maximum scenarios - following the introduction of hydrogen transport projects and the completion of projects;
- update of Chapter 14 - Upgrading and Investment Development Plan 2024-2026.




### LIST OF MAJOR PROJECTS

Project number	Project name	Status
1	Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor – <b>Phase I</b>	<b>COMPLETED</b>
2	Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor – <b>Phase II</b>	Completed FEED
3	Development on the Romanian territory of the Transmission Corridor for taking over gas from the Black Sea Shore (Tuzla-Podisor)	In construction
4	The interconnection of the National Gas Transmission System with the international gas transmission pipeline T1 and reverse flow Isaccea	<b>COMPLETED</b>
5	NTS developments in North-East Romania for enhancing gas supply to the area and for ensuring transmission capacities to the Republic of Moldova	<b>COMPLETED</b>
6	Extension of the bidirectional gas transmission corridor Bulgaria – Romania - Hungary – Austria (BRUA Phase III)	Completed Pre-feasibility study
7	NTS developments for taking over gas from the Black Sea Shore	<b>COMPLETED</b>
8	Romania – Serbia Interconnection	Completed FEED
9	Upgrading GMS Isaccea 1 and GMS Negru Vodă 1	<b>COMPLETED</b>
10	Interconnection between the gas transmission systems of Romania and Ukraine in the Gherăești – Siret direction	<b>Removed 2022</b>
11	Upgrading of natural gas storage system infrastructure – Bîlciurești	Phase 1 – Construction Phase 2 – Completed FEED
12	Increasing the capacity of the underground natural gas storage facility Ghercești	Completed FEED
13	New underground natural gas storage facility Fălticeni (Moldova)	Feasibility study – in progress
14	Increasing the capacity of the underground natural gas storage facility Sărmășel (Transylvania)	In construction
15	Upgrading of natural gas storage system infrastructure – Bălăceanca	Feasibility study completed

Project number	Project name	Status
16	Storage unit Depomureș	Phase 1 – in construction
17	Development/Upgrading of the gas transmission infrastructure in the North-Western part of Romania	Completed Pre-feasibility study
18	Increase in the gas transmission capacity of the interconnection Romania-Bulgaria, in the Giurgiu-Ruse direction	Completed Pre-feasibility study
19	Eastring–Romania	Completed Feasibility study
20	Monitoring system, data control and acquisition for the cathodic protection stations related to the National Gas Transmission System	Completed Feasibility study
21	Development of the SCADA system for the National Gas Transmission System	Completed Feasibility study Phase 1 – under procurement
22	Upgrading GMS Isaccea 2 and GMS Negru Voda 2 for enabling bidirectional flow on the T2 pipeline	Phase 1 – completed Phase 2 – market survey
23	Upgrading GMS Isaccea 3 and GMS Negru Voda 3 for enabling bidirectional flow on the T3 pipeline	Phase 1 – completed Phase 2 – market survey
24	Interconnection between NTS and the Black Sea LNG Terminal	The project is in an initial phase
25	LNG Terminal	<b>NEW</b>
26	Upgrading of the Pipeline Isaccea – Jupa for the transport of hydrogen	<b>NEW</b>
27	Upgrading of the Pipeline Giurgiu - Nădlac for the transport of hydrogen	<b>NEW</b>
28	Upgrading of the Pipeline Black Sea - Podișor for the transport of hydrogen	<b>NEW</b>
29	Upgrading of the Pipeline Onești - Ungheni for the transport of hydrogen	<b>NEW</b>
30	Upgrading of the Romania-Serbia interconnection for the transport of hydrogen	<b>NEW</b>
31	Upgrading of the Pipeline Coroi – Medieșu Aurit for the transport of hydrogen	<b>NEW</b>
32	Upgrading of the Pipeline Negru Vodă - Isaccea for the transport of hydrogen	<b>NEW</b>
33	Upgrading of the Pipeline Vadu – T1 for the transport of hydrogen	<b>NEW</b>
34	Upgrading of the natural gas storage infrastructure - Bălăceanca	<b>NEW</b>
35	Corridor for hydrogen transport in the direction Giurgiu-Podișor-Bibești-Jupa-Horia-Nădlac	<b>NEW</b>
36	Corridor for hydrogen transport in the Black Sea - Podisor direction	<b>NEW</b>

### Project included in:

	TYNDP 2014-2023
	TYNDP 2017-2026
	TYNDP 2018-2027

	TYNDP 2019-2028
	TYNDP 2020-2029
	TYNDP 2024-2033

## 2. COMPANY PROFILE

### 2.1 The company's core business

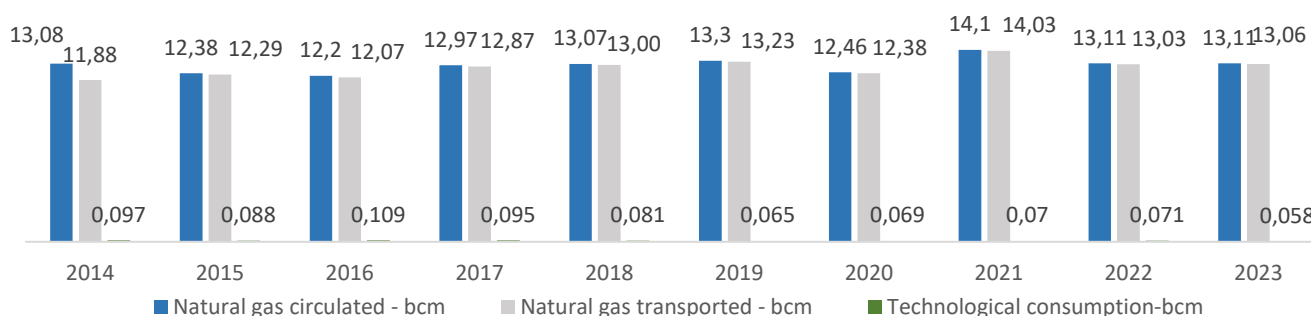
Transgaz is the technical operator of the National Gas Transmission System (NTS) ensuring the execution of the national strategy regarding the internal and international gas transmission and dispatching with efficiency, transparency, safety, non-discrimination and competitiveness, as well as the research 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.

The National Gas Transmission Company TRANSGAZ SA established under Governmental Decision no. 334/28 April 2000 carries out the following activities:

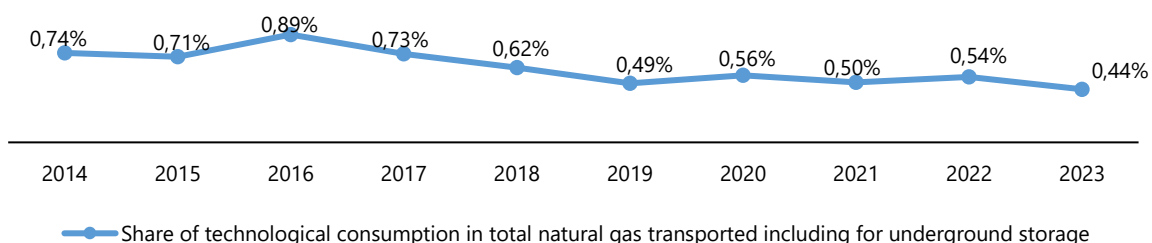
- Natural gas transmission - monopoly regulated activity, with tariffs established based on the methodology issued by the National Energy Regulatory Authority;
- Gas dispatching, research and design in the field of natural gas transmission.

### Transported natural gas

#### History



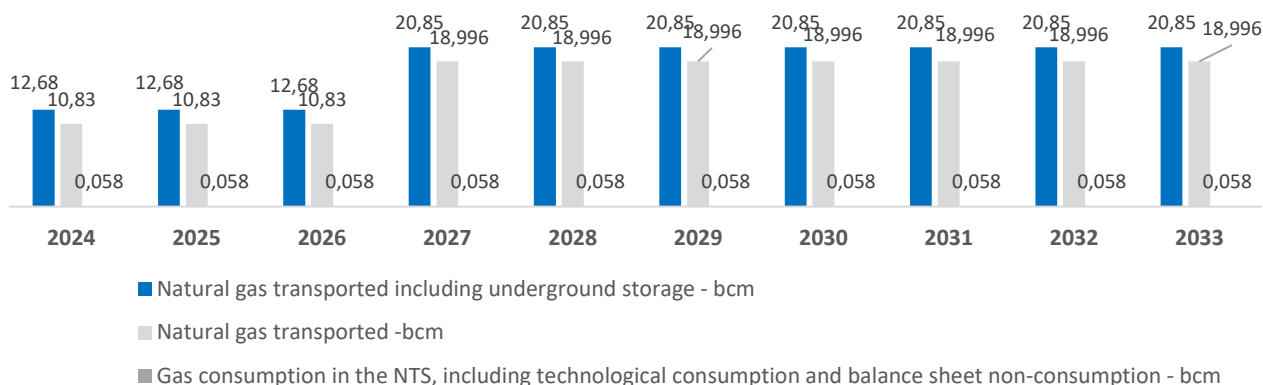
**Chart 1 - Evolution of transported natural gas including gas for underground storage and NTS gas consumption for the period 2014-2023**



**Chart 2 - The share of the NTS gas consumption in the total transmitted gas including gas for underground storage for the period 2014-2023**



**Forecasts of the transmitted gas quantities including the ones meant for underground storage and of the NTS gas consumption for the period 2024–2033:**



**\*Year 2027** - increase by 8,17 bcm

Source: Internal – compliant with the data provided by Neptun Deep – Black Sea natural gas exploitation

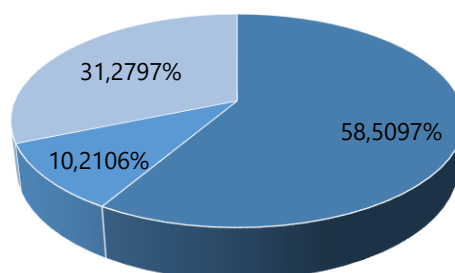
**Chart 3 - Forecasts of the transmitted gas quantities including underground storage gas (without international gas transmission) for the period 2024-2033**

## 2.2 Shareholding

The General Meeting of Transgaz’ Shareholders approved by Decision no. 11 of 07.12.2022 the increase in the share capital by incorporating reserves from the net profit of previous financial years in amount of 1.766.076.600 lei, from 117.738.440 lei to 1.883.815.040 lei, by issuing 176.607.660 new shares, with a nominal value of 10 lei/share.

Therefore, as at 31 December 2023, Transgaz’ share capital amounted to 1.883.815.040 lei and was divided into 188.381.504 nominative shares, each share having a nominal value of 10 lei.

### Transgaz’ shareholding structure as at 31 December 2023



- The Romanian State by the General Secretariat of the Government
- Natural entities
- Legal entities

**Chart 4 – Transgaz’ shareholding structure as at 31 December 2023**

## 2.3 Organization and management

The management of SNTGN Transgaz SA is ensured by:

- The General Meeting of Shareholders;
- The Board of Administration;
- The executive management delegated to the Director-General.

The Board of Administration delegated the company's management to Transgaz' Director-General. Transgaz' Director-General represents the company in the relations with third parties and is responsible for taking all measures related to the management, within the limits of the company's activity and in compliance with the exclusive powers reserved by law or by the Articles of Association, the Board of Administration and the General Meeting of Shareholders.

TRANSGAZ is structured into functional organisational entities (divisions, units, departments, offices, compartments, etc.) and production entities (9 regional operating centres, sectors, laboratories, workshops, etc.).

**SNTGN Transgaz SA** carries out its activities at the following locations:

### MEDIAS, SIBIU county

- **Transgaz' headquarters**; no. 1 Piața C.I.Motaș, code 551130;
- **Maintenance Division**: no. 11, George Enescu St., code 551018;
- **Research and Design Division**: no. 6 Unirii St., code 550173.

### BUCHAREST

- **Transgaz Representative Office – Romania**: no. 55 Primăverii bvd.;
- **General Inspection Division**: no. 155 Calea Victoriei, sector 1, Block D1, entrance 6, floor 3, code 010073;
- **Gas Market Operation Unit Bucharest**: no. 155 Calea Victoriei, sector 1, Block D1, entrance 6, floor 11, code 010073.

### CHISINAU, the Republic of MOLDOVA

The subsidiaries of SNTGN Transgaz SA in the Republic of Moldova are as follows:

- Limited Liability Company „EUROTRANSGAZ”: no. 7/E Șoseaua Balcani, outside the built-up area, Ghidighici village;
- Limited Liability Company „VESTMOLDTRANSGAZ”: no. 7/E Șoseaua Balcani, outside the built-up area, Ghidighici village.



Figure 1 - Map of the territorial organisation of SNTGN Transgaz SA

### 3<sup>1</sup>. DESCRIPTION OF THE NATIONAL GAS TRANSMISSION SYSTEM

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

Length of the National Gas Transmission System:

✚ 13.962,55 km

Compressor stations:

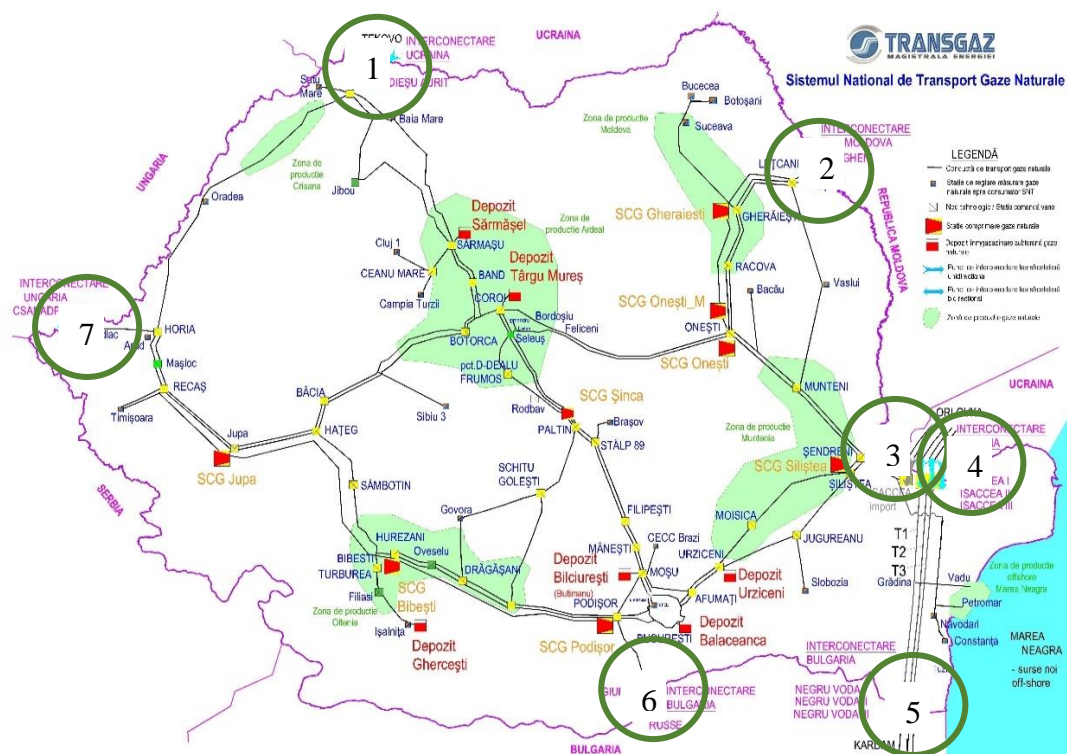
✚ 8 stations with an installed power of 79,6 MV

Neighbouring gas transmission system operators:

- ✚ FGSZ Hungary
- ✚ Bulgartransgaz EAD Bulgaria
- ✚ JP Srbijagas Serbia
- ✚ LLC Gas TSO of Ukraine
- ✚ Vestmoldtransgaz, the Republic of Moldova
- ✚ Moldovatransgaz

Cross-border Entry (En)/ Exit (Ex) points:

- ✚ Csanádpalota, FGSZ (HU);
- ✚ Ruse-Giurgiu, Bulgartransgaz (BG);
- ✚ Ungheni, Vestmoldtransgaz (MD);
- ✚ Negru Vodă 1/Kardam, Bulgartransgaz (BG);
- ✚ Negru Vodă 2/Kardam, Bulgartransgaz (BG);
- ✚ Negru Vodă 3/Kardam, Bulgartransgaz (BG);
- ✚ Medieșu Aurit Import/GTSOU (UA);
- ✚ Isaccea Import/GTSOU (UA);
- ✚ Isaccea 1/Orlovka, GTSOU (UA);
- ✚ Isaccea 2/Orlovka, GTSOU (UA);
- ✚ Isaccea 3/Orlovka, GTSOU (UA).



**Figure 2 – Map of the National Gas Transmission System and the capacities at the cross-border interconnection points (bScm/year)**

<sup>1</sup> As at 31.12.2023

1			
UA		RO	
Tekovo		Medieșu Aurit	
LLC GAS TSO		Transgaz	
Ex	2,71	→	2,71 En

2			
MO		RO	
Ungheni		Iași	
Vestmoldtransgaz		Transgaz	
Ex	0,73	→	0,73 En
En	1,88	←	1,88 Ex

3			
UA		RO	
Orlovka		Isaccea	
LLC GAS TSO		Transgaz	
Ex	6,85	→	6,85 En

4			
UA		RO	
Orlovka 1		Isaccea 1	
LLC GAS TSO		Transgaz	
Ex	6,85	→	6,85 En
En	4,12	←	4,12 Ex

5			
BG		RO	
Kardam		Negru Vodă	
Bulgartransgaz		Transgaz	
Ex	5,31	→	5,31 En
En	6,36	←	6,36 Ex

6			
BG		RO	
Ruse		Giurgiu	
Bulgartransgaz		Transgaz	
Ex	0,92	→	0,92 En
En	1,5	←	1,5 Ex

7			
HU		RO	
Szeged		Arad	
FGSZ		Transgaz	
Ex	2,63	→	2,63 En
En	2,63	←	2,63 Ex

In order to maintain the appropriate NTS technical conditions, Transgaz carries out the maintenance activity in the context of a predominantly preventive planned and corrective maintenance system, supported by annual investment programmes for development and upgrading.

The table below shows a synthesis of the limitations and interruptions scheduled following the repair/investment plans or the unforeseen limitations and interruptions following unexpected/accidental events for 2014-2023:

Period	Scheduled		Unscheduled		
	Limitations	Interruptions		Limitations	
Calendar year	2014	5	43	5	158
	2015	8	64	8	164
	2016	7	43	38	160
	2017	11	44	0	198
	2018	0	5	8	121
	2019	1	17	6	72
	2020	1	19	3	57
	2021	1	30	12	134
	2022	0	29	1	90
	2023	2	7	2	77
Gas year	2016-2017	11	58	2	174
	2017-2018	0	5	7	138
	2018-2019	1	17	5	84
	2019-2020	1	18	3	56
	2020-2021	1	29	13	115
	2021-2022	0	31	2	112
	2022-2023	2	7	2	74

## 4. ROMANIAN AND REGIONAL GAS MARKET

### 4.1 Romanian gas market

The current structure of the Romanian gas market includes (at the interface with Transgaz):

- 1 operator of the National Gas Transmission System – SNTGN TRANSGAZ SA MEDIAȘ;
- 13 gas producers: OMV Petrom SA, SNGN ROMGAZ SA, SC Amromco Energy SRL, SC Foraj Sonde SA, SC Raffless Energy SRL, Stratum Energy Romania LLC Wilmington the Bucharest Subsidiary, SC Hunt Oil SRL, SC Lotus Petrol SRL, SC Serinus Energy România, Dacian Petroleum SRL, Black Sea Oil & Gas SA; Petro Ventures Resources SRL: Gas Plus Dacia SRL;
- underground storage facilities operators: SNGN Romgaz - the Underground Gas Storage Facility Depogaz Ploiesti and SC Depomureș Târgu Mureș;
- 28 gas distribution companies, the largest being Distrigaz Sud Retele Srl and SC Delgaz Grid;
- 158 licences gas suppliers.

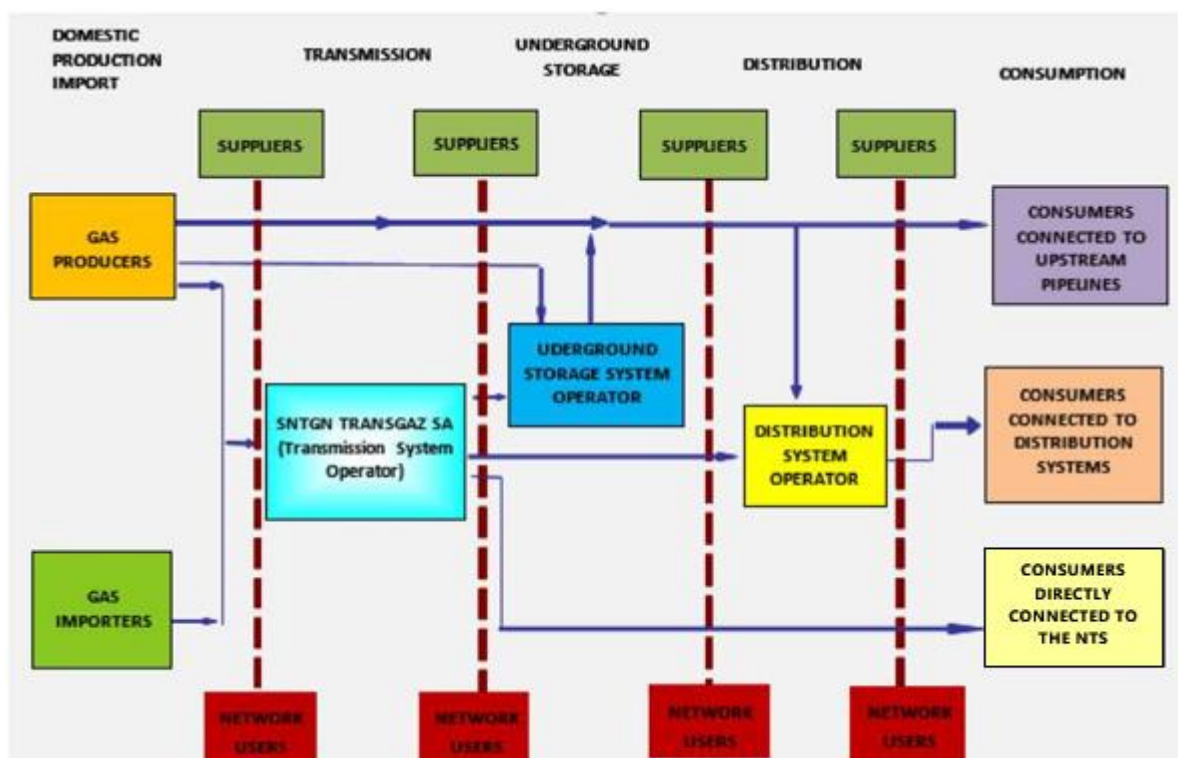


Figure 3 – Schematic representation of the Romanian gas market

Internal source

The internal gas market has two components:

- **the competitive segment**, which includes:
  - the *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,
    - (iii) other types of transactions or contracts.

- the *retail market* where the suppliers sell gas to final clients through contracts with negotiated prices.
- **the regulated segment** which includes the natural monopoly activities, the related activities and gas supply at a regulated price, based on the framework agreements approved by ANRE.

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 latter.

Currently the degree of gas market openness is 100% for both industrial and residential consumers.

Romania's energy mix is diverse, incorporating a mix of fossil fuels, renewables and nuclear energy. Historically, Romania has relied heavily on fossil fuels, particularly coal and natural gas, to meet its energy demand. The country's extensive coal reserves have played a crucial role in ensuring energy security. In addition, natural gas has been a vital source of energy for both electricity generation and heating, providing a cleaner alternative to coal.

Natural gas accounts for about 29% of domestic primary energy consumption. Its significant share is explained by the high availability of indigenous resources, low environmental impact and the ability to balance power produced from intermittent renewable sources.

Romania's natural gas consumption has been decreasing in recent years mainly because the petrochemical industry, a major consumer of natural gas, has closed production capacity. With the reopening of these units and the replacement of coal-fired power generation capacity by gas-fired capacity, the expansion of gas transmission and distribution networks and the increase in domestic production following the start of gas exploitation in the Black Sea, natural gas consumption is expected to increase.

Over the next 3-4 years, natural gas consumption in Romania is expected to increase by about 10 billion cubic meters of natural gas through the construction of the Mintia power plant with a production capacity of 1700 MWH and a consumption of 2.5 billion cubic meters of gas per year through the construction of the two co-generation plants in Isalnita and Turceni, as part of the CEO restructuring plan, already approved by the European Commission, with a production capacity of 1200 MWH and a consumption of 1.5 billion cubic metres of natural gas, by the completion of the Iernut power plant, with a production capacity of 450 MWH and a consumption of 1 billion cubic metres of natural gas, and by the restart of the Azomures fertiliser plant, which consumes 1.2 billion cubic metres of natural gas per year, and by the restart of the Piatra-Neamt chemical plant, which consumes over 0.8 billion cubic metres of natural gas per year. In addition, an estimated additional consumption of 3 billion cubic metres per year will come from localities that will be connected to the natural gas network, where local authorities have already prepared distribution projects using the instruments at their disposal: NRRP, Modernisation Fund, RepowerEU, or Government Programmes such as Anghel Saligny.

Natural gas means economic development, a better quality of life for citizens and environmental protection. Horizontal development is not just about how natural gas will be harnessed, but also about the industry that makes it possible to extract, transport and process it. The entire economic ecosystem will benefit from the exploitation of natural gas.

**In the context of development, 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;
- flexibility of the storage system.

**Transgaz**, as technical operator of the NTS, has a very important role in ensuring the security of gas supply to the country and in the correct operation of the national gas market.

---

#### ***4.2 Natural gas market in the region and possibilities for natural gas supply***

The conflict between Russia and Ukraine highlighted the importance of ensuring diversification of energy supplies and brought energy security to the forefront of European governments' concerns.

The situation in Ukraine required an immediate response from European and national authorities, and the sanctions imposed on Russia and the disruption of supply chains in the Black Sea basin had a direct impact on energy prices, which was reflected in the economy.

The effects in the energy sector showed the vulnerability of the Member States in relation to energy products imported from Russia, the natural consequence was for the EU to take the decision to ensure the Union's sustainable energy independence.

To achieve this goal, in May 2022 the European Commission presented the REPowerEU initiative - a planning document proposing to rapidly reduce dependence on fossil fuels from Russia. The REPowerEU plan sets out measures on diversification of energy suppliers, energy savings and energy efficiency, as well as an accelerated introduction of renewable energy.

The Commission set up the EU Energy Platform to aggregate regional energy demand and facilitate future joint purchases of green gas and hydrogen, to ensure the best use of infrastructure so that gas reaches where it is most needed, and to establish links with international supply partners.

Five Member State regional groups have already been initiated under the platform and a dedicated task force has been set up within the Commission to support this process. The EU is managing to move away from gas imports from Russia thanks to increased LNG imports and pipeline imports from other suppliers. In the first half of 2022, LNG imports from outside Russia increased by 21 billion cubic metres compared to the same period of last year. Pipeline imports from outside Russia, Norway, Azerbaijan, the UK and North Africa, also increased by 14 billion cubic metres.

**The European Gas Demand Reduction Plan** sets out measures, principles and criteria for coordinated demand reduction. The plan focuses on substitution of natural gas by other fuels and overall energy savings in all sectors - **Energy saved in summer means energy available for winter**. It aims to **safeguard supplies to households** and **essential users** such as hospitals, but also to industries that are crucial to the supply of essential products and services to the economy, as well as to the EU's supply chains and competitiveness. The plan gives Member States guidelines to take into account when planning to reduce.

The demand reduction plan **also helps Member States to identify and prioritise**, within their 'unprotected' customer groups, **the most important customers or installations**, based on overall economic considerations and the following criteria:

- **Critical societal importance** - sectors including health, food, safety, security, refining and defence, as well as the provision of environmental services;
- **Cross-border supply chains** - sectors or industries providing goods and services critical to the smooth functioning of supply chains in the EU;
- **Damage to installations** - to avoid them being unable to resume production without significant delays, repairs, regulatory approval and costs;
- **Gas reduction possibilities and product/component substitution** - the extent to which industries can switch to imported components/products and the extent to which demand for products or components can be met by imports.

By phasing out reliance on fossil fuel sources and reducing the EU's overall energy consumption as a result of increased energy efficiency, the **European Green Deal and the 'Fit for 55' package strengthen security of supply to the EU**. Based on these proposals, REPowerEU aims to accelerate the development of renewable energy across the EU and the start of energy efficiency investments.

Currently, more than 20% of EU energy comes from renewable sources, and the Commission has proposed that this share should be more than double and reach at least 45% by 2030.

With investment in LNG terminals and gas interconnectors, each Member State can now receive gas from at least two sources and two-way flows between neighbours are possible. Under the Security of Gas Supply Regulation, Member States are required to draw up national preventive action plans and emergency plans, as well as a solidarity mechanism to ensure the supply of 'protected customers' in neighbouring countries in a major emergency situation.

By exploiting the potential of the Black Sea and deep onshore resources, by supporting domestic natural gas production, Romania can achieve a sufficiently high level of domestic production to become an energy security provider in the region. A strong internal market contributes significantly to a high degree of energy security.

The natural gas transmission network is a particularly important infrastructure for the country's energy security. Romania will become a European natural gas transmission corridor by connecting to the European North-South and East-West corridors, by interconnecting pipelines with its neighbours and by natural gas infrastructure projects currently under construction or planned for the development of the domestic network.





Figure 4 - Lengths of natural gas transmission systems of neighbouring countries

**BULGARIA**


<b>BULGARIA</b>	
Natural gas consumption (2022)	2.7 bcm
National Transmission System Operator	Bulgartransgaz EAD
Shareholding structure	100% – Bulgarian Energy Holding EAD
Volume of gas transported (2023)	Consumers and storage – 8 mld.Mc Transit – 17,8 bcm/year until 2030 <b>TOTAL: 25,8 bcm</b>
Length of the natural gas transmission system	3.276 km
Natural Gas Transmission System Map	

BULGARIA	
<b>Description of the natural gas transmission system</b>	<p><b>The national Bulgarian gas transmission system</b> is circular in shape, with a total length of 3,276 km, with:</p> <ul style="list-style-type: none"> <li>✓ 11 compressor stations: CS Kardam-1, CS Kardam-2, CS Valchi Dol și CS Polski Senovets, CS Rasovo, CS Provadia, CS Nova Provadia, CS Lozenets, CS Strandzha, CS Ihtiman and CS Petrich with a total installed capacity of 406 MW;</li> <li>✓ 240 exit points from the system;</li> <li>✓ 2 connection points with production facilities;</li> <li>✓ 1 connection point with storage facilities;</li> <li>✓ 9 interconnections;</li> <li>✓ 1 interconnection point within the country.</li> </ul>
<b>LNG</b>	-
<b>Interconnections</b>	<p><b>Romania:</b> Negru Vodă I, II and III/Kardam–Transgaz Romania Ruse/Giurgiu – Transgaz Romania</p> <p><b>Greece:</b> Kulata/Sidirokastron – DESFA Greece IGB</p> <p><b>Turkyie:</b> Strandzha/Malkoclar – BOTAS Turkyie Strandzha 2/Malkoclar - TAGTAS, Turkyie</p> <p><b>Macedonia:</b> Kyustendil/Zidilovo – GA-MA , North Macedonia</p> <p><b>Serbia:</b> Kireevo/Zaychar – Gastrans, Serbia</p>
<b>Storage facilities</b>	Chiren–Bulgartransgaz –Installed capacity 9MW; Storage capacities 5,8 mill. MWh/d
<b>Investment program</b>	The development plan for the period 2023-2032 is available at: <a href="https://bulgartransgaz.bg/files/useruploads/files/amd/TYNDP%2023-2032%20EN.pdf">https://bulgartransgaz.bg/files/useruploads/files/amd/TYNDP%2023-2032%20EN.pdf</a>
<b>Main investments</b>	<ul style="list-style-type: none"> <li>– Rehabilitation, Upgrading and Development of the NTS;</li> <li>– Construction of a gas pipeline between BG-RO (investment in the Bulgarian system to increase capacity within the BRUA project);</li> <li>– LNG Terminal Alexandroupoli, Greece;</li> <li>– Eastring-Bulgaria;</li> <li>– Expansion of storage capacity at Chiren;</li> <li>– Construction of a pipeline to increase capacity and interconnection with the existing system in the form of a ring between CS ValchiDol and Novi Iskar valve station;</li> <li>– Construction of a pipeline between Varna and Oryahovo;</li> <li>– Construction of a pipeline to increase capacity and interconnection with the existing system in the form of a ring between CS Provadia and Rupcha;</li> <li>– Construction of new storage facilities on the territory of Bulgaria.</li> </ul>

*Source: www.bulgartransgaz.bg, http://ec.europa.eu/eurostat, www.gie.eu, entsog.eu*

## SERBIA

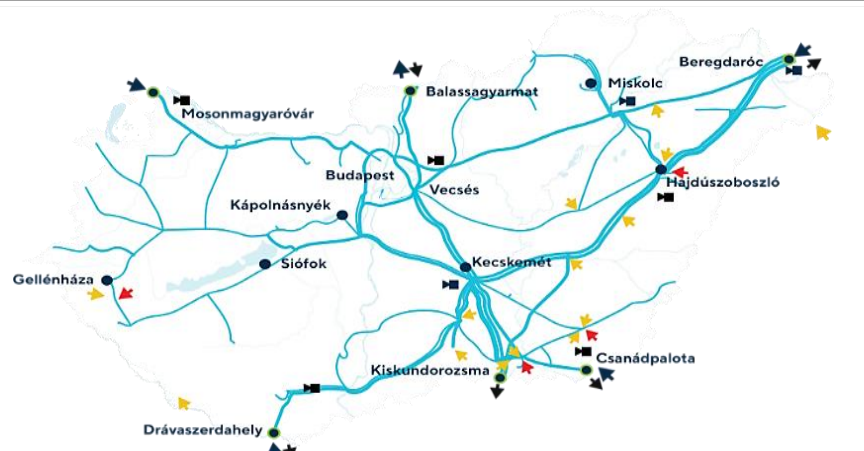
SERBIA	
<b>Natural gas consumption (2022)</b>	2,93 bcma
<b>National Transmission System Operator</b>	JP SRBIJAGAS
<b>Shareholding structure</b>	100% - Serbian state.
<b>Volume of gas transported (2023)</b>	In 2023 the volume of NG transported was 13 million cm.

SERBIA	
<b>Length of the natural gas transmission system</b>	2.501 km – pipelines.
<b>Natural Gas Transmission System Map</b>	
<b>Description of the natural gas transmission system</b>	<ul style="list-style-type: none"> <li>✓ The Serbian transmission system is operated by JP Srbijagas, with the exception of the MG-9 section from Pojate to Niš which is operated by Yugorosgaz (a subsidiary of Gazprom);</li> <li>✓ PN in the system is 16-50 bar; DN 150-750;</li> <li>✓ 32 gas distribution stations;</li> <li>✓ 1 compressor station at Batajnica;</li> <li>✓ storage facility with a maximum capacity of 550 million cubic meters.</li> </ul>
<b>LNG</b>	-
<b>Interconnections</b>	<p><b>Hungary:</b> Horgoš-Kiskundorozsma-FGSZ HU</p> <p><b>Bosnia and Herzegovina:</b> Mali-Zvornik-BH Gas d.o.o. BH</p> <p><b>YUGOROSGAZ:</b> Pojate-YUGOROSGAZ (Gazprom subsidiary)</p> <p><b>Bulgaria:</b> Niš-Dimitrovgrad-Bulgartransgaz BG</p>
<b>Storage facilities</b>	<p>Banatski Dvor SRBIJAGAS</p> <p>Total capacity 550 mill. cm</p>
<b>Investment program</b>	<p><b>JP SRBIJAGAS natural gas transmission system development plan 2022- 2031</b> can be found on the website: <a href="https://www.transportgas-srbija.rs/en/o-nama/plan-razvoja">https://www.transportgas-srbija.rs/en/o-nama/plan-razvoja</a></p>
<b>Main investments included in the program</b>	<p><b>Investments:</b></p> <p>The company's investments focus on:</p> <ul style="list-style-type: none"> <li>– upgrading and retrofitting of the Serbian NG transmission system (pipelines, connections, equipment, utilities, etc.);</li> <li>– upgrading of transmission capacities;</li> <li>– development of the Banatski Dvor storage system (increase to 800 million cubic metres - 1 billion cubic metres).</li> <li>– Implementation of PCIs agreed by the European Commission:</li> <li>– construction of an interconnector with Romania, 97 km long (12.8 km on the territory of the Republic of Serbia) and with a capacity of 1.2 bcm/year, which would make it possible to implement a future interconnection with Croatia of Serbia;</li> <li>– the construction of an interconnector with Bosnia-Herzegovina (Rep. Srpska), 90 km long, DN500 diameter, 50 bar pressure and a maximum capacity of 1.2 bcm/year;</li> <li>– the possibility of the construction of an interconnector with Montenegro (with the possibility of bidirectional flow), 114 km long, diameter DN500, pressure 50-40 bar, and a maximum capacity of 1,000 million cm/year;</li> <li>– construction of an interconnector with Croatia, 95 km long, diameter DN600, pressure 75 bar and capacity of 1,500 million cubic metres/year;</li> </ul>

SERBIA	
	– the possibility of the construction of an interconnector with Macedonia, 70.7 km long, diameter DN: 300, pressure 50 bar and capacity 380 million cubic metres/year.

Source: transportgas-srbija.rs, Internet, <http://ec.europa.eu/eurostat>

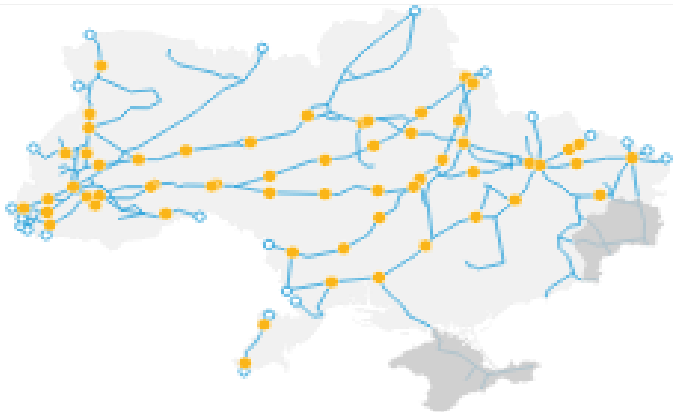
## HUNGARY

HUNGARY	
Natural gas consumption (2023)	10 bcm
National Transmission System Operator	FGSZ Zrt.
Shareholding structure	MOL Plc. – 100%
Volume of gas transported (2023)	În anul 2023 volumul de GN transportat a fost de 29,6 mld mc.
Length of the natural gas transmission system	5.889 km – conducte magistrale
Natural Gas Transmission System Map	 <p>The map shows the natural gas transmission system in Hungary, with major cities and interconnectors marked. Key locations include Mosonmagyaróvár, Balassagyarmat, Miskolc, Beregdaróc, Budapest, Vecsés, Hajdúszoboszló, Kápolnásnyék, Kecskemét, Siófok, Gellénháza, Kiskundorozsma, Csanádpalota, and Drávaszerdahely. The system is represented by a network of blue lines connecting these points.</p>
Description of the natural gas transmission system	<ul style="list-style-type: none"> <li>✓ 25 entry points;</li> <li>✓ 400 exit points;</li> <li>✓ infrastructure with DN between 80-1400 mm;</li> <li>✓ 8 compressor stations;</li> <li>✓ 6 technical control centres attached to 3 regions;</li> <li>✓ 1 technical control centre in Siófok;</li> <li>✓ 7,229 km of fibre optic for telecommunications;</li> <li>✓ gas transported at PN between 40-75 bar.</li> </ul>
Storage facilities	<p>Zsana Magyar Foldgaztarolo  Hajuszoboszlo Magyar Foldgaztarolo  Puszaederics Magyar Foldgaztarolo  Kardosku Magyar Foldgaztarolo  Szoreg-1 MMBF Foldgaztarolo  Total capacity 6 bcm</p>
LNG	-
Interconnections	<p><b>Interconnections with:</b></p> <p><b>Ukraine:</b> Beregdaróc–Ukrtransgas (UA)  <b>Austria:</b> Mosonmagyarovar–OMV Gas (AT)  <b>Serbia:</b> Kiskundorozsma–Srbijagas (RS)  <b>Romania:</b> Csanadpalota–Transgaz (RO)  <b>Croatia:</b> Dravaszerdahely–Plincro (HR)  <b>Slovakia:</b> Balassagyarmat–Eustream Slovacia (SK)  <b>Slovenia:</b> Pince–Tornyiszentmiklós</p>

HUNGARY	
<b>Investment program</b>	<b>The 10-year natural gas transmission system development plan of FGSZ Zrt. for 2022-2031 is presented at</b> <a href="http://fgsz.hu/en/about-fgsz">http://fgsz.hu/en/about-fgsz</a>
<b>Main investments included in the program</b>	<p><b>Development projects of FGSZ Zrt.:</b></p> <p>Ensuring an entry capacity on the Serbia-Hungary route of max. 6 bcm/year            Increasing the entry capacity in the Serbia-Hungary direction to 8.5 bcm/year            Development of the Csanádpalota compressor station and metering station            Ensuring capacity demand from Hungary to Ukraine and on the HU&gt;AT direction            Ensuring capacity on the Slovenia-Hungary interconnector between 20,000-190,000 m<sup>3</sup>/h            Development of the SZADA compressor station            Development of the Dorog compressor station            Construction of Kozármisleny-Kaposvár pipeline            Securing capacity on Hungary-Austria interconnector            Development of Hydrogen corridors (HU/UA, HU/HR, HU/SK, HU/RO, HU/AT, HU/SI)            Replacement of gas turbine compressors with electrically driven compressors            Construction of the Kiskundorozsma - Városföld pipeline            Construction of the Eastring in the direction RO&gt;HU&gt;SK with transmission capacities between 10-40 bcm/year.</p>

Source: gie.eu, <https://fgsz.hu>, <http://ec.europa.eu/eurostat>, [entsog.eu](https://entsog.eu)


## UKRAINE

UKRAINE	
<b>Gas consumption (2023)</b>	19 bcm
<b>Transmission operator</b>	<b>LLC Gas TSO of Ukraine vby two operators Branch and LLC</b>
<b>Length of transmission system (2021)</b>	33.190 km pipelines
<b>Transited gas volume (2021)</b>	15 bcm
<b>Map of the Natural Gas Transmission System</b>	
<b>Description of the natural gas transmission system (2020)</b>	<p>The transmission is characterised by infrastructure with:</p> <ul style="list-style-type: none"> <li>✓ 1,389 gas distribution stations + 83 gas distribution stations in occupied territories;</li> <li>✓ 71 compressor stations + 2 compressor stations in the occupied territories (Donetsk and Lugansk);</li> <li>✓ 87 compressor stations + 2 compressor stations;</li> <li>✓ 41 NG distribution companies connected to the Ukrainian gas transmission system;</li> <li>✓ 153 direct consumers;</li> <li>✓ 11 underground NG storage facilities with a capacity of 30.5 bcm + 1.4 bcm in the occupied territories (Donetsk and Lugansk).</li> </ul>
<b>Power of the compressor stations</b>	<p>Transmission: 4.581 MW            Storage: 10 MW</p>

UKRAINE	
<b>Interconnections</b>	<p><b>Romania:</b> Orlovka–Isaccea (RO) Tekovo–Medieșu Aurit (RO)</p> <p><b>Russia:</b> Platovo RU/UA Prokorovka RU/UA Sokhranovka RU/UA Pisarevka RU/UA Serebryanka RU/UA Valuyki RU/UA Volchansk RU/UA Belgorod RU/UA Sudzha RU/UA</p> <p><b>Belarus:</b> Kobryn Belarus–UA</p> <p><b>Polonia:</b> Hermanowice–Polonia/UA</p> <p><b>Slovakia:</b> Budince–Slovakia/UA</p> <p><b>Hungary:</b> Beregdaroc (HU)–Beregovo (UA)</p> <p><b>Moldova:</b> Oleksiivka–MD/UA Grebenyky–MD/UA</p>
<b>Storage facilities</b>	<p>12 underground storage facilities with a capacity of 30.95 bcm</p> <p>Krasnopopivske–PJSC Ukrtransgaz Olyshivske–PJSC Ukrtransgaz Bohorodchanske–PJSC Ukrtransgaz Uherske (XIV-XV)–PJSC Ukrtransgaz Oparske–PJSC Ukrtransgaz Solokhivske–PJSC Ukrtransgaz Dashavske–PJSC Ukrtransgaz Kehychivske–PJSC Ukrtransgaz Chervonopartyzanske–PJSC Ukrtransgaz Bilche-Volytsko-Uherske–PJSC Ukrtransgaz Proletarske–PJSC Ukrtransgaz Verhunske–PJSC Ukrtransgaz</p>
<b>Natural gas Import (bcm) (2021)</b>	2,6 (six times less than in 2020)
<b>Domestic production (bcm) (2022)</b>	18,5
<b>Future projects</b>	<p>Development and upgrading</p> <ul style="list-style-type: none"> <li>✓ of natural gas transmission pipeline networks and ancillary parts</li> <li>✓ compressor stations</li> <li>✓ telecommunications system</li> <li>✓ gas storage system</li> <li>✓ gas transmission system monitoring</li> <li>✓ alternative fuel sources</li> </ul> <p>It is important to underline Ukraine's interest both in physical reverse flow at the interconnection points with the Romanian system, but especially at the Isaccea 1 point, thus ensuring deliveries of natural gas from the South-East via the Bulgarian transmission system and the I transit line.</p>

**Source:** *tsoua.com, utg.ua, spglobal.com, www.reuters.com, http://ec.europa.eu/eurostat, www.entsog.eu, www.gie.eu*

## REPUBLIC OF MOLDOVA

REPUBLIC OF MOLDOVA	
Natural gas consumption (2023)	398 million cm
National Transmission System Operator	Vestmoldtransgaz SRL
Shareholding structure	75% - SNTGN Transgaz S.A. and 25% - BERD
Transported gas volumes	In 2023 the volume of natural gas transported was 423 million cm.
Length of the natural gas transmission system	1.682,5 km
Natural Gas Transmission System Map	
Description of the transmission system (2023)	<ul style="list-style-type: none"> <li>✓ 776,315 km of main pipelines;</li> <li>✓ 906,206 km of connection pipelines;</li> <li>✓ maximum capacity of the transmission system - 20 bcm/year;</li> <li>✓ 3 GCS with a total capacity of 75.5 MW;</li> <li>✓ 7 SGNC;</li> <li>✓ 81 Gas delivery stations;</li> <li>✓ 226 Cathodic protection stations;</li> <li>✓ 84 MRSs;</li> <li>✓ 2 GMS: Căușeni și Ungheni;</li> <li>✓ 2.200 km of cable telecommunications lines.</li> </ul>
LNG	-
Power of the compressor stations (2023)	<ul style="list-style-type: none"> <li>✓ GCS Drochia with a total capacity of 31,5 MW;</li> <li>✓ GCS Săldănești with a total capacity of 24 MW;</li> <li>✓ GCS Vulcănești with a total capacity of 20 MW.</li> </ul>
Interconnections (2021)	The transmission system of the Republic of Moldova is, in fact, a transit system (through the 8 main pipelines: ATI, RI, ŞDKRI, ACB, ChR, OCh, TCM, OIS) of gas via Ukraine from Russia to the states of the Balkan Peninsula and the south of the republic.

REPUBLIC OF MOLDOVA	
	<p><b>The Moldovan transmission system has 6 interconnection points, including 1 interconnection point (reverse-flow system) with Romania: L-120 km; Capacity RO-MD - 1.88 bcm/year MD-RO - 0.73 bcm/year</b></p> <p><b>The capacity requested for booking is carried out through the GMOIS platform managed by SNTGN Transgaz SA.</b></p> <p><u>Moldovatrangaz and Vestmoldtrangaz</u></p> <p><b>Romania:</b> Ungheni (IUC) RO-MD</p> <p><b>Ukraine:</b> GMS Alexeevca (ACB) UA-MD            GMS intermediare Ananiev/Orlovca (ACB) UA-MD            GMS Grebeniki (ATI) UA-MD,            GMS Grebeniki (RI, SDKRI) UA-MD,            GMDS Limanscoe (TO 3) UA-MD            Căuşeni (ATI) MD-UA, Căuşeni (RI, SDKRI) MD-UA            Virtual exit point to consumers in Ukraine (Vestmoldtrangaz)</p>
<b>Investment Program</b>	<p><b><i>Vestmoldtrangaz's natural gas transmission system development plan 2023-2032 is available on the website:</i></b></p> <p><b><i><a href="https://www.vmtg.md/images/PLANURI/H_CA_ANRE_nr_820_Plan_de_Dezvoltare_2023-2032_Vestmoldtrangaz.pdf">https://www.vmtg.md/images/PLANURI/H_CA_ANRE_nr_820_Plan_de_Dezvoltare_2023-2032_Vestmoldtrangaz.pdf</a></i></b></p>
<b>Main investments included in the programme</b>	<p><b>Investments:</b></p> <p>The company's investments focus on:</p> <ul style="list-style-type: none"> <li>– technical reuse, reconstruction and modernisation of existing transmission facilities (CS, GDS, GMS, CPS, data transmission networks, etc.);</li> <li>– optimisation of existing ones and introduction of new capacities with automated control of technological equipment operating processes;</li> <li>– introduction of tele-mechanical and telemetry systems for the control of the main technical elements (linear valve nodes, cathodic protection) on gas main pipelines, with the possibility of transmitting the necessary information to the central dispatching, in order to ensure the safe operation of the transmission system;</li> <li>– ensuring the safe and accident-free operation of the transmission system for the gas transmission to distribution system operators as well as for gas transit to the Balkan region and Turkey, eliminating emergency situations;</li> <li>– optimising the loads of existing pipelines;</li> <li>– extension of the Iasi-Ungheni-Chisinau Interconnector (Phase II);</li> <li>– construction of the natural gas transmission network with DN 500 on the Ungheni-Balti segment, with connection to the northern transmission network "Ananiev-Cernauti-Bogorodicieni";</li> <li>– construction of the natural gas compressor station located in Ungheni district.</li> </ul>

Source: [www. moldovatrangaz.md](http://www.moldovatrangaz.md), <http://ec.europa.eu/eurostat>

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

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

If until recently the only gas supply source for these countries was Russia, today, through the planning and implementation of new infrastructure projects, the neighbouring countries seek to diversify these sources, in order to increase the reliability of gas supply 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 that wishes to have a fully integrated market.

Romania is in a privileged position today thanks to major investments in gas transmission infrastructure. As a result, Romania is of particular importance in the region, representing a hub that can ensure energy security and gas supply from diversified sources.

After the construction of the Turkish Stream 2 pipeline in Bulgaria and Serbia, the pipelines on the Transbalkan Corridor became unused in the North-South direction. As a result, Transgaz transformed these pipelines from one-way to two-way pipelines by investing its own forces and thus created the conditions for transporting natural gas on the South-North direction from the Southern Corridor through the Transbalkan pipelines at a capacity of 14 billion cubic meters/year from Azerbaijan and LNG from terminals in Turkey and Greece to Romania and Europe.

The fact that we are reverse-flow interconnected allows us to import natural gas from different corridors. Until 5 years ago there was only the option of importing Russian gas through the T1 transit pipeline. Now things are radically different. We can import gas from Hungary, from Bulgaria, from the Caspian Sea, via the TANAP and then TAP pipelines, via the Vertical Corridor, or even liquefied natural gas from Greek or Turkish terminals. This demonstrates two important aspects: first, that Romania is a country with vision and courage to act in the gas sector, which is important for the present and the future; and second, that Transgaz is a leader in the regional energy sector.

The Vertical Corridor, a component of the South-North Corridor of the 3 Seas Initiative (3SI), will contribute to the diversification of natural gas sources and increase the security of natural gas supply to Central and Eastern Europe and the Balkans.

The integration of BRUA into the Vertical Corridor transforms Romania into an important player on the gas market in the region. Natural gas will be transported through Greece to other countries via several entry and exit points and from different sources of supply (Azerbaijan, Qatar, Algeria, Egypt, Iran ,etc.).

The meeting on 11 January 2024 in Bucharest of the heads of the signatory TSOs of the MoU on the Vertical Corridor was an important step towards the enabling of a bi-directional corridor of natural gas flows from Greece and Turkey to Central and Eastern Europe and the Balkans, respectively to the Republic of Moldova and Ukraine and vice versa, the development of the Vertical Corridor activity, interconnecting the gas transmission networks in Greece, Bulgaria, Romania and Hungary, allowing bi-directional gas flow by involving non-EU countries (Ukraine, Republic of Moldova) as this approach is relevant for the implementation of the Vertical Corridor, the harmonisation of planned developments in the region, taking into account the expectations of CESEC and relevant EU strategies and policies and regional aspects.

On 19 January 2024, on the sidelines of the CESEC meeting in Athens, gas infrastructure operators participating in the Vertical Corridor initiative signed a new Memorandum of Understanding which included as signatories operators from the Republic of Moldova (Vestmoldtransgaz), Ukraine (GTSO) and Slovakia (Eustream). The Vertical Corridor is operational and gas can be brought in from Azerbaijan. In the second phase, Bulgartransgaz

needs to build another 63 kilometres, which could bring the total gas volume up to 15 billion cubic metres, including gas from the Caspian Sea and liquefied gas from Turkey.

The operators (TSOs) of the national gas transmission systems of several Eastern European and Balkan countries are preparing to apply for non-reimbursable EU funds from the Modernisation Fund to strengthen their pipeline networks and increase interconnections between them in order to diversify the gas supply sources of the countries concerned by enhancing access to liquefied natural gas (LNG) from liquefaction terminals in Greece and Turkey.

The Vertical Corridor, created at Transgaz' initiative will bring prestige to Romania but also energy security for Eastern European countries, the Republic of Moldova and Ukraine, as well as Central Europe: Hungary, Slovakia, Poland, Austria, Czech Republic, etc. Transgaz is confident in the synergy of the Technical System Operators of Greece, Bulgaria, Romania, Hungary, Ukraine, Republic of Moldova and Slovakia, in the significant impact they can bring in increasing and strengthening the energy security of those countries, the region and the European Union.

A coordinated development of these countries' systems and interconnection capacities can contribute to the transformation of the region and the continent in terms of gas supply security and enable Romania to become a pole of economic development in Europe.

In all this picture **Romania** is the country with the market with the lowest dependence on imported natural gas, but it can become a gateway for natural gas from Greece through Bulgaria to Central and Eastern Europe. Adding to this picture, in addition to its favourable geostrategic position, the resources discovered in the Black Sea, Romania could clearly play a defining role in the region.

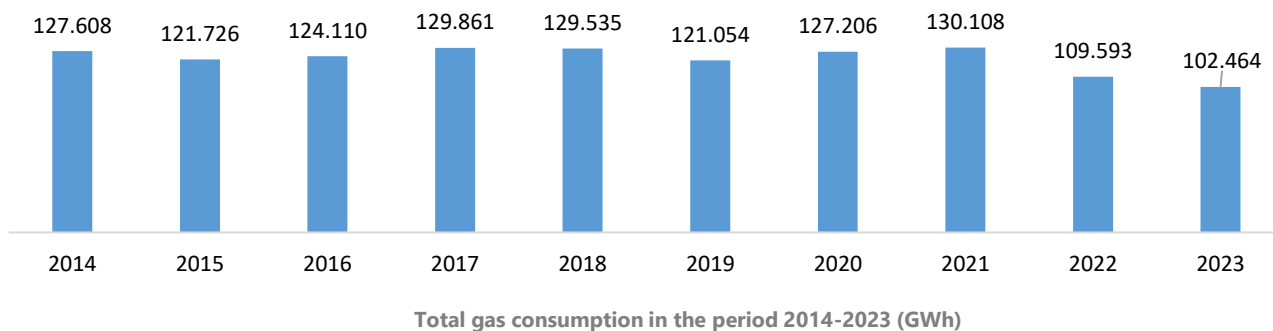
In this context, the natural gas transmission infrastructure becomes the most important factor, and **Transgaz** is facing a major challenge: the development - as soon as possible - of natural gas transmission corridors that ensure both the necessary degree of interconnectivity at European level and sufficient natural gas transmission potential to exploit resources on the domestic and regional markets.

## 5. GAS CONSUMPTION, PRODUCTION AND STORAGE

### 5.1 Gas consumption

#### 5.1.1 2014-2023 gas consumption history

The total gas consumption in the Romanian market in the period 2014–2023, expressed in GWh, is as follows:



**Chart 5 - The gas consumption in the Romanian market in the period 2014–2023 (GWh)**

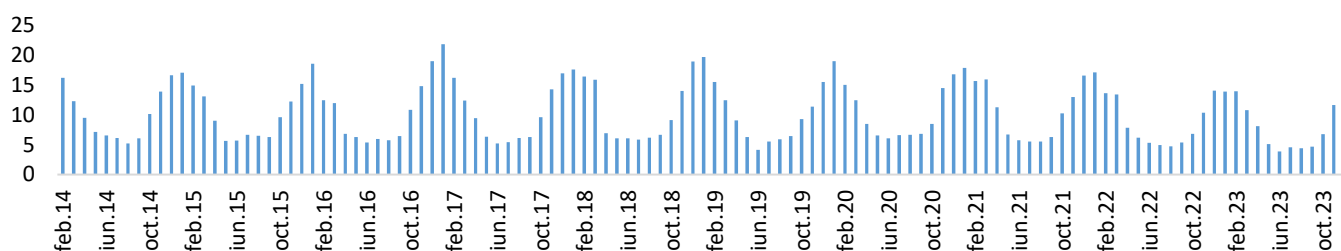
Source: ANRE reports

Natural gas consumption in Romania has decreased in recent years due to the decrease in consumption in the industrial sector (e.g. chemical industry), which has closed many production capacities.

#### 5.1.2 Seasonal consumption and consumption peak

Depending on the season (winter, summer), natural gas consumption varies and the gas transmission network has to deal with different levels of transmission demand.

The seasonal variation in the period 2014–2023 is represented in the following chart:



Source: ANRE reports

**Chart 6- Seasonal gas consumption in the period 2014-2023 (TWh)**

Key elements to ensure safety of gas supply in critical times have the historical gas consumption data of the **day** of the year with the **highest consumption** and of the **14 consecutive days with the highest consumption in the year**.

The history of the two key elements is as follows:

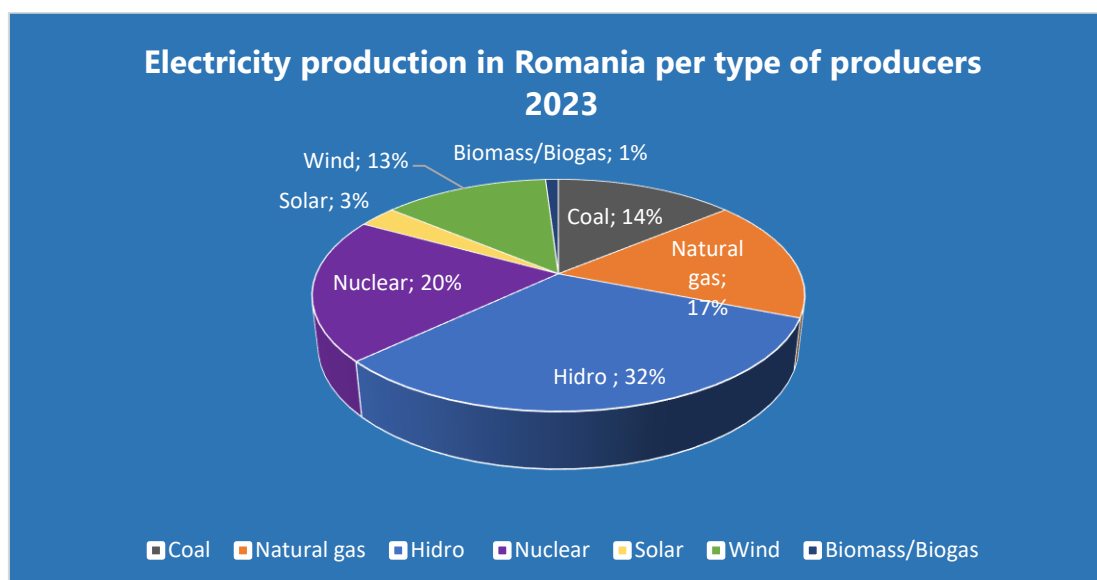
Maximum daily consumption and 14 days maximum consumption				
Year	Maximum consumption 1 day (GWh)	Date	Maximum consumption 14 days (GWh)	Period
2014	734,9	31 January	9.677,7	25 January-7 February
2015	647,5	9 January	8.393,3	1-14 January
2016	728,5	22 January	8.874,6	15-28 January
2017	751,1	9 January	10.145,2	7-20 January
2018	718,2	01 martie	9.061,0	20 February – 5 March
2019	709,9	08 January	9.344,9	4-17 January
2020	690,8	08 January	8.864,4	7-20 January
2021	690,8	19 January	8.648,3	9-22 January
2022	643,3	26 January	8.292,3	14-27 January
2023	612,1	10 februarie	7.823,7	30 January -12 February

**Table 1 - PEAK and maximum consumption 14 days**

### 5.1.3 Gas consumption forecasts 2024-2033

#### 1. Forecast of the electricity mix

The electricity mix, according to the Romania’s Energy Strategy for 2025–2035 with the 2050 outlook-draft, is and will remain balanced and diversified.



**Chart 7 – The structure of the primary energy mix in 2023**

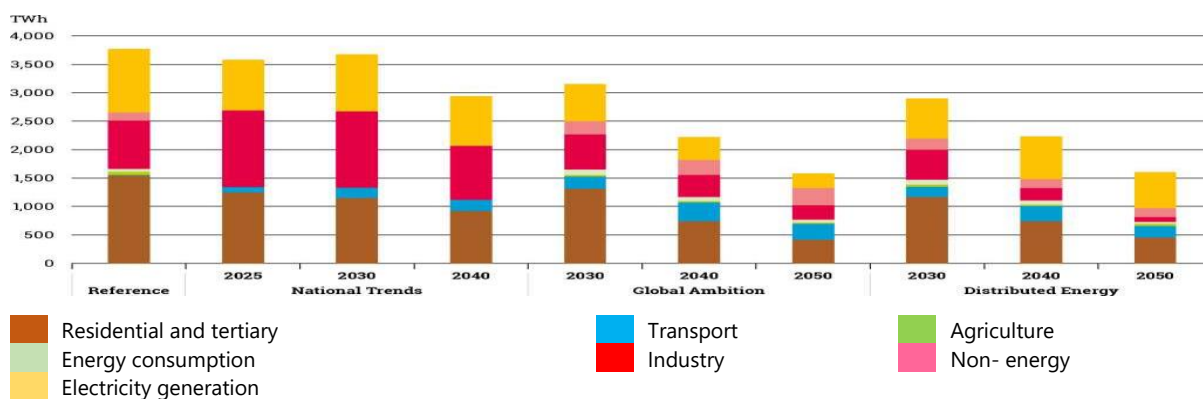
Source: National Energy Strategy 2025-2035 with 2050 outlook - draft

Romania's natural gas consumption has been declining in recent years mainly because the petro-chemical industry, a major consumer of natural gas, has closed production capacities,

but with the reopening of these units and with the replacement of some coal-fired power generation capacities by natural gas-fired ones, the expansion of natural gas transmission and distribution networks and the reduction of prices following the start of gas exploitation in the Black Sea, natural gas consumption is expected to increase in the medium term.

## 2. Forecast – ENTSOG TYNDP 2022<sup>2</sup>

At EU level, the *National Trends* scenario shows an important role for methane gas as an energy carrier with a very limited evolution of demand until 2030. After 2030, however, demand decreases with the implementation of Member States' hydrogen strategies.



**Chart 8 – Natural gas consumption forecast 2025 -2050 according to the TYNDP 2022 scenario (TWh)**

### Conclusion

Natural gas, although declining, has an important share in domestic primary energy consumption due to the relatively high availability of domestic resources, low environmental impact and increased ability to balance electricity from intermittent renewables (wind and PV) given the flexibility of natural gas-fired power plants.

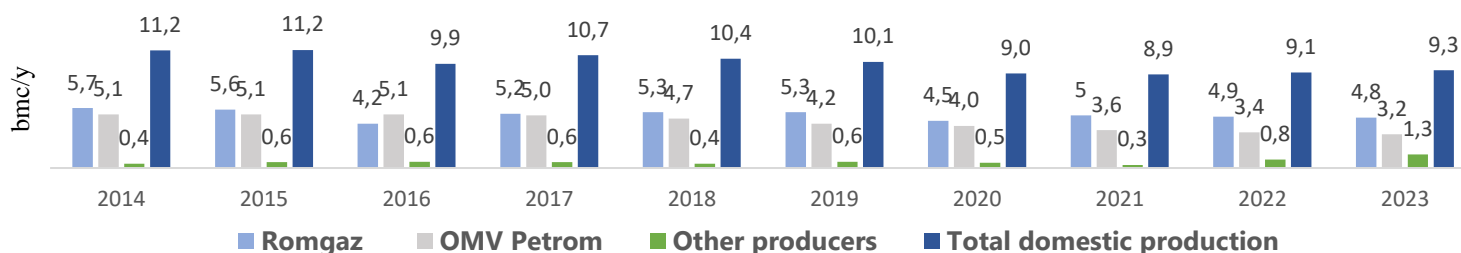
In the transition period (the transition from coal to renewables and cleaner technologies), Romania will rely on natural gas (transition fuel) because of its lower emissions compared to coal and also because of its technical capacity to ensure grid stability while significantly increasing the share of renewables in our energy system.

<sup>2</sup> ENTSOG – Scenario TYNDP 2022

## 5.2 Gas production

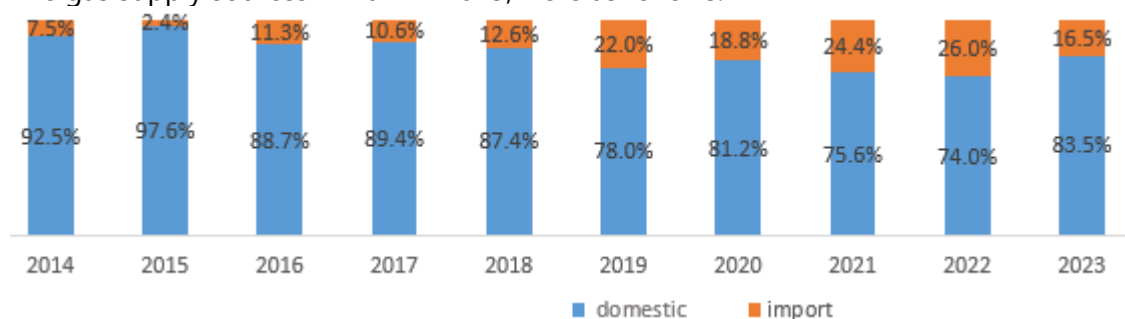
### 5.2.1 2014–2023 gas production history

The domestic gas production (bcm) in 2014–2023 by the main producers was as follows:



**Chart 9 – The domestic gas production depending on the main producers in the period 2014-2023 (bcm/y)**  
Source: Internal – Dispatching Centre

The gas supply sources in 2014 – 2023, were as follows:



**Chart 10 – The gas supply sources in the period 2014-2023**

Source: Annual ANRE reports for the period 2014 –2023

Declining domestic production in the period 2014-2023 amid depletion of natural gas reserves has led to an increase in the annual share of natural gas imports from 7.5% in 2014 to 16.5% in 2023.

### 5.2.2 Forecast of the domestic gas production 2024-2033

For the preparation of the gas production forecasts the following were taken into account:

1. Forecasts from Romania's 2025-2035 Energy Strategy with the 2050 outlook - draft

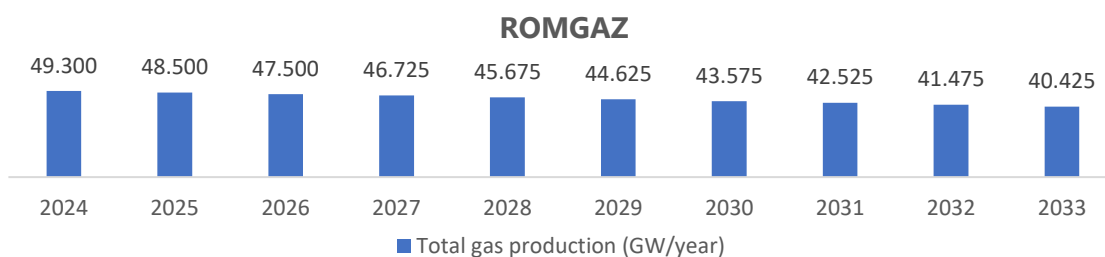
According to forecasts up to 2030 with the outlook for 2050, onshore natural gas production is expected to decrease, with the maintenance of a reduced dependence on imports thus being conditional on the development of natural gas reserves discovered in the Black Sea.

The first natural gas from the Neptun Deep project, gas exploited by OMV Petrom and Romgaz in the Black Sea, will be transported through the Tuzla-Podişor pipeline from autumn 2027. The estimated annual gas volumes are about 8,16 bcm entering the national natural gas transmission network from the Neptun Deep field.

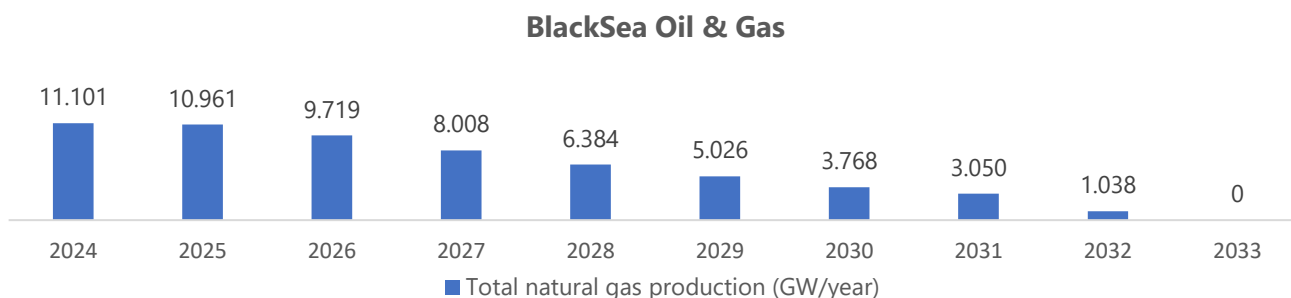
In terms of gas-fired electricity generation, the net installed capacity at the beginning of 2024 was 2238 MW, up from 1988 MW in 2023, but very low compared to other European countries.

Efficient natural gas-fired capacity has the prospect of a competitive position in the energy mix, thanks to its relatively low GHG and noxious emissions, flexibility and ability to be quickly adjusted. They are capable of providing system services and back-up for intermittent RES.

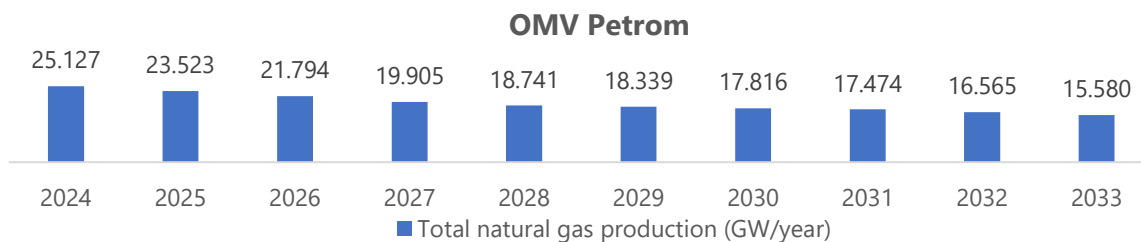
2. Forecasts of the main natural gas producers for the period 2024-2033



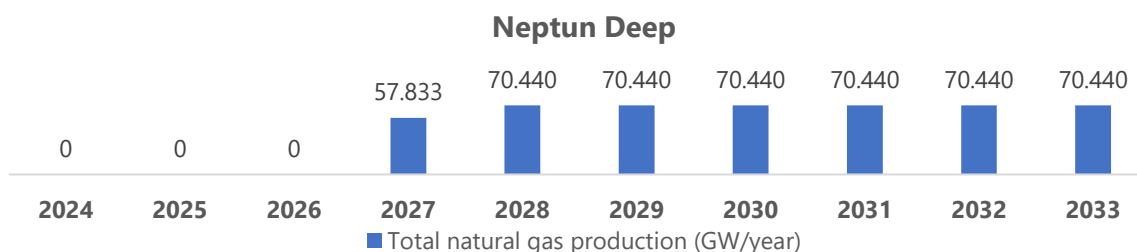
**Chart 11– ROMGAZ natural gas production forecast for the period 2024–2033**



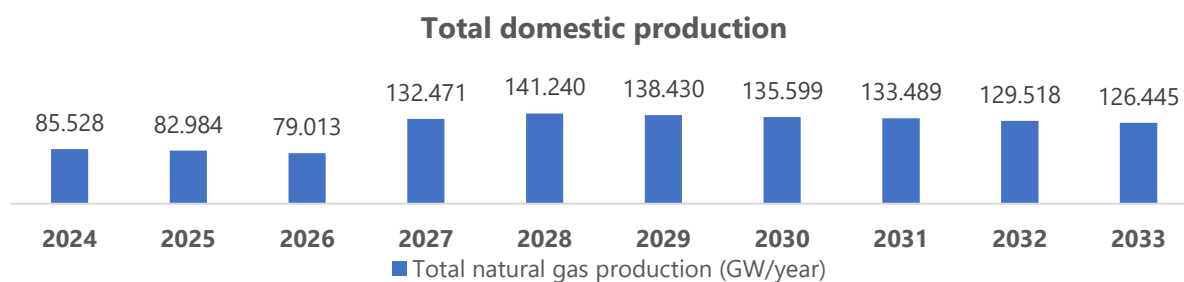
**Chart 12 – Black Sea Oil and Gas natural gas production forecast for the period 2024–2033**



**Chart 13 – OMV Petrom natural gas production forecast for the period 2024–2033**



**Chart 14 – Neptun Deep natural gas production forecast for the period 2024–2033**



**Chart 15– Natural gas production forecast 2024-2033 according to natural gas producers**

Source: ROMGAZ, Black Sea Oil and Gas, OMV Petrom

### 5.3. Underground gas storage

#### 5.3.1 Current context of the underground gas storage activity

The storage sector is of great importance to the European Union, to its security of energy supply and to the Union's other essential security interests. For the purposes of Council Directive 2008/114/EC underground gas storage facilities are considered to be critical infrastructure. The current European regulations on security of gas supply are geared towards cooperation between Member States in order to develop and agree on common measures to prevent and respond to security of supply risks and introduce the principle of solidarity in order to ensure the supply of gas to vulnerable consumers in crisis situations. The objective of the European Commission is to ensure the necessary measures to guarantee the continuity of gas supply throughout the European Union, in particular for protected customers, in the event of difficult weather conditions or disruption of gas supply.

Climate and environmental challenges are the defining responsibility of our generation. The atmosphere is warming and the climate is changing more and more every year. The European Green Deal proposes and sets out a new growth strategy, which aims to transform the EU into a fair and prosperous society with a modern, competitive and resource-efficient economy with zero net greenhouse gas emissions in 2050 and with economic growth decoupled from resource use. In this context, finding new ways of storing energy and developing and adapting to new, less polluting forms of energy production is a European challenge.

The use of methane gas will continue to play an important role in supporting the transition of the EU economy from solid fuel to green energy (energy from renewable sources). However, at EU level, in order to meet climate targets by 2050, methane will need to be composed of biomethane and synthetic methane.

At the national level, underground storage of natural gas plays a major role in ensuring security of natural gas supply, facilitating the balancing of consumption - domestic production - import of natural gas, by covering consumption peaks caused mainly by temperature variations, as well as maintaining the optimal operating characteristics of the National Natural Gas Transmission System, in order to obtain technical and economic advantages.

At the same time, underground gas storage has the strategic role of ensuring the supply of natural gas from storage in cases of force majeure.



The activity of underground storage of natural gas is an activity that can only be carried out by operators licensed by ANRE for this purpose, in accordance with the provisions of Law 123/2012 Law on Electricity and Natural Gas, as amended. Starting with the 2021 - 2022 storage cycle, the storage activity has been deregulated in line with national commitments on the liberalisation of the natural gas market.

Underground gas storage capacity is provided in Romania through 6 underground gas storage facilities with a total active capacity of 33.864 TWh per storage cycle, i.e. an injection capacity of 267,750 GWh/day and an extraction capacity of 341,440 GWh/day.

There are currently two storage system operators active in the Romanian storage market: Natural Gas Storage Subsidiary DEPOGAZ Ploiesti SRL, a subsidiary of SNGN Romgaz SA Mediaş, owning a license for the operation of five underground gas storage facilities having a total capacity of 30.709 TWh per cycle respectively 90, 7% of the total storage capacity and Depomures, which operates the underground gas storage facility in Târgu Mureş, with an active capacity of 3.155 TWh per storage cycle representing 9.3% of the total storage capacity.

Capacity of the underground storage facilities				
Underground storage facility	Storage operator	Active capacity	Withdrawal capacity	Injection capacity
		TWh/cyclu	GWh/day	GWh/day
Bălăceanca	Depogaz	0,535	12,840	10,700
Bilciureşti	Depogaz	14,017	149,800	107,000
Gherceşti	Depogaz	2,675	21,400	21,400
Sărmăşel	Depogaz	9,630	80,250	69,550
Urziceni	Depogaz	3,852	48,150	32,100
Târgu Mureş	Depomureş	3,155	29,000	27,000
<b>Total</b>		<b>33,864</b>	<b>341,440</b>	<b>267,750</b>

Source: Reporting: Depogaz and Depomureş

In terms of capacity booking history, the situation in the period 2014 - 2024 is described below:

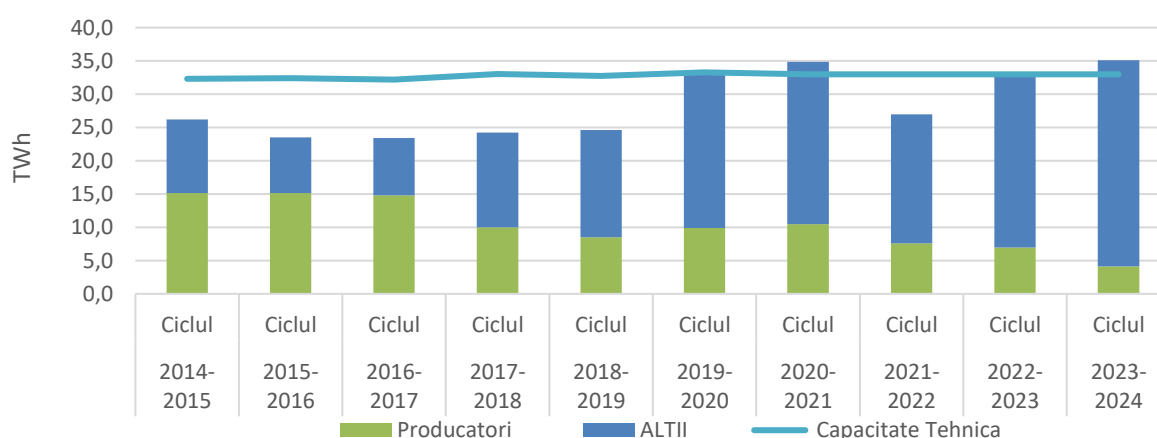


Chart 16 – Capacities booked in the period 2014-2024

Source: Depogaz

At national level, statistically over the last 5 years, the ratio of the volume of natural gas stored to annual consumption has been around 24.95%, in the middle of the European ranking.

During the winter period, the ratio of natural gas from storage to daily gas consumption is on average around 46%.

### **5.3.2 Forecasts for underground gas storage**

In order to implement the European Green Deal, the EC Communication to the EU Parliament states that there is a need to rethink policies for clean energy supply across the economy, industry, production and consumption, large-scale infrastructure, transport, food and agriculture, construction, taxation and social benefits”.

The Commission considers that decarbonising the energy system is critical to reach climate objectives in 2030 and 2050. The production and use of energy across economic sectors account for more than 75% of the EU’s greenhouse gas emissions. Energy efficiency must be prioritised. A power sector must be developed that is based largely on renewable sources, complemented by the rapid phasing out of coal and decarbonising gas.

In the context of the energy transition, natural gas is a source of energy, which makes a rapid and effective contribution, through available and innovative technologies, to harnessing the potential for energy efficiency.

The contribution of the storage activity to ensuring the quantities of natural gas needed for annual consumption during this transitional period can be increased by increasing the technical performance of the storage facilities, an objective which can be achieved by ensuring the conditions for increasing the degree of filling of the storage facilities and by providing the technical possibilities for increasing the volumes of gas extracted daily during the extraction cycles.

In accordance with the Preventive Action Plan on measures to guarantee the security of natural gas supply in Romania (approved by GD 1077/2021), storage investment projects are promoted by SNGN Romgaz S.A., the Gas Storage Subsidiary DEPOGAZ Ploiești SRL for the period 2024-2033, include the following actions:

- Investments in upgrades of storage facilities in order to increase the daily gas supply capacity;
- Increasing flexibility in using storage facilities in the injection and withdrawing cycles by promoting alternative operation solutions.

## 6. SECURITY OF GAS SUPPLY

Regulation (EU) 2017/1938 of 25 October 2017 concerning measures to safeguard the security of gas supply providing for the fulfilment of several objectives, as follows:

- The preparation by ENTSO-G of a simulation at EU level for the gas supply interruption situations in order to identify the main risks at EU level related to gas supply interruptions;
- The cooperation between Member States within the regional groups in order to evaluate common risks on the security of supply and to prepare and agree upon joint preventive and response measures;
- Introduction of the solidarity principle according to which Member States have to assist each other so as to permanently guarantee gas supply to vulnerable consumers even during the most severe crisis situations;
- Improving transparency: gas companies have to officially notify the national authority on long term contracts which may be relevant for security of supply;
- The setting of a relevant framework in which the decision on a bidirectional permanent flow takes into account the opinions of all EU countries for which that project brings benefits.

In order to meet the requirements of Regulation (EU) no. 2017/1938 of 25 October 2017, Art. 5, Transgaz shall demonstrate the fulfilment of all the necessary measures, so that, in case the main infrastructure is affected, the capacity of the remaining infrastructure, determined by 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 and in the case that the competent authority 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 calculation of the N-1 formula for Romania

#### 1. Definition of the N-1 formula

The N-1 formula describes the technical capacity of the gas transmission infrastructure to satisfy the total gas demand of the relevant area (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%.

## 2. The calculation method for the N-1 formula:

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

## 3. Definitions of the parameters of the N-1 formula

‘Relevant area’ means the geographical region for which the N-1 formula is calculated, as set by the competent authority.

*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.

*Definitions regarding offer*

‘EP<sub>m</sub>’: the entry points technical capacity (mil. cm/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 (mil. cm/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 (mil. cm/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 (mil. cm/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 (mil. cm/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.

---

<sup>3</sup> According to Art. 2 (1) (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.

The result of the N-1 formula calculated for Romania in 2023 is as follows:

$$N - 1[\%] = \frac{45,0 + 24,05 + 32 + 0 - 18,8}{72} \times 100$$

$$N - 1[\%] = 114,9\%$$

$$N - 1[\%] \geq 100\%$$

### Explanations regarding the used values

a) Terms regarding demand:

Terms regarding demand [mil. cm/day]		Explanations
$D_{max}$	72,0	In the beginning of 2023 the peak consumption ensured through the NTS amounted to 54.6 million $S\ m^3/day$ on gas day 09.02.2023, which was lower than the peak consumption statistically existing once every 20 years.

b) Terms regarding offer (capacity):

Terms regarding offer [mil. cm/day]		Explanations
$EP_m$	45,0	The total capacity of import points (Isaccea 1, Negru Vodă 1, Csanadpalota, Ruse-Giurgiu, Ungheni).
$P_m$	24,05	Domestic gas production entered into the NTS
$S_m$	32	The sum of the maximum potential flow rates to be extracted from each storage facility under conditions of 100% loading
$LNG_m$	0	There are no LNG terminals.
$I_m$	18,8	The import capacity at Isaccea 1.

For  $P_m$  it was considered the production potential and not the technical capacity (65.8 million  $Scm/day$ ).

We consider that this approach ensures a correct image provided by the N-1 standard - the technical capacity mentioned can no longer be achieved due to the decreasing of domestic production. Upon the determination of the  $S_m$  the maximum potential flows that can be extracted from the storage facilities under conditions of 100% loading was taken into consideration.

	Technological capacity (mil $S\ m^3/day$ )	Maximum potential flow (mil $S\ m^3/day$ )
Depogaz Ploiești SRL	32.7	29.2
Depomureș	3.0	2.8
<b>Total</b>	<b>35,7</b>	<b>32</b>
<i>Maximum daily flow withdrawn simultaneously from all the storage facilities (01.10.2016-31.03.2021)</i>	26.1	

At EP<sub>m</sub> value determination, the Isaccea 1, Negru Vodă 1, Csanadpalota and Giurgiu-Ruse and Ungheni entry points were considered as follows:

Entry point	Entry point capacity [mil. Scm/day]
Isaccea 1 entry point	18,8
Negru Voda 1 entry point	14,5
Csanadpalota entry point	7,2
Ruse –Giurgiu entry point	2,5
Ungheni entry point	2,0
<b>Total</b>	<b>45</b>

Table 2 - Gas import points

#### 4. The calculation of the N-1 formula by taking into account the demand oriented measures:

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

Definition related to demand:

`D<sub>eff</sub>` means the part of (mil. cm/day) of D<sub>max</sub> which, in case of gas supply interruption, may be covered to a sufficient extent and in due time by market measures related to demand, in line with Art. 9 (1) (c) and Art. 5 (2).

The calculation result is the same as: D<sub>eff</sub>=0 – no contracts are concluded with interruptible safety clients

#### Note:

- This document is 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) 1938 of 25 October 2017.

#### Forecast of the value of the N-1 formula for 10 years for the partial Russian gas supply interruptions (through Isaccea):

YEAR	N-1
2024	113,3
2025	111,8
2026	110,4
2027	163,5
2028	155,1
2029	154,2
2030	157,9
2031	157,2
2032	158,7
2033	157,8

Table 3– Forecasts for the N-1 value for 10 years

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

### I. STRATEGIC PROJECTS

The Development Plan for the Romanian National 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 in the middle of the country and in Oltenia.

The identification of the projects that need to be developed regarding the National Transmission System (NTS) 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 important sources for gas supply are clearly emerging: **Caspian** and **Black Sea gas**.

Therefore, the projects planned by the company 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 offshore blocks 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 the Caspian and Black Sea resources.

The geostrategic position, the primary energy resources, the major investment projects in gas transmission infrastructure 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. By the envisaged projects for the upgrading and development of the gas transmission infrastructure, by the smart network control, automation, communication and management system implementation, Transgaz 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, traceability, enhancing the system's operating flexibility, safety and integrity, generating the energy efficiency increase.

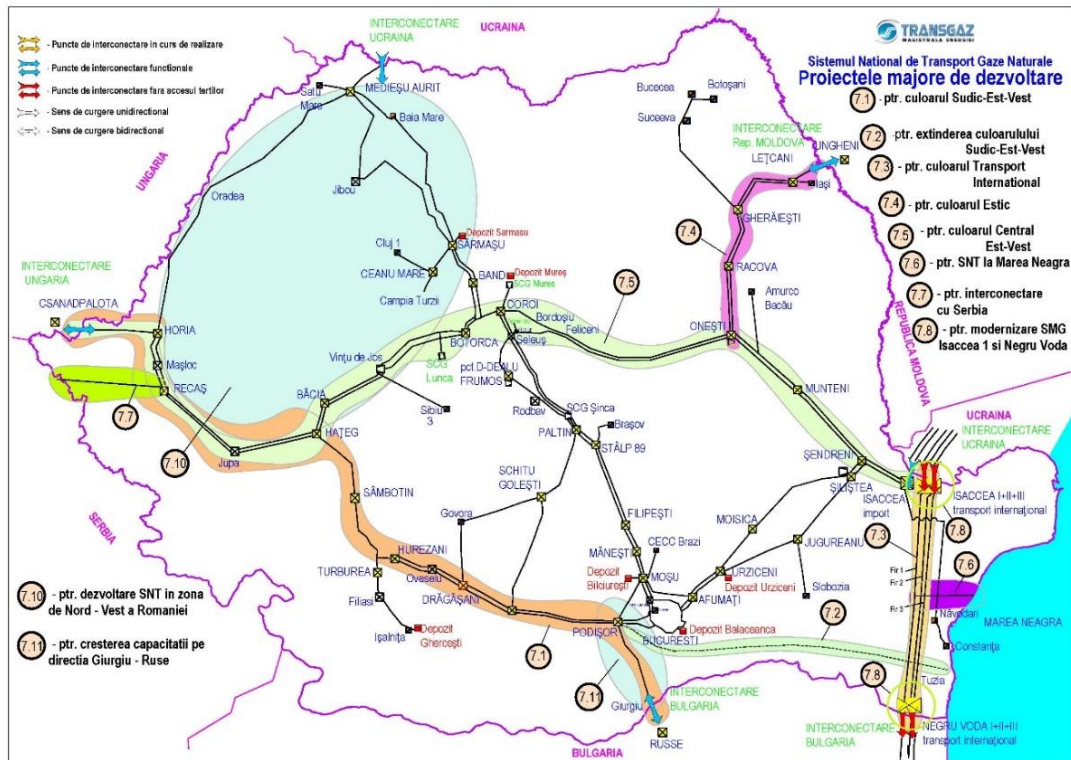



Figure 5 - Major NTS projects map

**7.1 Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor (BRUA) - phase II**

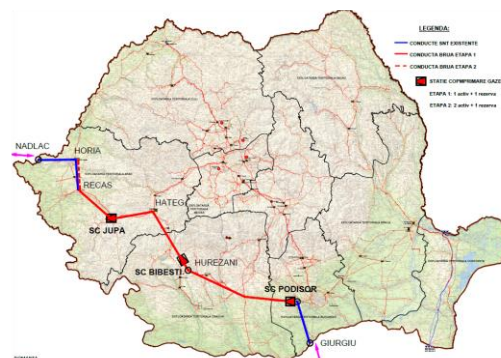
<b>Project name:</b>	<b>Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor (BRUA) - phase II</b>
<b>Project number:</b>	<b>7.1</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b> 
<b>Type of project:</b>	Capacity increase
<b>Estimated completion deadline</b>	<b>2027</b>
<b>Scope of the project:</b>	Phased capacity increase of the Bulgaria-Romania-Hungary-Austria bi-directional transmission corridor which currently provides 2.63 bcm/year of transmission capacity with Hungary. Three levels of capacity development with Hungary are proposed in the incremental capacity process, respectively at 2.98 bcm/year, 4.38 bcm/year and 5.32 bcm/year, for the transmission of gas from the Vertical Corridor.



**Description of the project:**

Phase II consists in the achievement of the following objectives:

- Recaş–Horia 32" x 63 bar pipeline approximately 50 km long;
- Expansion of the three gas compressor stations (CS Podișor, CS Bibești și CS Jupa) by mounting an additional compression unit in each station;
- Expansion of the existing gas metering station GMS Horia.


**Project justification:**

Phased capacity increase of the Bulgaria-Romania-Hungary-Austria bi-directional transmission corridor.

**Connection with other projects:**

- **BRUA** - Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor (BRUA) - phase I– completed project
- Development on the territory of Romania of the Transmission Corridor to take over natural gas from the Black Sea shore (Tuzla – Podișor)

**Economic data:**

The estimated value of the project is **Euro 150 million**

**Impact on cross-border capacity:**

Phased capacity increase of the Bulgaria-Romania-Hungary-Austria bi-directional transmission corridor which currently provides 2.63 bcm/year of transmission capacity with Hungary. Three levels of capacity development with Hungary are proposed in the incremental capacity process, respectively at 2.98 bcm/year, 4.38 bcm/year and 5.32 bcm/year, for the transmission of gas from the Vertical Corridor.

**Project phase:**

FEED – completed

**TYNDP:** TRA-A-1322

**PCI status:** YES – list V

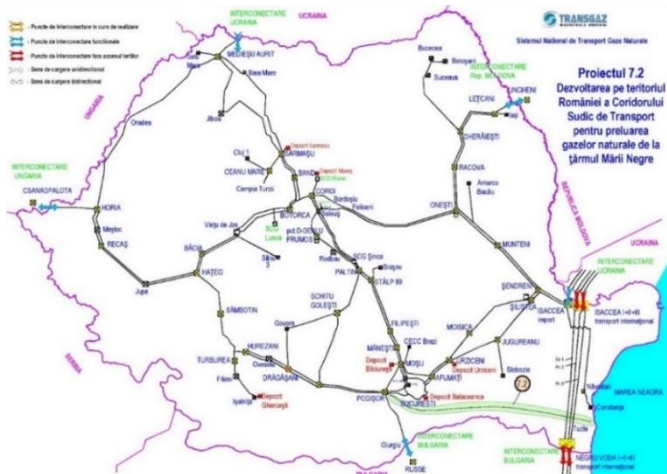
**Project amendments:**

	TYNDP 2014	TYNDP 2017	TYNDP 2018	TYNDP 2019	TYNDP 2020	TYNDP 2022	TYNDP 2024
<b>Estimated completion deadline</b>	2019	Phase I 2019 Phase II 2020	2022	2022	2022	2025	2027
<b>Total estimated value of the project (million euro)</b>	560	547,39	68,8	68,8	74,5	74,5	150

## 7.2 Development on the Romanian territory of the Transmission Corridor for taking over the Black Sea gas (Tuzla – Podișor)

<b>Project name:</b>	<b>Development on the Romanian territory of the Transmission Corridor for taking over the Black Sea gas (Tuzla – Podișor)</b>
<b>Project number:</b>	<b>7.2</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>

<b>Type of project:</b>	Capacity increase	
<b>Estimated completion deadline</b>	<b>2025</b>	
<b>Scope of the project:</b>	Construction of a natural gas transmission pipeline Tuzla-Podișor, with a length of 308.3 km and DN 1200 respectively DN 1000, connecting the natural gas resources available on the Black Sea coast to the BRUA corridor, thus ensuring the possibility to transport natural gas to Bulgaria and Hungary through the existing interconnections Giurgiu-Ruse (with Bulgaria) and Nădlac- Szeged (with Hungary). This pipeline will interconnect with the T1 natural gas transmission pipeline and crosses the counties: Constanta, Calarasi and Giurgiu.	
<b>Description of the project:</b>	<p>The pipeline consists of two sections as follows:</p> <ul style="list-style-type: none"> <li>▪ section I, Tuzla–Amzacea, 32,4 km long, Ø 48” diameter (DN1200) and technical capacity of 12 bcma;</li> <li>▪ section II, Amzacea–Podișor, 275,9 km long, Ø40” diameter (DN1000) and technical capacity of 6 bcma.</li> </ul>	
<b>Project justification:</b>	<p>As Europe becomes increasingly dependent on natural gas imports, access to new sources is becoming an urgent necessity. This investment will allow gas from the Black Sea to enter the NTS and thus reach economic operators and households in the localities connected to the system. Moreover, this pipeline will connect to new sources of natural gas in the Transbalkan Corridor and the Vertical Corridor, of which the BRUA pipeline is a part, and will also be necessary for gas transmission coming to Romania from the Caspian Sea area, from LNG terminals in Turkey and Greece.</p>	
<b>Connection with other projects:</b>	<b>BRUA</b> - Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor (BRUA) - phase I – completed project	
<b>Economic data:</b>	The estimated value of the project is <b>Euro 493.9 million</b> of which 85.5 million Euro was obtained from the Modernisation Fund.	
<b>Impact on cross-border capacity:</b>	Phased capacity increase of the bi-directional Bulgaria-Romania-Hungary-Austria transmission corridor which currently provides 2.63 bcm/year of transmission capacity with Hungary. Three levels of capacity development with Hungary are proposed in the incremental capacity process, respectively at 2.98 bcm/year, 4.38 bcm/year and 5.32 bcm/year, for the transmission of gas from the Vertical Corridor.	
<b>Project phase:</b>	In progress	
<b>TYNDP:</b> TRA-A-362	<b>PCI status:</b> <b>YES</b> – list V	
<b>Project amendments:</b>		



	TYNDP 2014	TYNDP 2017	TYNDP 2018	TYNDP 2019	TYNDP 2020	TYNDP 2022	TYNDP 2024
<b>Description of the project</b>	285 km	307 km	308,2 km	308,3 km	308,3 km	308,3 km	308,3 km
<b>Estimated completion deadline</b>	2019	2020	2020	2021	2022	2025	2025
<b>Total estimated value of the project (million euro)</b>	262,4	278,3	360,4	360,4	371,6	371,6	493,9

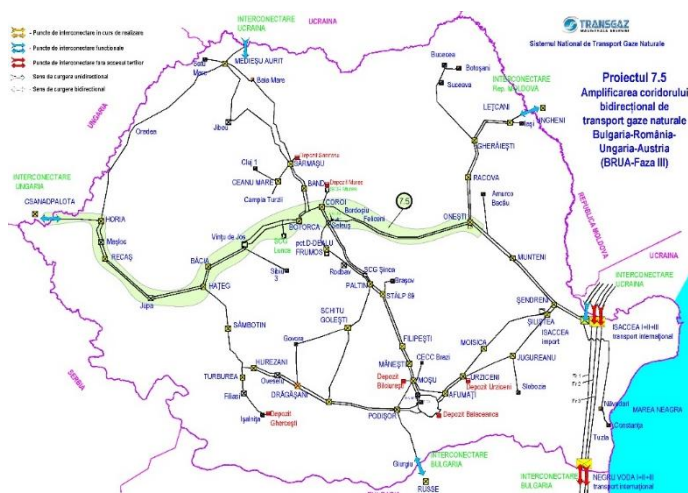
### 7.3 Extension of the bi-directional gas transmission corridor Bulgaria – Romania – Hungary – Austria (BRUA Phase III)

<b>Project name:</b>	Extension of the bi-directional gas transmission corridor Bulgaria – Romania – Hungary – Austria (BRUA Phase III)
<b>Project number:</b>	7.3
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>
<b>Type of project:</b>	Transmission capacity increase
<b>Estimated completion deadline</b>	<b>2028 - 2029</b>
<b>Scope of the project:</b>	Phased increase in transmission capacity to ensure the capacity levels proposed in the incremental capacity process, i.e. 4.38 bcm/year and 5.32 bcm/year, for gas transmission on the Vertical Corridor.

#### Project description:

The development of this natural gas transmission corridor involves the following:

- upgrading of existing pipelines belonging to the NTS;
- replacement of existing pipelines belonging to the NTS with new pipelines or construction of new pipelines installed in parallel with existing pipelines;
- development of 4 or 5 new compressor stations with a total installed capacity of approx. 66-82.5 MW;
- increasing natural gas transmission capacity to Hungary.



<b>Project justification:</b>	Phased increase in transmission capacity to ensure the capacity levels proposed in the incremental capacity process, i.e. 4.38 bcm/year and 5.32 bcm/year, for gas transmission on the Vertical Corridor.
<b>Connection with other projects:</b>	BRUA – Phase I BRUA – Phase II Gas transmission corridor Black sea - Podișor
<b>Economic data:</b>	The estimated value of the project is <b>Euro 855 million</b>

<b>Impact on cross-border capacity:</b>	Capacity increase to Hungary to ensure the capacity levels proposed in the incremental capacity process, i.e. 4.38 bcm/year and 5.32 bcm/year, to transport gas from the Vertical Corridor.						
<b>Project phase:</b>	Updated pre-feasibility study.						
<b>TYNDP:</b> TRA-N-959	<b>PCI status:</b> NO						
<b>Project amendments:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion deadline</b>	-	2023	2023	2025	2025	2027	2028-2029
<b>Total estimated value of the project (million euro)</b>	-	530	530	530	530	530	855

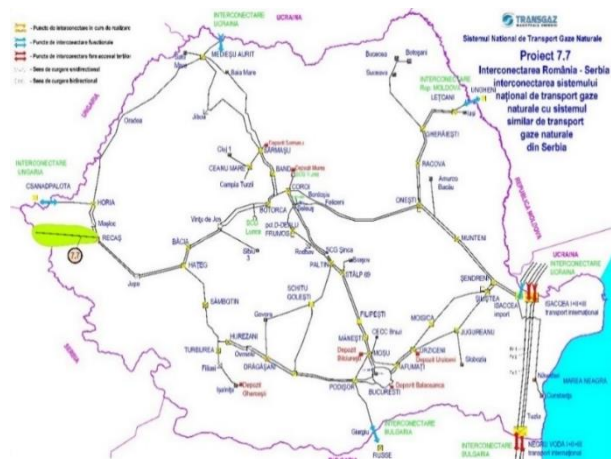
### 7.4 Romania – Serbia Interconnection – interconnection of the national gas transmission system with the similar gas transmission system in Serbia

<b>Project name:</b>	<i>Romania – Serbia Interconnection – interconnection of the national gas transmission system with the similar gas transmission system in Serbia</i>
<b>Project number:</b>	7.4
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>
<b>Type of project:</b>	Increasing security of gas supply, gas market integration
<b>Estimated completion deadline</b>	<b>2028</b>
<b>Scope of the project:</b>	Increasing the degree of interconnectivity between natural gas transmission systems in EU Member States and increasing energy security in the region

#### Description of the project:


The project will consist in the following:

- construction of a new interconnection pipeline on the Recaş-Mokrin direction of approx. 97 km in length of which approx. 85 km on the territory of Romania and 12 km on the territory of Serbia with the following characteristics:
  - pressure in the BRUA pipeline Recaş area: 50-54 bar (PN BRUA-63 bar);
  - diameter of the interconnection pipeline: DN 600, PN 63 bar;
  - transmission capacity: max. 1.2 bn Scm/year (137,000 Scm/h), both on the Romania-Serbia and Serbia-Romania direction.
- construction of a natural gas metering station (located on the territory of Romania).



<b>Project justification:</b>	In the context of the provisions of the European Strategy on Energy Union and the actions to implement the objectives of this strategy (competitiveness, sustainability and security of energy supply), Romania is particularly interested in ensuring the energy security dimension, developing energy infrastructure by diversifying energy sources and transmission routes, strengthening solidarity between Member States and ensuring the efficient functioning of the energy market..						
<b>Connection with other projects:</b>	<b>BRUA</b>						
<b>Economic data:</b>	The estimated value of the project is <b>Euro 86,8 million</b>						
<b>Impact on cross-border capacity:</b>	Transmission capacity: max. 1.2 bn Scm/year (137,000 Scm/h), both in the direction Romania-Serbia and Serbia-Romania.						
<b>Project phase:</b>	FEED - completed						
<b>TYNDP:</b> TRA-A-1268	<b>PCI status:</b> NO						
<b>Project amendments:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion deadline</b>	-	2026	2020	2021	2021	2028	2028
<b>Total estimated value of the project (million euro)</b>	-	43	42,4	53,76	56,21	56,21	86,8

### 7.5 Development/Upgrading of the gas transmission infrastructure in the North-Western part of Romania

<b>Project name:</b>	<b>Development/Upgrading of the gas transmission infrastructure in the North-Western part of Romania</b>
<b>Project number:</b>	<b>7.5</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b> 
<b>Type of project:</b>	Increasing natural gas transmission capacity Ensuring security of gas supply in the region
<b>Estimated completion deadline</b>	<b>2026 for Stage 1</b> <b>2027 for Stage 2</b> <b>2028 for Stage 3</b>
<b>Scope of the project:</b>	Development/upgrading of objectives related to the National Transmission System, in the North-West area of Romania, in order to create new natural gas transmission capacities or to increase existing capacities.
<b>Description of the project:</b>	
Given the scale of this project, it is proposed to implement it in stages as follows:	
<ul style="list-style-type: none"> <li>▪ <b>Stage 1:</b> <ul style="list-style-type: none"> <li>○ construction of the natural gas transmission pipeline and related installations in the Horia-Borş direction.</li> </ul> </li> <li>▪ <b>Stage 2:</b></li> </ul>	

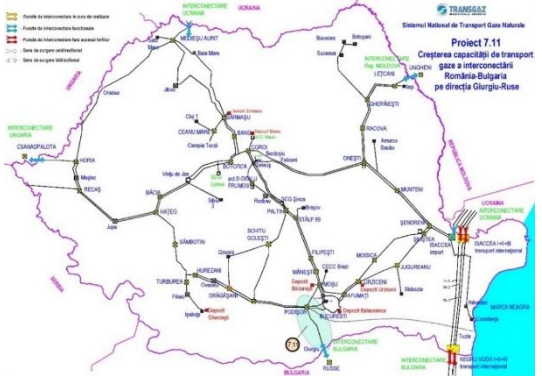
- construction of the natural gas transmission pipeline and related installations in the direction Borş-Abrămuț;
- construction of a Gas Compressor Station at Medieșu Aurit;
- construction of the gas transmission pipeline and related installations in the direction Huedin-Aleșd.
- **Stage 3:**
  - construction of the gas transmission pipeline and related installations in the direction Abrămuț-Medieșu Aurit;
  - construction of the gas transmission pipeline and related installations in the direction of Sărmășel-Medieșu Aurit.




<b>Project justification:</b>	In the context of the provisions of the European Strategy on Energy Union and the actions to implement the objectives of this strategy (competitiveness, sustainability and security of energy supply), Romania attaches particular interest to ensuring the energy security dimension, developing energy infrastructure by diversifying energy sources and transmission routes, strengthening solidarity between Member States and ensuring the efficient operation of the energy market.																								
<b>Connection with other projects:</b>	-																								
<b>Economic data:</b>	The estimated value of the project is <b>Euro 405 million</b>																								
<b>Impact on cross-border capacity:</b>	-																								
<b>Project phase:</b>	The Prefeasibility Study is finalised.																								
<b>TYNDP:</b> TRA-N-598	<b>PCI status:</b> -																								
<b>Project amendments:</b>																									
	<table border="1"> <thead> <tr> <th></th> <th>TYNDP 2014</th> <th>TYNDP 2017</th> <th>TYNDP 2018</th> <th>TYNDP 2019</th> <th>TYNDP 2020</th> <th>TYNDP 2022</th> <th>TYNDP 2024</th> </tr> </thead> <tbody> <tr> <td><b>Estimated completion deadline</b></td> <td>-</td> <td>-</td> <td>-</td> <td>2026</td> <td>2026</td> <td>2026</td> <td>2028</td> </tr> <tr> <td><b>Total estimated value of the project (million euro)</b></td> <td>-</td> <td>-</td> <td>-</td> <td>405</td> <td>405</td> <td>405</td> <td>405</td> </tr> </tbody> </table>		TYNDP 2014	TYNDP 2017	TYNDP 2018	TYNDP 2019	TYNDP 2020	TYNDP 2022	TYNDP 2024	<b>Estimated completion deadline</b>	-	-	-	2026	2026	2026	2028	<b>Total estimated value of the project (million euro)</b>	-	-	-	405	405	405	405
	TYNDP 2014	TYNDP 2017	TYNDP 2018	TYNDP 2019	TYNDP 2020	TYNDP 2022	TYNDP 2024																		
<b>Estimated completion deadline</b>	-	-	-	2026	2026	2026	2028																		
<b>Total estimated value of the project (million euro)</b>	-	-	-	405	405	405	405																		

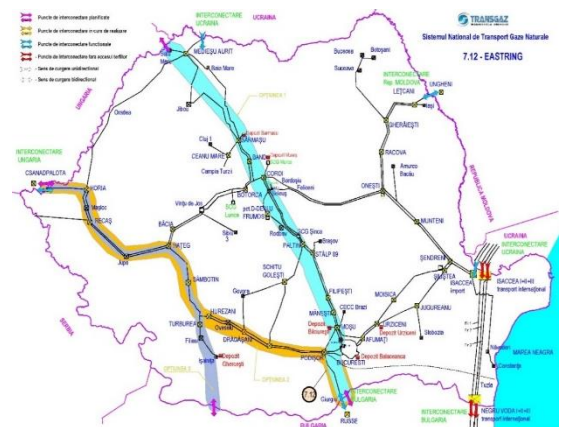
### 7.6 Increasing the natural gas transmission capacity of the Romania-Bulgaria interconnection on the Giurgiu -Ruse direction

<b>Project name:</b>	<b>Increasing the natural gas transmission capacity of the Romania-Bulgaria interconnection on the Giurgiu-Ruse direction</b>
<b>Project number:</b>	<b>7.6</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>

<b>Project type:</b>	Ensuring energy security Diversification of natural gas transmission sources and routes						
<b>Estimated completion date</b>	<b>2027</b>						
<b>Project Objective:</b>	In line with the provisions of the Memorandum of Cooperation for the implementation of the Vertical Corridor to achieve the goal, the parties agree to explore technical needs in the form of new pipelines, interconnections or reinforcements of national transmission systems.						
<b>Project description:</b>	<p>Depending on capacities, the project consists of:</p> <ul style="list-style-type: none"> <li>▪ construction of a new natural gas pipeline and related facilities;</li> <li>▪ construction of a new Danube undercrossing;</li> <li>▪ amplification of GMS Giurgiu.</li> </ul> <p>The Prefeasibility Study considered several development options for an increase in capacity from 1.5 bcm/year to 5 bcm/year.</p> 						
<b>Project justification:</b>	In the context of the provisions of the European Strategy on Energy Union and the actions to implement the objectives of this strategy (competitiveness, sustainability and security of energy supply), Romania is particularly interested in ensuring energy security, developing energy infrastructure by diversifying energy sources and transmission routes, strengthening solidarity between Member States and ensuring the efficient functioning of the energy market.						
<b>Connecting with other projects:</b>	<b>BRUA</b>						
<b>Economic data:</b>	The estimated value of the project is euro 51.8 million						
<b>Impact on cross-border capacity:</b>	Increasing capacity to Bulgaria from 1.5 bcm/year to 5 bcm/year.						
<b>Project Stage:</b>	Prefeasibility Study - completed.						
<b>TYNDP:</b>	<b>PCI status:-</b>						
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion deadline</b>	-	-	-	2027	2027	2027	2027
<b>Total estimated amount of the project (mil. Euro)</b>	-	-	-	51,8	51,8	51,8	51,8
<b>Project amendments:</b>							

## 7.7 Eastring-Romania

<b>Project name:</b>	<b>Eastring-Romania</b>
<b>Project number:</b>	<b>7.7</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b> 
<b>Project type:</b>	Increasing transmission capacity and ensuring security of gas supply across the region
<b>Estimated completion date</b>	<b>2028 for Stage 1</b> <b>2033 for Stage 2</b>
<b>Project Objective:</b>	Connecting the natural gas transmission systems of Slovakia, Hungary, Romania and Bulgaria to gain access to natural gas reserves in the Caspian region and the Middle East.
<b>Project description:</b>	<p>The EASTRING project, promoted by EUSTREAM, is a bi-directional flow pipeline for Central and South-Eastern Europe that aims to connect the natural gas transmission systems of Slovakia, Hungary, Romania and Bulgaria to gain access to natural gas reserves in the Caspian region and the Middle East.</p> <p>According to the feasibility study, the project will be implemented in two phases as follows:</p> <ul style="list-style-type: none"> <li>Phase 1 - Maximum capacity of 20 bcm/year;</li> <li>Phase 2 - Maximum capacity of 40 bcm/year.</li> </ul>
<b>Project justification:</b>	<p>EASTRING will provide the most cost-effective, direct transmission route between gas hubs in the western European Union and the Balkan region/Western Turkey, an area with a very high potential to deliver gas from different sources.</p> <p>By being able to diversify transmission routes as well as supply sources, it will ensure security of supply in the whole region, mainly in South-East European countries.</p>
<b>Connecting with other projects:</b>	It connects Slovakia with the EU's external border via Bulgaria, Hungary and Romania.
<b>Technical data:</b>	Bi-directional flow interconnection pipeline with an annual capacity between 225,500 GWh and 451,000 GWh (approx. 20 bcm to 40 bcm), connecting Slovakia to the EU external border via Bulgaria, Hungary and Romania.
<b>Economic data:</b>	<p>Estimated value of the investment</p> <ul style="list-style-type: none"> <li>Phase 1 - <b>Euro 1,297 million for Romania</b> (Euro 2,600 million -total);</li> <li>Phase 2 - <b>Euro 357 million for Romania</b> (Euro 739 million total).</li> </ul>
<b>The impact on cross-border capacity:</b>	<ul style="list-style-type: none"> <li>Phase 1 - Maximum capacity of 20 bcm/year;</li> <li>Phase 2 - Maximum capacity of 40 bcm/year.</li> </ul>
<b>The project stage:</b>	Feasibility study - completed
<b>TYNDP:</b> TRA-A-655	<b>PCI status:</b> YES– list V






**Project amendments:**

	PDSNT 2014	PDSNT 2017	PDSNT 2018	PDSNT 2019	PDSNT 2020	PDSNT 2022	PDSNT 2024
<b>Estimated completion deadline</b>	-	-	-	2028	2029	2030	2033
<b>Total estimated project amount (mill. euro)</b>	-	-	-	1.654	1.654	1.654	1.654

**7.8 Monitoring, control and data acquisition system for cathodic protection stations related to the National Gas Transmission System**

<b>Project name:</b>	<b>Monitoring, control and data acquisition system for cathodic protection stations related to the National Gas Transmission System</b>
<b>Project number:</b>	<b>7.8</b>
<b>Project beneficiary:</b>	<p style="text-align: center;"><b>SNTGN Transgaz SA</b></p> 
<b>Project type:</b>	Intelligent network implementation for remote monitoring and control.
<b>Estimated completion date</b>	<b>2027</b>
<b>Project Objective:</b>	<p>Reducing corrosion of pipelines, keeping them in operation for as long as possible and reducing maintenance costs is a major objective.</p> <p>The implementation of the acquisition, control and monitoring system for the cathodic protection system will ensure increased sustainability and safety in the operation of transmission pipelines. The acquired data will ensure simplicity of operation for a complex pipeline protection system with low maintenance costs.</p>

**Project description:**

The centralised cathodic protection system will offer the possibility of clear and precise remote setting, monitoring and operation of system points of interest, eliminate data reading costs, avoid situations where due to weather conditions it is not possible to read data and human errors, will allow distributed control of locations, will reduce operation and maintenance costs, considerably reduce setup time. Implementing such a system will reduce micro-management, testing and commissioning times.

The distributed architecture will provide minimal downtime risks and provide maximum reliability of the cathodic protection system.


The system will be intuitive, easy to use and acceptable in any SCADA system structure, and operator training requirements are short and simple.

Implementing such a system will reduce staff costs and specialise operations and maintenance staff.

The decision on the maintenance of the system as well as the proper adjustment of the cathodic protection stations in the integrated system will be the decision of a well trained dispatcher who will rely on real time incoming data and a historical database.

<b>Project justification:</b>	Remote control of cathodic protection station parameters and corrosion monitoring at critical points of the natural gas transmission system is mandatory to reduce corrosion and properly manage energy consumption at each location.  At the same time the system will provide information related to the electrosecurity of the pipeline, as well as for inner cathodic protection (no external source of cathodic current), providing information at some points or sections for limiting rectification of AC leakage currents induced in the pipeline.																								
<b>Economic data:</b>	Estimated value of the investment <b>Euro 17,7 million</b>																								
<b>The project stage:</b>	Feasibility study - completed																								
<b>TYNDP: -</b>	<b>PCI status:-</b>																								
<b>Project changes:</b>																									
	<table border="1"> <thead> <tr> <th></th> <th>PDSNT 2014</th> <th>PDSNT 2017</th> <th>PDSNT 2018</th> <th>PDSNT 2019</th> <th>PDSNT 2020</th> <th>PDSNT 2022</th> <th>PDSNT 2024</th> </tr> </thead> <tbody> <tr> <td><b>Estimated completion deadline</b></td> <td>-</td> <td>-</td> <td>-</td> <td>2023</td> <td>2023</td> <td>2027</td> <td>2027</td> </tr> <tr> <td><b>Total estimated value of the project (euro million)</b></td> <td>-</td> <td>-</td> <td>-</td> <td>8</td> <td>8</td> <td>17,7</td> <td>17,7</td> </tr> </tbody> </table>		PDSNT 2014	PDSNT 2017	PDSNT 2018	PDSNT 2019	PDSNT 2020	PDSNT 2022	PDSNT 2024	<b>Estimated completion deadline</b>	-	-	-	2023	2023	2027	2027	<b>Total estimated value of the project (euro million)</b>	-	-	-	8	8	17,7	17,7
	PDSNT 2014	PDSNT 2017	PDSNT 2018	PDSNT 2019	PDSNT 2020	PDSNT 2022	PDSNT 2024																		
<b>Estimated completion deadline</b>	-	-	-	2023	2023	2027	2027																		
<b>Total estimated value of the project (euro million)</b>	-	-	-	8	8	17,7	17,7																		

### 7.9 Development of the SCADA system for the National Gas Transmission System

<b>Project name:</b>	<b>Development of the SCADA system for the National Natural Gas Transmission System</b>
<b>Project number:</b>	<b>7.9</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b> 
<b>Project type:</b>	Intelligent network implementation for remote monitoring and control.
<b>Estimated completion date</b>	<b>2026</b>
<b>Project Objective:</b>	The upgrading of the natural gas transmission infrastructure must be supported in the coming years by the development of an efficient and flexible SCADA system, by upgrading the hardware and software architecture, by migrating to a decentralized architecture, with distributed control on administrative organizational units in accordance with the structure of SNTGN TRANSGAZ SA.
<b>Project description:</b>	<p>The project on "SCADA (Supervisory Control And Data Acquisition) System Development for the National Natural Gas Transmission System" will consist of:</p> <ul style="list-style-type: none"> <li>the analysis of the possibilities to optimise the SCADA system architecture;</li> <li>the replacement/upgrade of morally and physically obsolete hardware equipment in national/territorial SCADA dispatchers in order to ensure, through the new firmware/operating systems/software applications used, an increase in the volume and power of data processing as well as in the level of IT security;</li> <li>ensuring a reserve of hardware/software capacity at the level of national and regional SCADA dispatchers necessary for the future integration into the SCADA system of NTS facilities to be commissioned in the period 2022-2027;</li> </ul>

- additional integration of about 170 operational MRSs (Metering Regulating Stations) in the National Natural Gas Transmission System (NTS);
- ensuring the continuity of transmission, real-time monitoring at national and regional SCADA dispatchers, of the relevant and necessary technological parameters within the NTS objectives, in accordance with the level and pace of development of technological installations in the short and medium term, in order to monitor and operate the NTS in conditions of safety, efficiency and environmental protection; the integration of the new local automations to be put into operation by 2022 resulting from the upgrading/development of natural gas compression stations, technological nodes, shut-off valves located on main pipelines, etc;
- installation of SCADA-type systems Intrusion Detection System LAN SCADA;
- the installation of dedicated IP&DS type systems with supervision at industrial protocol level for sensitive applications-stations remotely controlled by SCADA system: technological nodes; interconnection stations; compressor stations; future Pipeline Automation Systems.
- the installation of a simulation system and PMS (Pipeline Monitoring Software) or NSM (Network Program Management);
- the identification and provision of technical solutions for securing the industrial data network where data acquisition and control systems (SCADA) are installed;
- the analysis of technical opportunities for the design and implementation of an emergency dispatch, if the study on the opportunity and necessity of an emergency dispatch calls for it, the training of SCADA operator/technical/maintenance staff in the use of the new security techniques and policies implemented.

For the implementation of the project "Development of TRANSGAZ SCADA System for the National Transmission System", taking into account the conclusions of the feasibility study it was proposed to develop the project in stages:

**Stage 1** - upgrading the central hardware and software infrastructure - servers and SCADA operator stations.

**Stage 2** - Equipping new MRSs for SCADA monitoring.

**Stage 3** - Implementation of interconnection, control and monitoring projects with other TRANSGAZ SCADA systems.

<b>Project justification:</b>	The National Natural Gas Transmission System has a continuous evolution justified by the dynamics of gas flows and the strategic position of Romania in terms of ensuring national and European energy independence and security.						
<b>Economic data:</b>	Estimated value of the investment <b>EUR 5.5 million</b>						
<b>The project stage:</b>	Feasibility study - completed. Stage 1- in procurement						
<b>TYNDP:</b>	<b>PCI status:</b> -						
<b>Project changes:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated time of completion</b>	-	-	-	2023	2023	2025	2026
<b>Total estimated value of the project (€ million)</b>	-	-	-	5,5	5,5	5,5	5,5

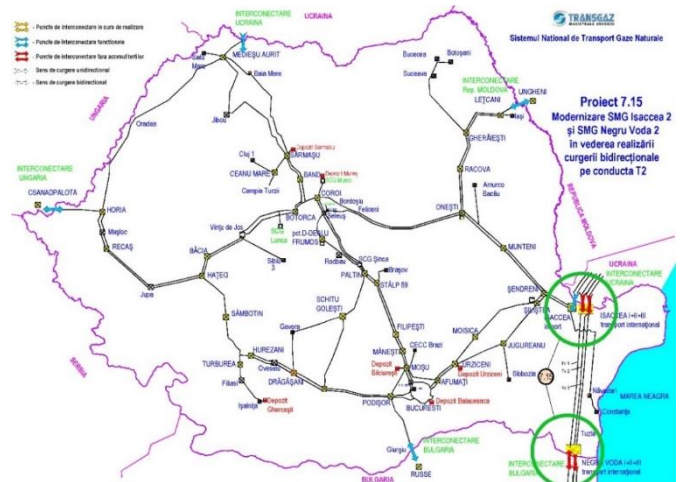
## 7.10 Upgrading of Isaccea 2 GMS and Negru Voda 2 GMS for bidirectional flow on T2 pipeline

<b>Project name:</b>	<b>Upgrading of Isaccea 2 GMS and Negru Voda 2 GMS for bidirectional flow on T2 pipeline</b>
<b>Project number:</b>	<b>7.10</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>
<b>Project type:</b>	The security of supply, Energy security
<b>Estimated completion date</b>	<b>2028</b> <i>The project will be developed according to the results of the market demand assessment for incremental capacity for the interconnection points located on the T2 and T3 pipelines on the Bulgaria - Romania - Ukraine transmission direction (Transbalkan corridor).</i>
<b>Project Objective:</b>	Ensuring bi-directional flow at the border with Ukraine and Bulgaria on the T2 transit pipeline requires the upgrading of the natural gas metering stations GMS Isaccea 2 and GMS Negru Voda 2.

### Project description:

Upgraded Isaccea 2 Metering Station will be equipped with separation/filtration plant and metering plant:

- the separation/filtration is provided by a separation/filtration battery;
- The metering installation will consist of several parallel metering lines (operating and standby) equipped with ultrasonic meters for the purpose of measuring the quantities of natural gas delivered, each line being identically equipped with three independent metering systems (Pay, Check and Verify); the independent Pay and Check systems will use dual ultrasonic meters and the Verify systems will use a single ultrasonic meter.



The upgraded Negru Voda 2 Metering Station will be equipped with separation/filtration plant and metering equipment:

- the separation/filtration is provided by a separation/filtration battery;
- the metering installation will consist of several parallel metering lines (in operation and in standby) equipped with ultrasonic meters for the purpose of measuring the quantities of natural gas delivered, each line being identically equipped with two independent metering systems (Pay and Check); the independent Pay and Check systems will use dual ultrasonic meters.

**Stage 1:** Creating the possibility of bi-directional gas flow on T2 at GMS Isaccea 2 respectively creating the possibility of bi-directional gas flow on T2 at GMS Negru Voda 2 - completed.

**Stage 2:** The replacement/upgrade of metering systems at GMS Isaccea 2 and GMS Negru Voda 2 respectively. The project is at an early stage and will be further developed depending on the results of the market demand assessment for incremental capacity for the interconnection points located on the T2 pipeline.

<b>Project justification:</b>	Ensuring bi-directional flow at the border with Ukraine and Bulgaria on the T2 transit pipeline
<b>Economic data:</b>	Estimated value of the investment <b>euro 26.65 million</b>
<b>Impact on cross-border capacity:</b>	No additional capacity is developed.
<b>Project Stage:</b>	Stage 1 – completed Stage 2 - market research


**TYNDP:** TRA-N-602.

**PCI status:** -

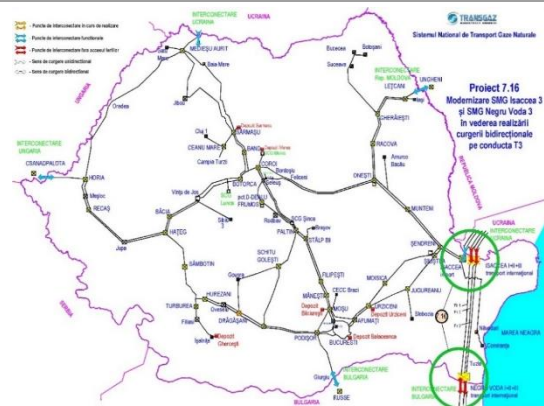
**Project changes:**

	TYNDP 2014	TYNDP 2017	TYNDP 2018	TYNDP 2019	TYNDP 2020	TYNDP 2022	TYNDP 2024
<b>Estimated completion time</b>	-	-	-	-	2024	2024	2028
<b>Total estimated value of the project (euro million)</b>	-	-	-	-	26,65	26,65	26,65

### 7.11 Upgrading of Isaccea 3 and Negru Voda 3 GMS for bidirectional flow on T3 pipeline

<b>Project name:</b>	<b>Upgrading of Isaccea 3 GMS and Negru Voda 3 GMS for bidirectional flow on T3 pipeline</b>
<b>Project number:</b>	<b>7.11</b>
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b> 
<b>Project type:</b>	The security of supply, Energy security
<b>Estimated completion date</b>	<b>2028</b> <i>The project will be developed according to the results of the market demand assessment for incremental capacity for the interconnection points located on the T2 and T3 pipelines on the Bulgaria - Romania - Ukraine transmission direction (Transbalkan corridor).</i>
<b>Project Objective:</b>	Creating the possibility of bi-directional flow on the T3 pipeline, part of the Transbalkan corridor
<b>Project description:</b>	The upgraded Isaccea 3 Metering Station will be equipped with separation/filtration plant and metering plant: <ul style="list-style-type: none"> <li>the separation/filtration is provided by a separation/filtration battery;</li> </ul>

- the metering installation will consist of several parallel metering lines (in operation and in standby) equipped with ultrasonic meters for the purpose of measuring the quantities of natural gas delivered, each line being identically equipped with three independent metering systems (Pay, Check and Verify);
- the stand-alone Pay and Check systems will use dual ultrasonic meters, and the Check systems will use a single ultrasonic meter.



The upgraded Negru Voda 3 Metering Station will be equipped with separation/filtration plant and metering equipment:


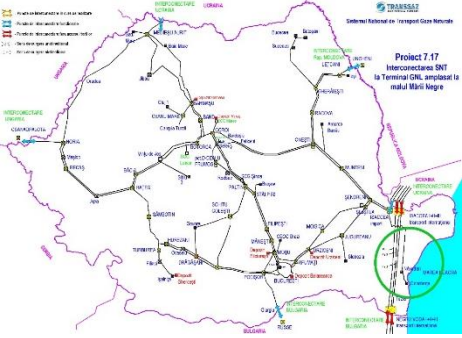
- the separation/filtration is provided by a separation/filtration battery;;
- The metering installation will consist of several parallel metering lines (in operation and back-up) equipped with ultrasonic meters for the purpose of measuring the quantities of natural gas delivered, each line being identically equipped with two independent metering systems (Pay and Check);
- the standalone Pay and Check systems will use dual ultrasonic meters.

**Stage 1:** Creating the possibility of bi-directional gas flow on T3 at GMS Isaccea 3 respectively creating the possibility of bi-directional gas flow on T3 at GMS Negru Voda 3 - completed.

**Stage 2:** The replacement/upgrade of metering systems at Isaccea 3 and Negru Voda 3 GMSs is next. The project is at an early stage and will be developed depending on the results of the market demand assessment for incremental capacity for interconnection points on the T3 pipeline.

<b>Project justification:</b>	Ensuring bi-directional flow at the border with Ukraine and Bulgaria on the T3 transit pipeline, part of the Transbalkan corridor						
<b>Economic data:</b>	Estimated investment value <b>euro 26.65 million</b>						
<b>Impact on cross-border capacity:</b>	No additional capacity is being developed.						
<b>Project Stage:</b>	Stage 1 - completed Stage 2 - market research						
<b>TYNDP:</b> -	<b>PCI status:</b> -						
<b>Project changes:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion date</b>	-	-	-	-	2028	2028	2028
<b>Total estimated value of the project (€ million)</b>	-	-	-	-	26,65	26,65	26,65

## 7.12 The interconnection of the NTS to the LNG Terminal located on the Black Sea shore

<b>Project name:</b>	<b>The interconnection of the NTS to the LNG Terminal located on the Black Sea shore</b>						
<b>Project number:</b>	<b>7.12</b>						
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>						
<b>Project type:</b>	The security of natural gas supply						
<b>Estimated completion date</b>	<b>2028</b>						
<b>Project Objective:</b>	Creating the transmission capacity to take over natural gas from the LNG terminal on the Black Sea coast						
<p><b>Project description:</b></p> <p>Taking natural gas from the Black Sea shore through an LNG terminal involves interconnecting the National Natural Gas Transmission System to the LNG terminal by building a natural gas transmission pipeline, about 25 km long, from the Black Sea shore to the T1 and T2 pipelines. The capacity and design pressure for this pipeline will be determined according to the quantities of natural gas available at the Black Sea shore.</p>							
							
<b>Project justification:</b>	Ensuring the security of gas supply from an alternative source						
<b>Connecting with other projects:</b>	LNG terminal located on the shores of the Black Sea.						
<b>Economic data:</b>	Estimated value of the investment <b>euro19.6 million</b>						
<b>Impact on cross-border capacity:</b>	The project has no impact on cross-border capacities, but contributes to diversification of sources and increased security of gas supply.						
<b>Project Stage:</b>	The project is at an early stage.						
<b>TYNDP:</b> -	<b>PCI status:</b> -						
<b>Project changes:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion date</b>	-	-	-	-	2028	2028	2028
<b>Total estimated amount of the project (euro million)</b>	-	-	-	-	19,6	19,6	19,6

### 7.13 The LNG terminal located on the Black Sea shore

<b>Project name:</b>	<b>The LNG terminal located on the Black Sea shore</b>	
<b>Project number:</b>	<b>7.13</b>	
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>	
<b>Project type:</b>	The security of natural gas supply	
<b>Estimated completion date</b>	<b>2028</b>	
<b>Project Objective:</b>	The construction of an LNG terminal on the Black Sea shore	
<b>Project description:</b>	<p>In order to diversify the natural gas supply sources, the opportunity has been identified to build an LNG terminal on the Black Sea coast with all the related facilities to be able to take over LNG quantities from the Caspian Sea area and the Middle East. The type of the terminal and its facilities and capacity will be determined in the design stages according to the level of gas demand resulting from the capacity booking procedures.</p>	
<b>Project justification:</b>	The implementation of the Project results in diversification of natural gas supply resources	
<b>Connecting with other projects:</b>	The interconnection of the NTS to the LNG Terminal located on the Black Sea shore.	
<b>Economic data:</b>	<b>Euro 360 million</b>	
<b>Impact on cross-border capacity:</b>	The project has no impact on cross-border capacities, but contributes to diversification of sources and increased security of gas supply.	
<b>Project Stage:</b>	The project is at an early stage	
<b>TYNDP:</b>	<b>PCI status:</b>	
<b>Project changes: new project</b>		



## 8. DIRECTIONS FOR THE DEVELOPMENT OF THE NATURAL GAS STORAGE SYSTEM

### I. DEPOGAZ PLOIEȘTI-MAJOR STORAGE PROJECTS

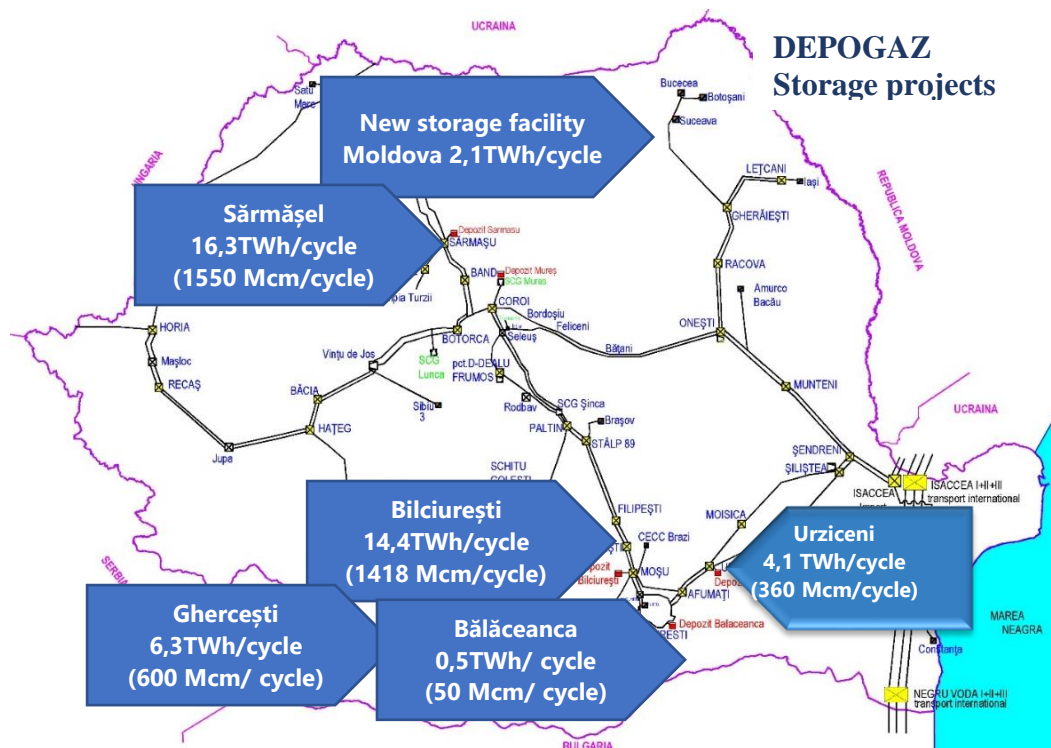


Figure 6 - Major natural gas storage projects – Depogaz

#### 8.1 Increasing the daily extraction capacity at the Bilciurești Storage Facility - Upgrading the infrastructure of the natural gas storage system-Bilciurești

<b>Project name:</b>	<b>Increasing the daily extraction capacity at the Bilciurești Storage Facility - Upgrading the infrastructure of the natural gas storage system-Bilciurești</b>
<b>Project number:</b>	<b>8.1</b>
<b>Project beneficiary:</b>	<b>Depogaz Ploiești</b>
<b>Project type:</b>	Increase storage capacity
<b>Estimated completion date</b>	<b>2027</b>
<b>Project scope:</b>	The project aims to increase current extraction capacity from 14 million cm/day to around 20 million cm/day, coupled with an increase in storage capacity of 108 million cm/cycle.

#### **Project description:**

In order not to disrupt the natural gas storage activity, the project is implemented in stages and consists of the following:

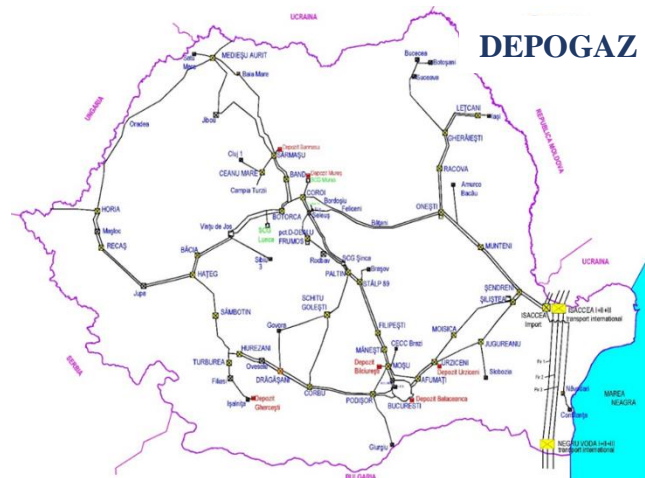
#### **Stage I:**

- Upgrading works for the drying station group 57 Bilciurești - works completed;
- Upgrading works for drying station group 101 Bilciurești - works completed;

- Construction works of a new drying station at Group 145 Bilciurești, as well as reconfiguration and upgrading works of the technological installations in the storage facility - works completed 2021;
- Drilling works for four wells and works for the above ground technological installations related to these wells - works completed 2023;
- Upgrading works of the technological installations inside the Butimanu compressor station - the works will be completed in Q I 2024.

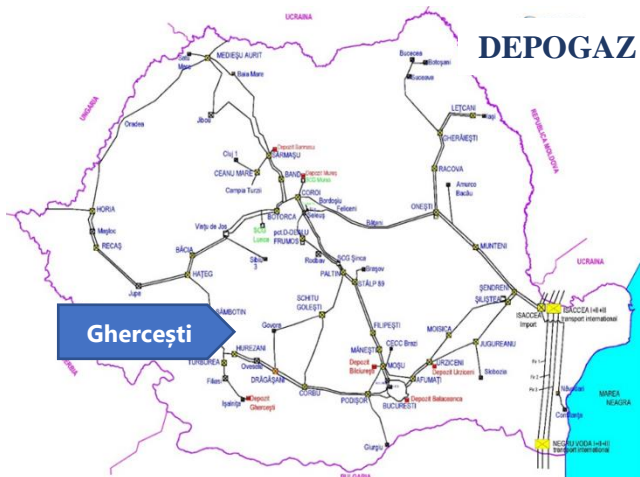
**Stage II:**

- Butimanu - Bilciurești collector with 24" diameter (DN 600 PN 150);
- Upgrading of installations within the Bilciurești natural gas storage groups;
- Upgrading of 39 injection/extraction wells;
- Injection/extraction gas separator batteries;
- Upgrading of M3 Butimanu compression module cooling system;
- New pipeline (11 km) for gas transmission between Bilciurești storage facility and Butimanu compressor station
- Digitisation of the natural gas storage process.



<b>Project justification:</b>	Ensuring the security of the natural gas supply.						
<b>Technical data:</b>	<ul style="list-style-type: none"> <li>○ Increase the daily gas delivery capacity from the Bilciuresti storage by 6 million cubic meters/day, giving a total daily extraction capacity of 20 million cubic meters/day;</li> <li>○ For all storage facility operated by Depogaz, the completion of the project will contribute to increase the daily extraction capacity from storage facilities at national level by about 20%;</li> <li>○ The increase in storage capacity by 108 million cubic metres per cycle, giving a total storage capacity of 1 418 million cubic metres per cycle.</li> </ul>						
<b>Economic data:</b>	<b>Euro 156 million of which :</b> <b>Stage I approximately Euro 32.5 million ;</b> <b>Stage II approximately Euro 123.5 million.</b>						
<b>The project stage:</b>	Construction stage 1, FEED completed for stage 2						
<b>TYNDP:</b>	TYNDP 2022: UGS-F-311			<b>PCI status: 6.20.7</b>			
<b>Project changes:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion date</b>						2026	2027
<b>Total estimated value of the project (Euro million)</b>						123	156

## 8.2 Increasing the underground natural gas storage capacity of the Ghercești storage facility

<b>Project name:</b>	<b>Increasing the underground natural gas storage capacity of the Ghercești storage facility</b>
<b>Project number:</b>	<b>8.2</b>
<b>Project beneficiary:</b>	<b>Depogaz Ploiești</b>
<b>Project type:</b>	Increase storage capacity
<b>Estimated completion date</b>	<b>2028</b>
<b>Project Objective:</b>	The project aims to complete the infrastructure of the Ghercești natural gas storage system to ensure operating conditions at a capacity of 600 million cm/cycle.
<b>Project description:</b>	
<p>The project will consist of the following: gas compressor station;</p> <ul style="list-style-type: none"> <li>extension of drying and gas metering installations;</li> <li>upgrading of 20 injection/extraction wells;</li> <li>interconnection of Ghercești gas storage facility with the NTS;</li> <li>installation of photovoltaic panels for electricity production from renewable sources;</li> <li>installation of facilities for the preparation of thermal agent from renewable sources for heating administrative and technological spaces;</li> <li>introduction of hydrogen ready engines to drive compressors;</li> <li>digitisation of natural gas storage and extraction processes.</li> </ul>	
	
<b>Project justification:</b>	Ensuring the security in the natural gas supply.
<b>Technical data:</b>	<ul style="list-style-type: none"> <li>Increasing the daily gas injection capacity by 3 million cubic meters per day, giving a total daily injection capacity of 5 million cubic meters per day;</li> <li>Increasing the daily gas delivery capacity by 3 million cubic meters per day, resulting in a total daily extraction capacity of 5 million cubic meters per day;</li> <li>Increasing the storage capacity by 450 million cubic meters/cycle resulting in a total storage capacity of 600 million cubic meters/cycle;</li> <li>For all Depogaz-operated storage facilities, the completion of the project will increase the national storage capacity by about 16% and the daily extraction capacity from storage facilities by about 10%;</li> </ul>
<b>Economic data:</b>	<b>Euro 126 million</b>
<b>Project stage:</b>	FEED - completed
<b>TYNDP:</b> UGS - F - 398	<b>PCI status:</b> -

**Project changes:**

	TYNDP 2014	TYNDP 2017	TYNDP 2018	TYNDP 2019	TYNDP 2020	TYNDP 2022	TYNDP 2024
<b>Estimated completion date</b>						2026	2028
<b>Total estimated value of the project (Euro million)</b>						55	126

**8.3 New underground natural gas storage facility in Fălticeni (Moldova)**

<b>Project name:</b>	<b>New underground natural gas storage facility in Fălticeni (Moldova)</b>
<b>Project number:</b>	<b>8.3</b>
<b>Project beneficiary:</b>	<b>Depogaz Ploiești</b>
<b>Project type:</b>	New storage facility
<b>Estimated completion date</b>	<b>2032</b>
<b>The Project scope:</b>	<p>The project aims to develop a new underground storage facility in north-eastern Romania (Moldova region) by converting one of the Pocoleni or Davideni gas fields into an underground storage facility. Providing storage capacity in a gas security deficit area; Newly created storage capacity of 200 million cm/cycle; For all Depogaz-operated storage facilities, the completion of the project will contribute to an increase in national storage capacity by about 7% and in daily extraction capacity from depots by about 7%.</p>

**Project description:**

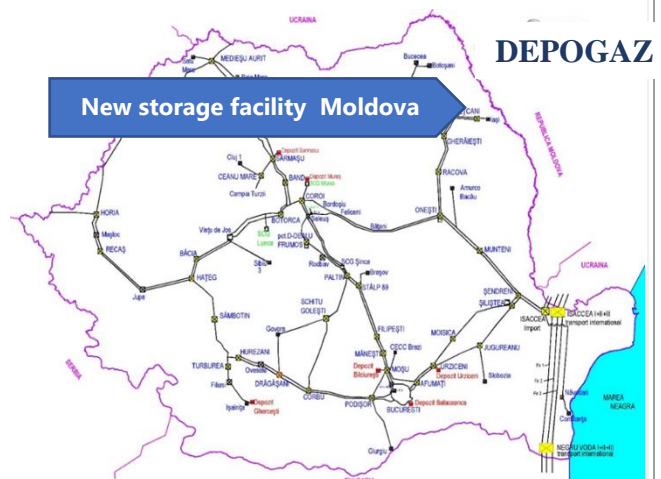
The transformation of one or more of the following depleted fields into an underground storage site: Pocoleni, Comanești, Todirești or Davideni.

**Characteristics:**

- capacity of about 200 million cm/cycle;
- injection capacity of approximately 1.4 million cm/day;
- extraction capacity of about 2 million cm/day.

The project will consist of the following

- natural gas compressor station;
- drying plants and natural gas metering;
- technological installations injection/extraction probes;
- drilling injection/extraction wells;
- interconnection of natural gas storage with the NTS;
- inactive natural gas stock;
- installation of facilities for the preparation of electricity and heat from renewable sources, for administrative and technological needs;
- digitizing the natural gas storage and extraction processes.



<b>Project justification:</b>	Ensuring the security of gas supply.						
<b>Economic data:</b>	<b>Euro 120 million</b>						
<b>Project Phase:</b>	Feasibility study - in preparation The project is conditional on obtaining agreements from Romgaz and ANRM for the conversion of a depleted storage facility into a storage facility.						
<b>TYNDP:</b> TYNDP 2022: UGS-N-399	<b>PCI status:</b>						
<b>Project changes:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion date</b>						2026	2032
<b>Total estimated value of the project (Euro million)</b>						80	120

#### 8.4 Increasing underground natural gas storage capacity at the Sărmășel storage facility (Transylvania)

<b>Project name:</b>	<b>Increasing the underground natural gas storage capacity at the Sărmășel storage facility (Transylvania)</b>
<b>Project number:</b>	<b>8.4</b>
<b>Project beneficiary:</b>	<b>Depogaz Ploiești</b>
<b>Project type:</b>	Increasing storage capacity
<b>Estimated completion date</b>	<b>2030</b>
<b>Project Objective:</b>	The project aims to expand the existing underground storage at Sărmășel from a capacity of 900 million cm/cycle to 1550 million cm/cycle (an increase of 650 million cm/cycle), increase the injection capacity by 4 million cm/day to a total of 10 million cm/day, increase the extraction capacity by 4 million cm/day to a total of 11.5 million cm/day.
<b>Project description:</b>	
From a technical point of view, the project consists of drilling new wells, building a modern above ground infrastructure complying with the requirements of European safety and control standards, extending the natural gas compression facilities and upgrading and optimising the existing separation and fiscal metering facilities.	
The injection/extraction system is designed to ensure that natural gas flows for injection/extraction are conveyed through dedicated collecting pipelines for each facility.	

The project consists of the extension of the Sărmășel gas storage facilities and is carried out in stages:

**Stage I:**

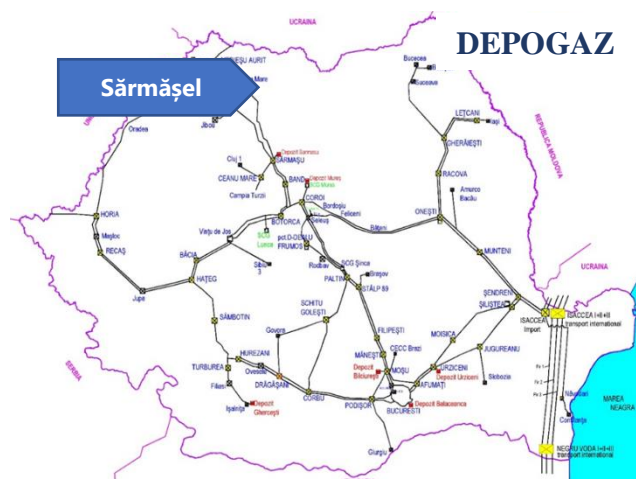
- Upgrading of 12 existing wells;
- Drilling 6 new wells
- Above-ground technology facilities for 6 wells.

**Stage II:**

- Upgrading 15 existing wells;
- Realisation of 8 technological groups;
- 7.70 km of adduction pipelines;
- 9.60 km of collector pipelines;
- Separation and metering system upgrade (ISM);
- Installation of facilities for the production of electricity and heat from renewable sources for administrative and technological needs;
- Digitising the natural gas storage process.

**Stage III:**

- drilling 32 new wells;
- 41 km of adduction pipelines;
- 9.6 km of collector pipes;
- 3 compressor units equipped with gasomotocompressors driven by natural gas mixed with up to 20% hydrogen;
- 2 gas drying installations with TEG;
- Separation and metering plant extension (ISM)
- Connection to the National Gas Transmission System ( NTS);
- Expansion of facilities for the production of electricity and heat from renewable sources for administrative and technological needs;
- Extending the digitisation of the natural gas storage process.



**Project justification:**

Following the implementation of the technical solution resulting from the feasibility study, the new designed infrastructure will allow:

- Increasing the storage capacity from 900 million cm/cycle to 1550 million cm/cycle;
- Increasing the injection capacity by 4 million cm/day to a total of 10.5 million cm/day and increasing the extraction capacity by 4 million cm/day to a total of 11.5 million cm/day;
- On all of the storage facilities operated by Depogaz, the completion of the project will contribute to increasing the national storage capacity by about 23% and the daily extraction capacity from the storage facilities at national level by about 14%; energy from renewable sources (photovoltaic panels) and the use of LED technology for indoor and outdoor lighting system
- The project contributes to the reduction of greenhouse gas emissions and pollutant emissions in the context of decarbonisation policies at European level and the increase of ETS emission allowances prices in the context of policies already adopted by the European institutions. Through the implementation of the project, the role of natural gas or gas from renewable sources is expected to increase significantly;
- Contribution to the fulfilment of the N-1 rule at regional level in accordance with EU Regulation 1938/2017. The implementation of the project ensures an increase of the N-1 indicator from 106.3% to 111.81%;
- Reducing the dependence on gas imports during the cold season.

<b>Economic data:</b>	<b>Euro 185 million</b>						
<b>Project stage:</b>	The feasibility study - completed Upgrading work on 12 wells was completed during 2023. Technical design for drilling 6 new wells - completed.						
<b>TYNDP:</b> TYNDP 2022: UGS-N-371	<b>PCI status:</b>						
<b>Project changes:</b>							
	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion date</b>						2026	2030
<b>Total estimated value of the project (Euro million)</b>						163,1	185

### 8.5 Upgrading of the natural gas storage infrastructure – Bălăceanca

<b>Project name:</b>	<b>Upgrading of the natural gas storage infrastructure - Bălăceanca</b>
<b>Project number:</b>	<b>8.5</b>
<b>Project beneficiary:</b>	<b>Depogaz Ploiești</b>
<b>Project type:</b>	Increasing the storage capacity
<b>Estimated completion date</b>	<b>2032</b>
<b>Project Objective:</b>	The project aims to use the storage in a multi-cycle regime and increase the daily gas delivery capacity of the Bălăceanca storage to 1.6 million cm/day. In order to ensure a higher degree of operational safety and to complement the capacity of the existing natural gas infrastructure, it is necessary to upgrade the existing facilities and to build new above ground facilities that will take the additional flow and will provide the necessary flexibility for the multi-cycle use of the storage.
<b>Project description:</b>	<p>From a technical point of view, the project consists of drilling new wells, upgrading the existing wells and the above ground infrastructure in accordance with the requirements of European safety and control standards, expanding, upgrading and optimising the existing compression, separation and fiscal metering facilities.</p> <p>The project will consist of the following:</p> <ul style="list-style-type: none"> <li>• systemization of suction/refilling, natural gas injection/extraction manifolds;</li> <li>• Expansion and upgrading of Bălăceanca compressor station;</li> </ul>

- Expansion and upgrading of TEG drying station;
- upgrading of the Bălăceanca metering panel;
- upgrades within storage groups;
- drilling and equipping of 3 new wells;
- upgrading of old wells;
- digitization of the natural gas storage process.



<b>Project justification:</b>	The completion of the project will contribute to the flexibility of the national storage system through the use of the multi-cycle storage system and increase the storage utilisation by 200%.
<b>Economic data:</b>	<b>Euro 50 million</b>
<b>Project stage:</b>	The feasibility study completed.
<b>TYNDP:</b> UGS-N-606	<b>PCI status:</b>
<b>The project changes:</b> - new project	

## II. DEPOMURES TÂRGU-MURES-MAJOR STORAGE PROJECT

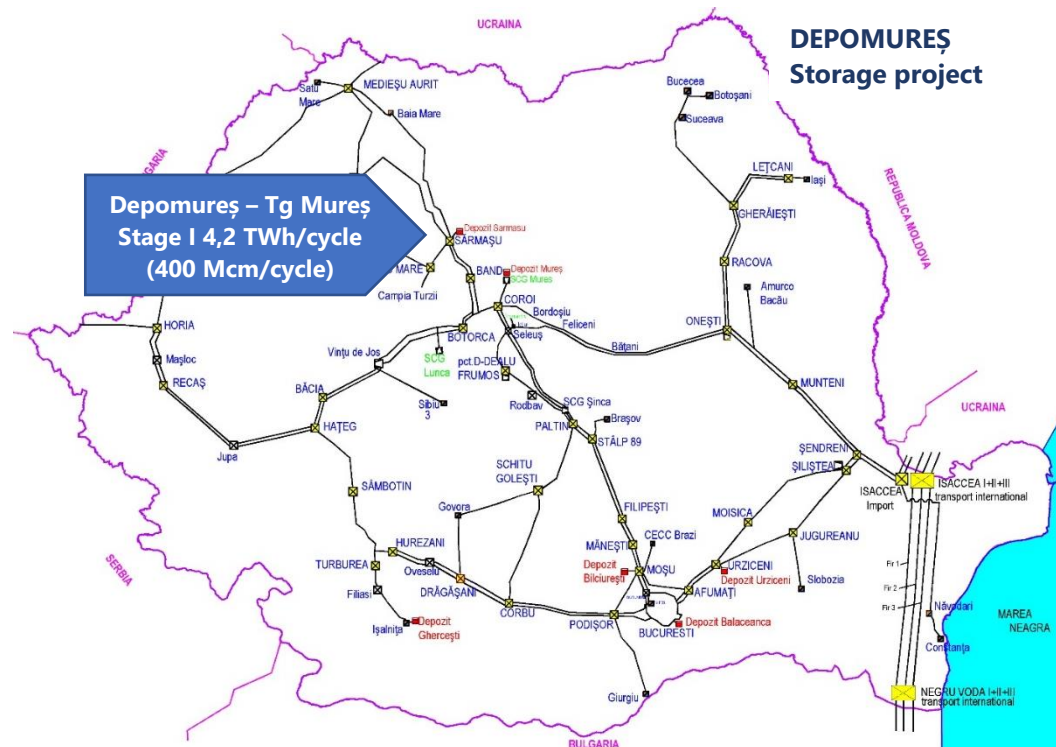


Figure 7 - Major natural gas storage projects – Depomures



## 8.6. Storage unit –Depomureş

<b>Project name:</b>	<b>Storage unit-Depomureş</b>
<b>Project number:</b>	<b>8.6</b>
<b>Project beneficiary:</b>	<b>Depomureş Târgu Mureş</b>
<b>Project type:</b>	Upgrading
<b>Estimated completion date</b>	<b>2026 (Stage1)</b>
<b>Project Objective:</b>	The project aims at upgrading and developing the Târgu-Mureş underground natural gas storage facility in order to improve the technical conditions of gas delivery - reception at the Târgu-Mureş storage facility - NTS interface, implicitly increasing the degree of flexibility of the services provided, especially in the context of the current dynamics of the gas market.

### Project description:

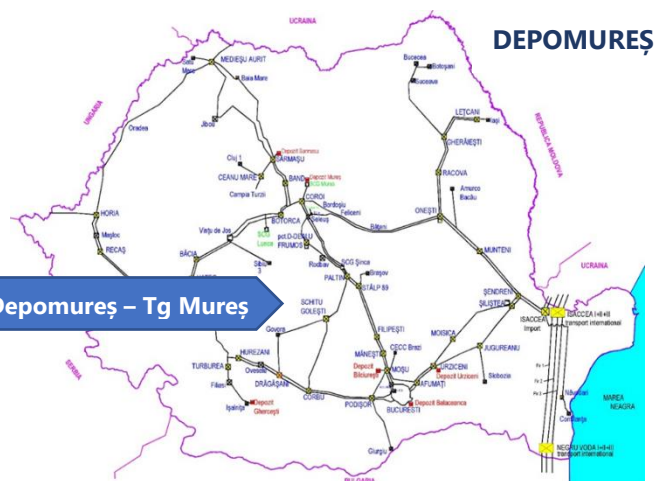
The project initiated by Depomureş consists in the refurbishment and development of the Târgu-Mureş underground natural gas storage facility, with a current capacity of 300 million cubic meters. The development project of the natural gas storage operator Depomureş SA is a project that is being carried out in stages (2 stages).

The main objectives of this project are:

- (i) building of its own compression installations to serve the Târgu Mureş storage facility both for gas injection into the storage facility and for gas extraction for delivery to the NTS;
- (ii) increasing the flexibility of the storage on the one hand by increasing the storage gas delivery pressure at the interface with the NTS to 35 bar and on the other hand by increasing the daily injection and extraction capacity to approx. 3.5 million cm<sup>3</sup>/day after implementation of phase 1 of the project, i.e. to approx. 5 million cubic metres/day after the implementation of the second phase of development, i.e.
- (iii) increasing the useful volume of the storage facility to 400 million cubic metres in a first stage (Stage 1) and to 600 million cubic metres in a subsequent phase (Stage 2).

The project mainly consists of the following:

- central gas station (compressor units, gas drying, commercial two-way gas metering panel, adjacent facilities);
- new storage collector;
- upgrading of above ground technology installations to increase operating pressure, new wells.



### Project justification:

The implementation of the project will bring a number of benefits both nationally and regionally through :

- Ensuring the energy security and reducing dependence on imported fossil fuels through additional useful volume
- Increased integration of an efficient and competitive internal market by reducing and preventing infrastructure bottlenecks related to gas supply, i.e. increased flexibility of gas storage services which will contribute to increased market liquidity, with the wholesale market able to offer more flexibility to the system

	<ul style="list-style-type: none"> <li>- Grid interoperability across borders and sectors through its overall contribution to increasing gas export capacities, i.e. reducing risks of intermittency of renewable energy</li> <li>- Supporting the decarbonisation of the economy and promoting energy efficiency through its overall contribution to the energy transition and balancing the significant renewable energy capacity to be installed in Eastern Europe</li> </ul>						
<b>Economic data:</b>	<b>Euro 37 million - Stage I</b>						
<b>Project stage:</b>	Feasibility study - completed. FEED study - completed. Stage 1 construction - partially implemented.						
<b>TYNDP:</b> TYNDP 2022: UGS-A-233		<b>PCI status:</b> Yes – list V(6.20.4)			<b>CBCA decision:</b> yes		
<b>Project changes:</b>	<b>TYNDP 2014</b>	<b>TYNDP 2017</b>	<b>TYNDP 2018</b>	<b>TYNDP 2019</b>	<b>TYNDP 2020</b>	<b>TYNDP 2022</b>	<b>TYNDP 2024</b>
<b>Estimated completion date</b>						2026	2026 (Stage1)
<b>Total estimated value of the project (Euro million)</b>						87	37 (Stage 1)

## 9. DEVELOPMENT DIRECTIONS FOR THE HYDROGEN TRANSPORT

### 9.1 The hydrogen market in Romania <sup>4</sup>

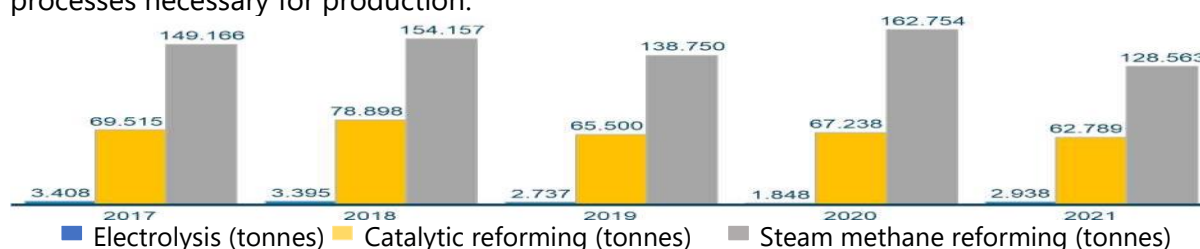
In Romania, the hydrogen is currently a raw material used mainly in refining, fertiliser production and in the chemical industry, being used in most cases at the place of its production.

In the expected context, based on the consumption and decarbonisation targets proposed by: NESCAP (2021), Directive (EU) 2018/2021 on the promotion of energy from renewable sources (currently under review), Fit-for-55, REPowerEU (2022), taking into account that the role of hydrogen will not only be as a raw material but also as an energy carrier and fuel, the future value chain will incorporate the following segments:

- Renewable hydrogen production, considered a priority, and, to a lesser extent, low-carbon hydrogen from electrolysis of water and, at a later stage, pyrolysis of methane gas after 2030;
- Storage of hydrogen, in gaseous, liquid form, as liquid-organic hydrogen carrier (LOHC), or ammonia;
- The transport and distribution of gaseous hydrogen
  - through pipelines,
  - in pressurised vessels, by road, rail, inland waterway or sea;
- The applications and use of hydrogen are much more diverse than today, depending on local conditions: as a fuel for transport, to reduce emissions in difficult to decarbonise industries such as refining and petrochemicals, chemicals, metallurgy, cement, ceramics and paper industries, in high temperature industrial processes, but also as an energy storage medium and feedstock for synthetic fuels.

### 9.2 Hydrogen production in Romania <sup>5</sup>

In Romania, most of the hydrogen is produced by steam methane reforming, catalytic reforming and, to a much lesser extent, by water electrolysis and consumed in the industrial processes necessary for production.



*Chart 17- - The hydrogen production by technology type in tonnes for the period 2017-2021*

*Source: Horvath analysis based on information received from the main hydrogen producers/consumers in the industry (February 2022)*

<sup>4</sup> National Strategy for Hydrogen

<sup>5</sup> The National Hydrogen Strategy

With a perspective of decarbonisation, the grey hydrogen production should be replaced by renewable hydrogen and, to a lesser extent, low carbon hydrogen.

### 9.3 Hydrogen consumption in Romania <sup>6</sup>

Currently, hydrogen consumption in Romania is exclusively for the industrial sector, mainly in refining, chemicals, steel and chemical fertiliser production.

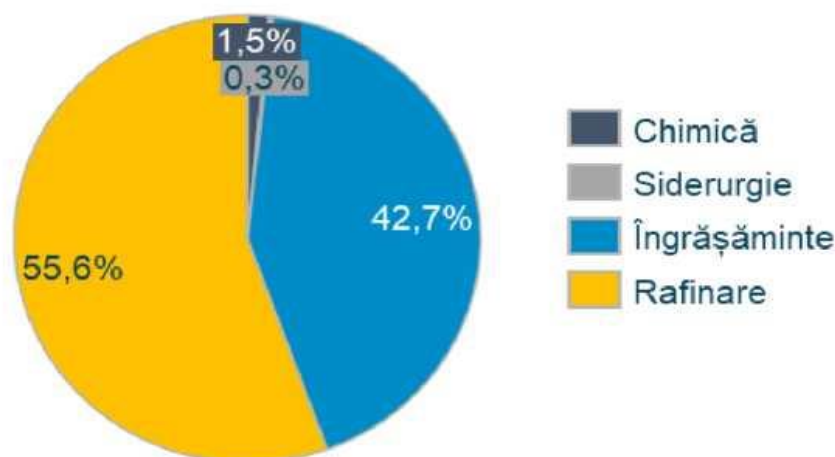


Chart 18 - The Hydrogen consumption by industry, expressed in average percentages, by 2017 - 2021, Source: Horvath analysis (February 2023)

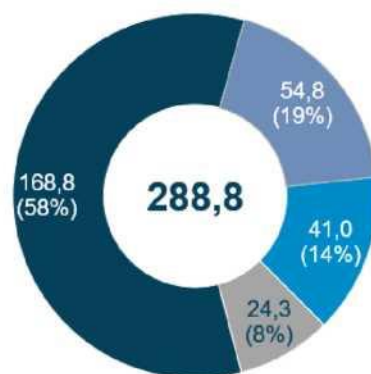
### 9.4 The estimation of hydrogen consumption <sup>7</sup>

In order to estimate the potential consumption and production of renewable hydrogen and low carbon footprint hydrogen in Romania by 2030, a number of scenarios have been analysed in the National Hydrogen Strategy to estimate hydrogen consumption (demand) and its contribution to achieving the 2030 CO2 emission reduction targets.

Taking into the account all the scenarios analysed and comparing the ratio between the cost of implementing the strategy and the level of CO2 reduction for each type of hydrogen use, the *optimal scenario* was selected.

<sup>6</sup> The National Hydrogen Strategy

<sup>7</sup> Strategia Națională pentru Hidrogen



■ Industrie existentă ■ Aplicații industriale noi (siderurgie) ■ Transport ■ Amestec cu gaz natural (CCGT)

**Chart 19- Summary of the estimated consumption of renewable and reduced footprint hydrogen emissions by sector expressed in percentages for the year 2030, Source: Horvath analysis (April 2023)**

The consumption estimates were made on the basis of European and national targets, technical assumptions, analysis of the current situation, and with the help of the working group set up and coordinated at the Ministry of Energy, and structured by 5 sectors:

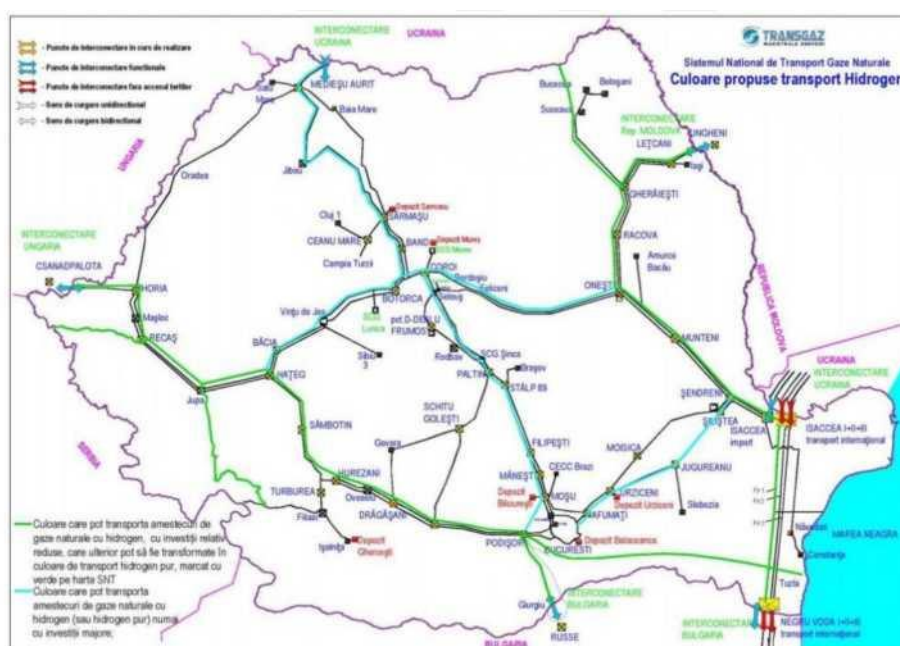
1. **The Industrial consumption**, where renewable and, to a lesser extent, low carbon footprint hydrogen are used to replace the grey hydrogen currently used in the industrial processes;
2. **Consumption in the steel industry**, where renewable hydrogen is used in new industrial applications for steel production;
3. **Consumption in the transport sector**, where renewable hydrogen is used as a fuel for the following modes of transport: heavy and medium duty road haulage, passenger cars, rail, public passenger transport and maritime transport, as well as in the aviation sector, both as an addition to aviation fuels and to fuel vehicles used in airport operations;
4. **Consumption of renewable hydrogen mixed with natural gas for new CCGT projects** - with a total capacity of 2,615 MW, to be installed under the NREP and NESCAP.
5. **Consumption of renewable hydrogen mixed with natural gas for residential heating**, which has not been quantified in the optimal scenario, but is targeted as a sector that can contribute to the development of projects promoting hydrogen production and sector coupling.

## 9.5 Transgaz projects for hydrogen transport

Transgaz' membership of the European Hydrogen Backbone is a suitable solution for the transport and use of hydrogen in areas without localised production.

Transgaz, which has joined the EHB initiative, has identified 11 corridors that could be included in the "backbone" of the future European hydrogen transport system:


1. Transit pipeline corridor (using a pipeline);
2. Black Sea - Podișor corridor;
3. Giurgiu - Podișor - Jupa - Nădlac corridor (BRUA corridor);
4. Onești - Gherăești - Lețcani - Ungheni (Republic of Moldova) corridor;
5. Petrovaselo - Comloșu Mare (Serbia) corridor;
6. Jupa - Prunișor corridor;
7. Isaccea - Onești corridor;
8. Siliștea corridor - Bucharest;
9. Onești - Coroi - Hațeg corridor;
10. Coroi - Medieșu Aurit corridor;
11. Podișor - Coroi corridor.




**Figure 8 - Proposed "backbone" of the NTS for hydrogen transport, Source: Transgaz (2021)**

## 9.5.1 Gas transmission infrastructure repurposing projects for hydrogen transport

### 9.5.1.1 Upgrading of the Isaccea - Jupa pipeline for hydrogen transport


<b>Project name:</b>	<b>Upgrading of the Isaccea - Jupa pipeline for hydrogen transport</b>	
<b>Project number:</b>	<b>9.5.1.1</b>	
<b>Project beneficiary:</b>	<b>SNTGN Transgaz SA</b>	
<b>Project type:</b>	Transport of hydrogen or mixture of natural gas with hydrogen	
<b>Estimated completion date</b>	<b>2040</b>	
<b>Project Objective:</b>	Repurposing of natural gas transmission infrastructure for hydrogen transport	
<b>Project description:</b>	<p>The project implies the rerepurposing of existing natural gas transmission pipeline sections on the Isaccea - Jupa corridor so as to provide a hydrogen pipeline on this corridor, including the rerepurposing of some natural gas compressor stations. The length of the reconverted pipelines is approx. 550 km.</p> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sector coupling between the electricity system and H2 transmission systems.</p>	
<b>Project justification:</b>	<p>The project will contribute to security of supply and the development of competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p> <p>Integration of Hydrogen from renewable and low-carbon sources into the natural gas transmission system in order to align with existing European Directives, Strategies and Agreements.</p>	
<b>Economic data:</b>	<b>Euro 378.6 million</b> (+/- 30%, preliminary estimate at 2021 level)	
<b>Project stage:</b>	The project is under analysis, at the conceptual stage.	
<b>TYNDP:</b> HYD-N-640	<b>PCI status:</b>	
<b>Project changes: new project</b>		

### 9.5.1.2 Upgrade of the Giurgiu - Nădlac pipeline for hydrogen transmission


<b>Project name:</b>	<b>Upgrade of the Giurgiu - Nădlac pipeline for hydrogen transmission</b>	
<b>Project number:</b>	<b>9.5.1.2</b>	
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b>	
<b>Project type:</b>	Transmission of hydrogen or mixture of natural gas with hydrogen	
<b>Estimated completion date</b>	<b>2040</b>	
<b>Project Objective:</b>	Retrofitting the natural gas transport infrastructure for hydrogen transmission.	
<b>Project description:</b>	<p>The project involves the repurposing of a natural gas transmission pipeline to transport hydrogen and includes the following objectives:</p> <ul style="list-style-type: none"> <li>• New DN800 pipeline between RO/HU border - Jupa-Podisor.</li> <li>• New H2 compressor stations.</li> <li>• One metering station at the RO/HU border.</li> </ul> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sectoral coupling between the electricity system and H2 transmission systems.</p>	
<b>Project justification:</b>	<p>The project will contribute to ensuring the security of supply and diversification of energy sources in the countries involved. The project contributes to the development of competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p> <p>Integration of Hydrogen from renewable and low carbon sources into the natural gas transmission system in order to align with the European Directives, Strategies and Agreements in force.</p>	
<b>Economic data:</b>	<b>Euro 464,4 million</b> (+/- 30%, preliminary estimate at 2021 level)	
<b>Project phase:</b>	The project is under analysis, in the conceptual stage	
<b>TYNDP:</b> HYD-N-999	<b>PCI status:</b>	
<b>Project changes: new project</b>		




### 9.5.1.3 Upgrade of the Black Sea - Podișor pipeline for hydrogen transmission

<b>Project name:</b>	<b>Upgrade of the Black Sea - Podișor pipeline for hydrogen transmission</b>	
<b>Project number:</b>	<b>9.5.1.3</b>	
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b>	
<b>Project type:</b>	Transmission of hydrogen or mixture of natural gas with hydrogen	
<b>Estimated completion date</b>	<b>2042</b>	
<b>Project Objective:</b>	Retrofitting the natural gas transmission infrastructure for hydrogen transmission	
<b>Project description:</b>	<p>The project involves converting a natural gas pipeline to transport hydrogen. The length of the pipeline is about 308 km.</p> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sectoral coupling between the electricity system and H2 transmission systems.</p>	
<b>Project justification:</b>	<p>The project will contribute to ensuring the security of supply and diversification of energy sources in the countries involved. The project contributes to the development of competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p> <p>Integration of Hydrogen from renewable and low carbon sources into the natural gas transmission system in order to align with the European Directives, Strategies and Agreements in force.</p>	
<b>Economic data:</b>	<b>Euro 199,6 million</b> (+/- 30%, preliminary estimate at 2021 level)	
<b>Project phase:</b>	The project is under analysis, in the conceptual stage	
<b>TYNDP:</b> HYD-N-608	<b>PCI status:</b>	
<b>Project changes: new project</b>		

#### 9.5.1.4 Upgrade of the Onești - Ungheni pipeline for hydrogen transmission


<b>Project name:</b>	<b>Upgrade of the Onești - Ungheni pipeline for hydrogen transmission</b>	
<b>Project number:</b>	<b>9.5.1.4</b>	
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b>	
<b>Project type:</b>	Transmission of hydrogen or mixture of natural gas with hydrogen	
<b>Estimated completion date</b>	<b>2040</b>	
<b>Project Objective:</b>	Retrofitting of the natural gas transmission infrastructure for hydrogen transport	
<b>Project description:</b>	<p>The project involves retrofitting a natural gas pipeline to transport hydrogen. The length of the pipeline is about 183 km.</p> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sectoral coupling between the electricity system and H2 transmission systems.</p>	
<b>Project justification:</b>	<p>The project will contribute to security of supply and diversification of energy sources in the countries involved. The project contributes to the development of competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p> <p>Integration of Hydrogen from renewable and low carbon sources into the natural gas transmission system in order to align with the European Directives, Strategies and Agreements in force.</p>	
<b>Economic data:</b>	<b>Euro 156,4 million</b> (+/- 30%, preliminary estimate at 2021 level)	
<b>Project phase:</b>	The project is under analysis, in the conceptual stage	
<b>TYNDP:</b> HYD-N-625	<b>PCI status:</b>	
<b>Project changes: new project</b>		

#### 9.5.1.5 Upgrade of the Romania - Serbia interconnection for hydrogen transmission

<b>Project name:</b>	<b>Upgrade of the Romania-Serbia interconnection for hydrogen transmission</b>	
<b>Project number:</b>	<b>9.5.1.5</b>	
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b>	
<b>Project type:</b>	Transmission of hydrogen or mixture of natural gas with hydrogen	
<b>Estimated completion date</b>	<b>2040</b>	
<b>Project Objective:</b>	Retrofitting the natural gas transmission infrastructure for hydrogen transmission	

<b>Project description:</b>	
<p>The project involves converting a natural gas pipeline to transport hydrogen. The length of the pipeline is about 85 km.</p> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sectoral coupling between the electricity system and H2 transmission systems.</p>	
<b>Project justification:</b>	<p>The project will contribute to security of supply and diversification of energy sources in the countries involved. The project contributes to the development of the competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p> <p>Integration of Hydrogen from renewable and low carbon sources into the natural gas transmission system in order to align with the European Directives, Strategies and Agreements in force.</p>
<b>Economic data:</b>	<b>Euro 143.8 million</b> (+/- 30%, preliminary estimate at 2021 level)
<b>Project phase:</b>	The project is under analysis, in the conceptual stage.
<b>TYNDP:</b> HYD-N-648	<b>PCI status:</b>
<b>Project changes: new project</b>	

#### 9.5.1.6 Upgrade of the Coroi-Medioșu Aurit pipeline for hydrogen transmission


<b>Project name:</b>	<b>Upgrade of the Coroi - Mediasu Aurit pipeline for hydrogen transmission</b>
<b>Project number:</b>	<b>9.5.1.6</b>
<b>Project holder:</b>	<p><b>SNTGN Transgaz SA</b></p> 
<b>Project type:</b>	Transmission of hydrogen or mixture of natural gas with hydrogen
<b>Estimated completion date</b>	<b>2040</b>
<b>Project Objective:</b>	Retrofitting of the natural gas transmission infrastructure for hydrogen transmission
<b>Project description:</b>	
<p>The project involves converting a natural gas pipeline to transport hydrogen. The length of the pipeline is about 300 km.</p> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sectoral coupling between the electricity system and H2 transmission systems.</p>	
<b>Project justification:</b>	<p>The project will contribute to security of supply and diversification of energy sources in the countries involved. The project contributes to the development of competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p>

	Integration of Hydrogen from renewable and low carbon sources into the natural gas transmission system in order to align with the European Directives, Strategies and Agreements in force.
<b>Economic data:</b>	<b>Euro 156,5 million</b> (+/- 30%, preliminary estimate at 2021 level)
<b>Project phase:</b>	The project is under analysis, in the conceptual stage.
<b>TYNDP:</b> HYD-N-730	<b>PCI status:</b>
<b>Project changes: new project</b>	

### 9.5.1.7 Upgrade of the Negru Voda - Isaccea pipeline for hydrogen transmission


<b>Project name:</b>	<b>Upgrade of the Negru Voda - Isaccea pipeline for hydrogen transmission</b>
<b>Project number:</b>	<b>9.5.1.7</b>
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b> 
<b>Project type:</b>	Transmission of hydrogen or mixture of natural gas with hydrogen
<b>Estimated completion date</b>	<b>2040</b>
<b>Project Objective:</b>	Retrofitting of natural gas transmission infrastructure for hydrogen transmission
<b>Project description:</b>	<p>The project involves retrofitting a natural gas pipeline to transport hydrogen. The length of the pipeline is about 185 km.</p> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sectoral coupling between the electricity system and H2 transmission systems.</p>
<b>Project justification:</b>	<p>The project will contribute to security of supply and diversification of energy sources in the countries involved. The project contributes to the development of competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p> <p>Integration of Hydrogen from renewable and low carbon sources into the natural gas transmission system in order to align with the European Directives, Strategies and Agreements in force.</p>
<b>Economic data:</b>	<b>Euro 99,4 million</b> (+/- 30%, preliminary estimate at 2021 level)
<b>Project phase:</b>	The project is under analysis, in the conceptual stage.
<b>TYNDP:</b> HYD-N-756	<b>PCI status:</b>
<b>Project changes: new project</b>	

### 9.5.1.8 Upgrading the Vadu - T1 pipeline for hydrogen transmission

<b>Project name:</b>	<b>Upgrade of the Vadu - T1 pipeline for hydrogen transmission</b>
<b>Project number:</b>	<b>9.5.1.8</b>
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b> 
<b>Project type:</b>	Transmission of hydrogen or mixture of natural gas with hydrogen
<b>Estimated completion date</b>	<b>2040</b>
<b>Project Objective:</b>	Retrofitting the natural gas transmission infrastructure for hydrogen transmission
<b>Project description:</b>	<p>The project involves retrofitting a natural gas pipeline to transport hydrogen. The length of the pipeline is about 25 km.</p> <p>The sustainability of the project is confirmed by the reduction of greenhouse gas emissions in the first phase by gradually replacing fossil gas sources from grey H2 to green H2 at existing H2 users. Along the pipeline route, there will be an opportunity to connect new H2 producers/consumers, which also contributes to the sectoral coupling between the electricity system and H2 transmission systems.</p>
<b>Project justification:</b>	<p>The project will contribute to security of supply and diversification of energy sources in the countries involved. The project contributes to the development of competition between domestic and diversified sources of imported H2 and will benefit hydrogen prices by keeping the price of hydrogen low in relation to variations in supply and demand.</p> <p>Integration of Hydrogen from renewable and low carbon sources into the natural gas transmission system in order to align with the European Directives, Strategies and Agreements in force.</p>
<b>Economic data:</b>	<b>Euro 7 million</b> (+/- 30%, preliminary estimate at 2021 level)
<b>Project phase:</b>	The project is under analysis, in the conceptual stage.
<b>TYNDP:</b> HYD-N-647	<b>PCI status:</b>
<b>Project changes: new project</b>	


### 9.5.2 Dedicated Hydrogen transmission line development projects

#### 9.5.2.1 Hydrogen transmission line in the direction Giurgiu-Podişor-Bibeşti-Jupa-Horia-Nădlac

<b>Project name:</b>	<b>Hydrogen transmission line in the direction Giurgiu-Podişor-Bibeşti-Jupa-Horia-Nădlac</b>
<b>Project number:</b>	<b>9.5.2.1</b>
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b> 
<b>Project type:</b>	Hydrogen transmission
<b>Estimated completion date</b>	<b>2030</b>

<b>Project Objective:</b>	It contributes to security of supply and diversification of energy sources in the countries involved. Diversified sources of H2 will be beneficial for hydrogen prices and would allow a further reduction of greenhouse gas emissions by replacing fossil sources with hydrogen.
<b>Project description:</b>	The project involves the construction of a new hydrogen pipeline along the Giurgiu - Podișor - Bibești - Jupa - Horia - Nădlac corridor. The project connects future hydrogen systems in Bulgaria, Romania and Hungary and enables the creation of the hydrogen market and cross-border hydrogen trade. The project will be part of the South East Europe Hydrogen Corridor (SEEHyC), which provides hydrogen deliveries on the route Greece>Bulgaria>Romania>Hungary>Slovakia>Czech Republic>Germany to the EU market and will also be available for reverse flow.
<b>Project justification:</b>	In an integrated energy system, hydrogen supports the decarbonisation of industry, transport and energy production. The project is aligned with the EU strategy on decarbonisation by reducing CO2 emissions, while creating the possibility to connect to Europe's future hydrogen infrastructure.
<b>Economic data:</b>	<b>Euro 2.263 million</b> (+/- 30%, preliminary estimate at 2024 level)
<b>Project phase:</b>	The project is in the conceptual stage of analysis.
<b>TYNDP:</b> H2T-A-1014	<b>PCI status:</b>
<b>Project changes: new project</b>	

### 9.5.2.2 Hydrogen transmission line on the Black Sea - Podișor direction

<b>Project name:</b>	<b>Hydrogen transmission line in the Black Sea - Podișor direction</b>
<b>Project number:</b>	<b>9.5.2.2</b>
<b>Project holder:</b>	<b>SNTGN Transgaz SA</b> 
<b>Project type:</b>	Hydrogen transmission
<b>Estimated completion date</b>	<b>2030</b>
<b>Project Objective:</b>	It contributes to the security of supply and diversification of energy sources. Diversified sources of H2 will be beneficial for hydrogen prices and would allow a greater reduction in greenhouse gas emissions by replacing fossil sources with hydrogen.
<b>Project description:</b>	Given the significant potential for renewable energy production in the S-E area of Romania, the proposed project creates the necessary infrastructure to take over the potential for green hydrogen production in this area, including the hydrogen production already reported in the procedure for requesting non-binding capacity on hydrogen, carried out by SNTGN Transgaz SA in 2023. The green hydrogen capacity taken over by this project will be directed to the Giurgiu - Nădlac hydrogen corridor which is part of the SEEHyC Corridor.
<b>Project justification:</b>	In an integrated energy system, hydrogen supports the decarbonisation of industry, transport and energy production. The project is aligned with the EU strategy on decarbonisation by reducing CO2 emissions, while creating the possibility to connect to Europe's future hydrogen infrastructure.

<b>Economic data:</b>	<b>Euro 1.073 million</b> (+/- 30%, preliminary estimate at 2024 level)
<b>Project phase:</b>	The project is under analysis, in the conceptual stage.
<b>TYNDP:</b> H2T-N-1015	<b>PCI status:</b>
<b>Project changes: new project</b>	

With financing from the European Investment Bank (EIB), SNTGN Transgaz SA has implemented the Decarbonisation and Climate Strategy. It includes a series of measures leading to the reduction of greenhouse gas emissions in order to achieve the decarbonisation targets set out in the Strategy for the short (2030), medium (2040) and long term (2050). The Strategy also includes the Investment Plan necessary to implement the measures related to the decarbonisation process.

## 10. ANALYSIS OF MAJOR PROJECTS

### I. Analysis of major gas transmission projects

#### 10.1.1 Status of Projects

According to the Final Investment Decision (FID) in TYNDP 2015 projects were classified into two categories: FID-projects for which the final investment decision was taken and non-FID-projects for which the final investment decision was not taken.

In the TYNDP 2017 the basic non-FID status has been divided into subcategories:

- advanced non-FID (A non-FID);
- less advanced non-FID (LA non-FID).

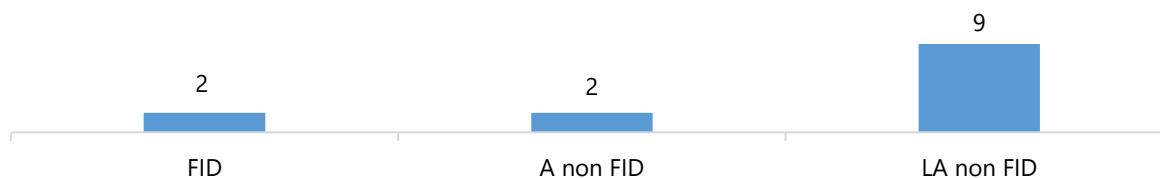
According to this classification, the projects of the National Gas Transmission System Development Plan 2024-2033 are as follows:

No.	Project No. according to NTS TYNDP 2024-2033	Project name	Status
1	7.1	Development of the National Natural Gas Transmission System on the Bulgaria-Romania-Hungary-Austria Corridor in Romania - <b>Phase II</b>	A non FID
2	7.2	Development of the Black Sea - Podișor natural gas transmission pipeline in Romania	FID
3	7.3	Expansion of the Bulgaria-Romania-Hungary-Austria bi-directional transmission corridor (BRUA-Phase III)	LA non FID
4	7.4	Romania-Serbia Interconnection	A non FID
5	7.5	Development-Upgrade of the natural gas transmission infrastructure in the North-West of Romania	LA non FID
6	7.6	Increasing the natural gas transmission capacity of the Romania-Bulgaria interconnection on the Giurgiu-Russia direction	LA non FID*
7	7.7	Eastring-Romania	LA non FID
8	7.8	Monitoring, control and data acquisition system for cathodic protection stations related to the National Natural Gas Transmission System	LA non FID*
9	7.9	Development of the SCADA system for the National Natural Gas Transmission System	FID
10	7.10	Upgrading of Isaccea 2 SMG and Negru Voda 2 SMG for reverse flow on T2 pipeline	LA non FID*
11	7.11	Upgrading of Isaccea 3 SMG and Negru Voda 3 SMG for reverse flow on T3 pipeline	LA non FID*
12	7.12	Interconnection of SNT to the LNG Terminal located on the Black Sea shore	LA non FID*
13	7.13	Black Sea LNG Terminal	LA non FID*

\*Projects not included in TYNDP 2022

**Table 4 - Status of Transgaz Major Projects for natural gas transmission**





**Chart 20 - Status of Major Gas Transmission Projects**

**Note**

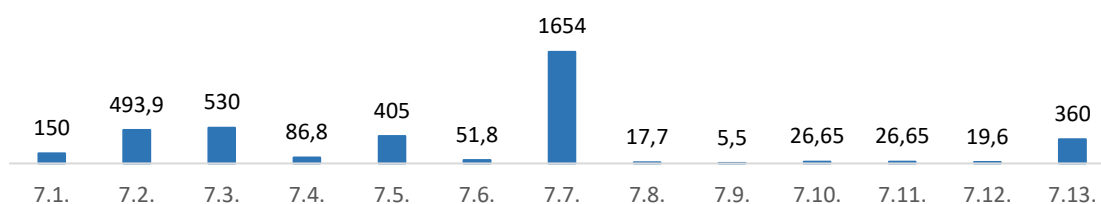
Two projects have been completed in relation to the National Gas Transmission System Development Plan 2022-2031:

- Developments of the NTS in the North-Eastern part of Romania in order to improve the natural gas supply of the area as well as to ensure transport capacities to the Republic of Moldova ;
- New NTS developments to take gas from the Black Sea shore.

Project no.	Project name	Projects for which the open season procedure applies
7.1	Development of the National Natural Gas Transmission System on the Bulgaria-Romania-Hungary-Austria Corridor in Romania - <b>Phase II</b>	x
7.2	Development of the Southern Transport Corridor on the territory of Romania to take over natural gas from the Black Sea coast	x
7.3	Expansion of the Bulgaria-Romania-Hungary-Austria reverse flow transmission corridor (BRUA-Phase III)	x

**Table 5 - Projects for which the Open Season procedure applies**

**10.1.2 Cost of Projects**



**Chart 21 - Cost of major natural gas transmission projects (€ million)**

The following is a summary of the major gas transmission projects:

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
1	7.1	Development of the National Natural Gas Transmission System on the <b>Bulgaria-Romania-Hungary-Austria Corridor</b> in Romania ( <b>Phase II</b> )	150	2027	Step-by-step capacity increase of the Bulgaria-Romania-Hungary-Austria reverse flow transmission corridor which currently provides 2,63 bcm/year transmission capacity with Hungary. Three levels of capacity expansion with Hungary are proposed in the incremental capacity process, respectively at 2,98 bcm/year, 4,38 bcm/year and 5,32 bcm/year, for the transmission of gas from the Vertical Corridor.	A non FID
2	7.2	Development on the territory of Romania of the natural gas <b>Transmission Corridor</b> from the Black Sea coast (Tuzla - Podișor).	493,9	2025	As Europe becomes increasingly dependent on natural gas imports, access to new sources is becoming an urgent necessity. This investment will allow gas from the Black Sea to enter the NTS and thus reach economic operators and households in the localities connected to the system. Moreover, this pipeline will connect to new sources of natural gas in the Transbalkan Corridor and the Vertical Corridor, of which the BRUA pipeline is a part, and will also be necessary for the transmission of gas coming to Romania from the Caspian Sea area, from LNG terminals in Turkiye and Greece.	FID
3	7.3	<b>Expansion of the Bulgaria-Romania-Hungary-Austria</b> bi-directional natural gas transmission <b>corridor (BRUA-Phase III)*</b>	855	2029	Phased increase of transmission capacity to ensure the capacity levels proposed in the incremental capacity process, i.e. 4,38 bcm/year and 5,32 bcm/year, for gas transmission on the Vertical Corridor.	LA Non-FID
4	7.4	<b>Romania-Serbia Interconnection</b>	86,8	2028	Increasing the degree of interconnectivity between natural gas transmission systems in EU Member States	A non FID

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
					and increasing energy security in the region.	
5	7.5	Development/Modernisation of natural gas transmission infrastructure in the North-West of Romania	405	Stage 1 2026 Stage 2 2027 Stage 3 2028	Realization/modernization of some objectives related to the National Transmission System, in the North-West area of Romania, in order to create new natural gas transmission capacities or to increase existing capacities.	LA Non-FID
6	7.6	Increasing the natural gas transmission capacity of the Romania-Bulgaria interconnection on the Giurgiu-Russia direction	51,8	2027	Improving natural gas supply to the area, ensuring energy security by diversifying natural gas transport sources and routes.	LA Non-FID
7	7.7	Eastring-Romania	Phase 1: 1.297 Romania Phase 2: 357 million Romania	Phase 1: 2028 Phase 2: 2033	EASTRING will be open to well-established as well as alternative sources. It will bring gas from new sources in the Caspian/Eastern Mediterranean/Black Sea/Middle East regions. At the same time, it will secure supplies to South-East Europe from European gas HUBs. The total capacity will be available to any transporter or supplier.	LA Non-FID
8	7.8	Monitoring, control and data acquisition system for cathodic protection stations related to the National Natural Gas Transmission System	17,7	2027	The implementation of the SCADA system for cathodic protection will ensure durability and increased safety in the operation of transmission pipelines. Based on the acquired data, simplicity of operation will be ensured for a complex pipeline protection system.	LA Non-FID
9	7.9	Development of the SCADA system for the National Natural Gas Transmission System	5,5	Phase 1 2025 Phase 2 and 3 2026	The upgrade of the natural gas transmission infrastructure must be supported in the coming years by the development of an efficient and flexible SCADA system, by modernizing the hardware and software architecture, by migrating to a decentralized architecture, with distributed control on administrative organizational units in accordance with the structure of SNTGN TRANSGAZ SA..	FID

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
10	7.10	Upgrading of Isaccea 2 GMS and Negru Voda 2 GMS for reverse flow on T2 pipeline	26,65	2028	Ensure reverse flow at the border with Ukraine and Bulgaria on the T2 transit pipeline.	LA Non-FID
11	7.11	Upgrading of Isaccea 3 GMS and Negru Voda 3 GMS for reverse flow on T3 pipeline	26,65	2028	Creating the possibility of reverse flow on the T3 pipeline, part of the Transbalkan corridor.	LA Non-FID
12	7.12	Interconnection of SNT to the LNG Terminal located on the Black Sea shore	19,6	2028	Creating transmission capacity to take over natural gas from the LNG terminal on the Black Sea coast.	LA Non-FID
13	7.13	LNG terminal located on the Black Sea shore	360	2028	Ensuring security of gas supply from alternative sources.	LA Non-FID
<b>TOTAL</b>			<b>4.152,6 mil. EURO</b>			

#### Total estimated value of FID projects:

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
1	7.2	Development on the territory of Romania of the natural gas <b>Transmission Corridor</b> from the Black Sea shore (Tuzla - Podișor).	493,9	2025	As Europe becomes increasingly dependent on natural gas imports, access to new sources is becoming an urgent necessity. This investment will allow gas from the Black Sea to enter the NTS and thus reach economic operators and households in the localities connected to the system. Moreover, this pipeline will connect to new sources of natural gas in the Transbalkan Corridor and the Vertical Corridor, of which the BRUA pipeline is a part, and will also be necessary for the transport of gas coming to Romania from the Caspian Sea area, from LNG terminals in Türkiye and Greece.	FID
	7.8	Development of the SCADA system for the National Natural Gas Transmission System	5,5	Stage 1 2025 Stage 2 and 3 2026	The implementation of the SCADA system for cathodic protection will ensure increased durability and safety in the operation of transmission pipelines. Based on the acquired data, simplicity of operation will be ensured for a complex pipeline protection system.	FID
<b>TOTAL FID projects:</b>			<b>499,4 million EURO</b>			



**Chart 22 - Investment effort for FID natural gas transmission projects by estimated time of completion (mil. Euro)**

**Estimated total value of A non FID projects:**

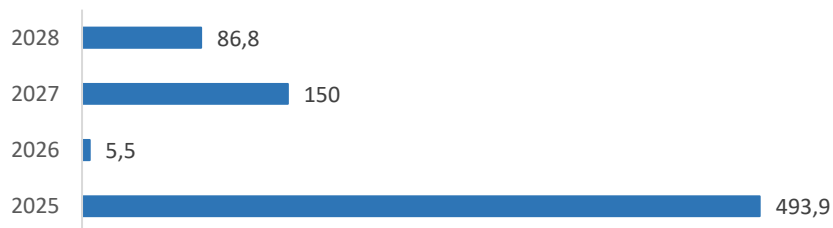
No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
1	7.1	Development of the National Natural Gas Transmission System on the <b>Bulgaria-Romania-Hungary-Austria Corridor</b> in Romania <b>(Phase II)</b>	150	2027	Step-by-step capacity increase of the Bulgaria-Romania-Hungary-Austria reverse flow transmission corridor which currently provides 2,63 bcm/year of transport capacity with Hungary. Three levels of capacity expansion with Hungary are proposed in the incremental capacity process, respectively at 2,98 bcm/year, 4,38 bcm/year and 5,32 bcm/year, for the transmission of gas from the Vertical Corridor.	A non FID
2	7.4	<b>Romania-Serbia Interconnection</b>	86,8	2028	Increasing the degree of interconnectivity between natural gas transmission systems in EU Member States and increasing energy security in the region.	A non FID
<b>TOTAL projects A non FID</b>			<b>236.8 million EURO</b>			



**Chart 23 - Investment effort for A non FID natural gas transmission projects by estimated time of completion (€ million)**

**Total estimated value of FID and A non FID projects:**

Crt. no.	Status of projects	Total estimated value (€ million)
1	FID Projects	499,4
2	Projects A non FID	236,8
<b>TOTAL FID and A non FID projects</b>		<b>736.2 million</b>



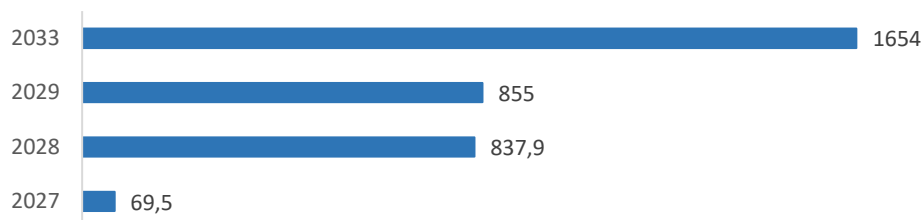
**Chart 24 - Investment effort for FID and A non FID natural gas transmission projects by estimated time of completion (million Euro)**

For the period 2024-2033, SNTGN Transgaz SA also proposes to carry out the following projects, which are currently at an early stage (**LA non FID**).

**Total estimated value of LA non FID projects:**

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
1	7.3	<b>Expansion of the Bulgaria-Romania-Hungary-Austria reverse flow natural gas transmission corridor (BRUA-Phase III)*</b>	855	2028 -2029	Phased increase of transmission capacity to ensure the capacity levels proposed in the incremental capacity process, i.e. 4,38 bcm/year and 5,32 bcm/year, for gas transmission on the Vertical Corridor.	LA non FID
2	7.5	Development/Upgrade of natural gas transmission infrastructure in the North-West of Romania	405	Phase 1 2026 Phase 2 2027 Phase 3 2028	The realisation/upgrade of objectives related to the National Transmission System in the North-West area of Romania, with the urpose of creating new natural gas transmission capacity or increasing existing capacity.	LA non FID
3	7.6	Increasing the natural gas transmission capacity of the Romania-Bulgaria interconnection on the Giurgiu-Russia direction	51,8	2027	Improving natural gas supply to the area, ensuring energy security by diversifying natural gas transport sources and routes.	LA non FID
4	7.7	Eastring-Romania	Phase 1: 1.297 Romania Phase 2: 357 million Romania	Phase 1: 2028 Phase 2: 2033	EASTRING will be open to well-established as well as alternative sources. It will bring gas from new sources in the Caspian/Eastern Mediterranean/Black Sea/Middle East regions. At the same time, it will secure supplies to South-East Europe from European gas HUBs. The total capacity will be available to any transporter or supplier.	LA non FID
5	7.8	Monitoring, control and data acquisition system for cathodic protection stations related to the National Natural Gas Transmission System	17,7	2027	The implementation of the SCADA system for cathodic protection will ensure increased durability and safety in the operation of transmission pipelines. Based on the acquired data, simplicity of operation	LA non FID

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
					will be ensured for a complex pipeline protection system.	
6	7.10	Upgrade of Isaccea 2 GMS and Negru Voda 2 GMS for reverdse flow on T2 pipeline	26,65	2028	Ensure revrse flow at the border with Ukraine and Bulgaria on the T2 transit pipeline.	LA non FID
7	7.11	Upgrading of Isaccea 3 GMS and Negru Voda 3 GMS for reverse flow on T3 pipeline	26,65	2028	Creating the possibility of reverse flow on the T3 pipeline, part of the Transbalkanic corridor.	LA non FID
8	7.12	Interconnection of NTS to the LNG Terminal located on the Black Sea shore	19,6	2028	Creating transport capacity to take natural gas from the LNG terminal located on the Black Sea coast.	LA non FID
9	7.13	LNG Terminal	360	2028	Ensuring security of gas supply from alternative sources.	LA non FID
<b>TOTAL non FID projects</b>			<b>3.416,4 mil. Euro</b>			



**Chart 25 - Investment effort for LA non FID natural gas transmission projects by estimated time of completion (million Euro)**

### 10.1.3 Planning the implementation of Transgaz' natural gas transmission projects for the period 2024-2033

Project name	Estimated present value (Euro million)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Development of the National Natural Gas Transmission System in Romania on the Bulgaria-Romania-Hungary-Austria Corridor Phase II	150											
Development on the territory of Romania of the Transission Corridor for the takeover of natural gas from the Black Sea shore (Tuzla - Podișor)	587,69											
Expansion of the reverse flow natural gas transmission corridor Bulgaria-Romania-Hungary-Austria (BRUA Phase III)	855*											
Romania-Serbia Interconnection	86,8											
Development/Upgrade of natural gas transmission infrastructure in the North-West of Romania	405											

Increasing the natural gas transmission capacity of the Romania-Bulgaria interconnection on the Giurgiu-Russia direction	51,8											
Eastring - Romania	1654											
Monitoring, control and data acquisition system for cathodic protection stations related to the National Natural Gas Transmission System	17,7											
SCADA system development for NTS	5,5											
Upgrading of Isaccea 2 GMS and Negru Voda 2 GMS for reverse flow on T2 pipeline	26,65											
Upgrading of Isaccea 3 GMS and Negru Voda 3 GMS for reverse flow on T3 pipeline	26,65											
Interconnection of the NTS to the LNG Terminal located on the Black Sea shore	19,6											
LNG terminal on the Black Sea coast	360											

**Table 6 - Planning of Major Natural Gas Transmission Projects 2024-2033**

### 10.1.4 Benefits of Natural Gas Transmission Projects

By linking different sources of natural gas supply to the European market, these investment projects contribute to the achievement of the European Union's goals, the main benefits of which can be summarised as follows:

- gas market integration and interoperability of natural gas transmission systems in the region;
- gas price convergence in the region;
- increasing the flexibility of the European gas transmission system by making interconnections in bi-directional flow;
- opening access for Romania and the European Union to a new source of natural gas - through the interconnection of the BULGARIA-RomanIA-HUNGARY-AUSTRIA-Black Sea corridor;
- increasing competition in the European gas market by diversifying sources, transmission routes and companies active in the region;
- increasing security of gas supply;
- reducing dependence on gas imports from Russia;
- boosting the development of renewable energy production in the region (especially wind and solar energy) in view of the possibility of using natural gas as a back-up for renewable energies, which leads to a significant increase in the sustainability of the proposed projects.



## II. Analysis of major storage projects

### 10.II.1. Status of Projects according to the Final Investment Decision (FID):

Storage projects		TYNDP 2022	ICP (list V)	
8.1	Increasing the daily withdrawal capacity at the Bilciuresti Storage Facility - Upgrade of the natural gas storage system infrastructure - Bilciuresti	SKU - F - 311	6.20.7	FID
8.2	Increasing the underground natural gas storage capacity of the Ghercești storage facility	UGS - F - 398		FID
8.3	New underground gas storage facility in Fălticeni (Moldova)	SKU - N - 399		LA Non-FID
8.4	Increasing the underground natural gas storage capacity at the Sărmășel storage (Transilvania)	SKU - N - 371		A non FID
8.5	Modernization of natural gas storage infrastructure - Bălăceanca	USG - N - 606		LA Non-FID
8.6	Refurbishment and development of the underground natural gas storage facility in Târgu Mureș	UGS - A - 233	6.20.4	A non FID

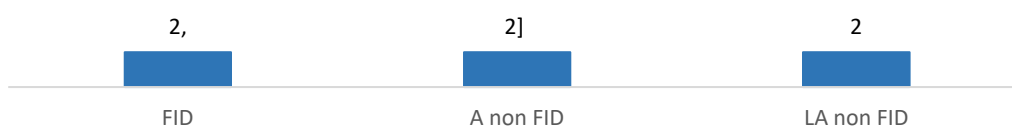


Chart 26 - Status of Major Storage Projects

### 10.II.2. Cost of Major Storage Projects

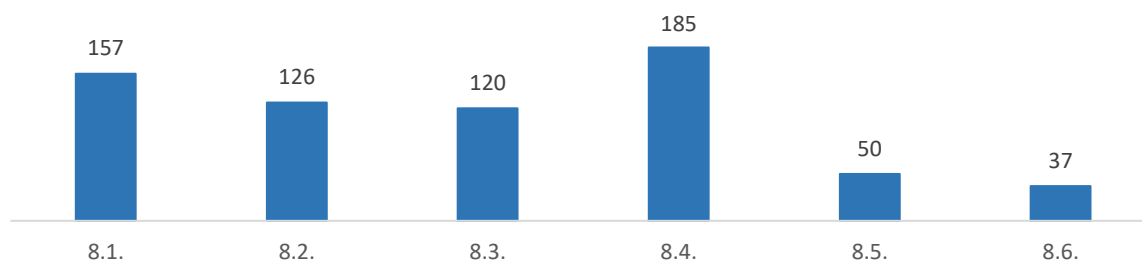


Chart 27 - Estimated cost of major storage projects (€ million)

Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	
8.1	Increasing the daily extraction capacity at the Bilciuresti Storage Facility - Modernization of the natural gas storage system infrastructure - Bilciuresti	157	2027	Increasing the daily delivery capacity of natural gas from the Bilciuresti storage to a flow rate of 20 mill cm/day and ensuring a higher degree of operational safety, coupled with an increase in storage capacity of 108 mill cm/cycle.	FID
8.2	Increasing the underground natural gas storage capacity of the Ghercești storage facility	126	2028	Increasing the daily delivery capacity of natural gas from the Ghercesti storage facility	FID

Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	
8.3	New underground gas storage facility in Fălticeni	120	2032	Increasing natural gas storage capacity to ensure security of natural gas supply	LA Non-FID
8.4	Increasing underground natural gas storage capacity at the Sărmășel storage facility (Transylvania)	185	2030	Increasing natural gas storage capacity to ensure security of natural gas supply	A non FID
8.5	Modernization of natural gas storage infrastructure - Bălăceanca	50	2032	Increasing the daily delivery capacity of natural gas from the Bălăceanca storage to 1,6 million m <sup>3</sup> /day.	LA Non-FID
8.6	Refurbishment and development of the underground natural gas storage facility in Târgu Mureș	37 (Phase 1)	2026	Increasing daily injection/extraction capacity while increasing the useful volume of storage to ensure security of gas supply and the flexibility needed to better integrate national and regional energy markets	A non FID
<b>TOTAL Storage projects</b>		<b>675 million Euro</b>			

Investment effort required to complete major storage projects according to completion deadlines:



**Chart 28 - Investment effort for storage projects according to completion dates (million EUR)**

Please note that as far as the projects *Modernization of the natural gas storage system infrastructure - Bilciuresti* (FID project) and *Storage Unit Depomures* (FID project) Transgaz is able to confirm that it has the necessary capacity to take over the related volumes, taking into account the prior discussions with Romgaz and Depomureș Târgu-Mureș.

### 10.II.3 Planning of storage projects for the period 2024-2033

Project name	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Increasing the daily extraction capacity at the Bilciuresti Storage Facility - Upgrade of the natural gas storage system infrastructure - Bilciuresti											
Increasing the underground natural gas storage capacity of the Ghercești storage facility											
New underground gas storage facility in Fălticeni											
Increasing underground natural gas storage capacity at the Sărmășel storage facility (Transylvania)											
Modernization of natural gas storage infrastructure - Bălăceanca											
Refurbishment and development of the underground natural gas storage facility in Târgu Mureș											

## III. Analysis of major hydrogen transmission projects

### 10.III.1 Status of Projects

According to the Final Investment Decision (FID) in TYNDP 2015 projects were classified into two categories: FID-projects for which the final investment decision was taken and non-FID-projects for which the final investment decision was not taken.

In the TYNDP 2017 the basic non-FID status has been divided into subcategories:

- advanced non-FID (A non-FID);
- less advanced non-FID (LA non-FID).

According to this classification, the projects of the National Gas Transmission System Development Plan 2024-2033 are as follows:

No.	Project No. according to PDSNT 2024-2033	Project name	Status
1	9.5.1.1	Upgrade of the Isaccea - Jupa pipeline for hydrogen transmission	LA non FID
2	9.5.1.2	Upgrade of the Giurgiu - Nădlac pipeline for hydrogen transmission	LA non FID
3	9.5.1.3	Upgrade of the Black Sea - Podișor pipeline for hydrogen transmission	LA non FID
4	9.5.1.4	Upgrade of the Onești - Ungheni pipeline for hydrogen transmission	LA non FID
5	9.5.1.5	Upgrade of the Romania-Serbia interconnection for hydrogen transmission	LA non FID
6	9.5.1.6	Upgrade of the Coroi - Mediasu Aurit pipeline for hydrogen transmission	LA non FID
7	9.5.1.7	Upgrade of the Negru Voda - Isaccea pipeline for hydrogen transmission	LA non FID
8	9.5.1.8	Upgrade of the Vadu - T1 pipeline for hydrogen transmission	LA non FID

No.	Project No. according to PDSNT 2024-2033	Project name	Status
9	9.5.2.1	Hydrogen transmission line in the direction Giurgiu-Podişor-Bibesti-Jupa-Horia-Nădlac	LA non FID*
10	9.5.2.2	Hydrogen transmission line ane on the Black Sea - Podişor direction	LA non FID*

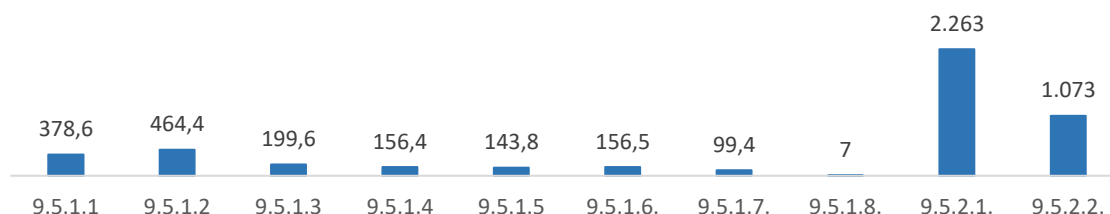
\*Projects not included in TYNDP 2022

**Table 7 - Status of Transgaz Major Projects for hydrogen transmission**



**Chart 29 - Status of Transgaz Major Hydrogen Transmission Projects**

### 10.III.2 Cost of Hydrogen Transmission Projects



**Chart 30 - Cost of major projects for hydrogen transmission (mil.Euro)**

The following is a summary of the major projects for pure hydrogen transmission:

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
1	9.5.1.1	Upgrade of the Isaccea - Jupa pipeline for hydrogen transmission	378,6	2040	Repurposing of natural gas transmission infrastructure to transport hydrogen mixed with natural gas in accordance with European provisions.	LA non FID
2	9.5.1.2	Upgrade of the Giurgiu - Nădlac pipeline for hydrogen transmission	464,4	2042	Repurposing of natural gas transmission infrastructure to transport hydrogen mixed with natural gas in accordance with European provisions.	LA non FID
3	9.5.1.3	Upgrade of the Black Sea - Podişor pipeline for hydrogen transmission	199,6	2040	Repurposing of natural gas transmission infrastructure to transport hydrogen mixed with natural gas in accordance with European provisions.	LA non FID
4	9.5.1.4	Upgrade of the Oneşti - Ungheni pipeline for hydrogen transmission	156,4	2040	Repurposing of natural gas transmission infrastructure to transport hydrogen mixed with	LA non FID

No.	Project no.	Project	Value estimated mil. Euro	Deadline for completion	Importance of the project	Project status
					natural gas in accordance with European provisions.	
5	9.5.1.5	Upgrade of the Romania-Serbia interconnection for hydrogen transmission	143,8	2040	Repurposing of natural gas transmission infrastructure to transport hydrogen mixed with natural gas in accordance with European provisions.	LA non FID
6	9.5.1.6	Upgrade of the Coroi - Mediasu Aurit pipeline for hydrogen transmission	156,5	2040	Repurposing of natural gas transmission infrastructure to transport hydrogen mixed with natural gas in accordance with European provisions.	LA non FID
7	9.5.1.7	Upgrade of the Negru Voda - Isaccea pipeline for hydrogen transmission	99,4	2040	Repurposing of natural gas transmission infrastructure to transport hydrogen mixed with natural gas in accordance with European provisions.	LA non FID
8	9.5.1.8	Upgrade of the Vadu - T1 pipeline for hydrogen transport	7	2040	Repurposing of the natural gas transport infrastructure for hydrogen transport in line with European provisions.	LA non FID
9	9.5.2.1	Hydrogen transmission line in the direction Giurgiu-Podişor-Bibeşti-Jupa-Horia-Nădlac	2263	2030	Repurposing the possibility of transporting hydrogen in accordance with European provisions.	LA non FID
10	9.5.2.2	Hydrogen transmission line on the Black Sea - Podişor direction	1073	2030	Repurposing the possibility of transporting hydrogen in accordance with European provisions.	LA non FID
<b>TOTAL</b>			<b>4.941,7 mil. EURO</b>			

### 10.III.3 Planning the implementation of Transgaz's hydrogen transport projects for the period 2024-2033

Project name	Estimated present value (Euro million)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Upgrade of the Isaccea - Jupa pipeline for hydrogen transmission												
Upgrade of the Giurgiu - Nădlac pipeline for hydrogen transmission												
Upgrade of the Black Sea - Podișor pipeline for hydrogen transmission												
Upgrade of the Onești - Ungheni pipeline for hydrogen transmission												
Upgrade of the Romania-Serbia interconnection for hydrogen transmission												
Upgrade of the Coroi - Mediasu Aurit pipeline for hydrogen transmission												
Upgrade of the Negru Voda - Isaccea pipeline for hydrogen transmission												
Upgrade of the Vadu - T1 pipeline for hydrogen transmission												
Hydrogen transmission line in the direction Giurgiu-Podișor-Bibeuști-Jupa-Horia-Nădlac												
Hydrogen transmission line on the Black Sea - Podișor direction												

Table 8 - Planning of Major Projects for pure hydrogen transmission 2024-2033

### 10.III.4 Benefits of Hydrogen Transmission Projects

The use of hydrogen as an energy carrier is an essential element for sustainable development. However, there are many challenges to implementing the components of a hydrogen energy system. At European level, it is accepted that hydrogen in the energy sector is a solution that will solve a number of issues such as energy security, energy equity and environmental sustainability. By harmonising these elements, the basis for prosperity and competitiveness at national level is laid.

Romania's energy system, and therefore the gas sector, is undergoing a transformation. The European context will have an impact on them and hydrogen will be one of the important and integral components of the energy system. Hydrogen opens a new chapter in the energy transition, where its unique properties allow it to be used for carbon-free energy storage and distribution through all forms of use.

## 10.1 Comparison ENTSOG TYNDP 2022 / Development Plan for the National Gas Transmission System 2024 – 2033 (Transgaz TYNDP)

No.	Project code 2022 Transgaz TYNDP	Transgaz TYNDP project name	Project code 2022 ENTSOG TYNDP	2022 ENTSOG TYNDP project name
1.	7.1.	Development on the Romanian territory of the National gas Transmission System on the Bulgaria – Romania – Hungary – Austria corridor – (Phase II)	TRA -A-1322	Development on the Romanian territory of the NTS (BG–RO–HU–AT) - Phase II
2.	7.2.	Development on the Romanian territory of the Southern Corridor for taking over Black Sea shore gas	TRA-F-362	Development on the Romanian territory of the Southern Transmission Corridor
3.	7.3.	Extension of the bidirectional gas transmission corridor Bulgaria – Romania – Hungary – Austria (BRUA Phase III)		Further enlargement of the BG—RO—HU—AT transmission corridor (BRUA) phase 3
4.	7.4	Romania - Serbia Interconnection	TRA-A-1268	Romania-Serbia Interconnection
5.	7.5	Development/Upgrading of the gas transmission infrastructure in the North-Western part of Romania	TRA-N-598	NTS developments in North-East Romania
6.	7.6	Increase in the gas transmission capacity of the interconnection Romania-Bulgaria, in the Giurgiu-Ruse direction		
7.	7.7	Eastring-Romania		
8.	7.8	Monitoring system, data control and acquisition for the cathodic protection stations related to the National Gas Transmission System		
9.	7.9	Development of the SCADA system for the National Gas Transmission System		
10.	7.10	Upgrading GMS Isaccea 2 and GMS Negru Voda 2 for enabling bidirectional flow on the T2 pipeline	TRA-N-602	Upgrading GMS Isaccea 2 and GMS Negru Voda 2
11.	7.11	Upgrading GMS Isaccea 3 and GMS Negru Voda 3 for enabling bidirectional flow on the T3 pipeline		
12.	7.12	Interconnection between NTS and the Black Sea LNG Terminal		
13.	7.13	LNG Terminal		
14.	9.5.1.1	Isaccea - Jupa corridor upgrading for hydrogen transmission	HYD-N-640	Isaccea - Jupa corridor upgrading for hydrogen transmission
15.	9.5.1.2	Giurgiu - Nădlac corridor upgrading for hydrogen transmission	HYD-N-999	Giurgiu - Nădlac corridor upgrading for hydrogen transmission

No.	Project code 2022 Transgaz TYNDP	Transgaz TYNDP project name	Project code 2022 ENTSOG TYNDP	2022 ENTSOG TYNDP project name
16.	<b>9.5.1.3</b>	Black Sea – Podișor Pipeline upgrading for hydrogen transmission	HYD-N-608	Black Sea – Podișor Pipeline upgrading for hydrogen transmission
17.	<b>9.5.1.4</b>	Onești – Ungheni corridor upgrading for hydrogen transmission	HYD-N-625	Onești – Ungheni corridor upgrading for hydrogen transmission
18.	<b>9.5.1.5</b>	Romania - Serbia Interconnection upgrading for hydrogen transmission	HYD-N-648	Romania - Serbia Interconnection upgrading for hydrogen transmission
19.	<b>9.5.1.6</b>	Coroi - Medieșu Aurit corridor upgrading for hydrogen transmission	HYD-N-730	Coroi - Medieșu Aurit corridor upgrading for hydrogen transmission
20.	<b>9.5.1.7</b>	Negru Voda – Isaccea corridor upgrading for hydrogen transmission	HYD-N-756	Negru Voda – Isaccea corridor upgrading for hydrogen transmission
21.	<b>9.5.1.8</b>	Vadu – T1 pipeline upgrading for hydrogen transmission	HYD-N-647	Vadu – T1 pipeline upgrading for hydrogen transmission
22.	<b>9.5.2.1</b>	Hydrogen transmission corridor on the Giurgiu-Podișor-Bibeuști-Jupa-Horia-Nădlac direction	H2T-A-1014	
23.	<b>9.5.2.2</b>	Hydrogen transmission corridor on the Black Sea - Podișor direction	H2T-N-1015	
24.	<b>8.1</b>	Upgrading the gas storage system infrastructure - Bilciurești	UGS-F-311	Bilciurești daily withdrawal capacity increase
25.	<b>8.2</b>	Increasing the underground gas storage capacity of the Ghercești storage facility	USG-F-398	Ghercești Underground Gas Storage in Romania
26.	<b>8.3</b>	New underground gas storage facility at Fălticeni (Moldova)	USG-N-399	New Underground Gas Storage at Falticeni
27.	<b>8.4</b>	Increasing underground gas storage capacity at Sărmășel storage facility (Transylvania)	USG-N-371	Sarmasel underground gas storage in Romania
28.	<b>8.5</b>	Upgrading of the natural gas storage infrastructure - Balaceanca	USG-N-606	Upgrading of the natural gas storage infrastructure - Balaceanca UGS
29.	<b>8.6</b>	Storage facility Depomures	USG-A-233	Depomures

**Table 9 - 2024 PDSNT/ 2022 TYNDP code comparison**



## 11. FINANCING OPTIONS

Every organization is required to adapt to the environment in which it operates, while maintaining its internal cohesion and minimizing the uncertainty that characterizes the transformations of the internal and external environment.

In order for the organization to maintain its identity as a result of adaptation efforts, its development must be planned with the utmost care, and this plan should be reviewed periodically.

**The moment when the decision to make an investment is made**, regardless of its nature and scale, is of great importance in the life of the organization.

The Investment Decision **is one of the most accountable managerial decisions because the investment targets the long-term strategic objectives of the company and its sustainable development.**

The financing for the implementation of the major projects for the development of the National Gas Transmission System in the period 2024 – 2033 are from:

- equity;
- attracted sources.

**The analysis of the financial resources considered only the necessary amounts for covering the FID project.** The value of Transgaz' major FID projects for 2024-2033 estimated to Euro 499,4 million, 26% will be covered by equity, 57% by loans and 17% by grants.

SNTGN Transgaz SA endeavours, through sustained efforts, to obtain non-reimbursable financial assistance for the financing of investment projects with an impact on the modernization, upgrading and development of the NTS infrastructure, in order to obtain a financing mix that ensures the lowest cost in financing the development plan.

## 12. MAJOR PROJECTS COMPLETED (TYNDP 2022-2031)

### 1. NTS developments in North-East Romania for enhancing gas supply to the area and for ensuring transmission capacities to/from the Republic of Moldova – completed project

Taking into account the need for improving gas supply to the North-East Romania and also keeping in mind the perspective offered by the interconnection pipeline between Romania and the Republic of Moldova (Iași-Ungheni) to offer gas transmission capacities to the Republic of Moldova, a series of developments needed to be performed in the Romanian gas transmission system to ensure the required technical parameters for the consumption in the relevant regions.

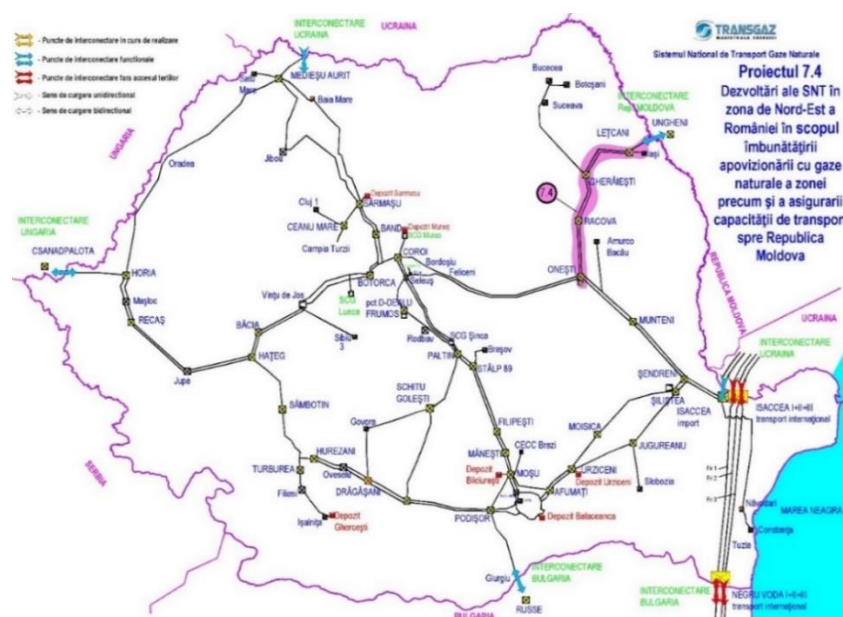


Figure 9 - NTS developments in the North-Eastern part of Romania

#### Project description:

For enhancing the implementation process and obtaining grants under the regional development programmes made available by European Funds, the project was divided into subprojects.

- Construction of a new gas transmission pipeline DN 700, Pn 55 bar, in the Onești – Gherăești direction, 104,1 km long. The route of this pipeline will be parallel mainly to the existing pipelines DN 500 Onești – Gherăești;
- Construction of a new gas transmission pipeline DN 700, Pn 55 bar, in the Gherăești – Lețcani direction, 61,05 km long. This pipeline will replace the existing DN 400 pipeline Gherăești – Iași on the Gherăești – Lețcani section.
- Construction of a new gas compressor station at Onești with an installed power of 9,14 MW, compressors of 4,57 MW each, one active one backup,
- Construction of a new gas compressor station at Gherăești with an installed power of 9,14 MW, 2 compressors of 4,57 MW each, one active one backup.

**PROJECT COMPLETED**

The project met the eligibility criteria of the Large Infrastructure Operational Programme (POIM). Priority Axis 8 - Strategic Objective (OS) 8.2, programme developed by the Management Authority of the Ministry of European Funds and received a non-reimbursable funding through PAP8 - *Intelligent and sustainable transport systems for electricity and natural gas* amounting to lei 214.496.026,71 (EUR 46,3 million). Grant Agreement 226/22.11.2018 was signed in this regard with the Ministry of European Funds.

**2. NTS developments for taking over Black Sea gas (Vadu – T1)**

Taking into account the natural gas reserves discovered at the Black Sea, Transgaz planned to expand the NTS with the aim of creating an additional taking over point for the natural gas coming from the Black Sea blocks.

**Project description**

The project **NTS developments for taking over Black Sea gas** consisted in the construction of a new transmission pipeline of approximately 25 km and a Dn 500 diameter, from the Black Sea shore (Vadu) to the existing T1 international gas transmission pipeline. The transmission capacity is 1,23 bcm/year according to the Open Season results published on the Transgaz website.

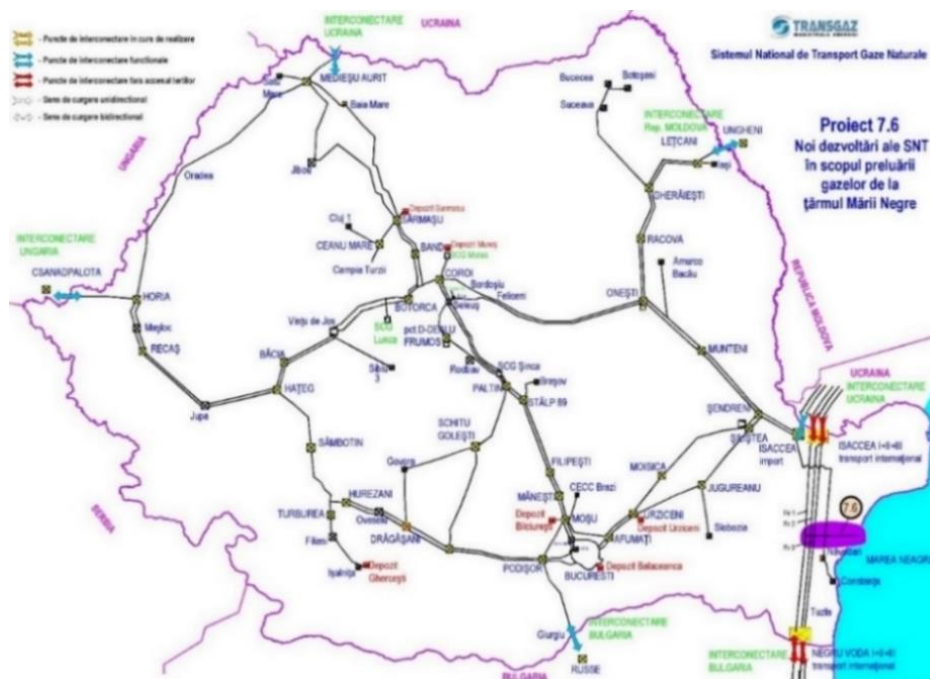


Figure 10 - SNT developments in the Black Sea

**PROJECT COMPLETED**

### 13. DO MINIMUM AND DO MAXIMUM SCENARIOS

The major projects were grouped by their status into two scenarios: *do minimum* (FID and A non FID projects) and *do maximum* (all of the projects). This classification is necessary for the environmental assessment purposes.

#### Variant 1 – DO MINIMUM

Project no.	Project name	Status
<b>Gas transmission</b>		
7.1.	Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor – Phase II	A non FID
7.2	Development on the Romanian territory of the Transmission Corridor for taking over the Black Sea gas (Tuzla – Podisor)	FID
7.4	Romania – Serbia Interconnection	A non FID
<b>Storage</b>		
8.1	Upgrading of Bilciurești underground gas storage system infrastructure	FID
8.2	Increasing underground gas storage capacity at the Ghercești Underground Gas Storage Facility	FID
8.4	Increasing the storage capacity of the Sărmășel underground gas storage facility (Transylvania)	A non FID
8.6	Retrofitting and development of the underground gas storage facility Târgu Mureș	A non FID

Table 10 – List of major projects – Base scenario DO MINIMUM

#### Variant 2 – DO MAXIMUM

Project no.	Project name	Status
<b>Gas transmission</b>		
7.1	Development on the Romanian territory of the National Gas Transmission System on the Bulgaria – Romania – Hungary – Austria Corridor – Phase II	A non FID
7.2	Development on the Romanian territory of the Transmission Corridor for taking over the Black Sea gas (Tuzla – Podisor)	FID
7.3	Extension of the bi-directional gas transmission corridor Bulgaria – Romania - Hungary – Austria (BRUA Phase III)	LA non FID
7.4	Romania – Serbia Interconnection	A non FID
7.5	Development/Upgrading of the gas transmission infrastructure in the North-Western part of Romania	LA non FID
7.6	Increase in the gas transmission capacity of the interconnection Romania-Bulgaria, in the Giurgiu-Ruse direction	LA non FID
7.7	Eastring–Romania	LA non FID
7.8	Monitoring system, data control and acquisition for the cathodic protection stations related to the National Gas Transmission System	LA non FID
7.9	Development of the SCADA system for the National Gas Transmission System	LA non FID
7.10	Upgrading GMS Isaccea 2 and GMS Negru Voda 2 for enabling bidirectional flow on the T2 pipeline	LA non FID

Project no.	Project name	Status
<b>Gas transmission</b>		
7.11	Upgrading GMS Isaccea 3 and GMS Negru Voda 3 for enabling bidirectional flow on the T3 pipeline	LA non FID
7.12	Interconnection between NTS and the Black Sea LNG Terminal	LA non FID
7.13	LNG Terminal	LA non FID
<b>Hydrogen transmission</b>		
9.5.1	Isaccea - Jupa corridor upgrading for hydrogen transmission	LA non FID
9.5.2	Giurgiu - Nădlac corridor upgrading for hydrogen transmission	LA non FID
9.5.3	Black Sea – Podișor Pipeline upgrading for hydrogen transmission	LA non FID
9.5.4	Onești – Ungheni corridor upgrading for hydrogen transmission	LA non FID
9.5.5	Romania - Serbia Interconnection upgrading for hydrogen transmission	LA non FID
9.5.6	Coroi - Medieșu Aurit corridor upgrading for hydrogen transmission	LA non FID
9.5.7	Negru Voda – Isaccea corridor upgrading for hydrogen transmission	LA non FID
9.5.8	Vadu – T1 pipeline upgrading for hydrogen transmission	LA non FID
9.5.9	Hydrogen transmission corridor on the Giurgiu-Podișor-Bibești-Jupa-Horia-Nădlac direction	LA non FID
9.5.10	Hydrogen transmission corridor on the Black Sea - Podișor direction	LA non FID
<b>Storage</b>		
8.1	Upgrading of Bilciurești underground gas storage system infrastructure	FID
8.2	Increasing underground gas storage capacity at the Ghercești Underground Gas Storage Facility	FID
8.3	New underground storage facility in Falticeni (Moldova)	LA non FID
8.4	Increasing the storage capacity of the Sărmășel underground gas storage facility (Transylvania)	A non FID
8.5	Upgrading of the natural gas storage infrastructure - Balaceanca	LA non FID
8.6	Retrofitting and development of the underground gas storage facility Târgu Mureș	A non FID

**Table 11 - List of major projects – Base scenario DO MAXIMUM**

## 14. THE 2024 – 2026 INVESTMENT DEVELOPMENT AND MODERNIZATION PLAN

No.	Type of work	2023	2024	2025	2026
<b>1</b>	<b>UPGRADING AND RETROFITTING OF THE NATIONAL GAS TRANSMISSION SYSTEM</b>				
<b>1.1.</b>	<b>UPGRADING OF TECHNOLOGICAL INSTALLATIONS OF THE NATIONAL GAS TRANSMISSION SYSTEM (MRS, VCS, MP,NNT)</b>				
<b>1.1.1</b>	ADAPTATION TO FIELD OF THE METERING LINES TO BE INSTALLED UNDER THE SCADA <b>PROGRAMME AND TECHNOLOGICAL NODES AUTOMATIONS</b> (Annex 1)				
<b>1.2</b>	<b>DATA ACQUISITION CONTROL SYSTEM (Annex 2)</b>				
<b>2</b>	<b>DEVELOPMENT OF THE GAS TRANSMISSION SYSTEM AND RELATED FACILITIES</b>				
<b>2.1.</b>	<b>GAS TRANSMISSION PIPELINES</b>				
<b>1</b>	Replacement undercrossing county road, railways bucurești by-pass and railway progresu gas transmission pipeline DN 700 Bucharest ring, Moara Domneasă – Măgurele section				
<b>2</b>	Safeguarding of the DN 500 Filipești - Răzvad and DN 400 Filipești - Moreni gas transmission pipelines, Cricovul Dulce river undercrossing, I.L. Caragiale area, Dâmbovița county				
<b>3</b>	Safeguarding of the DN 500 Turcești-Isalnita gas transmission pipeline at the above-crossing of the Bradesti river, Almaj village area, Dolj county				
<b>4</b>	Safeguarding the DN 500 Posada - Bobolia gas transportation pipeline ( left bank of the river) at Prahova river undercrossing - Nistorești-Breaza area - Prahova county				
<b>5</b>	Safeguarding of above-crossing of Tarnava Mica river by DN200 Fantanele-Sovata gas transmission pipeline, Chibed area, Mures county				
<b>6</b>	Safeguarding of the DN 500 Hurezani - Corbu - Bucharest gas transmission pipeline, F1 and F2 at the above-crossing of the Amărăzuia creek, Stejari area, Gorj county				
<b>7</b>	Safeguarding the DN 300 gas transmission pipeline PM Stejari connection near Amărăzuia creek, Stejari area, Gorj county				
<b>8</b>	Safeguarding of the DN 800 Butimanu - Brazi gas transmission pipeline at the Prahova river undercrossing, Stancesti area, Prahova county				
<b>9</b>	Deviation of Dn 800 Onesti-Han Domnesti and Dn 500 Onesti-Adjudul Vechi gas transport pipelines, in the Caiuti area, Bacau county				
<b>10</b>	Safeguarding the above-crossing of Valea Tarsei Valley by DN700 Platou Izvor Sinaia - Filipesti pipeline , Valea Tarsei area, Prahova county				
<b>11</b>	Safeguarding of the DN 350 Căței-Baia Mare gas transmission pipeline at the undercrossing of the Craica creek, Baia Mare area, Maramures county				
<b>12</b>	Mounting the regulating valve in the Podisor Regulation Station 2 premises				
<b>13</b>	Safeguarding of the railway above-crossing in the Valea Mare Pravat area by the DN600 Mateias - Schitu Golesti gas transmission pipeline				

No.	Type of work	2023	2024	2025	2026
14	Safeguarding the Siret River undercrossing by the DN 500 Onești - Adjutul Vechi pipeline, in the Adjutul Vechi area, Vrancea county.				
15	Safeguarding the Shusita Stream undercrossing by the DN250 gas transport pipeline MRS Focșani connection in the Țifești area, Vrancea county				
16	Safeguarding the Corunca-Coroi-Sinca Bucharest 28"-24"-20" gas transmission pipeline Platou Izvor Sinaia-Filipești, in Valea Târsei area, county of Prahova, point Ferma				
17	Safeguarding the above-crossing of the Tarnava Mica river by the gas transport pipelines DN 200 Fantanele-Sovata, Trei Sate area, Mures county				
18	Coupling of the above-crossing of the Siret river to the DN 800 Han Domnesti-Tecucigas transport pipeline , Cosmesti area				
19	Safeguarding the DN400 Campina-Nedelea and DN 500 Posada-Bobolia pipelines, Vrajitoarea area, Prahova county				
20	Safeguarding the DN 800 BRUA gas transmission pipeline , Jupânești area, Gorj county				
21	Replacement of the DN 500 Moinești-Dărmănești gas transmission pipeline, in the Dărmăneasca-Dărmănești area, county of Bacău				
22	Safeguarding the DN700 Platou Izvor Sinaia - Filipești gas transmission pipeline, in the Ghioșești Comarnic area, Prahova county				
23	"Safeguarding the undercrossing of Nisipoasa stream by DN400 Govora-Drăgășani gas transmission pipeline , in the Scăioși village area, Vâlcea county				
24	Safeguarding the DN700 Platou Sinaia - Filipești gas transmission pipeline, Talea - Breaza area, Prahova county				
25	Safeguarding DN 350 Cășei - Baia Mare gas pipeline section at the Bloaja stream undercrossing, Cernești area, Maramureș county.				
26	Securing the DN 700 Moghiorosi - ONESTI and the DN 800 Moghiorosi – Onesti pipelines, Ferăstrău area, , Bacău county				
27	Safeguarding the 20" Drăgușeni - Spătăreni gas transmission pipeline, in Drăgușeni area, Suceava county				
28	Safeguarding the DN 300 Satu-Mare-Baia-Mare gas transport pipeline section at the Ilba stream undercrossing, in Ilba locality area , county of Maramures				
29	Safeguarding the undercrossing of the Ampoi river by the DN 200 Alba Iulia- Zlatna gas transmission pipeline, in the Presaca Ampoiului locality area, county Alba				
30	Providing the possibility of bidirectional gas flow on T3 at GMS Isaccea 4				
31	Providing the possibility of bidirectional gas flow on T3 at GMS Negru Voda 3				
32	Safeguarding the DN 300 Simeria - MRS Hunedoara I gas transmission pipeline in the Bârcea Mică and Peștișu Mare area, Hunedoara county				
33	Safeguarding of above-crossing of Plapcea river by DN 100 gas transmission pipeline, MRS Scornicești supply connection, Olt county				
34	Safeguarding the DN 300 Sibiu - Cislădie pipeline at the Argintului stream above-crossing, MRS Transilvania Automobile area, Sibiu county				

No.	Type of work	2023	2024	2025	2026
35	Safeguarding of the undercrossing of the Cibin river by the DN 400 gas transmission pipeline, bordering Alba - Sibiu county, in the Orlat area, county of Sibiu				
36	Connection of Seuca MRS to the DN 600 Coroi-Masloc (West 2) gas transmission pipeline				
37	Safeguarding of above-crossing of Aries river by DN 500 Ozd - Campia Turzii gas transmission pipeline in Lunca area, Cluj county				
38	Safeguarding the DN 500 Posada - Bobolia gas transportation pipeline (left bank of the river) at Prahova river undercrossing - Comarnic area - Prahova county				
39	Adaptation to the land and mounting PIG trap station DN 700 MM on the gas transmission pipeline DN 700 Bucharest ring				
40	Safeguarding the DN 700 Tautii Magherus-Ulmeni pipeline at the undercrossing of the Lăpuș river, the area of Busag village, Maramures county				
41	Safeguarding the DN 500 Schitu Golesti-Govora-Dragasani gas transmission pipeline, Topolog River under-crossing, in Tigveni area, county of Arges				
42	Safeguarding the DN 500 Schitul Golesti-Govora gas transmission pipeline, in the Slanic area, Arges county				
43	Safeguarding the DN 700 Moghioroși - Onești and DN 800 Moghioroși - Onești pipeline in the Hârja (Pisotaia) area, Oituz village, Bacău county				
44	Safeguarding the DN 500 Schitu Golesti - Pitesti - Corbu gas transmission pipeline (Line 2), the Pitesti area				
45	Upgrading of a gas connection pipeline and MRS Vladimirescu, Vladimirescu locality, Arad county				
46	Safeguarding the DN 300 Agarbiciu - Sibiu gas transmission pipeline, Seica Mare area				
47	Safeguarding of the DN 80 pipeline supply connection Ucea de Jos and adjustment to the MRS Ucea DE Jos site				
48	Safeguarding of the DN500 Schitu Golesti-Tigveni gas transmission pipeline at the Valea Danului above-crossing, Valea Danului area, Arges county.				
49	Safeguarding the DN 500 Corbu-Turnu Măgurele F2 gas transmission pipeline at the Vedea river undercrossing, Icoana area, county of Olt				
50	"Installation of a gas flow metering system at Negru Voda GMS Transit 1 (flow computers, monitoring system and transducers)				
51	Interconnection of the DN 800 Crevedia - Podișor gas transmission pipeline and the DN 400 Gura Șuții - Bucharest pipeline in the Slobozia Moară area, Dâmbovița county				
52	Replacement of the Botoșani - Bucecea pipeline section, in the Baisa village area, Botoșani county				
53	Safeguarding the above-crossing of Ghimbașel river by DN 700 Paltin-Gura Diham gas transmission pipeline - Section ET Mediaș in the Râșnov site area, Brasov county				
54	Safeguarding of above-crossing of Palos river by DN300 Beia-Hoghiz gas transmission pipeline in the CPS Palos area, county of Brasov				



No.	Type of work	2023	2024	2025	2026
55	Safeguarding the DN 300 Piatra Neamt bypass pipeline in the Valeni area and installation of a gas pressure regulation equipment in the Savinesti area, county of Neamt				
56	Safeguarding of DN800 Onesti-Han Domnesti and DN 500 Onesti Adjutul Vechi gas transmission pipelines, in the Stefan Cel Mare area				
57	Safeguarding of above-crossing of Racovița stream and Moașa stream by DN 200/150mm gas transmission pipeline Turnu Roșu MRS connection in Racovița and Sebeșul de Sus areas, Sibiu county				
58	Safeguarding of DN 80 gas transmission pipeline - Bisericani MRS gas supply connection in the Schit Bisericani area, county of Neamt				
59	Gas transmission pipeline MRS Timisoara I - MRS Timisoara III (including power supply, cathodic protection and optical fiber)				
60	DN 500 Plătărești - Bălăceanca Gas Transmission Pipeline				
61	Câmpulung Moldovenesc-Vatra Dornei-Pojorâta-Vatra Dornei section gas transmission pipeline				
62	Arinis - Oarta de Jos gas transmission pipeline (including power supply, cathodic protection and optical fiber)				
63	Techirghiol - Ovidiu Gas Transmission Pipeline				
64	28" Ganesti - Botorca transmission pipeline and construction of interconnections between the new 28" Coroi - Ganesti pipeline and the 28" Band - Idrifaia, and the 24" Coroi - Botorca - Bacia (Vest II) pipelines, in the Bahnea and Ganesti area				
65	Râmnicu Vâlcea - Tetila gas transmission pipeline (including power supply, cathodic protection and optical fibre)				
66	Ghercesti - Jitaru gas transmission pipeline				
<b>2.2</b>	<b>INCREASING NTS TRANSMISSION CAPACITY</b>				
1	DN600 Mihai Bravu – Siliștea gas transmission pipeline and changing into a piggable pipeline. Danube river undercrossing Măcin arm				
2	DN600 Mihai Bravu – Siliștea gas transmission pipeline and changing into a piggable pipeline. Danube river undercrossing Borcea arm				
3	Development on the Romanian territory of the Southern Transmission Corridor for taking over the Black Sea gas (Black Sea – Podișor shore)				
4	Upgrading of the Vințu turbo-compressor station				
5	Gas transmission pipeline for natural gas supply to CET Mintia (including power supply, cathodic protection and fibre optics)				
6	Mihai Bravu - Silistea (without Danube)				
7	BRUA (Phase 2)				
7.1	Gas transmission pipeline construction				
7.2	Procurement of the centrifugal compressors at Podișor				
7.3	CS Podișor construction Phase 2				
7.4	Procurement of the centrifugal compressors at Bibești				
7.5	CS Bibești construction Phase 2				
7.6	Procurement of the centrifugal compressors at CS Jupa				
7.7	CS Jupa construction Phase 2				
8	DN 500 Horia - Borș gas transmission pipeline				

No.	Type of work	2023	2024	2025	2026
9	Dn 800 Bordoșiu - Coroi gas transmission pipeline (including power supply, cathodic protection and optical fibre)				
10	GCS Coroi				
11	Increasing the transmission capacity of the NTS and the security of gas supply of the Electrocentrale Ișalnița Branch (Dolj county) and the Electrocentrale Turceni Branch (Gorj county)				
11.1	TN Hurezani - Bibești - TN Turburea gas transmission pipeline, Gorj county				
11.2	Țânțăreni - Turceni gas transmission pipeline, Gorj county				
11.3	CCGT Ișalnița connection pipeline, Dolj county				
12	DN 700 Săușa-Târgu Mureș gas transmission pipeline				
2.3	<b>ABOVEGROUND CONSTRUCTION AND INSTALLATION WORKS FOR MRS (Annex 3)</b>				
2.4	<b>CATHODIC PROTECTION STATIONS (Annex 4)</b>				
2.5	<b>ABOVEGROUND INSTALLATION AND CONSTRUCTION WORKS FOR ODORIZATION INSTALLATIONS (Annex 5)</b>				
2.6	<b>WORKS AT GAS TRANSMISSION PIPELINES LOCATING IN RISK-BEARING AREAS (Annex 6)</b>				
3	<b>ELECTRICAL INSTALLATIONS AND NETWORKS</b>				
4	<b>LAND PROCUREMENT</b>				
5	<b>NTS ACCESS WORKS</b>				
6	<b>NTS DEVELOPMENT ACCORDING TO LAW 123/2012 (UPDATED) ART 130, AL. E<sup>1</sup> AND E<sup>2</sup></b>				
1	Tg. Neamt – Baltasesti gas transmission pipeline, Neamt county				
2	Deta - Moravita gas transmission pipeline, Timis county				
3	Bentu gas transmission pipeline, Siliștea București-Cotu Ciorii gas transmission pipeline				
4	Prunisor - Orsova - Baile Herculane - Jupa gas transmission pipeline				
4.1	Prunisor - Orsova - Baile Herculane - Jupa gas transmission pipeline - LOT 1				
4.2	Prunisor - Orsova - Baile Herculane - Jupa gas transmission pipeline - LOT 2				
4.3	Prunisor - Orsova - Baile Herculane - Jupa gas transmission pipeline - LOT 3				
4.4	Prunisor - Orsova - Baile Herculane - Jupa gas transmission pipeline - LOT 4				
5	Vernești - Mărăcineni - Poșta Călnău gas transmission pipeline, Buzău County, Phase II = Mărăcineni - Poșta Călnău				
6	Ghergheasa – Focsani gas transmission pipeline				
7	Lugasu – Huedin Gas transmission pipeline				
8	Vladimirescu - Lipova Gas transmission pipeline				
9	Segarcea - Bailesti - Calafat Gas transmission pipeline				
10	Gas supply to Borsec town				
11	Gas supply to the localities in the Moinesti - Asau and Mihaileni-Lunca de Sus consumption directions, located in the ADI "Trotus Gaz Palanca" area, Bacau and Harghita counties				

No.	Type of work	2023	2024	2025	2026
12	Gas supply to the localities in the Scanteia – Deleni and Petresti - Costuleni consumption directions, located in the ADI "PLAIURILE JIJIEI" area, Iasi county				
13	Gas supply to the Praid, Lupeni, Corund and Atid localities, located in the ADI GORDON TARNAVA are, Harghita county				
14	Potential NTS investment projects, depending on requests, the results of the technical and economic studies and the completion of the FEEDs.				

**IDMP – Annex 1 – LAND ADAPTATION OF THE METERING LINES TO BE INSTALLED BY THE PROGRAMME SCADA AND TECHNOLOGICAL NODE AUTOMATIONS**

No.	Type of work	2023	2024	2025	2026
1	Racova Technological Node - power supply for actuation and automation components				
2	Power supply to vital consumers TN Podisor				
3	Mounting of regulating valve for Corbu-Turnu Magurele subsystem supply from TN Corbu				
4	Mounting of regulating valve at TN Hurezani on the Hurezani-Corbu-Bucuresti direction, pigable pipeline				
5	Power supply for actuation and automation components at TN Munteni- electricity line and transformer station				
6	Mounting of DN600/ANSI40 pig receiving station at TN RECAS				
7	Upgrading of TN Lazaresti - Power supply to actuation, automation and supervision components				
8	Upgrading of TN Jugureanu, including power supply to the facility, as well as to the actuation and automation components, county of Brăila				
9	Power supply to actuation, automation and supervision components at the TN Dealul Frumos				

**IDMP – Annex 2 – DATA ACQUISITION CONTROL SYSTEM**

No.	Type of work	2023	2024	2025	2026
1	Upgrade of central hardware and software infrastructure - servers and SCADA operator stations				
2	Interconnection, control and monitoring of BRUA SCADA system				
3	Interconnection, control and monitoring of Moldova NE SCADA system".				
4	Interconnection, control and monitoring of the Tuzla-Podisoar SCADA system				
5	SADZ system - Implementation of PTZ4 volume converter pressure value alarm system				
6	Interconnect industrial communication solution				

## **IDMP – Annex 3 – SURFACE CONSTRUCTION AND INSTALLATION WORKS FOR METERING-REGULATING STATIONS**

<b>No.</b>	<b>Denumirea categoriei de lucrări</b>	2023	2024	2025	2026
1	Power supply and indoor electrical installations at MRS Marpod				
2	MRS Moinesti I (Dealul Mare) connection to NTS and to the gas distribution system				
3	Protection system against atmospheric discharges, with lightning conductor and earthing system to protect the mechanical and electrical installations belonging to MRS Șona - Mediaș Regional Operating Centre				
4	Protection system against atmospheric discharges, with lightning conductor and earthing system to protect mechanical and electrical installations belonging to the MRS Crăciunelu de Jos - Mediaș Regional Operating Centre				
5	Power supply and indoor electrical installations at MRS Filiași				
6	Protection system against atmospheric discharges, with lightning conductor and earthing system for the protection of mechanical and electrical installations belonging to MRS Moara Iacobeni - Cluj Regional Operating Centre				
7	Protection system against atmospheric discharges, with lightning conductor and earthing system for the protection of mechanical and electrical installations belonging to the MRS Sausa - Cluj Regional Operating Centre				
8	Protection system against atmospheric discharges, with lightning conductor and earthing system to protect mechanical and electrical installations belonging to the MRS Chetani – Cluj Regional Operating Centre				
9	Electricity supply - voltaic panels solution and installations for electricity use at MRS SDE Belciugatele				
10	Land preparation for MRDS Băbeni				
11	Atmospheric discharge protection system, with lightning rod and restoration of electrical installation for use for MRS Fulger Bragadiru facility				
12	Upgrading of MRS Sighisoara				
13	Power supply and indoor power installations at the MRS Ighisul Nou				
14	Power supply at MRS Lechinta				
15	Replacement of technological installation in MRS Dulcești, Neamț county				
16	Power supply and indoor electrical installations at MRS Foieni, Satu Mare county				
17	Power supply MRS Marsa				
18	Power supply MRS Grindeni				
19	Upgrading of distribution system at MRS Bistrita				
20	Power supply and indoor electrical installations at MRS Vestem				
21	Power supply and indoor electrical installations at MRS Cenade				
22	Power supply and indoor electrical installations at MRS Șelimbăr				
23	Power supply and indoor electrical installations at MRS Mohu				
24	Relocation of master power switchboard at MRS Ion Neculce, Iași county				
25	Upgrading and replacement of technological installations at MRS Miercurea Ciuc				
26	Upgrading of technological installation MRDS Arad I				
27	Relocation and land adjustment of the technological installation of MRS Poroterom Orastie on the MRS Baru site				

No.	Denumirea categoriei de lucrări	2023	2024	2025	2026
28	Replacement of MRS Măgurele Bucharest				
29	Land adaptation for MRS Falticeni, Suceava county				
30	Access road MRDS Arad I technological installation upgrading				
31	Connection and MRDS Craiova Sud, Dolj county				
32	Upgrading of MRS Pascani II				
33	Upgrading of MRS Onesti, Bacău county				
34	Power supply and interior electrical installations at MRS Daia				
35	Installation of photovoltaic panels for the power generation for self-consumption at Transgaz facilities				

#### IDMP – Annex 4 – **CATHODIC PROTECTION STATIONS**

No.	Type of work	2023	2024	2025	2026
1	Cathodic protection on DN250 pipeline gas supply connection to MRS Oarja, Arges county				
2	Cathodic protection on DN 500 transmission pipeline PM402 Simnic-Pielesti				
3	Relocation of cathodic protection station Bradu 8 5/8" Arges county				
4	Cathodic protection station Șercaia, Brașov county				
5	Cathodic protection of DN400 pipeline gas supply connection MRS Vaslui".				
6	Cathodic protection on DN400 gas transmission pipeline MRS Alprom Slatina connection, Olt county				

#### IDMP – Annex 5 – **ABOVE-GROUD INSTALLATION AND CONSTRUCTION WORKS FOR ODORIZATION**



No.	Type of work	2023	2024	2025	2026
1.	Adaptation to field of the odorization installations				

#### IDMP – Annex 6 – **WORKS AT GAS TRANSMISSION PIPELINES LOCATED IN RISK-BEARING AREAS**

No.	Type of work	2023	2024	2025	2026
1.	WORKS FOR SECURING Ø20" HATEG - DEALUL BABII - PAROSANI GAS TRANSMISSION PIPELINE, Dealul Babii area, Hunedoara county				
2.	WORKS FOR SECURING Ø 10" FRASIN – SPĂTĂREȘTI GAS TRANSMISSION PIPELINE, Spătărești area				
3.	WORKS FOR SECURING MRS RĂCĂCIUNI GAS SUPPLY CONNECTON PIPELINE, Dumbrava tourist halt area				
4.	DN 500 SARMASEL - BAIA MARE - SATU MARE GAS TRANSMISSION PIPELINE, Sucutard area				

No.	Type of work	2023	2024	2025	2026
1.	WORKS FOR SECURING Ø20" HATEG - DEALUL BABII - PAROSENI GAS TRANSMISSION PIPELINE, Dealul Babii area, Hunedoara county				
2.	WORKS FOR SECURING Ø 10" FRASIN – SPĂTĂREȘTI GAS TRANSMISSION PIPELINE, Spătărești area				
5.	WORKS FOR SECURING DN 350 LUNA - AIUD, DN250 LUNA – OCNA MUREȘ (Line I) and DN250 LUNA -OCNA MUREȘ (Line II) GAS TRANSMISSION PIPELINES, Razboieni area				
6.	SECURING DN 300 CORMENIS-APA GAS TRANSMISSION PIPELINE, Buciumi area				

**Note:** The 2024-2026 Investment Development and Modernization Plan was approved based on Resolution 36/19 December 2023 of the Board of Administration as further amended.

	Works completed.
	Works in progress, according to the initial estimation.

Within the PMDI for 2024 and estimates for the period 2025-2026, investments in NTS developments were included in accordance with Law 123/2012 on electricity and natural gas, as amended, investments to ensure the expansion of the National Transmission System in areas with newly established distribution systems.

Estimated values for the development of the transmission network in Romania are contained in the PMDI in the chapters **NTS ACCESS WORKS** and **NATIONAL TRANSMISSION SYSTEM DEVELOPMENT IN ACCORDANCE WITH LAW 123/2012 (UPDATED), ART.130 (E<sup>1</sup>) and (E<sup>2</sup>), as follows:**

- Thousand lei -

	REB 2024	Estimated 2025	Estimated 2026
<b>NTS access works</b>	<b>85.399</b>	<b>30.122</b>	<b>27.699</b>
<b>NTS development in line with Law 123/2012</b>	<b>65.078</b>	<b>12.839</b>	<b>45.000</b>
<b>TOTAL</b>	<b>150.477</b>	<b>42.961</b>	<b>72.699</b>

The amounts included in the NTS Development Plan 2024-2033 on the extension and NTS development ensures the possibility to connect the NTS to all the localities in Romania, in line with the provisions of Law 123/2012, on electricity and natural gas, as amended, and ANRE Order 82/2017.

## 15. CONCLUSIONS

Romania seeks to become an energy turntable in Eastern Europe, both from the perspective of achieving a gas transmission network strongly interconnected with similar gas transmission networks in the region, and from the perspective of gas supplying.

The three major directions of action in order for Romania to gain this position are presented in the **Energy Deal**, 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.

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, can ensure a high degree of energy security and regional integration, and the energy sector can become a real "economic growth driver".

The cross-border interconnection of networks is nowadays a priority in the Romanian energy policy.

Any development scenario for gas and electric energy production, or for the diversification of the external sources on import, needs a **proper transmission infrastructure**. In order to ensure the compliance with the requirements of the European Union policy in the energy sector, based on three fundamental objectives: **energy security, sustainable development and competitiveness**, Transgaz established in its 2021-2025 administration plan the increasing of the level of NTS reliability to ensure the interoperability with the neighbouring systems, the development, upgrading and modernization 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 set in **the 2024-2033 TYNDP Transgaz** aims to become a leader in the energy sector, an important 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 discovered gas reserves 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.

**Aware of this responsibility, Transgaz management is continuing one of the largest and most important plans for the development of the Romanian gas transmission infrastructure over the last 20 years, with investment projects estimated at approximately Euro 9 billion (of which Euro 736,2 million for FID and A non-FID projects) and meant to create gas transmission routes, essential to efficient transmitting of the 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-South Corridor.**

**The capability of the company to adapt and to respond to the requirements of the Romanian gas resources, in the following years, is 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 plan will not only ensure the use of essential economic resources for the welfare of Romania but it will also be a litmus test to prove the foreign investors that Romania is able to create favourable conditions for developing and attracting foreign investments.**



## Definitions and abbreviations

ENTSO-G	European Network of Transmission System Operators for Gas
TYNDP	Ten Year Network Development Plan
CE	The European Commission
CEF-Energie	Connecting Europe Facility
CESEC	Central East South Europe Gas Connectivity
ROHUAT/BRUA	Cluster phased capacity increase on the Bulgaria — Romania — Hungary — Austria bidirectional transmission corridor
NSI-EAST	North South Corridor - East
PCI	Projects of Common Interest
POIM	Large Infrastructure Operational Program
AP	Priority Axis (POIM)
OS	Strategic Objective (POIM)
TANAP	The Trans-Anatolian Pipeline (TANAP);
TAP	The Trans Adriatic Pipeline
IGB	The Interconnector Greece – Bulgaria
AGRI	The Azerbaijan-Georgia-Romania-Hungary interconnector
BRUA	The Bulgaria – Romania – Hungary – Austria pipeline
SNTGN	The National Gas Transmission Company
ANRE	National Energy Regulatory Authority
ANRM	National Agency of Mineral Resources
BVB	Bucharest Stock Exchange
NTS	National Gas Transmission System
MRS	Gas metering regulating station
SCV	Valve control station
NT	Technological Node
SMG	International transmission pipeline metering station
SCG, SC	Gas compressor station
SPC	Cathodic protection station
SOG	Gas odorization station
SCADA	Supervisory control and data acquisition system
BG	Bulgaria
UA	Ukraine
HU	Hungary
RO	Romania
DN	Nominal Diameter
L	Length
Pn	Nominal pressure

## List of figures, charts and tables

Figure 1 - Map of the territorial organisation of SNTGN Transgaz SA.....	9
Figure 2 – Map of the National Gas Transmission System and the capacities at the cross-border interconnection points (bScm/year) .....	10
Figure 3 – Schematic representation of the Romanian gas market.....	12
Figure 4 - Lengths of natural gas transmission systems of neighbouring countries .....	16
Figure 5 - Major NTS projects map .....	39
Figure 6 - Major natural gas storage projects – Depogaz.....	56
Figure 7 - Major natural gas storage projects - Depomures.....	63
Figure 8 - Proposed "backbone" of the NTS for hydrogen transport, .....	69
Figure 9 - NTS developments in the North-Eastern part of Romania.....	97
Figure 10 - SNT developments in the Black Sea .....	98

## CHARTS

Chart 1 - Evolution of transported natural gas including gas for underground storage and NTS gas consumption for the period 2014-2023 .....	7
Chart 2 - The share of the NTS gas consumption in the total transmitted gas including gas for underground storage for the period 2014-2023.....	7
Chart 3 - Forecasts of the transmitted gas quantities including underground storage gas (without international gas transmission) for the period 2024-2033 .....	8
Chart 4 – Transgaz' shareholding structure as at 31 December 2023 .....	8
Chart 5 -The gas consumption in the Romanian market in the period 2014–2023 (GWh).....	26
Chart 6- Seasonal gas consumption in the period 2014-2023 (TWh) .....	26
Chart 7 – The structure of the primary energy mix in 2023.....	27
Chart 8 – Natural gas consumption forecast 2025 -2050 according to the TYNDP 2022 scenario (TWh).....	28
Chart 9 – The domestic gas production depending on the main producers in the period 2014-2023 (bcm/y).....	29
Chart 10 – The gas supply sources in the period 2014-2023.....	29
Chart 11– ROMGAZ natural gas production forecast for the period 2024–2033.....	30
Chart 12 – Black Sea Oil and Gas natural gas production forecast for the period 2024–2033.....	30
Chart 13 – OMV Petrom natural gas production forecast for the period 2024–2033.....	30
Chart 14 – Neptun Deep natural gas production forecast for the period 2024–2033.....	30
Chart 15– Natural gas production forecast 2024-2033 according to natural gas producers .....	31
Chart 16 – Capacities booked in the period 2014-2024.....	32
Chart 17- - The hydrogen production by technology type in tonnes for the period .....	66
Chart 18 - The Hydrogen consumption by industry, expressed in average percentages, by.....	67
Chart 19- Summary of the estimated consumption of renewable and reduced footprint hydrogen .....	68
Chart 20 - Status of Major Gas Transmission Projects .....	80
Chart 21 - Cost of major natural gas transmission projects (€ million).....	80
Chart 22 - Investment effort for FID natural gas transmission projects.....	84
Chart 23 - Investment effort for A non FID natural gas transmission projects by estimated time of completion (€ million) .....	84
Chart 24 - Investment effort for FID and A non FID natural gas transmission projects by estimated time of completion (million Euro).....	85
Chart 25 - Investment effort for LA non FID natural gas transmission projects by estimated time of completion (million Euro).....	86
Chart 26 - Status of Major Storage Projects.....	88
Chart 27 - Estimated cost of major storage projects (€ million) .....	88
Chart 28 - Investment effort for storage projects according to completion dates (million EUR) .....	89

Chart 29 - Status of Transgaz Major Hydrogen Transmission Projects.....91  
 Chart 30 - Cost of major projects for hydrogen transmission (mil.Euro).....91

**TABLES**

Table 1 - PEAK and maximum consumption 14 days .....27  
 Table 2 - Gas import points.....37  
 Table 3- Forecasts for the N-1 value for 10 years .....37  
 Table 4 - Status of Transgaz Major Projects for natural gas transmission.....79  
 Table 5 - Projects for which the Open Season procedure applies .....80  
 Table 6 - Planning of Major Natural Gas Transmission Projects 2024-2033.....87  
 Table 7 - Status of Transgaz Major Projects for hydrogen transmission .....91  
 Table 8 - Planning of Major Projects for pure hydrogen transmission 2024-2033.....93  
 Table 9 - 2024 PDSNT/ 2022 TYNDP code comparison.....95  
 Table 10 – List of major projects – Base scenario DO MINIMUM.....99  
 Table 11 - List of major projects – Base scenario DO MAXIMUM..... 100