Catalog of Potential Eastern European Natural Gas Investment Projects in Support of the Three Seas Initiative

Eastern Europe Natural Gas Partnership (EENGP)
Cooperative Agreement: AID-OAA-12-00036-

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Catalog of Potential Eastern European Natural Gas Investment Projects in Support of the Three Seas Initiative

Eastern Europe Natural Gas Partnership (EE-NGP)

Prepared for:

United States Agency for International Development
and United States Energy Association

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1.1 List of figures

ABBREVIATIONS

Alphabetically

ACER	- Agency for the Cooperation of Energy Regulators
bcm	- billion cubic meters
CAPEX	- Capital expenditures
CS	- Compressor Station
EC	- European Commission
EE-NGP	- Eastern Europe Natural Gas Partnership
EIHP	- Energy Institute Hrvoje Požar
ENTSOG	- European Network Transmission System Operators for Gas
FSRU	- Floating Storage Regasification Unit
GWh	- Gigawatt hours
LNG	- Liquefied Natural Gas
OPEX	- Operating expenses
PCI	- Project of Common Interest
PECI	- Project of Energy Community Interest
TSO	- Transmission System Operator
UGS	- Underground Gas Storage
USAID	- United States Agency for International Development
USEA	- United States Energy Association

1 SUMMARY

1.1 Overview

The Eastern Europe Natural Gas Development Partnership (EE-NGP) was established by the United States Agency for International Development (USAID), the United States Energy Association (USEA), and Ministries and Natural Gas Transmission System Operators (TSOs) of Eastern Europe in May 2017 to build sustainable institutional capacity and to develop and utilize the region's first common transmission planning models. The EE-NGP model is utilized to analyze on a regional basis, internal pipeline infrastructure, interconnections, and regional storage capacity necessary to accelerate the gas market development process in Eastern Europe.

The following are members of the EE-NGP:

- ALBGAZ. Sh.a. (Albania)
- BH-GAS D.O.O. (Bosnia & Herzegovina)
- BULGARTRANSGAZ EAD (Bulgaria)
- PLINACRO D.O.O. (Croatia)
- MINISTRY OF ECONOMIC DEVELOPMENT (Kosovo)
- MONTENEGRO BONUS (Montenegro)
- GA-MA AD – SKOPJE (North Macedonia)
- SRBIJAGAS (Serbia)
- DESFA S.A. (Greece)
- OPERATOR GAZOCIĄGÓW PRZESYŁOWYCH GAZ-SYSTEM S.A. (Poland)
- TRANSGAZ S.A. (Romania)

This Catalogue of gas infrastructure projects is a component of a larger gas market integration study that aims at analyzing the potential for integration of the gas markets in the EE-NGP countries. During the previous project carried out under the auspices of the United States Energy Agency,[1] it became apparent that the region contains many potential gas infrastructure projects that could foster gas market integration among EE-NGP countries. Many of these projects are in the final phases (near commissioning), some are under construction and some are just being conceptualized. The goal of this catalogue is to provide a consolidated list of the gas investment projects in the EE-NGP countries.

The projects that are identified in this Catalogue are incorporated in the SIMONE EE-NGP Max 2040 Regional Natural Gas Transmission Network Planning Model used for the hydraulic simulation and optimization of the technical development. In short, the model is used to analyze the feasibility of the regional gas infrastructure and its capacity to transport quantities of gas to meet the identified demand as well as analyses of the possible technical limitations of the proposed gas infrastructure.

The projects that are identified within this catalogue will further be used as an input in the gas market study to assess their contribution to the development of the wholesale gas markets in the EE-NGP countries. Therefore, when we collected the relevant projects, we identified key technical and financial parameters for the projects to be used in technical and market analysis. The analysis will provide information on the impact of identified projects on the regional gas markets, as well as it may highlight the absence of the projects that are crucial to the integration of EE-NGP gas markets.

1.2 Data Source

[1] Optimization of the Regional Gas System to Reach Lowest Cost Maximum Diversification of Gas Supply for Target Year 2040.

In this catalogue we identify all relevant gas infrastructure projects in EE-NGP countries. Relevant projects are considered to be those projects that are either part of the national network development plans or are part of the regional gas infrastructure development initiatives such as Projects of the Energy Community Interest and Projects of Mutual Interest (link).

Following the collection of the project data from the publicly available sources, we reached out to the EE-NGP members to receive their approval of the proposed list of the projects. We received feedback from the EE-NGP members in the form of additional projects or modification of the input data.

1.3 Types of Projects Identified

Within the Catalogue we aimed to collect technical and selected financial parameters for the identified projects. In terms of the categories of the projects, we collected three types:

- supply points such as new production facilities, LNG, and UGS facilities. We collected the following information
    - For UGS: project name, country, UGS facility type, project promoter, maturity status, project phase, working gas volume (mcm), withdrawal capacity (mcm/d), injection capacity (mcm/d), investment costs, annual operating, and maintenance costs.
    - FOR LNG: project name, country, project promoter, maturity status, project phase, reloading ability, yearly volume (bcm/y), project ship size (m^3 LNG), project storage capacity (m^3 LNG), investment costs, annual operating and maintenance costs.
    - New production facilities: no new production facilities have been identified.
- pipeline infrastructure for which we collected the following data: project name, country, project promotor, maturity status, commissioning year, investment costs, annual operating and maintenance costs, length, diameter, start point, endpoint, capacity at entry and exit points
- compressor stations for which we collected the following data: project name, country, project promotor, maturity status, commissioning year, investment costs, annual operating, and maintenance costs.

Based on the preliminary analysis of the data, we collected a total of 46 projects[2]. Data that we were not able to locate from publicly available sources, and that were not supplied by the EE-NGP members were identified as NA (not available). We provide a list of the projects here.

1.4 Review of LNG Projects

We identified four LNG projects:

1. Croatia, LNG Terminal Krk (2nd phase).
2. Greece, LNG Terminal Alexandroupolis.
3. Poland, upgrade of the LNG Terminal Świnoujście.
4. FSRU Polish Baltic Sea Coast.

[2] A project between two countries where each country builds its own part is considered a single project. Also, some projects contain multiple phases which have been grouped into a single cluster (project).

Given the fact that members of EE-NGP include only TSOs and not LNG operators /investors (except for the case of LNG Terminal Krk), we have not obtained the information on the LNG investment costs (with the exception of LNG Krk) nor annual operating and maintenance costs for all terminals.

1.5 Review of UGS Project

We identified ten underground gas storage facilities that are planned to be constructed:

1. Romania, Bilciuresti
2. Romania, Targu Mures, two phases
3. Romania, UGS SARMASEL
4. Romania, Ghercesti
5. Romania, Falticeni UGS
6. Bulgaria, UGS Chiren
7. Croatia, Grubisno Polje
8. Greece, South Kavala
9. Poland, UGS Damasławek
10. Slovakia, Underground Gas Storage Velke Kapusany.

Again, due to the fact that UGS operators are not members of the EE-NGP group, we relied on the publicly available data only. Therefore, the Catalogue lacks investment costs (except for UGS Chiren and UGS Velke Kapusany) and annual operating and maintenance costs (except for UGS Velke Kapusany).

1.6 Review of Compressor Station Projects

We identified the following investments in reconstruction or construction of new compressor station points:

1. Compressor station 1 at the Croatian gas transmission system (TYNDP code: TRA-F-334)
2. Compressor stations 2 and 3 at the Croatian gas transmission system (TYNDP code: TRA-N-1057)

1.7 Review of Pipeline Projects

We identified the following pipeline projects:

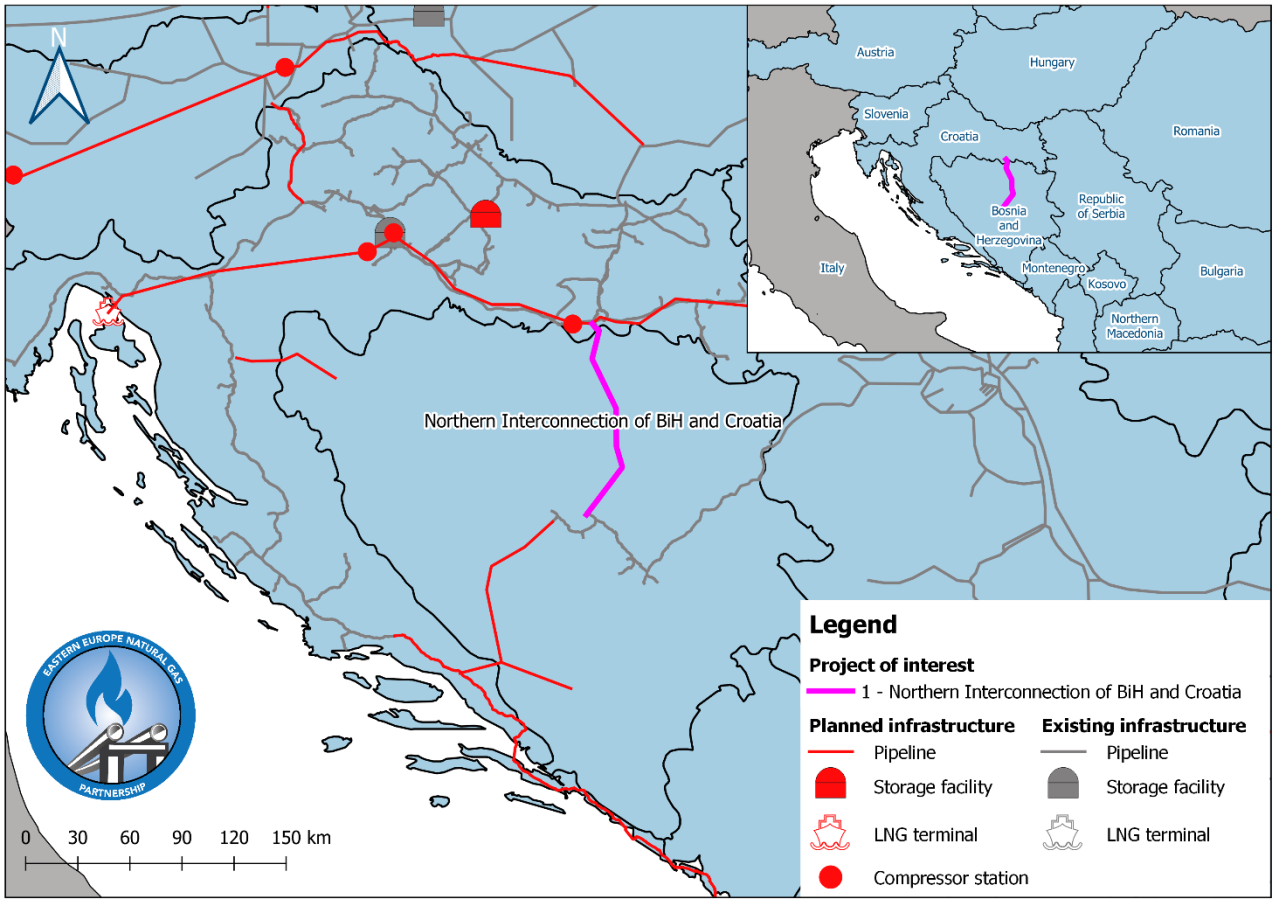
1. Northern Interconnection of BiH and Croatia (TYNDP codes - HR: TRA-N-66 and BH: TRA-N-224)
2. Western Interconnection of BiH and Croatia (TYNDP codes - HR: TRA-N-303 and BH: TRA -N-910)
3. Southern Interconnection of BiH and Croatia (TYNDP codes - HR: TRA-A-302 and BH: TRA-N-851)
4. Gas Interconnector Serbia (Injija) - Republic of Srpska (Janja)
5. North Macedonia - Greece Interconnector (TYNDP codes - MK: TRA-A-980 and GR: TRA-A-967)

6. North Macedonia - Kosovo interconnector. There are two projects, stated below.
    a. TYNDP codes MK: TRA-N-966 that goes from Skopje Sever to Blace.
    b. The second interconnection goes from Glumovo-Matka to Vorba.
7. Serbia - North Macedonia (PECI Gas_11)
8. North Macedonia - Albania that consists of two projects:
    a. From Bitola to Struge
    b. From Struge to Kjafasan
9. North Macedonia - Bulgaria
10. Romania - Serbia (TYNDP code RU: TRA-A-1268)
11. Balkan Gas Hub - Interconnection Bulgaria - Serbia (TYNDP code for RU: TRA-N-137
12. Interconnection Croatia-Serbia (Slobodnica-Sotin-Bačko Novo Selo) (TYNDP code for HR: TRA-A-70)
13. Albania - Kosovo* Gas Pipeline (ALKOGAP)
14. Ionian Adriatic Pipeline (Fier, AL - Split, HR)
15. Interconnection Croatia-Slovenia (Umag-Koper) (TYNDP code: TRA-N-336)
16. Krk LNG terminal with connecting and evacuation pipelines towards Hungary and beyond (TYND code: TRA-F-90, TRA-N-75, TRA-N-1058)
17. Interconnection Slovenia-Croatia (Gas pipeline Lučko-Zabok-Rogatec) (TYNDP code: TRA-A-86)
18. Poland - Ukraine interconnection (TYNDP code: TRA-A-561, TRA-A-621)
19. Poland - Slovakia interconnection (TYNDP code: TRA-F-190, TRA-F-275)
20. Poland - Lithuania interconnection (TYNDP code: TRA-F-212)
21. Poland - Denmark interconnection (TYNDP code: TRA-A-271)
22. Poland - Czech Republic interconnection (TYNDP code: TRA-A-273)
23. Greece - Bulgaria interconnection (TYNDP code: TRA-F-378)
24. Slovak - Hungarian capacity increase (TYNDP code: TRA-N-524)
25. Romania - Hungary reverse flow (TYNDP code: TRA-F-286)
26. Interconnection Italy - Slovenia – Hungary (TYNDP code: TRA-N-108, TRA-N-325)
27. Interconnection Hungary – Austria (TYNDP code: TRA-N-423)
28. Interconnection Austria – Slovenia (TYNDP code: TRA-N-389, TRA-A-21)

1.8 List of all Projects

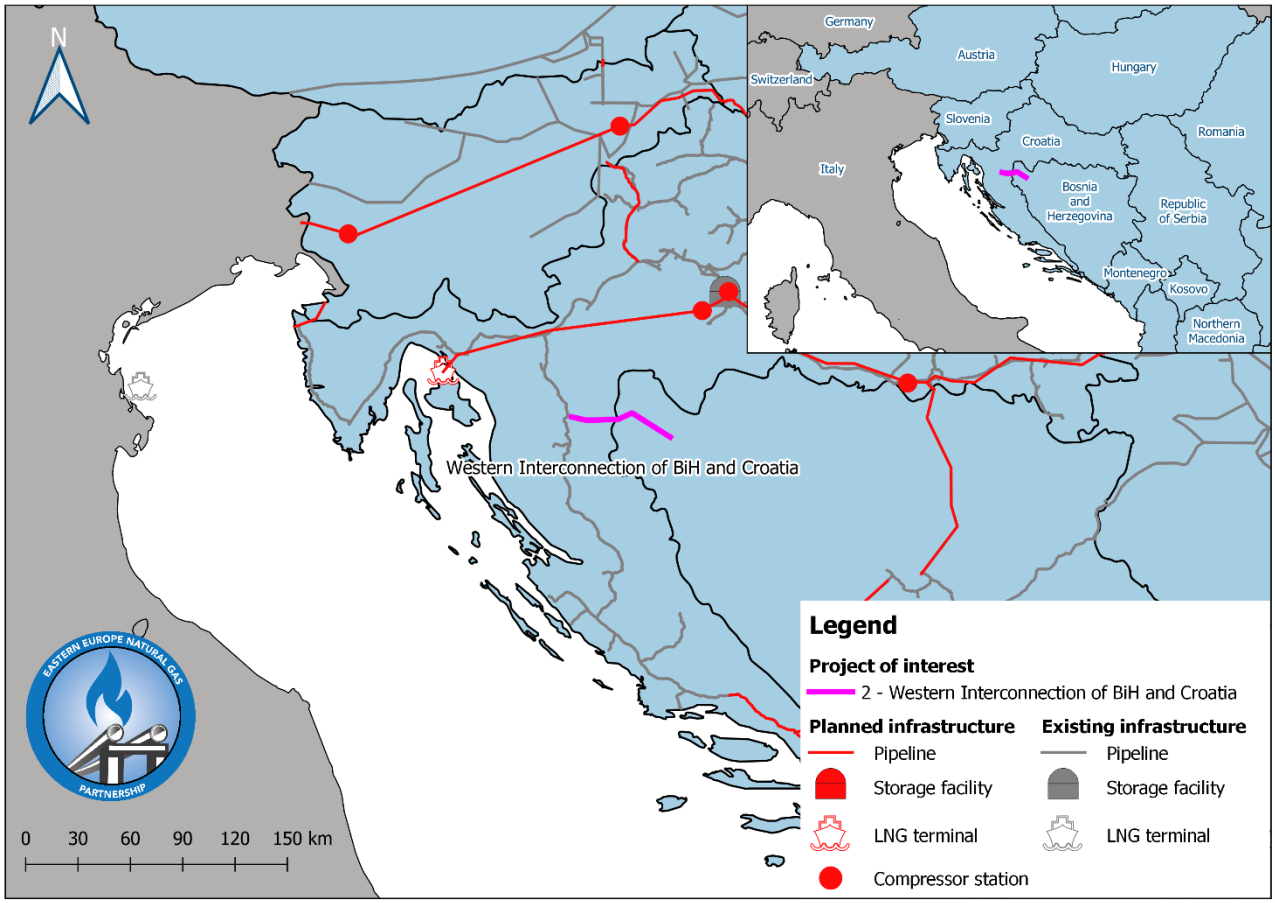
1.9 Interconnection Projects

Figure 1: Northern Interconnection of BiH and Croatia



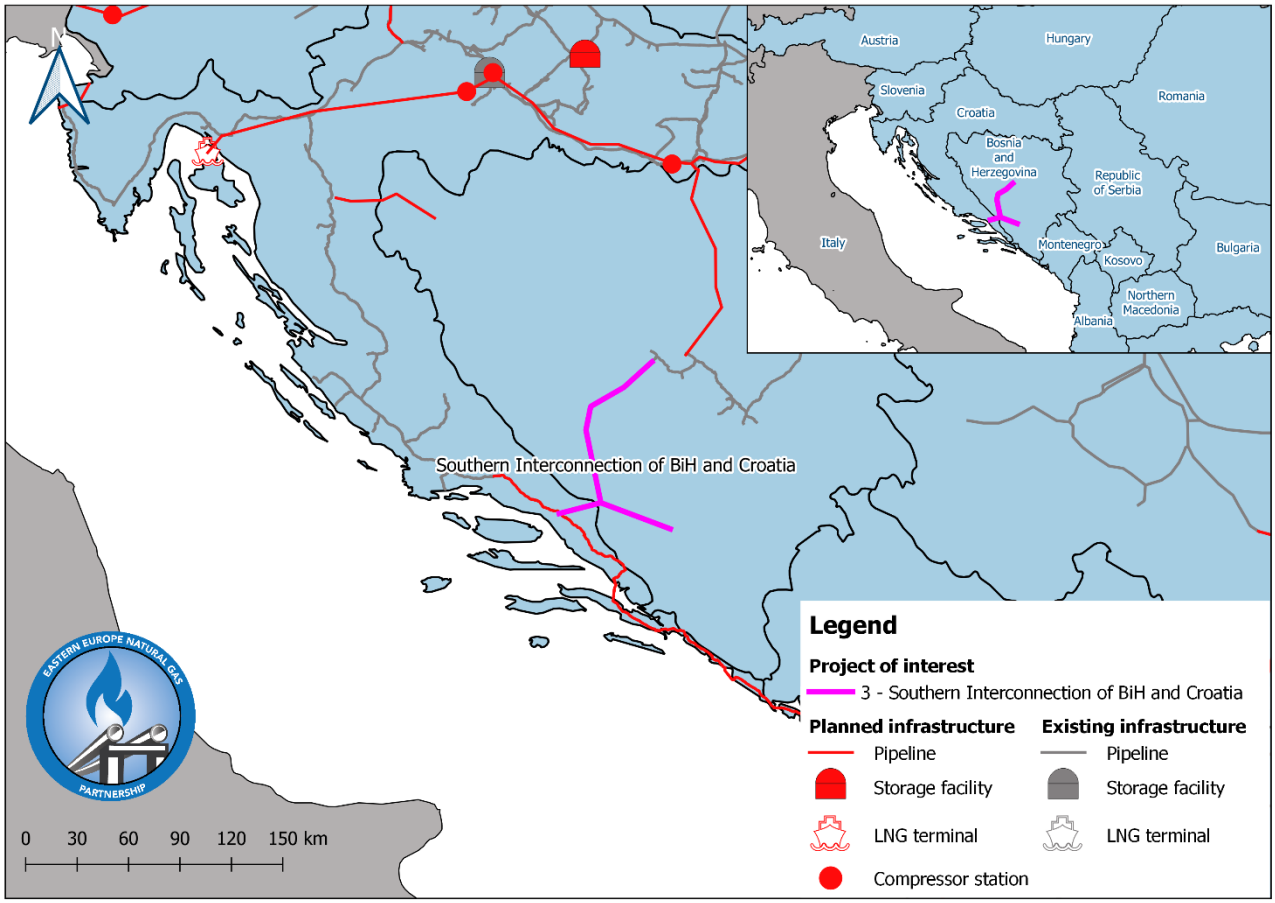
	Northern Interconnection of BiH and Croatia	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Croatia	Bosnia and Herzegovina
Promotor	Plinacro Ltd	BH-Gas d.o.o.
Project name	Interconnection Croatia - Bosnia and Herzegovina (Slobodnica - Bosanski Brod)	Gas pipeline Brod - Zenica
TYNDP code	TRA-N-66	TRA-N-224
PECI code	Gas_01	Gas_01
EIHP code	1	1
Maturity status	Less-Advanced	Less-Advanced
Commissioning year	2026	2026
CAPEX [mil. EUR]	9	85
OPEX [mil. EUR /yr]	0	1
Length (km)	6	140
Diameter (mm)	700	500
Start point	Slobodnica	Bosanski brod (BH)
End point	Croatia-BiH border	Zenica (BH)
GWh/day exit	162	42
GWh/day entry	42	42

Figure 2: Western Interconnection of BiH and Croatia



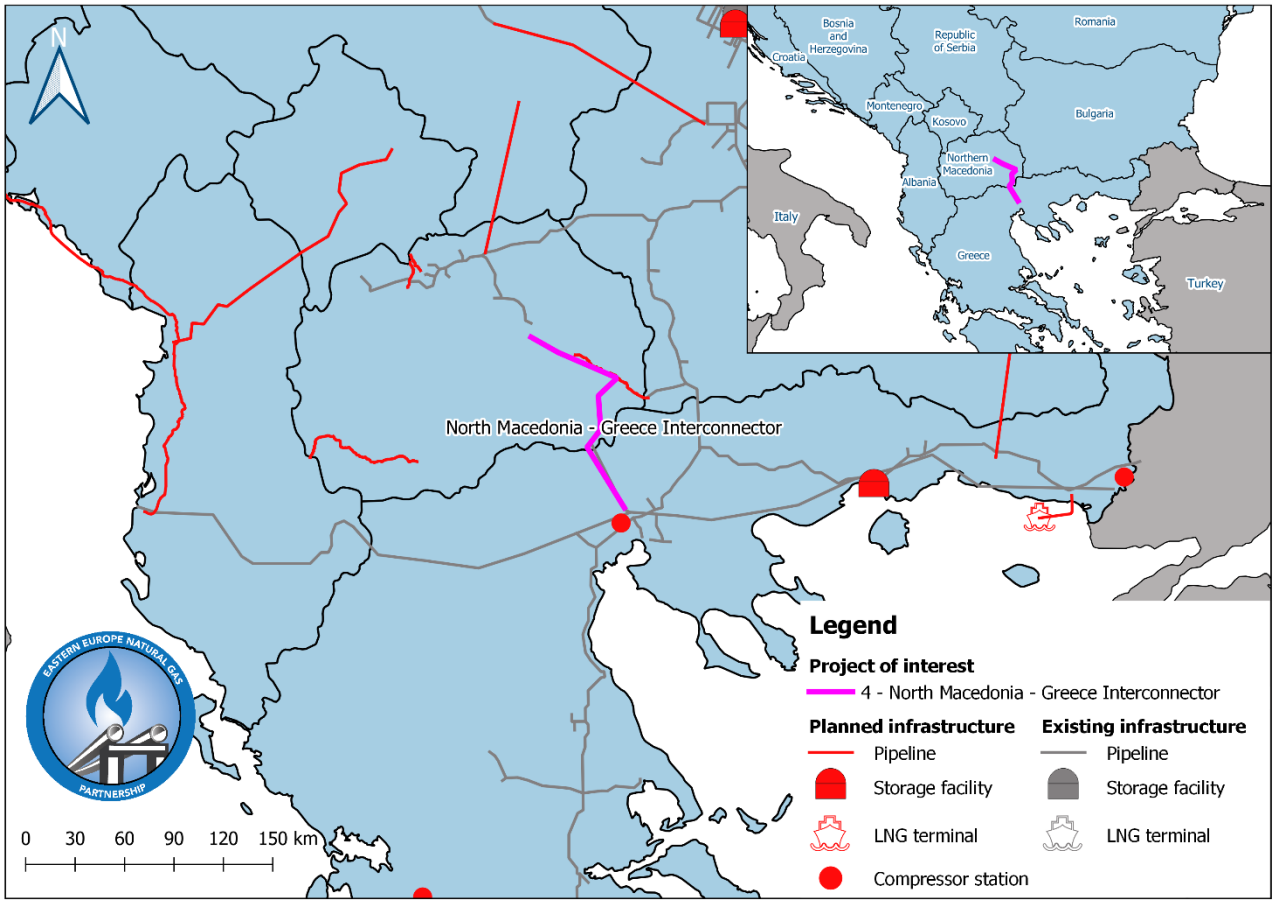
	Western Interconnection of BiH and Croatia	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Croatia	Bosnia and Herzegovina
Promotor	Plinacro Ltd	BH-Gas d.o.o.
Project name	Interconnection Croatia-Bosnia and Herzegovina (Licka Jesenica - Rakovica - Bihac)	West Interconnection BiH/CRO (Trzac - Bosanska Krupa with branches to Bihac and Velika Kladusa)
TYNDP code	TRA-N-303	TRA-N-910
PECI code	Gas_02	Gas_02
EIHP code	2	2
Maturity status	Less-Advanced	Less-Advanced
Commissioning year	2027	2027
CAPEX [mil. EUR]	(***)	33
OPEX [mil. EUR /yr]	(***)	1
Length (km)	30	35
Diameter (mm)	500	500
Start point	Licka Jesenica	Tržac/BiH-CRO border
End point	Rakovica/CRO-BiH border	Bosanska Krupa
GWh/day exit	81	
GWh/day entry		73

Figure 3: Southern Interconnection of BiH and Croatia



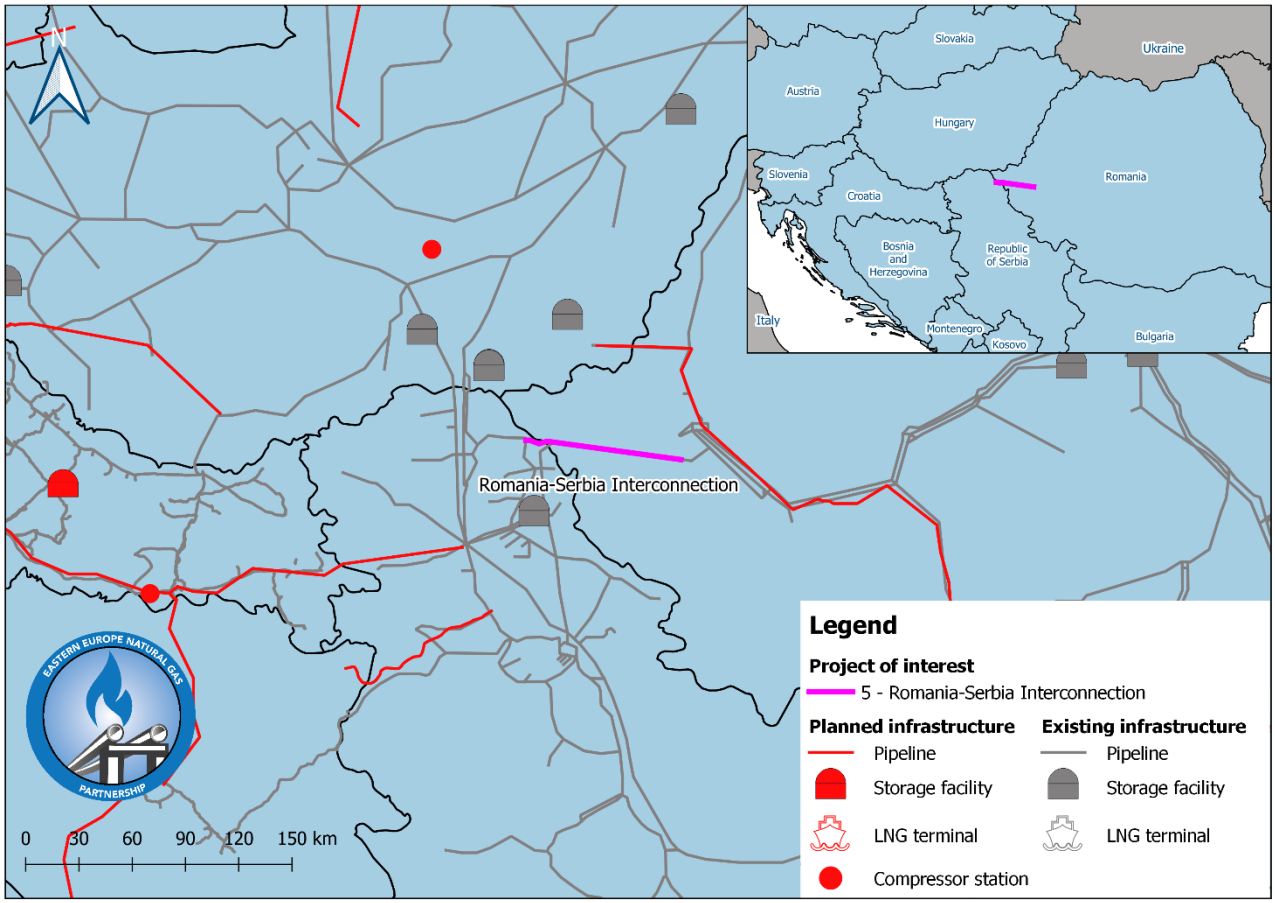
	Southern Interconnection of BiH and Croatia	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Croatia	Bosnia and Herzegovina
Promotor	Plinacro Ltd	BH-GAS d.o.o.
Project name	Interconnection Croatia-Bosnia and Herzegovina (Zagvozd - Imotski - Posusje)	Southern Interconnection pipeline BiH/CRO (Posusje-Novi Travnik with a main branch to Mostar)
TYNDP code	TRA-A-302	TRA-N-851
PECI code	Gas_03	Gas_03
EIHP code	3	3
Maturity status	Advanced	Less-Advanced (**)
Commissioning year	2024	2024
CAPEX [mil. EUR]	16	100 (****)
OPEX [mil. EUR /yr]	0	1
Length (km)	22	162
Diameter (mm)	500	500
Start point	Zagvozd	BiH/HR border
End point	HR/BiH border	Novi Travnik
GWh/day exit	81	38
GWh/day entry		81

Figure 4: North Macedonia - Greece Interconnector



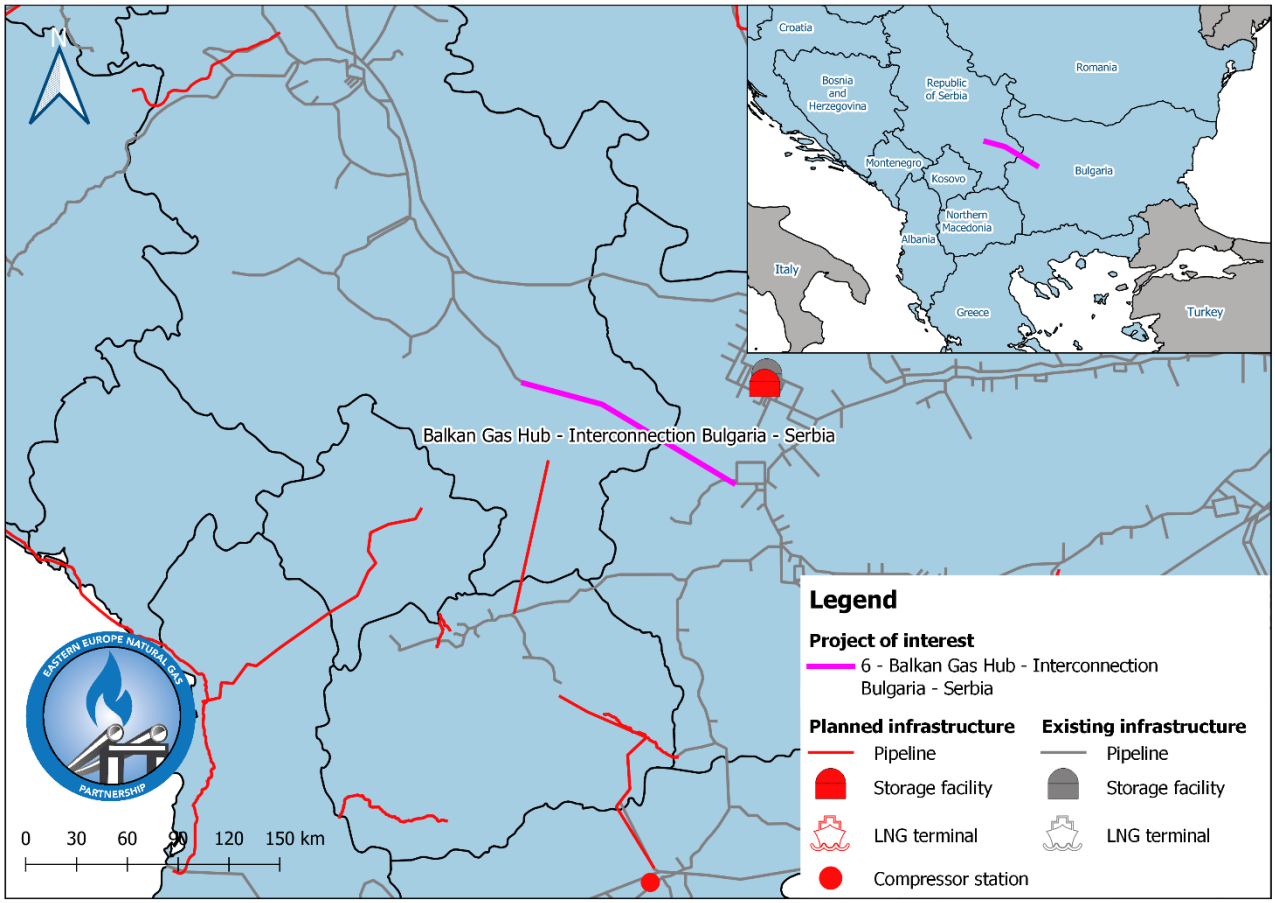
	North Macedonia - Greece Interconnector	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	North Macedonia	Greece
Promotor	MER JSC Skopje	DESFA S.A.
Project name	North Macedonia - Greece Interconnector	Nea-Messimvria to Evzoni/Gevgelija pipeline (IGNM)
TYNDP code	TRA-A-980	TRA-A-967
PECI code	Gas_04B	Gas_04B
EIHP code	4	4
Maturity status	Advanced	Advanced
Commissioning year	2022	2022
CAPEX [mil. EUR]	70	49
OPEX [mil. EUR /yr]	2	1
Length (km)	68	50
Diameter (mm)	700	700
Start point	Near Idomeni village and Gevgelija city	Nea Messimvria
End point	To the already constructed valve station (BS 7) , near the city of Negotino	Evzoni
GWh/day exit	76,4	76,4
GWh/day entry	76,4	76,4

Figure 5: Romania-Serbia Interconnection



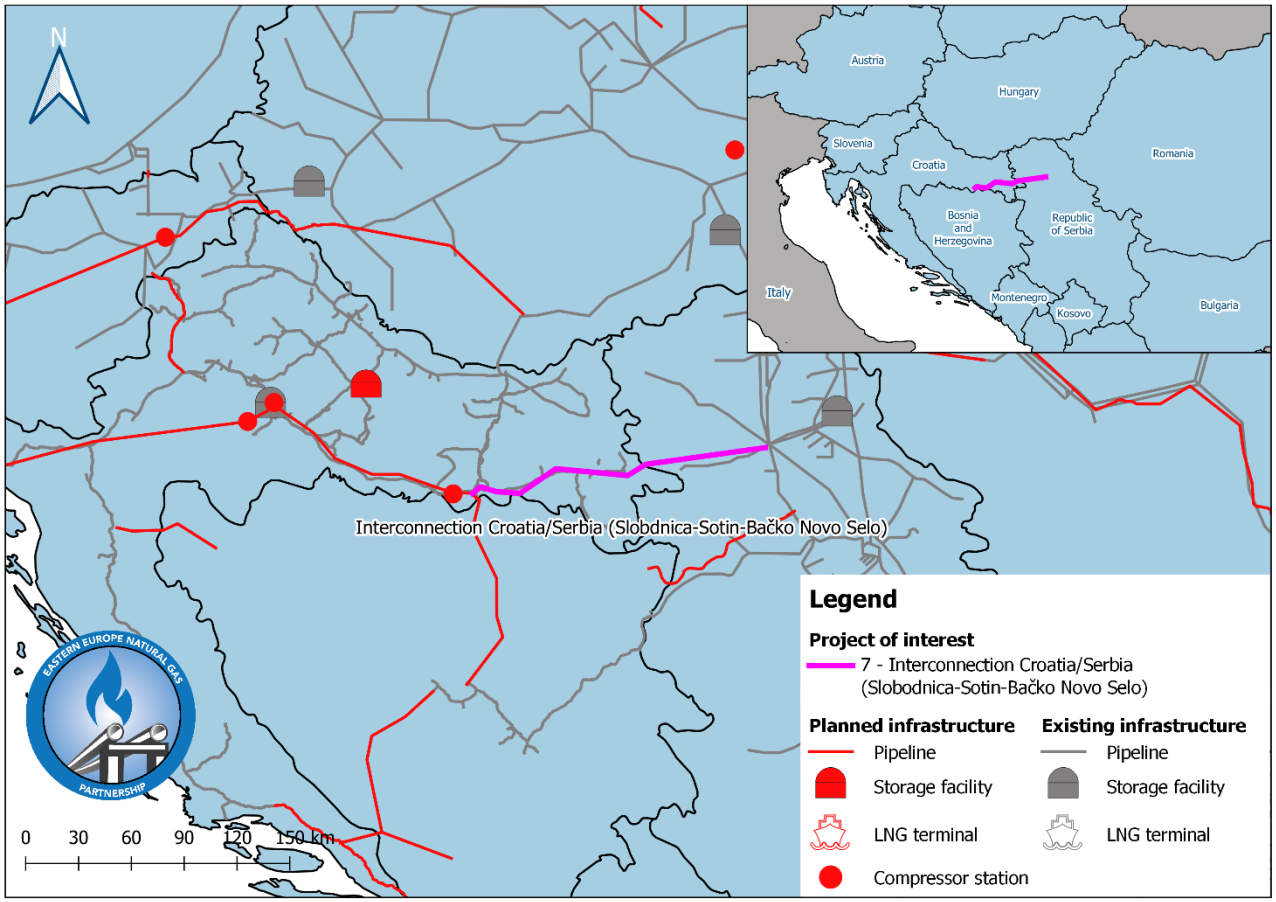
	Romania-Serbia Interconnection	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Romania	Serbia
Promotor	SNTGN Tranzgaz SA	Srbijagas
Project name	Romania-Serbia Interconnection	Romania-Serbia Interconnection
TYNDP code	TRA-A-1268	NA
PECI code	Gas_08	Gas_08
EIHP code	5	5
Maturity status	Advanced	Spatial plan?
Commissioning year	2020	2022
CAPEX [mil. EUR]	54	10
OPEX [mil. EUR /yr]		
Length (km)	85	3,5 9
Diameter (mm)	600	600/500; 500/300
Start point	Petrovaselo, Romania	Mokrin, Serbia Node Nakovo (3,5 km from border)
End point	Romania - Serbian border	Serbian - Romanian border
GWh/day exit	46,03	35,04
GWh/day entry	46,03	35,04

Figure 6: Balkan Gas Hub - Interconnection Bulgaria - Serbia



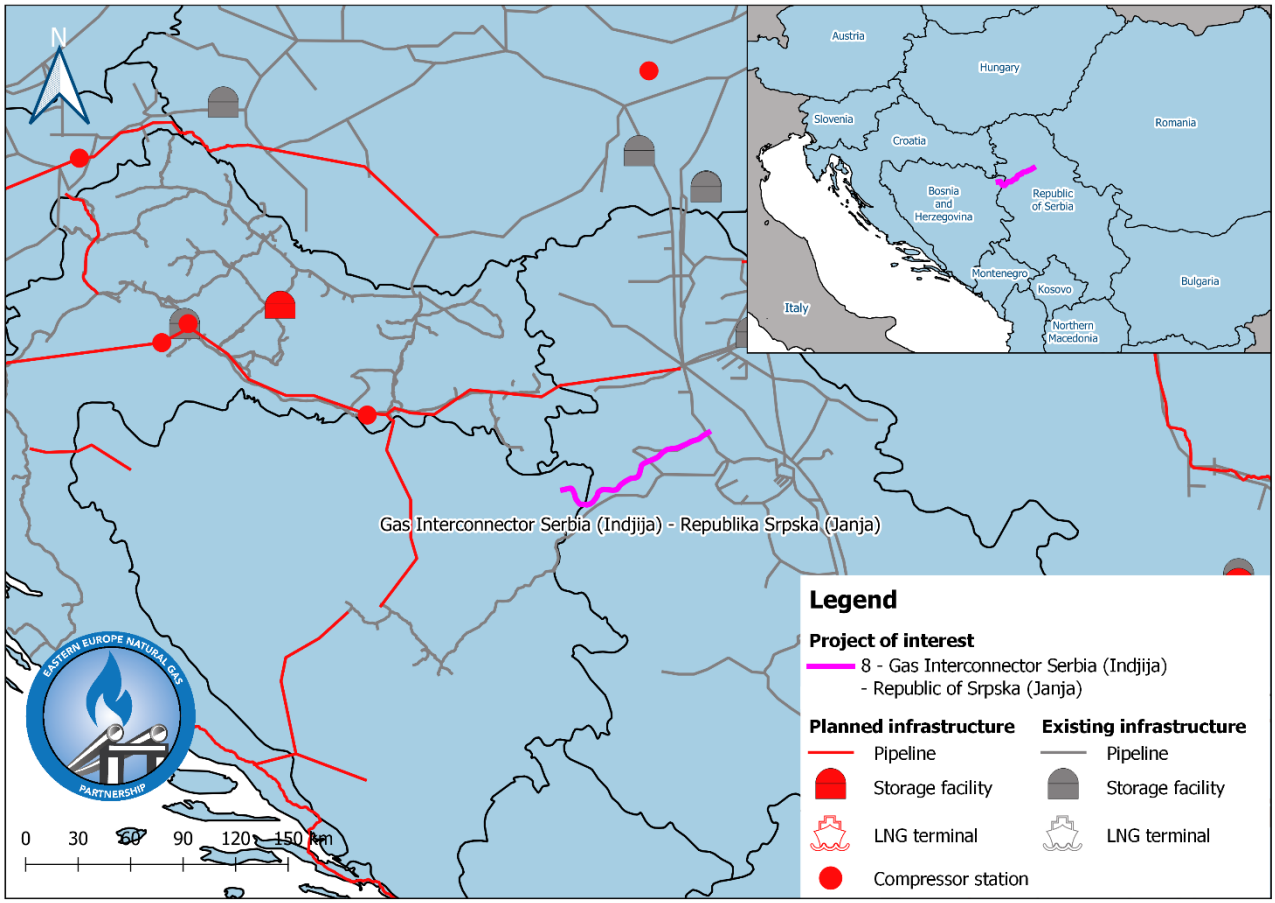
	Balkan Gas Hub - Interconnection Bulgaria - Serbia	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Bulgaria	Serbia
Promotor	Bulgartransgaz EAD	Srbijagas
Project name	Balkan Gas Hub - Interconnection Bulgaria - Serbia	Balkan Gas Hub - Interconnection Bulgaria - Serbia
TYNDP code	TRA-N-137	NA
PECI code	Gas_09	Gas_09
EIHP code	6	6
Maturity status	Less-Advanced	Advanced
Commissioning year	2022	2023
CAPEX [mil. EUR]	48	86
OPEX [mil. EUR /yr]	1	
Length (km)	62	108
Diameter (mm)	700	700
Start point	Novi Iskar, Bulgaria	Niš, Serbia
End point	Serbian - Bulgarian border	Serbian- Bulgarian border
GWh/day exit	5	3
GWh/day entry	32	39

Figure 7: Interconnection Croatia/Serbia (Slobodnica-Sotin-Bačko Novo Selo)



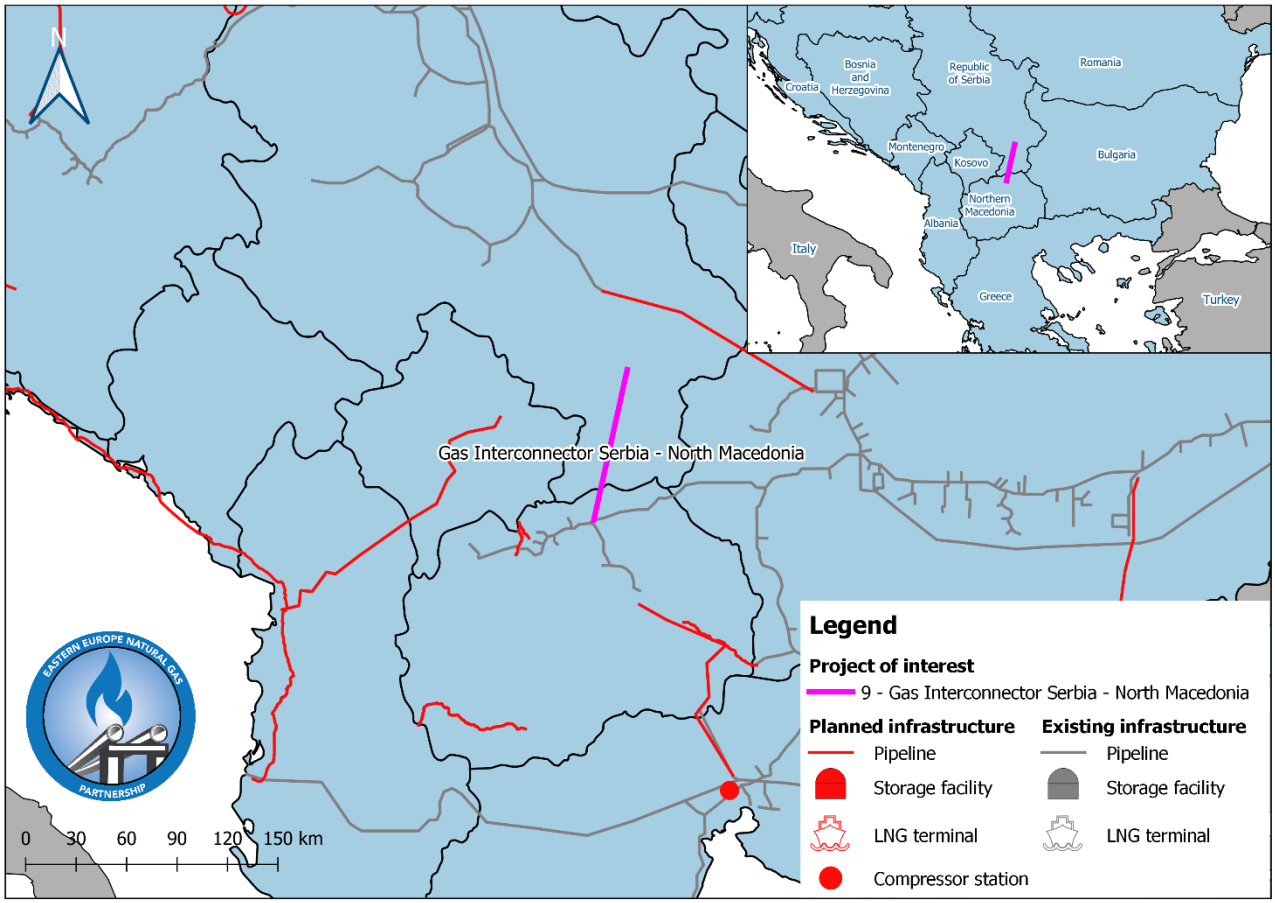
	Interconnection Croatia/Serbia (Slobodnica-Sotin-Bačko Novo Selo)	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Croatia	Serbia
Promotor	Plinacro Ltd	Srbijagas
Project name	Gas Interconnector Serbia - Croatia	Gas Interconnector Serbia - Croatia
TYNDP code	TRA-A-70	NA
PECI code	Gas_10	Gas_10
EIHP code	7	7
Maturity status	Advanced	Less-Advanced
Commissioning year	2027	2027
CAPEX [mil. EUR]		60
OPEX [mil. EUR /yr]		
Length (km)	87	95
Diameter (mm)	800	600
Start point	Slobodnica	Gospođinci, Serbia
End point	Croatian - Serbian border	Bačko Novo Selo (Serbian - Croatian border)
GWh/day exit	228	33
GWh/day entry	228	33

Figure 8: Gas Interconnector Serbia (Indjija) - Republika Srpska (Janja)



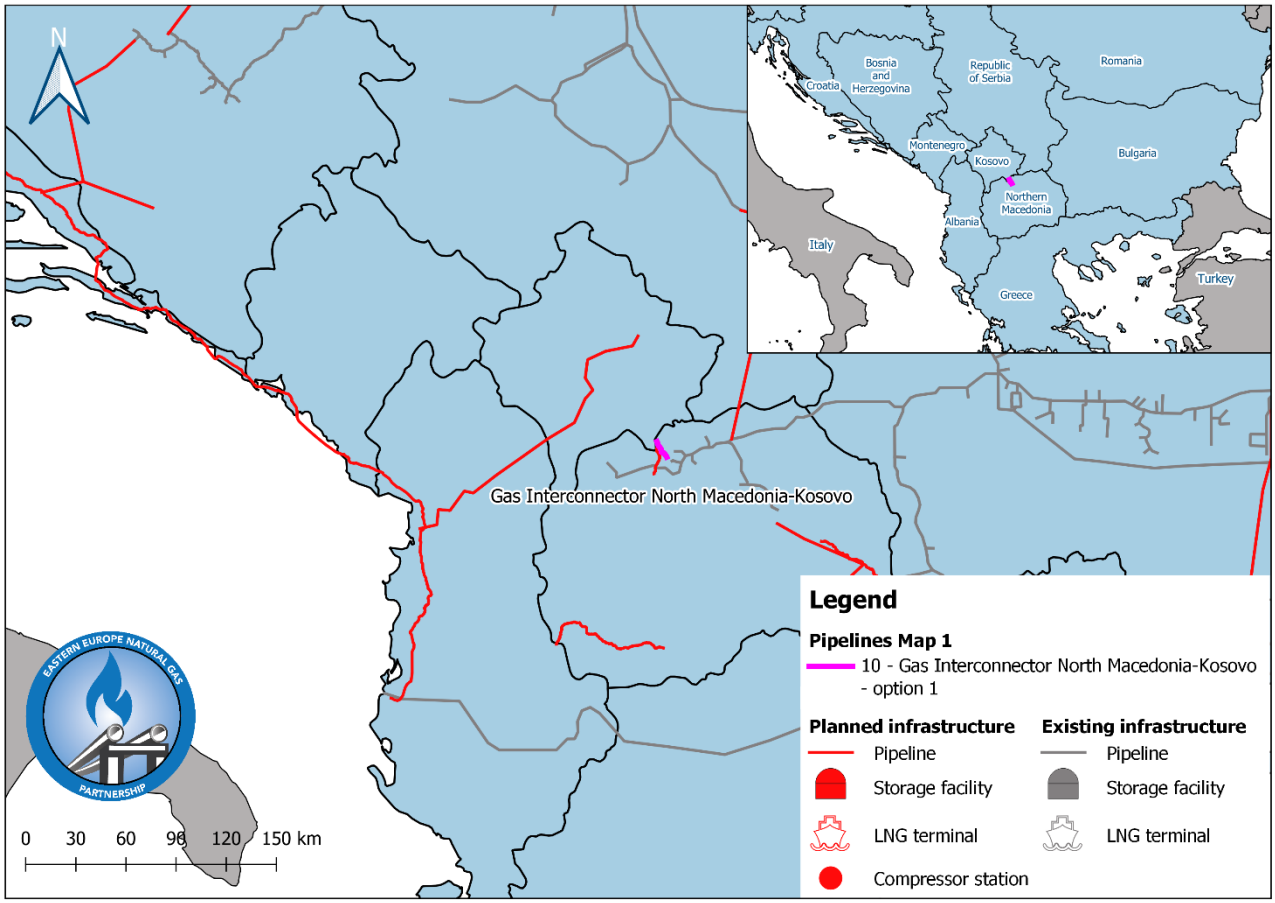
	Gas Interconnector Serbia (Indjija) - Republika Srpska (Janja)	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Serbia	Bosnia and Hercegovina
Promotor	JP Srbijagas	GAS RES
Project name	Gas Interconnector Serbia - Republika Srpska (North BiH)	
TYNDP code		
PECI code		
EIHP code	8	8
Maturity status	Less-Advanced	
Commissioning year	2024	
CAPEX [mil. EUR]	45	
OPEX [mil. EUR /yr]		
Length (km)	90 12	
Diameter (mm)	500 400	
Start point	Indjija	Janja Serbian - BiH (R.Srpska) border
End point	Novo Selo - Serbian -BiH (R.Srpska) border	
GWh/day exit		
GWh/day entry		

Figure 9: Gas Interconnector Serbia - North Macedonia



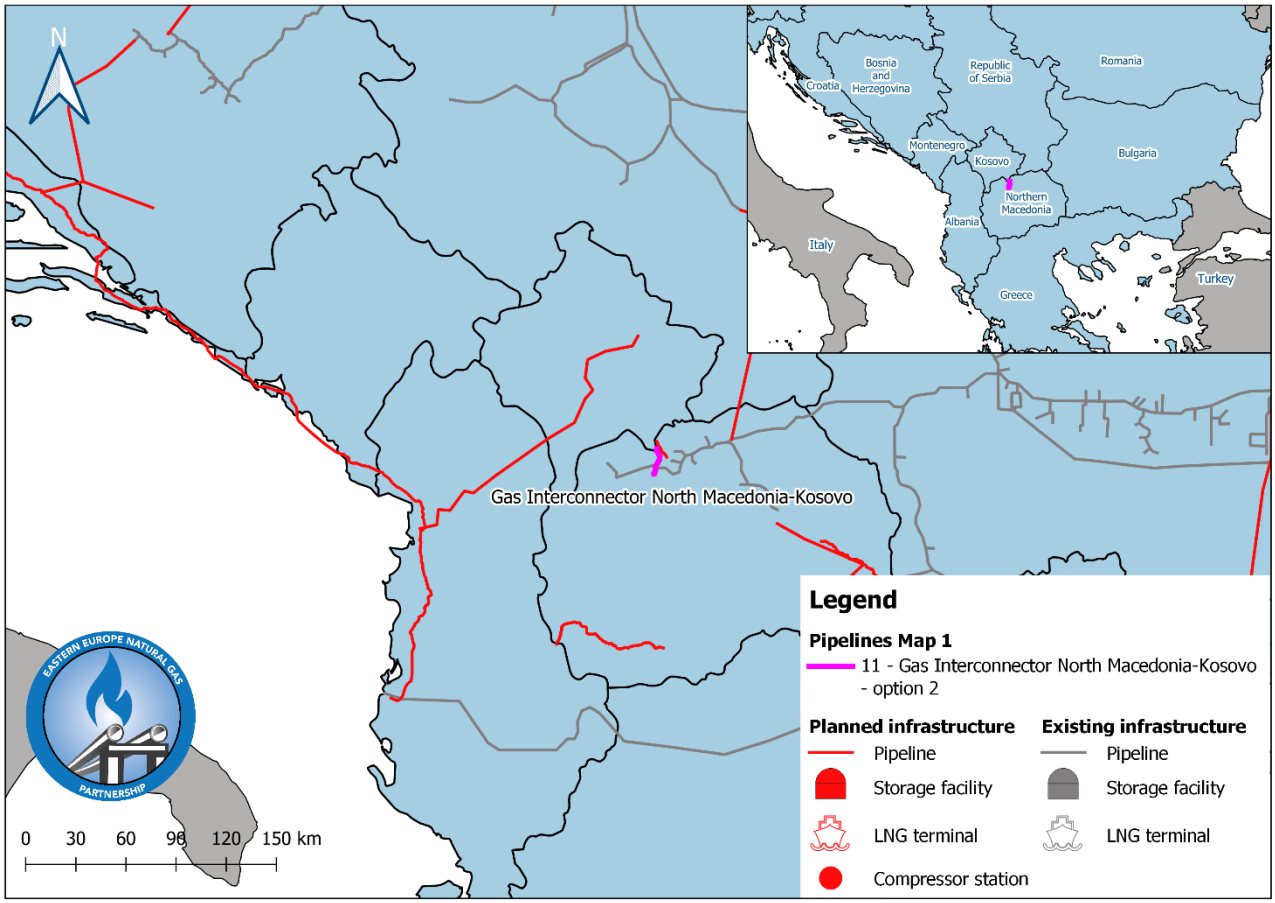
	Gas Interconnector Serbia - North Macedonia	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Serbia	North Macedonia
Promotor	JP Srbijagas	Macedonian Energy Resources - MER JSC Skopje
Project name	Gas Interconnector Serbia - North Macedonia	Gas Interconnector North Macedonia- Serbia
TYNDP code	NA	NA
PECI code	Gas_11	Gas_11
EIHP code	9	9
Maturity status		
Commissioning year	2023	2023
CAPEX [mil. EUR]	17	21
OPEX [mil. EUR /yr]		1
Length (km)	42	30
Diameter (mm)		500
Start point	Vranje	Klechovce, R. of North Macedonia
End point	Serbian - North Macedonian border	Sopot (border with R. Serbia), R. of North Macedonia
GWh/day exit	4,5mil/day	42
GWh/day entry	190 000m3/h	42

Figure 10: Gas Interconnector North Macedonia-Kosovo – option 1



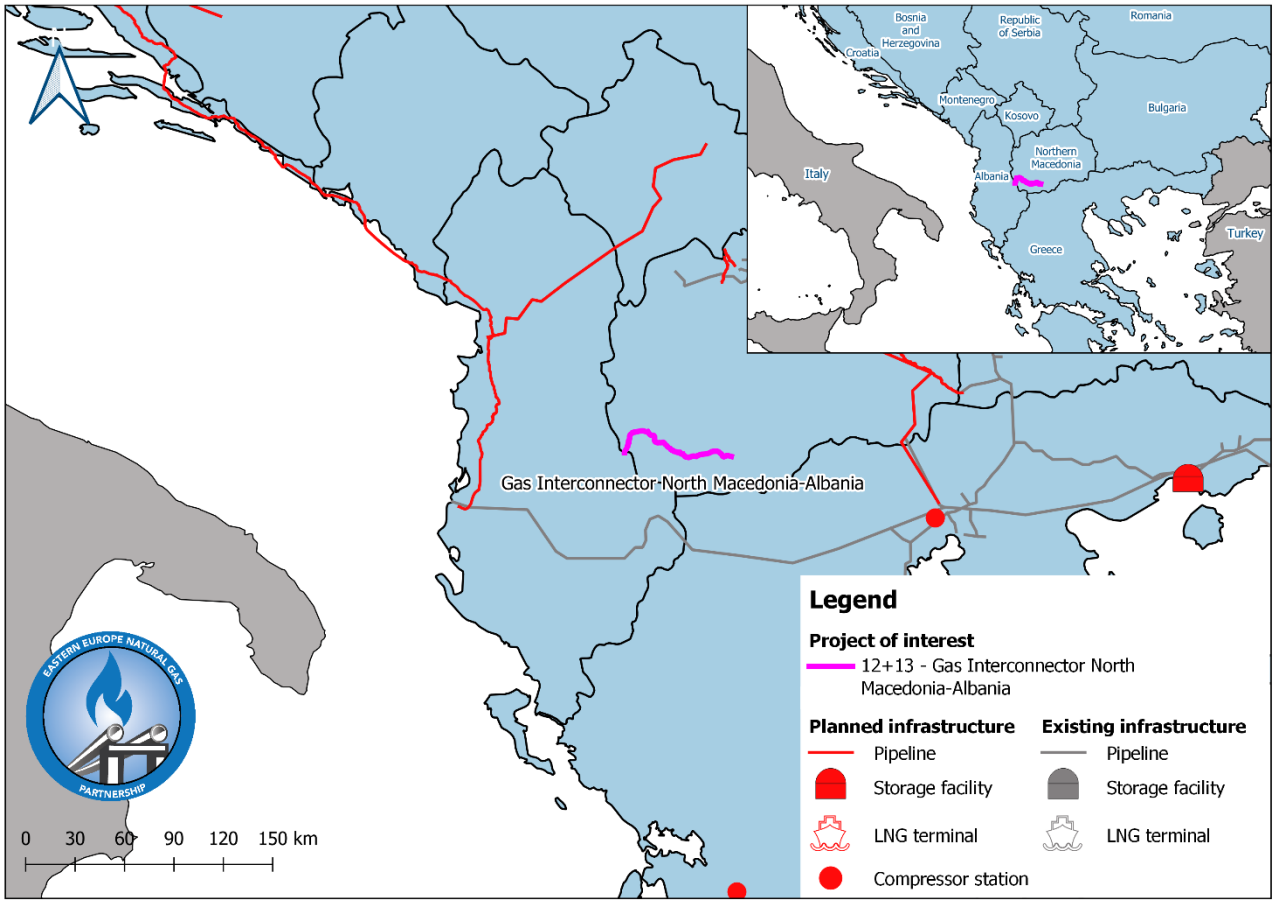
	Gas Interconnector North Macedonia-Kosovo - option 1	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	North Macedonia	Kosovo
Promotor	GA-MA AD	Kosovo
Project name	Gas Interconnector North Macedonia-Kosovo	Gas Interconnector Kosovo - North Macedonia
TYNDP code	NA	NA
PECI code		
EIHP code	10	10
Maturity status		
Commissioning year		
CAPEX [mil. EUR]	16	
OPEX [mil. EUR /yr]	0.42	
Length (km)	21	
Diameter (mm)	500	
Start point	Skopje Sever, R. of North Macedonia	
End point	Blace - border with Kosovo and R. of North Macedonia	
GWh/day exit	44	
GWh/day entry	42	
Comission / Schedule		

Figure 11: Gas Interconnector North Macedonia-Kosovo – option 2



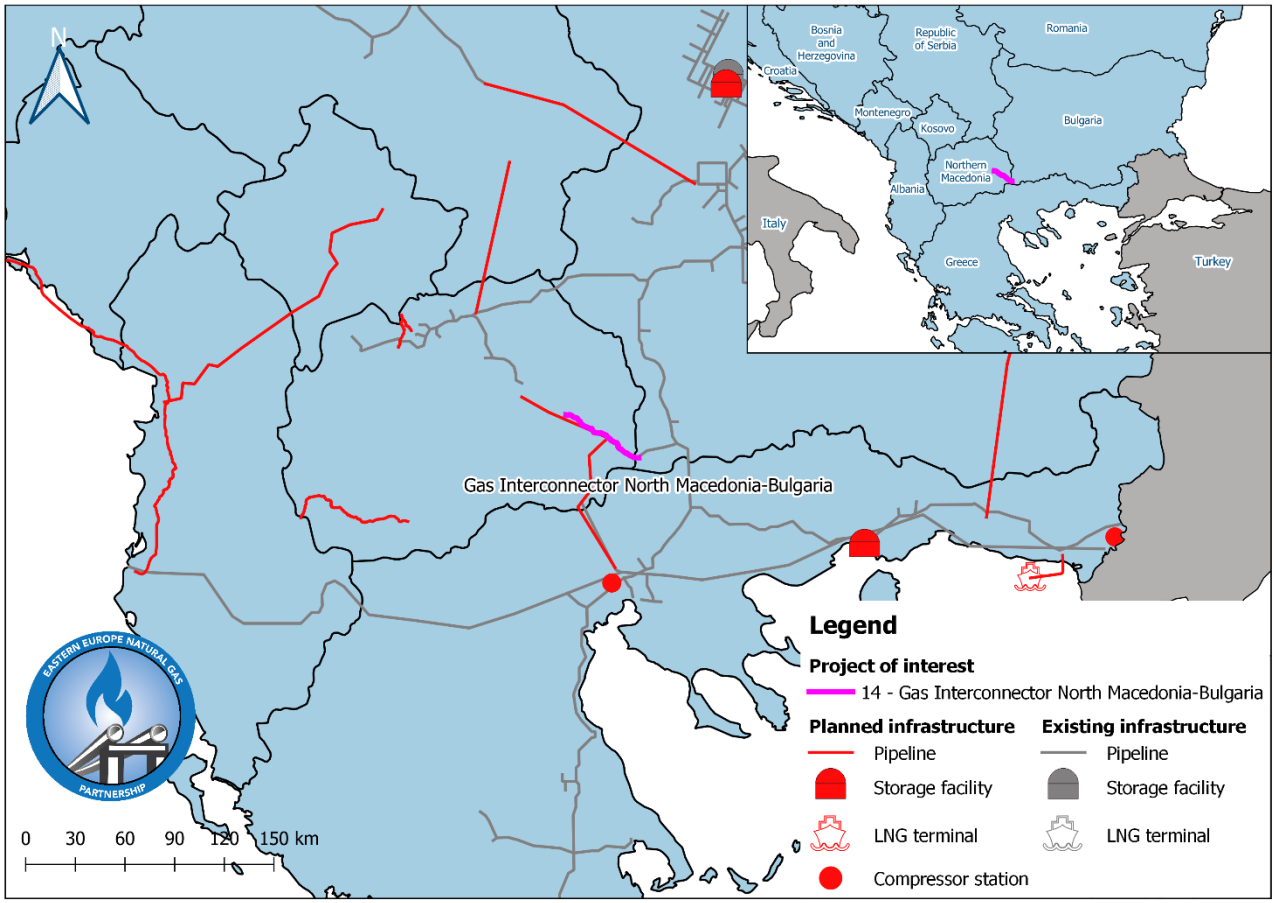
	Gas Interconnector North Macedonia-Kosovo - option 2	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	North Macedonia	Kosovo
Promotor	Macedonian Energy Resources - MER JSC Skopje	Kosovo
Project name	Gas Interconnector North Macedonia - Kosovo	Gas Interconnector Kosovo-North Macedonia
TYNDP code	TRA-N-966	
PECI code	Gas_26	Gas_26
EIHP code	11	11
Maturity status		
Commissioning year	2024	
CAPEX [mil. EUR]	12	
OPEX [mil. EUR /yr]	0.32	
Length (km)	16	
Diameter (mm)	500	
Start point	Glumovo-Matka, R. of North Macedonia	
End point	Vorba - border with Kosovo and R. of North Macedonia	
GWh/day exit	42	
GWh/day entry	42	

Figure 12: Gas Interconnector North Macedonia-Albania



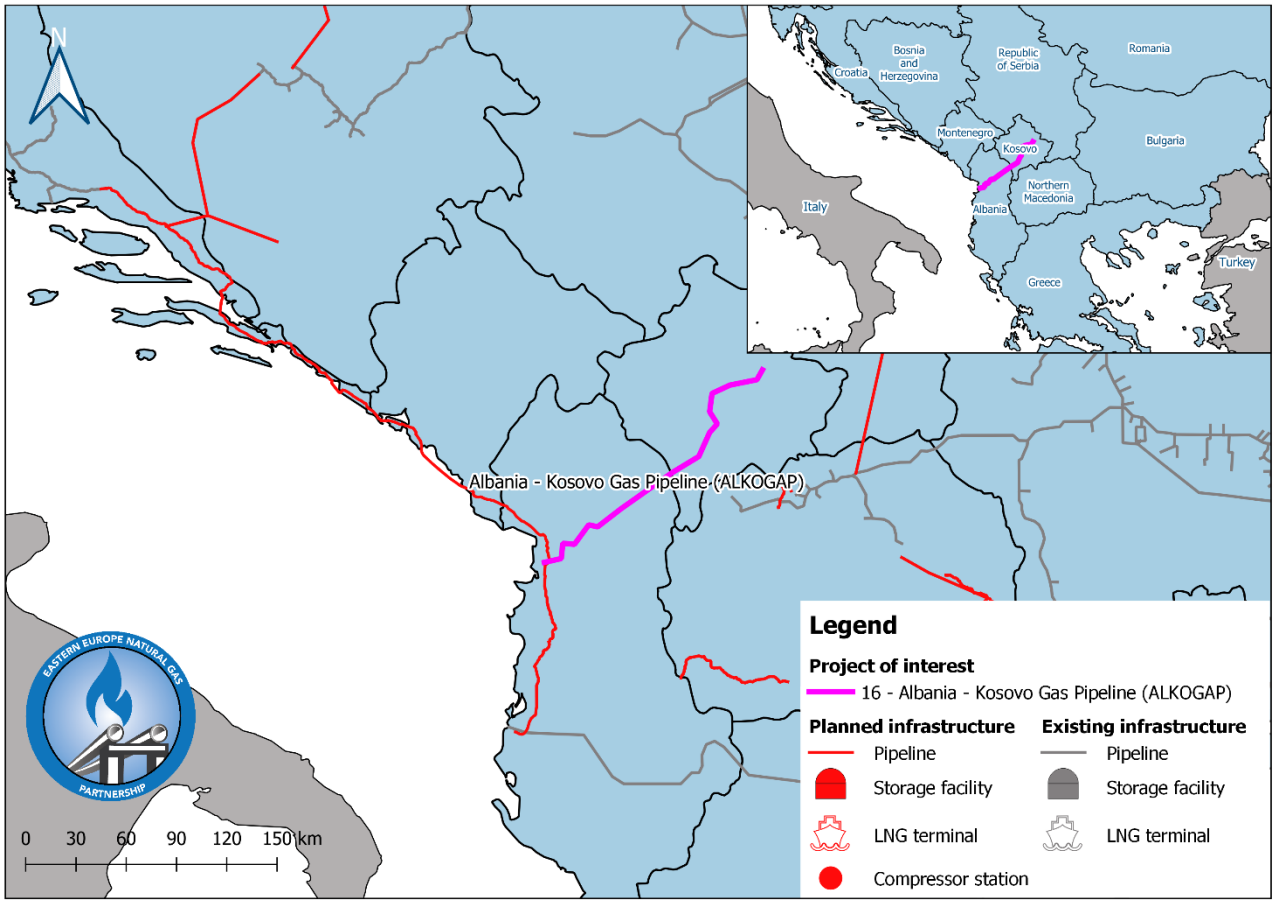
	Gas Interconnector North Macedonia-Albania	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	North Macedonia	Albania
Promotor	North Macedonia	Albania
Project name	Gas Interconnector North Macedonia - Albania	Gas Interconnector Albania - North Macedonia
TYNDP code	NA	NA
PECI code	Gas_05	
EIHP code	12 & 13	12 & 13
Maturity status		
Commissioning year		
CAPEX [mil. EUR]	94	
OPEX [mil. EUR /yr]	0	
Length (km)	135	
Diameter (mm)	500	
Start point	Bitola, R. of North Macedonia	
End point	Kjafasan - border with R. of North Macedonia and Albania	
GWh/day exit	56	
GWh/day entry	56	

Figure 13: Gas Interconnector North Macedonia-Bulgaria



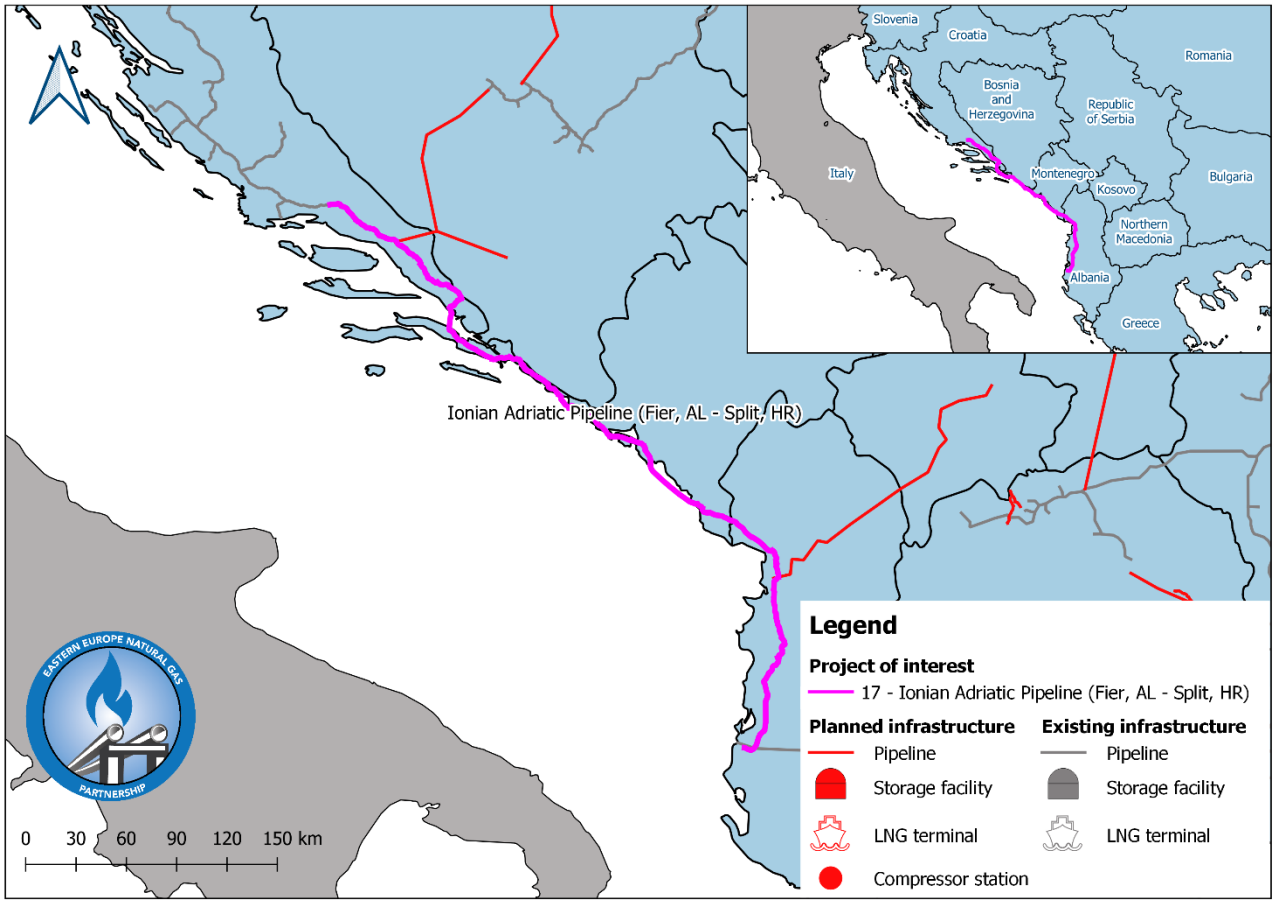
	Gas Interconnector North Macedonia-Bulgaria	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	North Macedonia	Bulgaria
Promotor	North Macedonia	Bulgaria
Project name	Gas Interconnector North Macedonia - Bulgaria	Gas Interconnector Bulgaria - North Macedonia
TYNDP code	NA	NA
PECI code	Gas-4a	Gas_4a
EIHP code	14	14
Maturity status		
Commissioning year		
CAPEX [mil. EUR]	23	
OPEX [mil. EUR /yr]	1	
Length (km)	110	
Diameter (mm)	500	
Start point	Radoviš over Hamzali, R. of North Macedonia	
End point	Novo selo - border with R. of North Macedonia and Bulgaria	Petrich - border with Bulgaria and R. of North Macedonia
GWh/day exit	56	
GWh/day entry	56	

Figure 14: Albania - Kosovo Gas Pipeline (ALKOGAP)



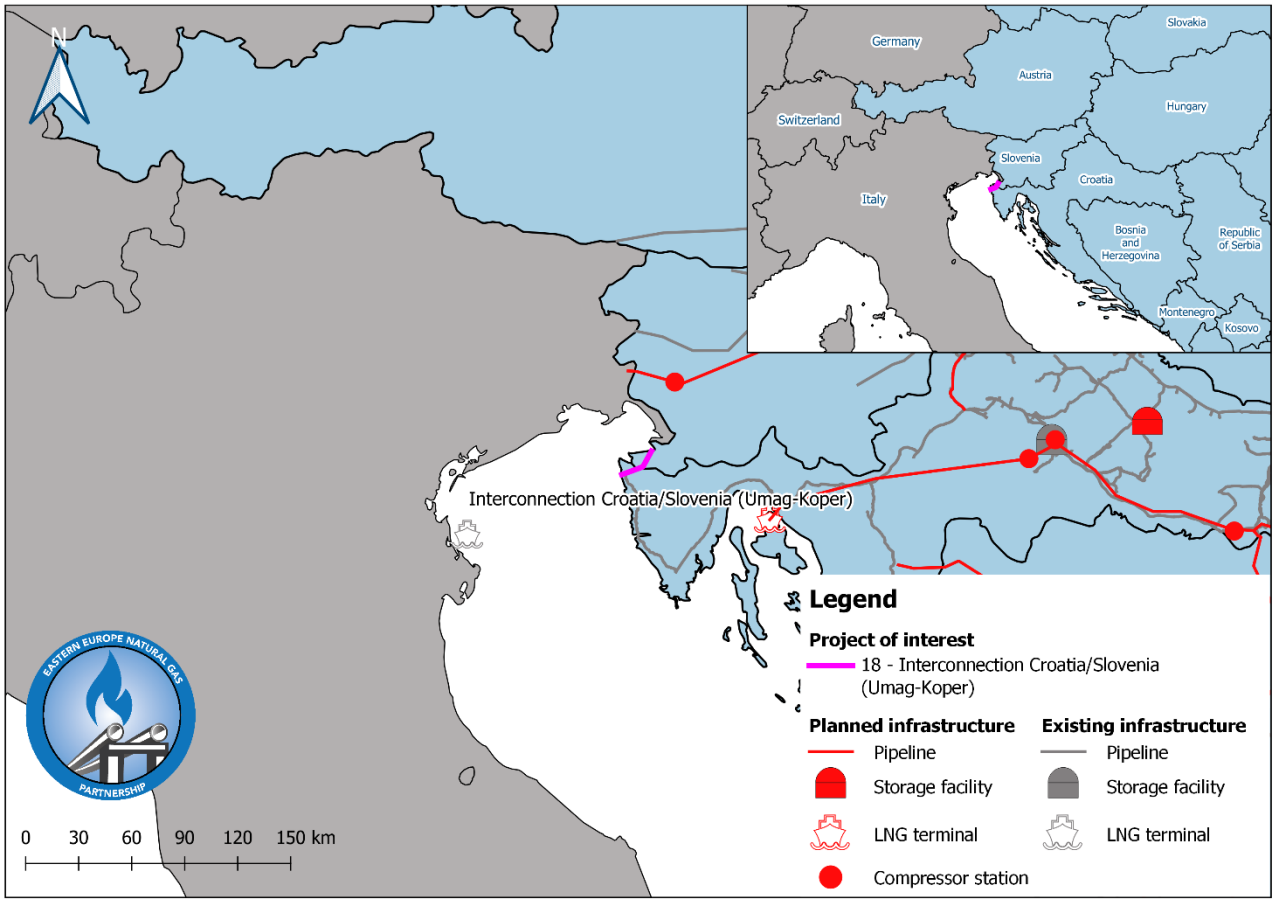
	Albania - Kosovo* Gas Pipeline (ALKOGAP)	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Albania	Kosovo*
Promotor	Ministry of Infrastructure and Energy of Albania Republic	Ministry of Economic Development of Kosovo Republic
Project name	Albania - Kosovo* Gas Pipeline (ALKOGAP)	Albania - Kosovo* Gas Pipeline (ALKOGAP)
TYNDP code	NA	NA
PECI code	Gas_13	Gas_13
EIHP code	16	16
Maturity status	Planned	Planned
Commissioning year	2027	2027
CAPEX [mil. EUR]	152	63
OPEX [mil. EUR /yr]		
Length (km)	108	104
Diameter (mm)		
Start point	Lezha/Milot (IAP Connenction)	Prizren/CTMS Border Albania-Kosovo
End point	Kukës/Albania Kosovo Border	Prishtina/PRMS Prishtina 2
GWh/day exit	47,8– 63,7	348,082 m3/h
GWh/day entry	15.9 – 22.3	348,082 m3/h

Figure 15: Ionian Adriatic Pipeline (Fier, AL - Split, HR)



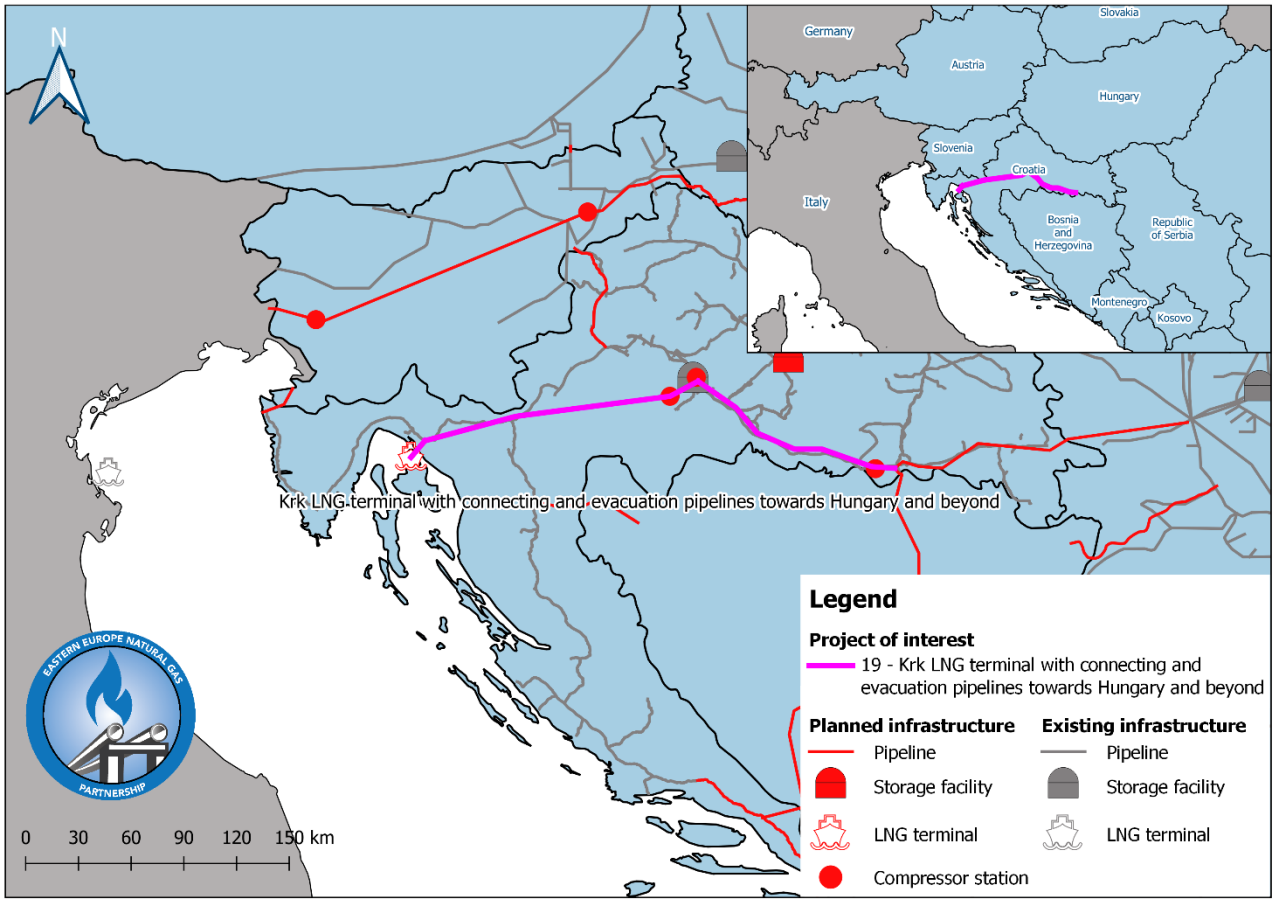
	Ionian Adriatic Pipeline (Fier, AL - Split, HR)		
Project type	Gas pipeline		
	Country A	Country B	Country C
Name of the country	Croatia	Montenegro	Albania
Promotor	Plinacro	Montenegro Bonus	Albgaz
Project name	Ionian Adriatic Pipeline	Ionian Adriatic Pipeline	Ionian Adriatic Pipeline
TYNDP code	TRA-A-68		
PECI code	Gas_16	Gas_16	Gas_16
EIHP code	17	17	17
Maturity status	Advanced	Advanced	Advanced
Commissioning year	2025		
CAPEX [mil. EUR]	299	118	169
OPEX [mil. EUR /yr]			
Length (km)	250	110	180
Diameter (mm)	800	800	800
Start point	Split	Albanian / Montenegro border	
End point	Prevlaka - Dobrec	Croatian border	Shkoder
GWh/day exit	83	120	150
GWh/day entry	83	110	120

Figure 16: Interconnection Croatia/Slovenia (Umag-Koper)



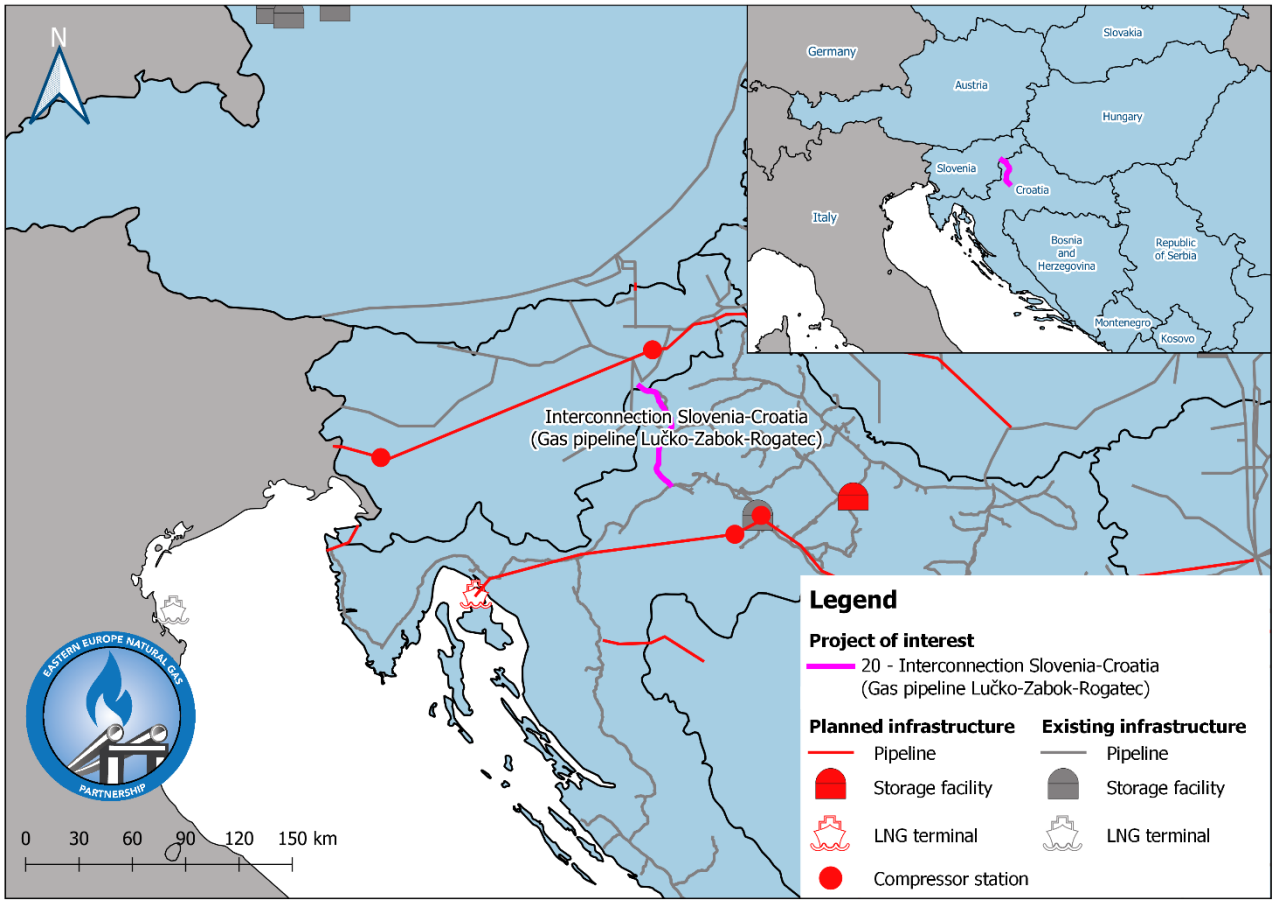
	Interconnection Croatia/Slovenia (Umag-Koper)	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Croatia	
Promotor	Plinacro Ltd	
Project name	Interconnection Croatia/Slovenia (Umag-Koper)	
TYNDP code	TRA-N-336	
PECI code		
EIHP code	18	18
Maturity status	Less-Advanced	
Commissioning year	2029	
CAPEX [mil. EUR]		
OPEX [mil. EUR /yr]		
Length (km)	8	
Diameter (mm)	300	
Start point	Umag	
End point	Plovanija	
GWh/day exit	16	
GWh/day entry	16	

Figure 17: Krk LNG terminal with connecting and evacuation pipelines towards Hungary and beyond



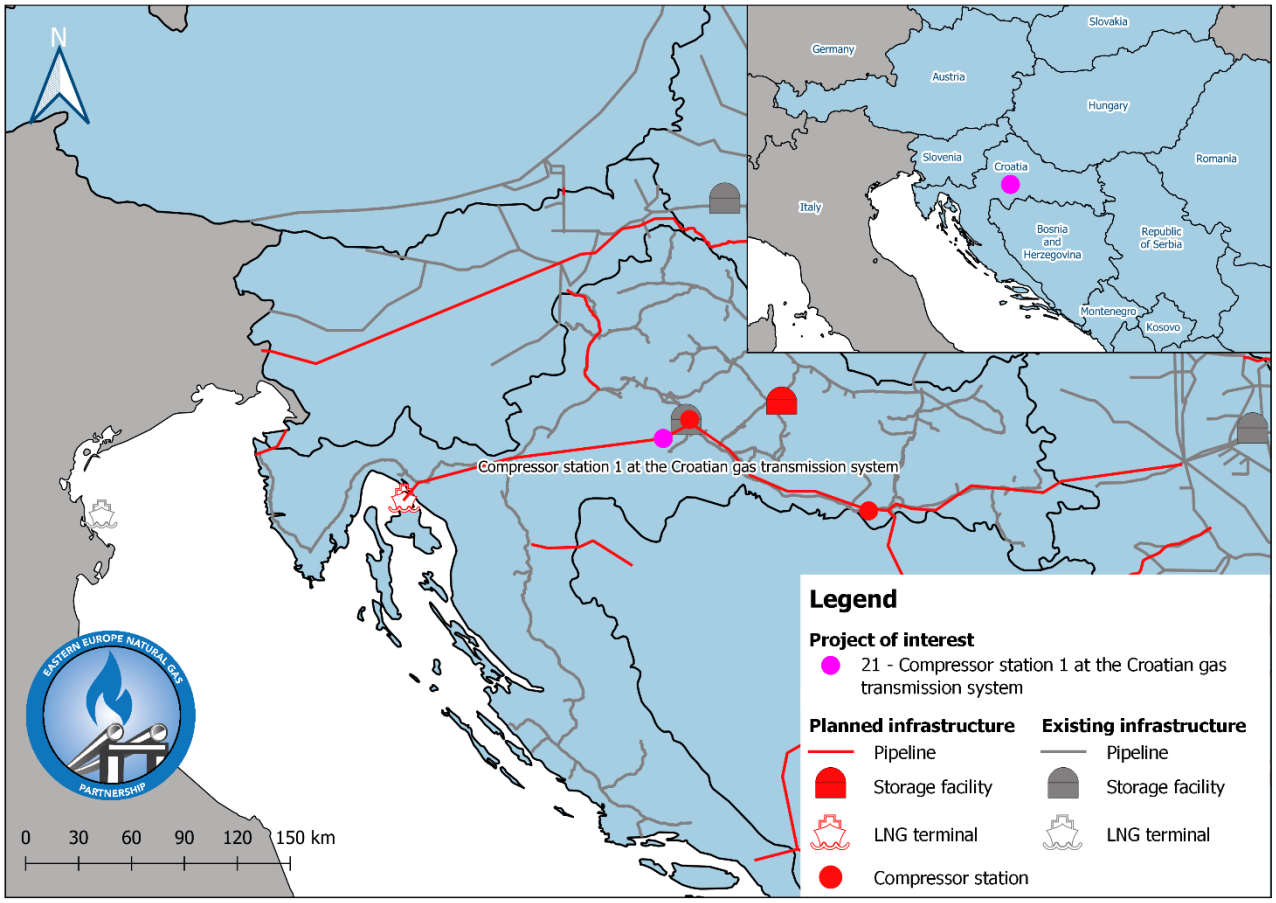
	Krk LNG terminal with connecting and evacuation pipelines towards Hungary and beyond		
Project type	Gas pipeline		
	Country A		
Name of the country	Croatia		
Promotor	Plinacro		
Project name	LNG evacuation pipeline Omišalj - Zlobin (Croatia)		
TYNDP code	TRA-F-90	TRA-N-75	TRA-N-1058
PECI code			
EIHP code	19	19	19
Maturity status	Completed	Less-Advanced	Less-Advanced
Commissioning year	2020	2027	2027
CAPEX [mil. EUR]	27	198	141
OPEX [mil. EUR /yr]	0	4	3
Length (km)	18	180	128
Diameter (mm)	800	800	800
Start point	Omisalj	Zlobin	Kozarac
End point	Zlobin	Kozarac	Slobodnica
GWh/day exit	41	54	82
GWh/day entry	41	54	82

Figure 18: Interconnection Slovenia-Croatia (Gas pipeline Lučko-Zabok-Rogatec)



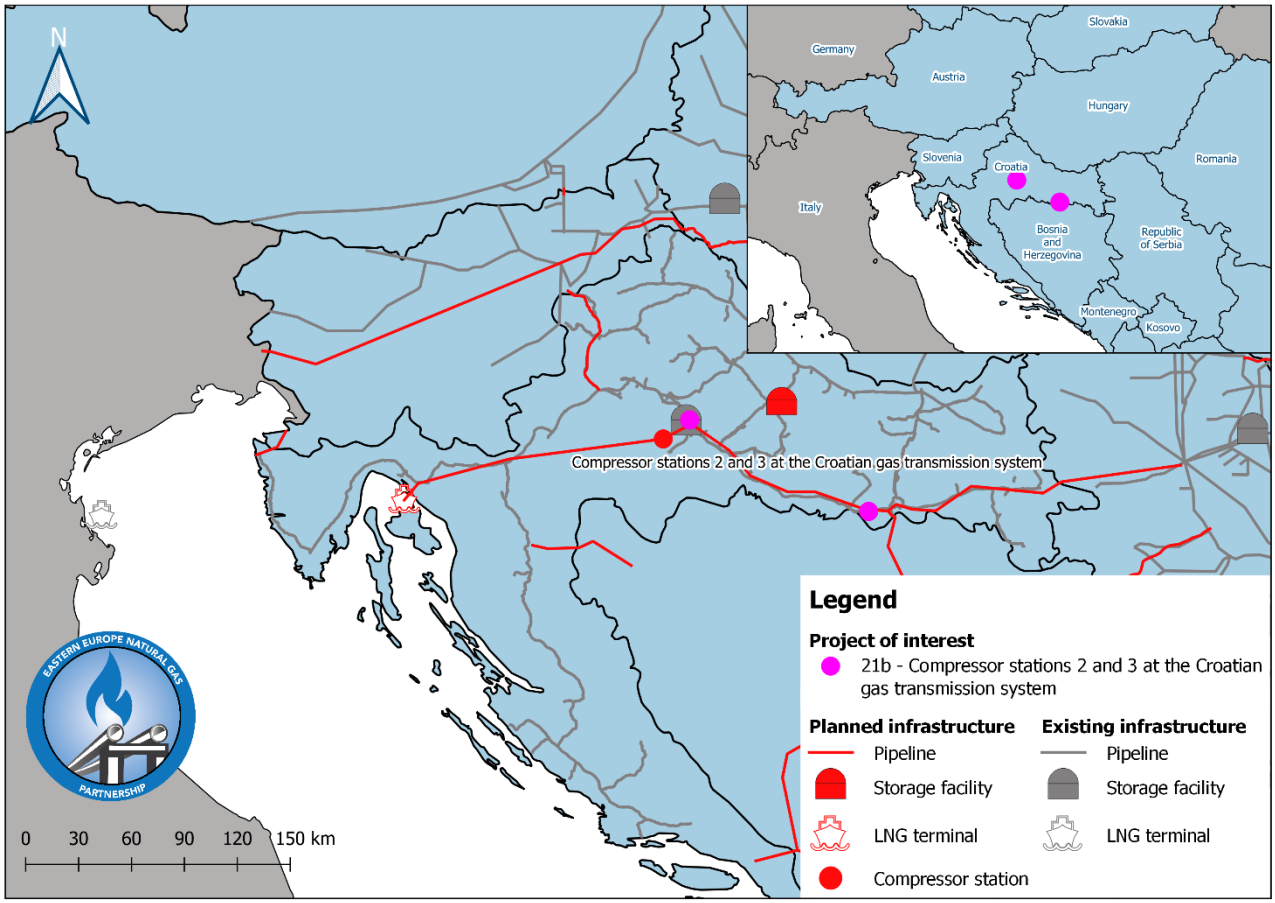
	Interconnection Slovenia-Croatia (Gas pipeline Lučko-Zabok-Rogatec)	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Croatia	
Promotor	Plinacro Ltd	
Project name	Interconnection Croatia/Slovenia (Lučko - Zabok - Jezerišće - Sotla)	
TYNDP code	TRA-A-86	
PECI code		
EIHP code	20	20
Maturity status	Advanced	
Commissioning year	2023	
CAPEX [mil. EUR]	76	
OPEX [mil. EUR /yr]	1	
Length (km)	69	
Diameter (mm)	700	
Start point	Lucko	
End point	Sutla / Rogatec	
GWh/day exit		
GWh/day entry		

Figure 19: Compressor station 1 at the Croatian gas transmission system



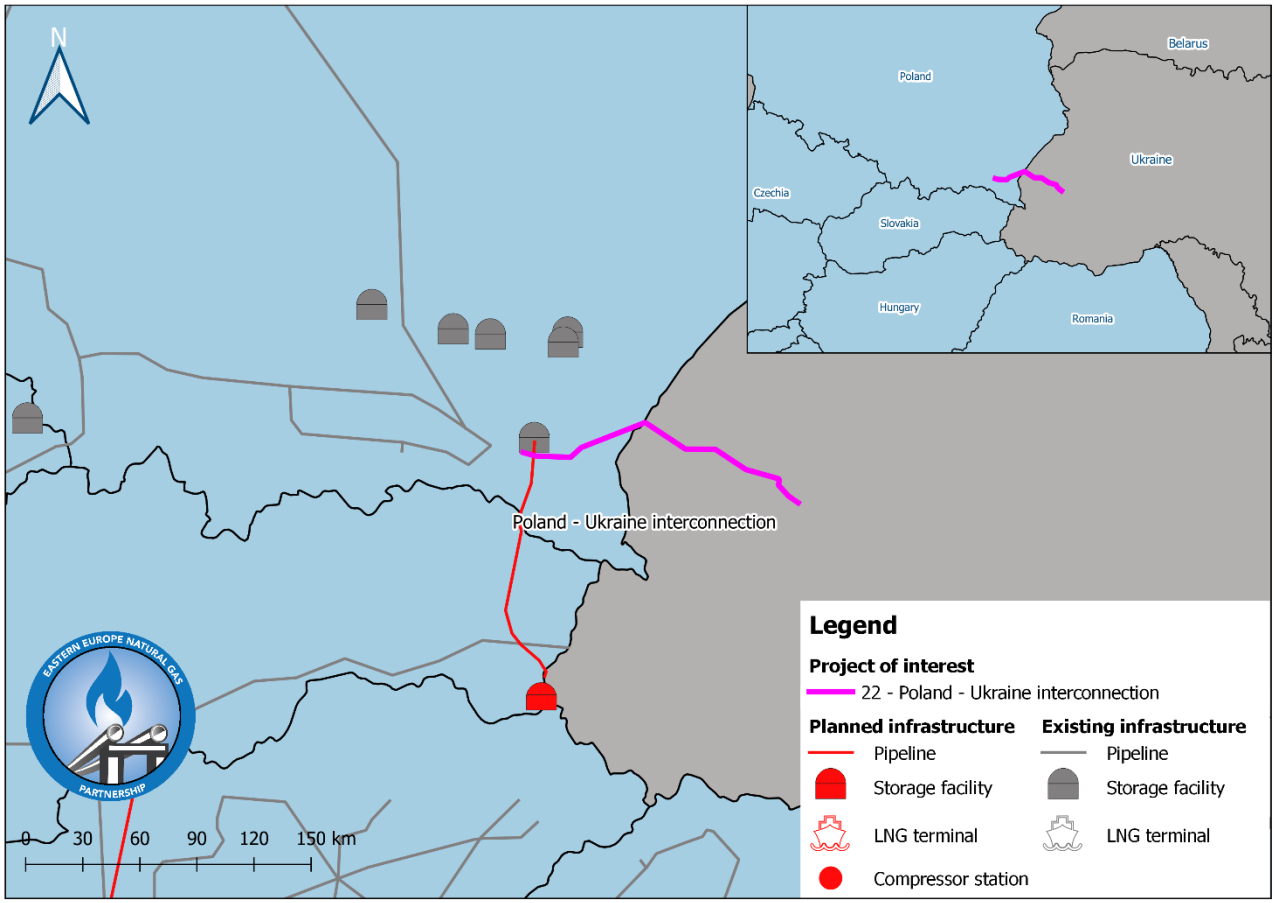
	Compressor station 1 at the Croatian gas transmission system
Project type	Compressor station
Name of the country	Croatia
Promotor	Plinacro Ltd
Project name	Compressor station 1 at the Croatian gas transmission system
TYNDP code	TRA-F-334
PECI code	
EIHP code	21
Maturity status	FID
Commissioning year	2019
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Length (km)	
Diameter (mm)	
Start point	
End point	
GWh/day exit	14
GWh/day entry	14

Figure 20: Compressor stations 2 and 3 at the Croatian gas transmission system



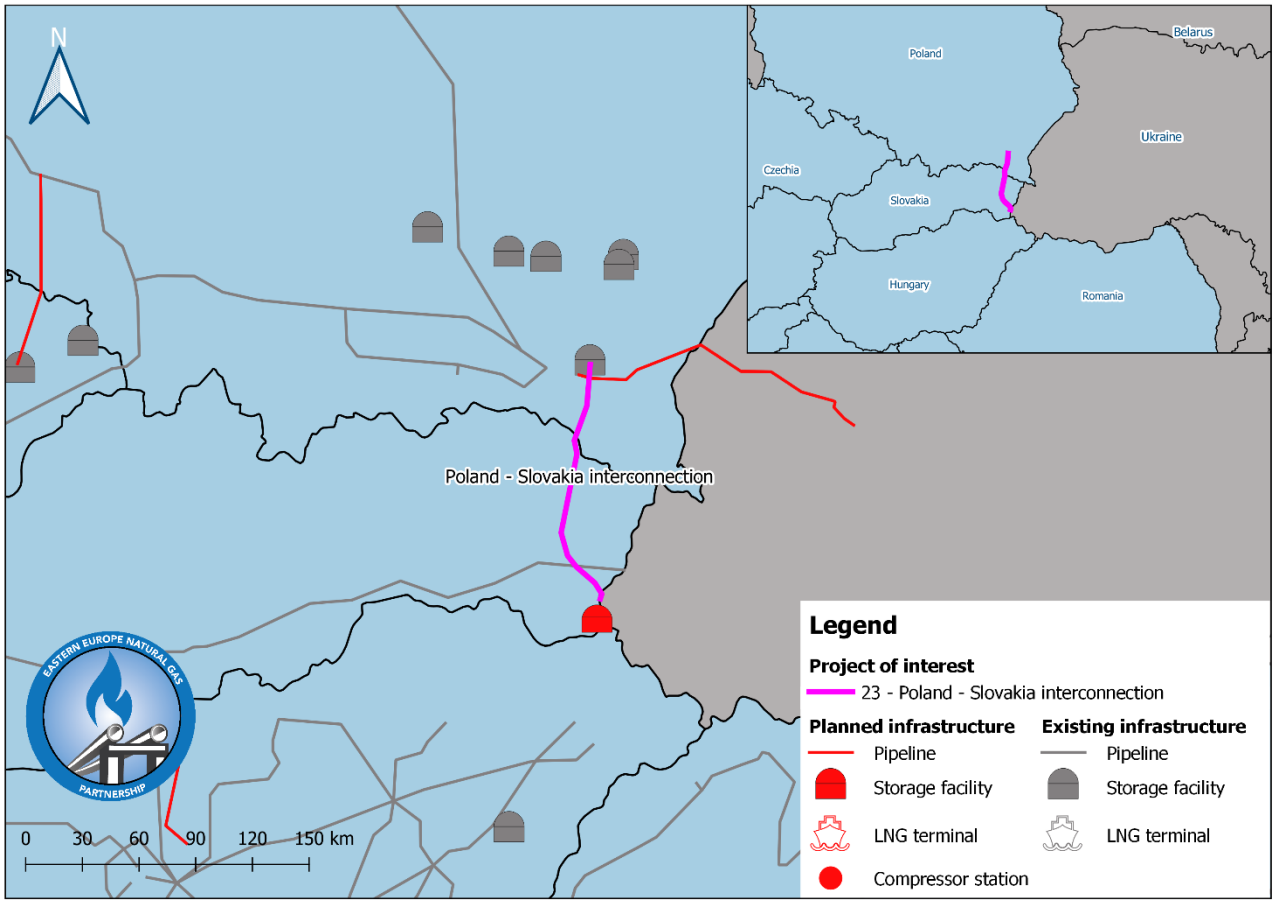
	Compressor stations 2 and 3 at the Croatian gas transmission system
Project type	Compressor station
Name of the country	Croatia
Promotor	Plinacro Ltd
Project name	Compressor stations 2 and 3 at the Croatian gas transmission system
TYNDP code	TRA-N-1057
PECI code	
EIHP code	21b
Maturity status	Less-Advanced
Commissioning year	2029
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Length (km)	
Diameter (mm)	
Start point	
End point	
GWh/day exit	
GWh/day entry	

Figure 21: Poland - Ukraine interconnection



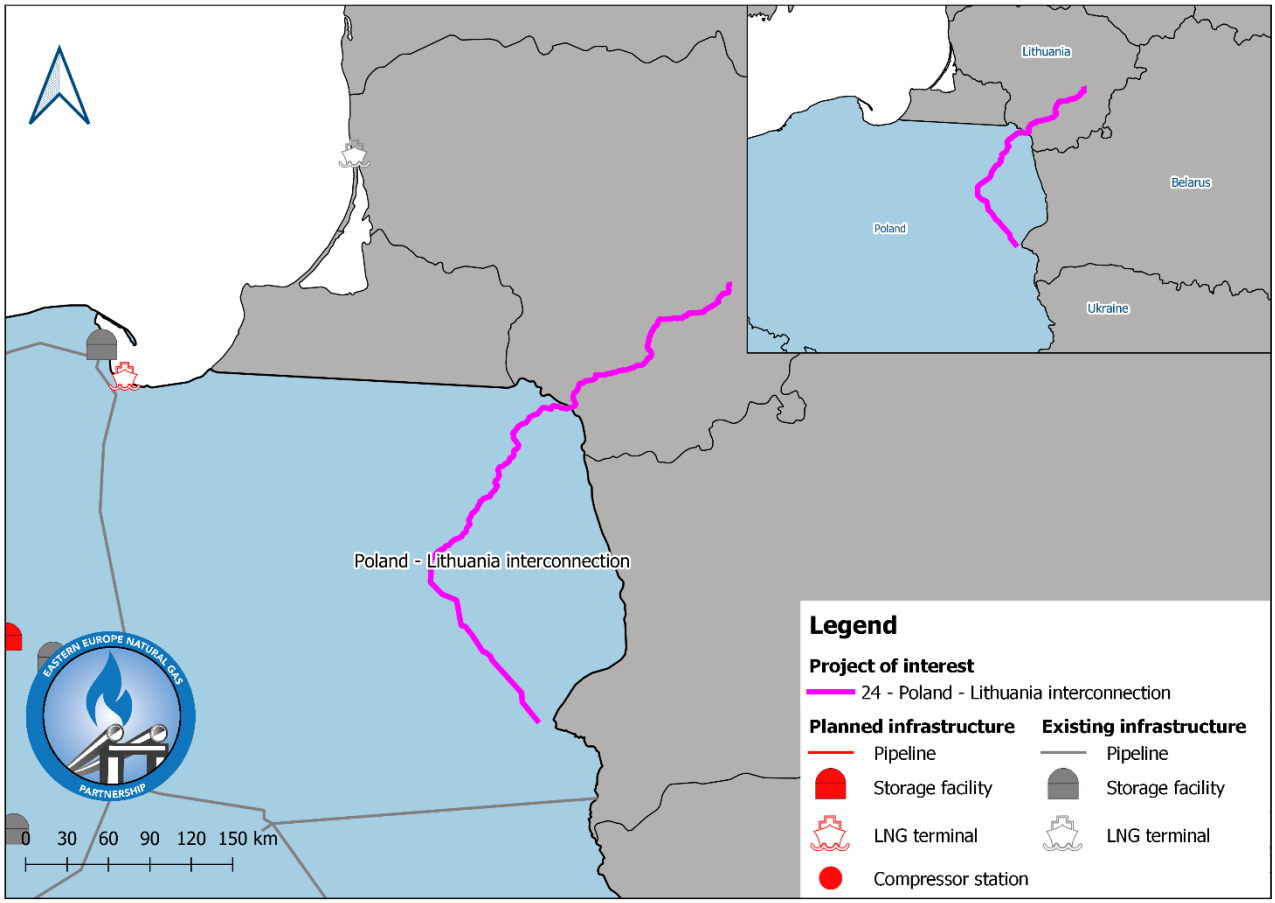
	Poland - Ukraine interconnection	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Poland	Ukraine
Promotor	Joint Stock Company Ukrtransgaz	Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A
Project name	Gas interconnection Poland - Ukraine	Poland - Ukraine Gas Interconnection
TYNDP code	TRA-A-561	TRA-A-621
PECI code	GAS_14	GAS_14
EIHP code	22	22
Maturity status	non-FID	non-FID
Commissioning year	2022	
CAPEX [mil. EUR]	n/a	n/a
OPEX [mil. EUR /yr]	n/a	n/a
Length (km)	99	72
Diameter (mm)	1,000	700
Start point	Strachocina	Bilche Volytsya
End point	Hermanowice	Hermanowice
GWh/day exit	153	215
GWh/day entry	245	215

Figure 22: Poland - Slovakia interconnection



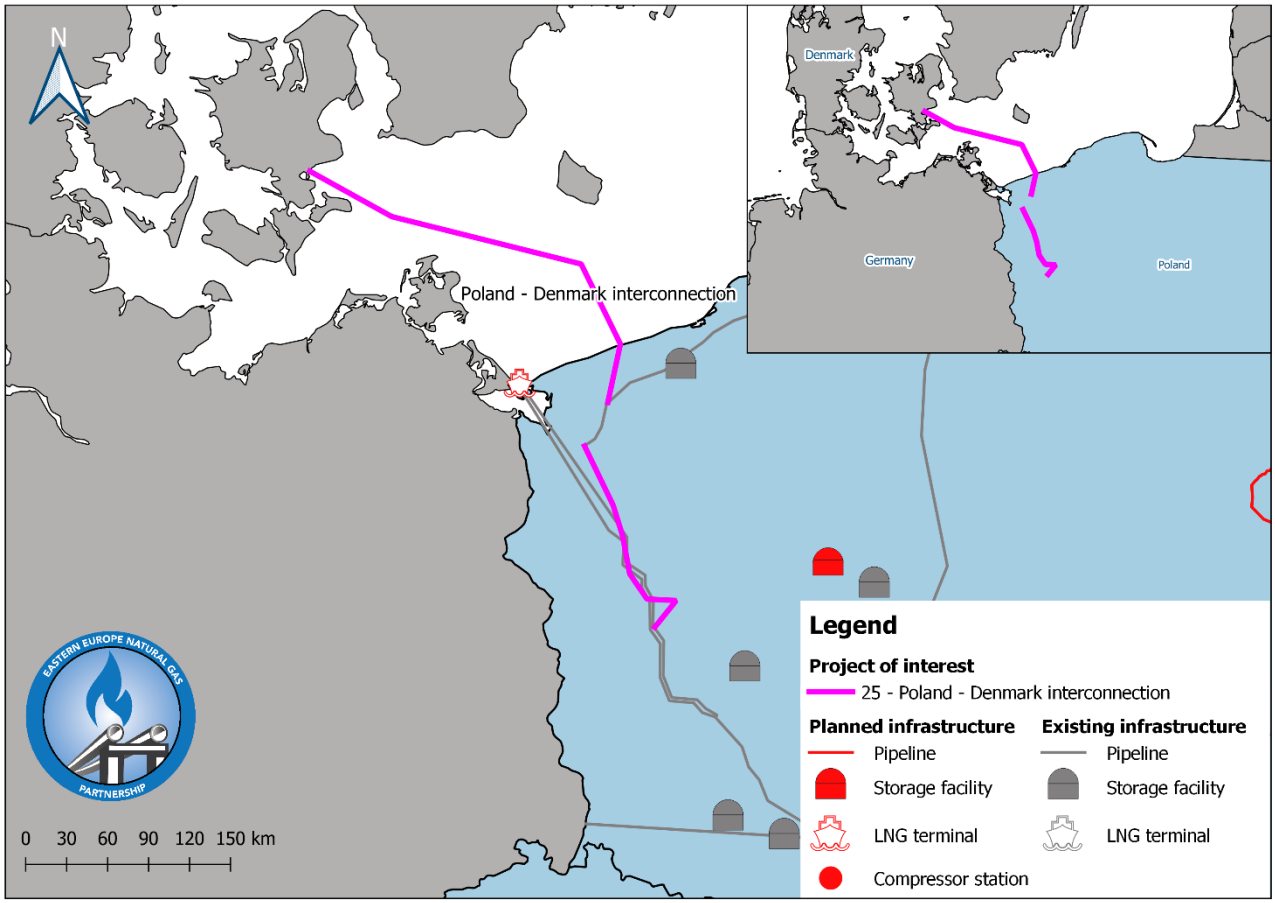
	Poland - Slovakia interconnection	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Slovakia	Poland
Promotor	Eustream, a.s.	Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A
Project name	Poland - Slovakia interconnection	Poland - Slovakia Gas Interconnection (PL section)
TYNDP code	TRA-F-190	TRA-F-275
PECI code	6.2.1.	6.2.1.
EIHP code	23	23
Maturity status	Implementation	Implementation
Commissioning year	2021	2021, but delayed
CAPEX [mil. EUR]	135	135
OPEX [mil. EUR /yr]	n/a	n/a
Length (km)	103	59
Diameter (mm)	1,000	1,000
Start point	Veľké Kapušany	Strachocina
End point	Lupkowska Pass	Lupkowska Pass
GWh/day exit	172	142
GWh/day entry	142	172

Figure 23: Poland - Lithuania interconnection



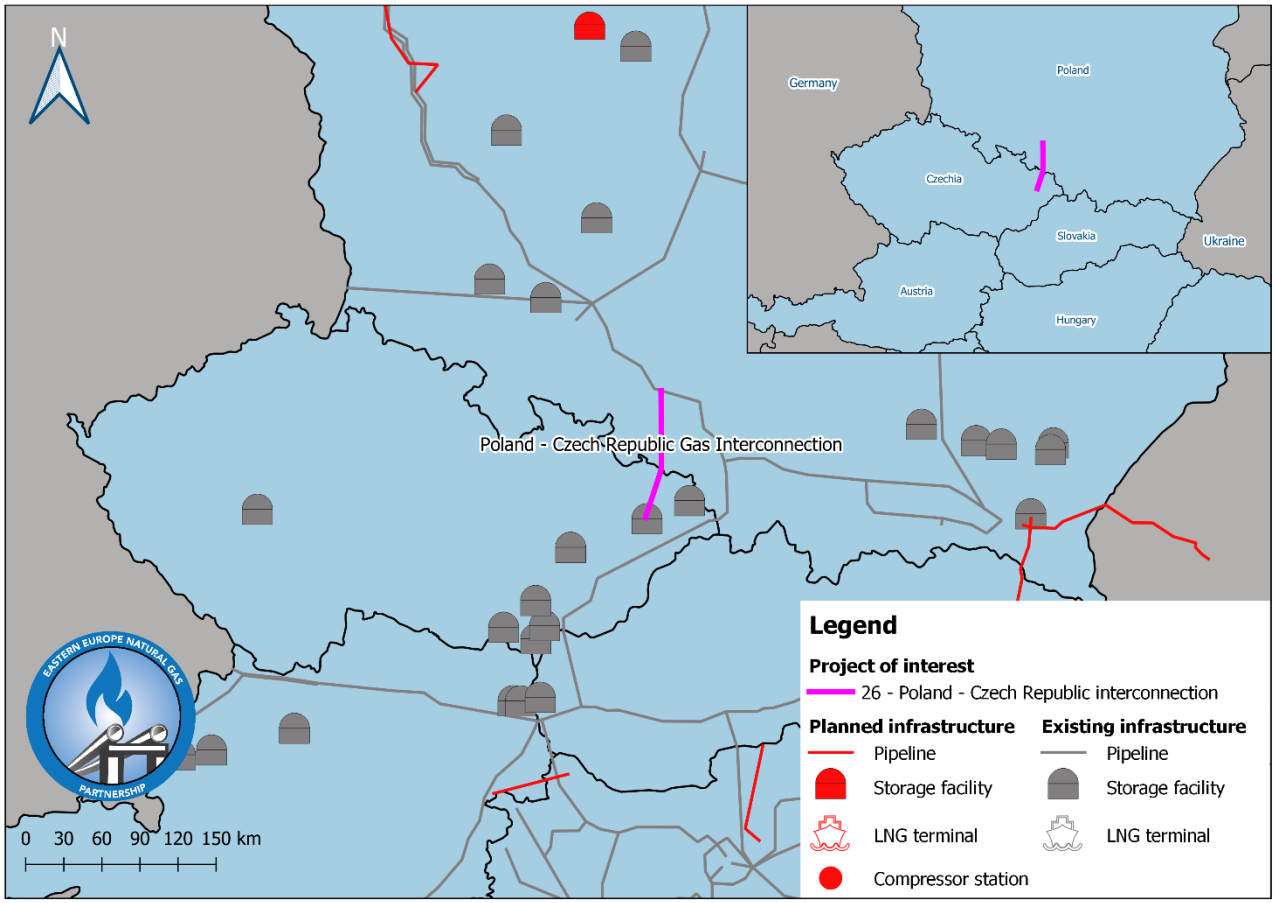
	Poland - Lithuania interconnection	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Poland	Lithuania
Promotor	Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A	
Project name	Gas Interconnection Poland-Lithuania (GIPL) - PL section	
TYNDP code	TRA-F-212	
PECI code	8.5.	
EIHP code	24	
Maturity status	Implementation	
Commissioning year	2021	
CAPEX [mil. EUR]	444	
OPEX [mil. EUR /yr]	n/a	
Length (km)	357	
Diameter (mm)	700	
Start point	Hołowczyce	
End point	Gustorzyn	
GWh/day exit	74	
GWh/day entry	58	

Figure 24: Poland - Denmark interconnection



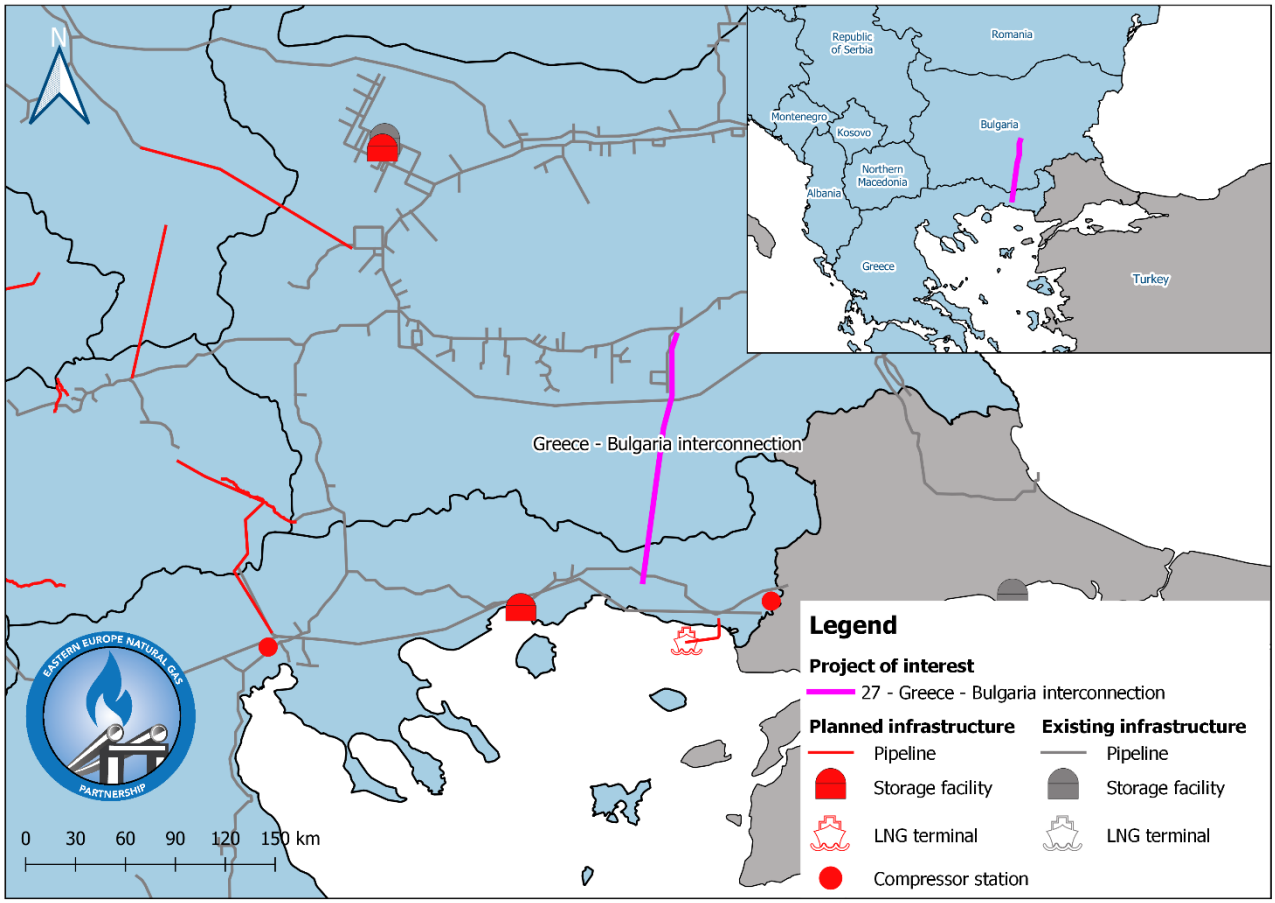
	Poland - Denmark interconnection	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Poland	Denmark
Promotor	Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A	
Project name	Poland - Denmark interconnection (Baltic Pipe)	
TYNDP code	TRA-A-271	
PECI code	8.3.2.	
EIHP code	25	
Maturity status	Feasibility study	
Commissioning year	2022	
CAPEX [mil. EUR]	2,500	
OPEX [mil. EUR /yr]	n/a	
Length (km)	110	
Diameter (mm)	700	
Start point	Świnoujście	
End point	Baltic sea	
GWh/day exit	100	
GWh/day entry	300	

Figure 25: Poland - Czech Republic interconnection



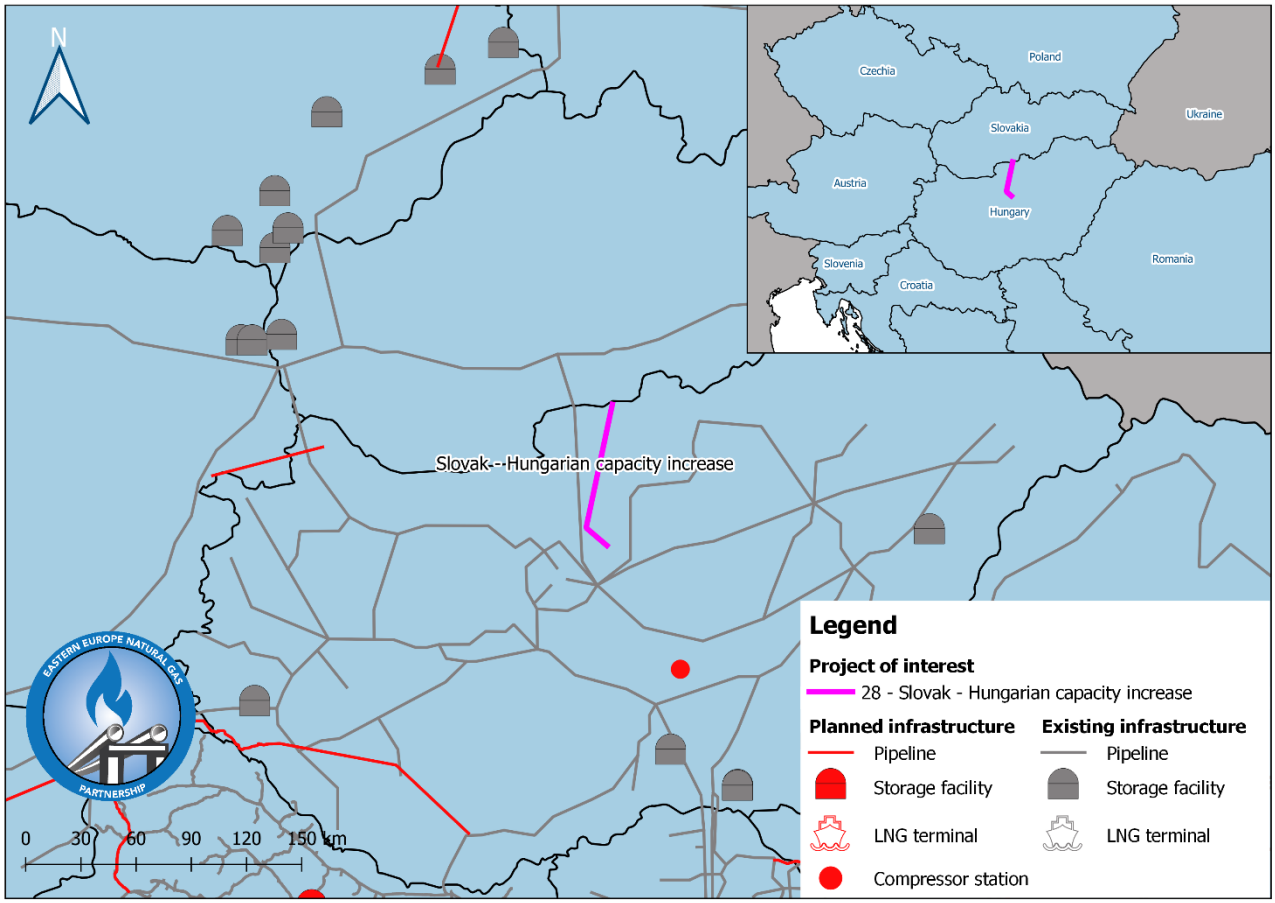
	Poland - Czech Republic interconnection	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Poland	Czech Republic
Promotor	Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A	
Project name	Poland - Czech Republic Gas Interconnection	
TYNDP code	TRA-A-273	
PECI code	6.1.1	
EIHP code	26	
Maturity status	Feasibility study	
Commissioning year	2023	
CAPEX [mil. EUR]	3	
OPEX [mil. EUR /yr]	n/a	
Length (km)	55	
Diameter (mm)	500	
Start point	Kędzierzyn	
End point	Hať	
GWh/day exit	150	
GWh/day entry	215	

Figure 26: Greece - Bulgaria interconnection



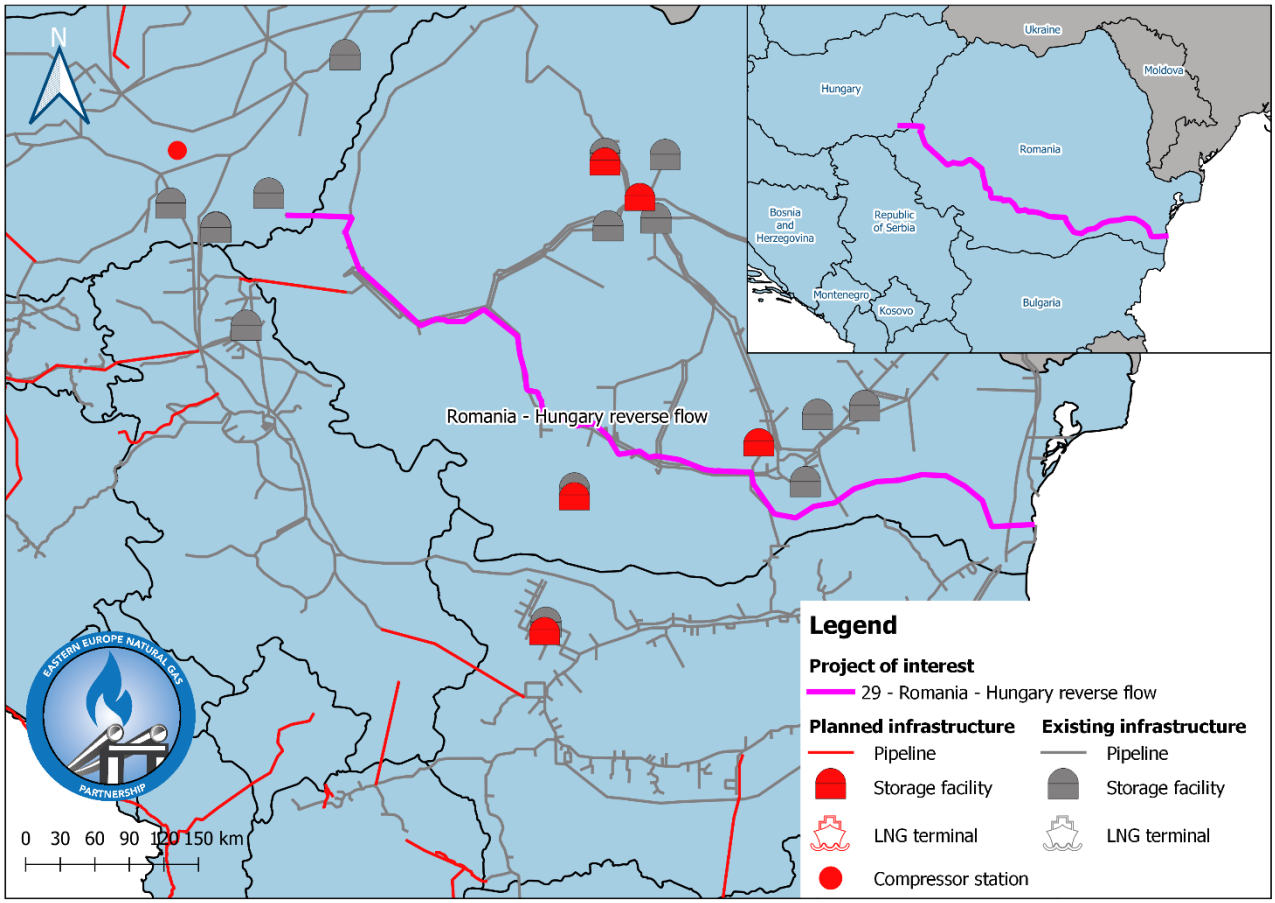
	Greece - Bulgaria interconnection	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Greece	Bulgaria
Promotor	DESFA S.A.	Bulgartransgaz EAD
Project name	Interconnector Greece-Bulgaria (IGB Project)	Interconnector Greece-Bulgaria (IGB Project)
TYNDP code	TRA-F-378	TRA-F-378
PECI code	6.8.1.	6.8.1.
EIHP code	27	27
Maturity status	Under construction	Under construction
Commissioning year	2025	2025
CAPEX [mil. EUR]	120	120
OPEX [mil. EUR /yr]	n/a	n/a
Length (km)	31	151
Diameter (mm)	800	800
Start point	Komotini	Stara Zagora
End point	Bulgaria	Greece
GWh/day exit	90	90
GWh/day entry	90	90

Figure 27: Slovak - Hungarian capacity increase



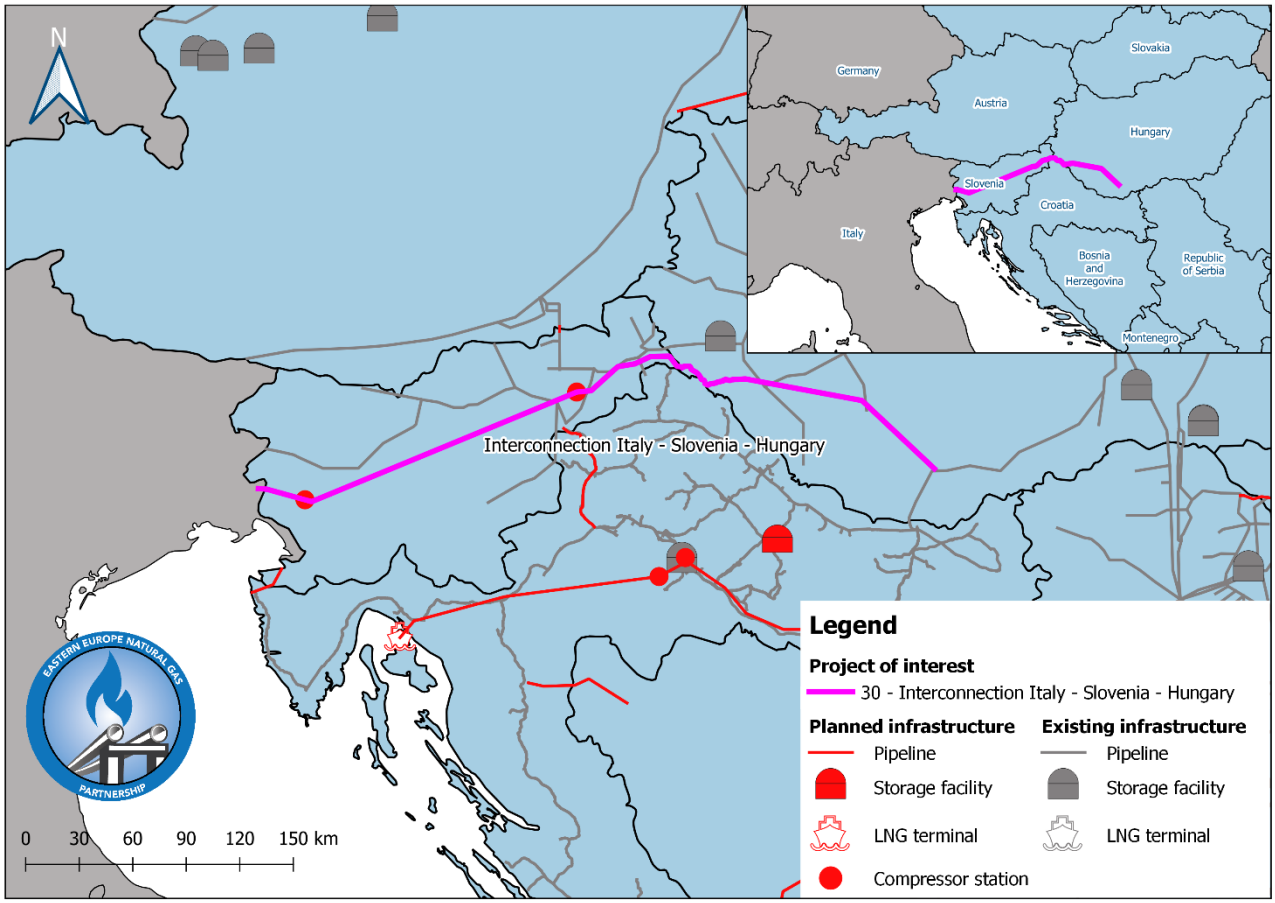
	Slovak - Hungarian capacity increase	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Slovakia	Hungary
Promotor	Eustream, a.s.	
Project name	Enhancement of Transmission Capacity of Slovak-Hungarian interconnector	
TYNDP code	TRA-N-524	
PECI code	6.2.13.	
EIHP code	28	
Maturity status	Feasibility study	
Commissioning year	2024	
CAPEX [mil. EUR]	160	
OPEX [mil. EUR /yr]	n/a	
Length (km)	/	
Diameter (mm)	/	
Start point	Balassagyarmat	
End point	Balassagyarmat	
GWh/day exit	153	
GWh/day entry	153	

Figure 28: Romania - Hungary reverse flow



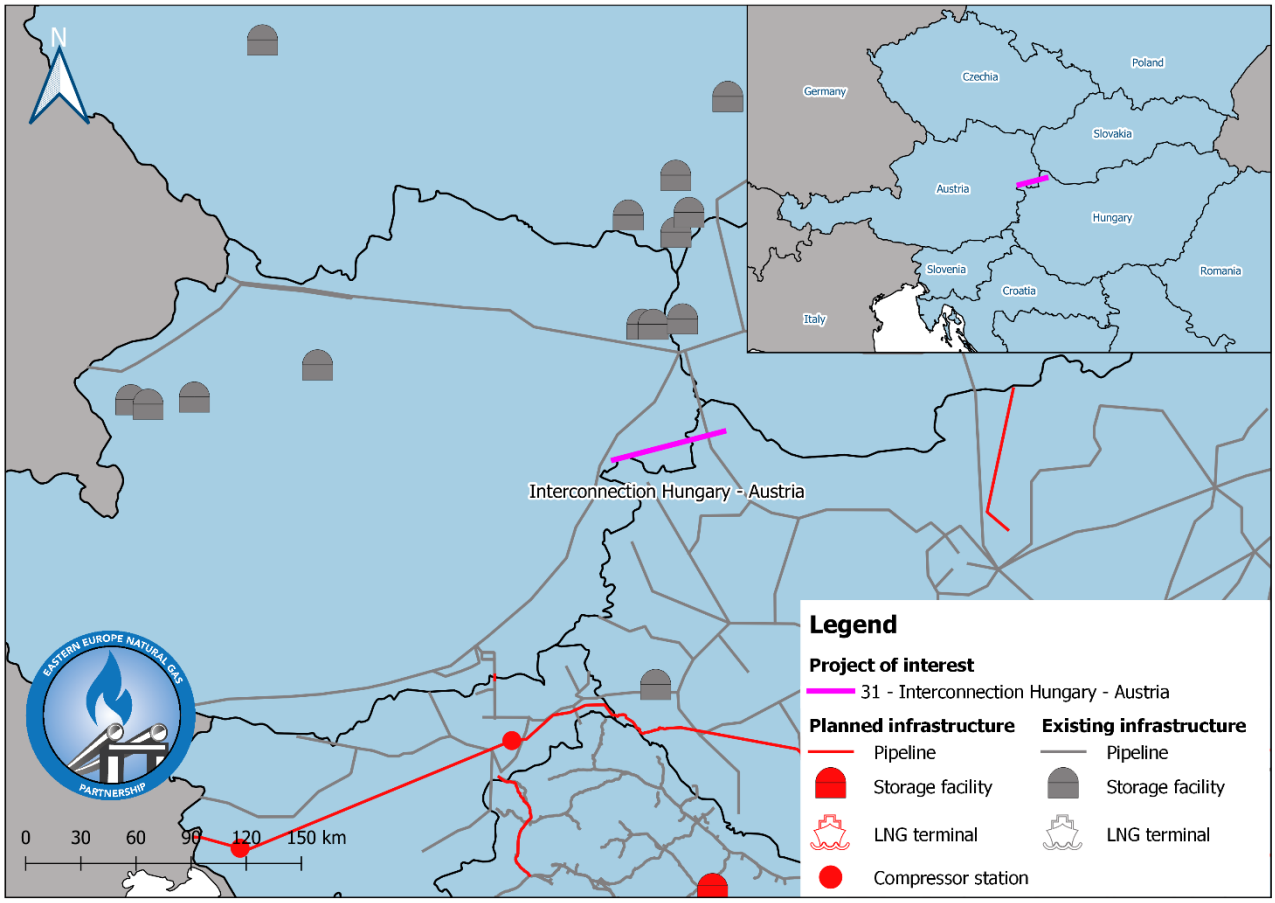
	Romania - Hungary reverse flow	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Romania	Hungary
Promotor	TRANSGAZ SA	FGSZ Ltd. SNTGN TRANSGAZ SA
Project name	Romanian-Hungarian reverse flow Hungarian section 1st stage	Romanian-Hungarian reverse flow Hungarian section 2nd stage
TYNDP code	TRA-F-286	TRA-A-377
PECI code	6.24.1.	6.24.4.
EIHP code	29	29
Maturity status	Permitting	Permitting
Commissioning year	2022	2022
CAPEX [mil. EUR]		
OPEX [mil. EUR /yr]		
Length (km)	50	300
Diameter (mm)	800	800
Start point		
End point		
GWh/day exit	125	
GWh/day entry	125	

Figure 29: Interconnection Italy - Slovenia - Hungary



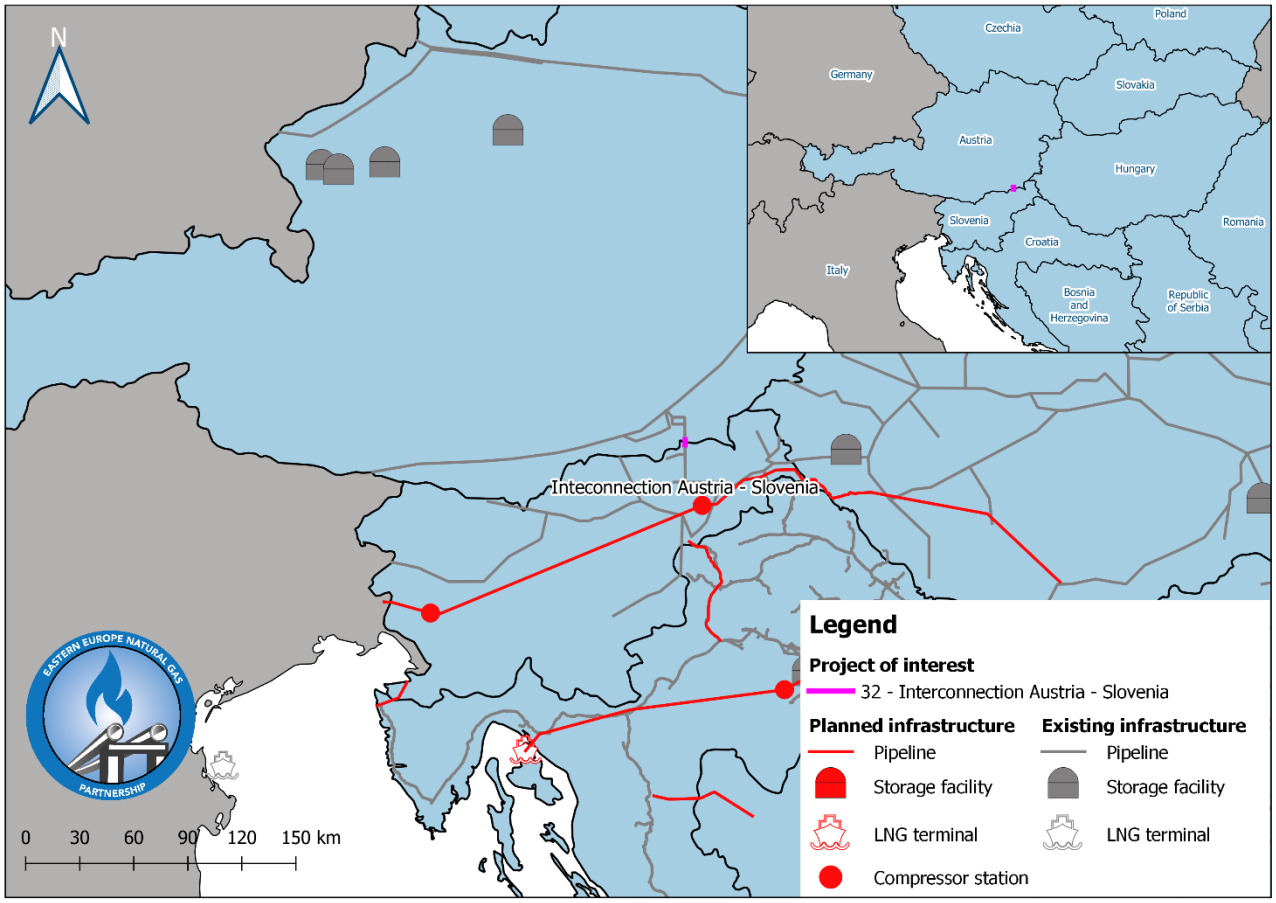
	Interconnection Italy - Slovenia - Hungary		
Project type	Gas pipeline		
	Country B	Country B	Country C
Name of the country	Italy	Slovenia	Hungary
Promotor	SNAM S.p.A.	Plinovodi	FGSZ Ltd. SNTGN TRANSGAZ SA
Project name	M3 pipeline reconstruction from CS Ajdovščina to Šempeter/Gorizia	M3/1 Šempeter - Vodice	Slovenian-Hungarian interconnector
TYNDP code	TRA-N-108	TRA-N-299	TRA-N-325
PECI code	6.23.	6.23.	6.23.
EIHP code	30	30	30
Maturity status			
Commissioning year	2026	2026	2026
CAPEX [mil. EUR]			
OPEX [mil. EUR /yr]			
Length (km)			
Diameter (mm)			
Start point			
End point			
GWh/day exit			
GWh/day entry			

Figure 30: Interconnection Hungary - Austria



	Interconnection Hungary - Austria	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Hungary	Austria
Promotor	FGSZ Ltd. SNTGN TRANSGAZ SA	
Project name	GCA Mosonmagyaróvár	GCA Mosonmagyaróvár
TYNDP code	TRA-N-423	
PECI code	6.24.3	
EIHP code	31	
Maturity status		
Commissioning year	2024	
CAPEX [mil. EUR]		
OPEX [mil. EUR /yr]		
Length (km)		
Diameter (mm)		
Start point		
End point		
GWh/day exit		
GWh/day entry		

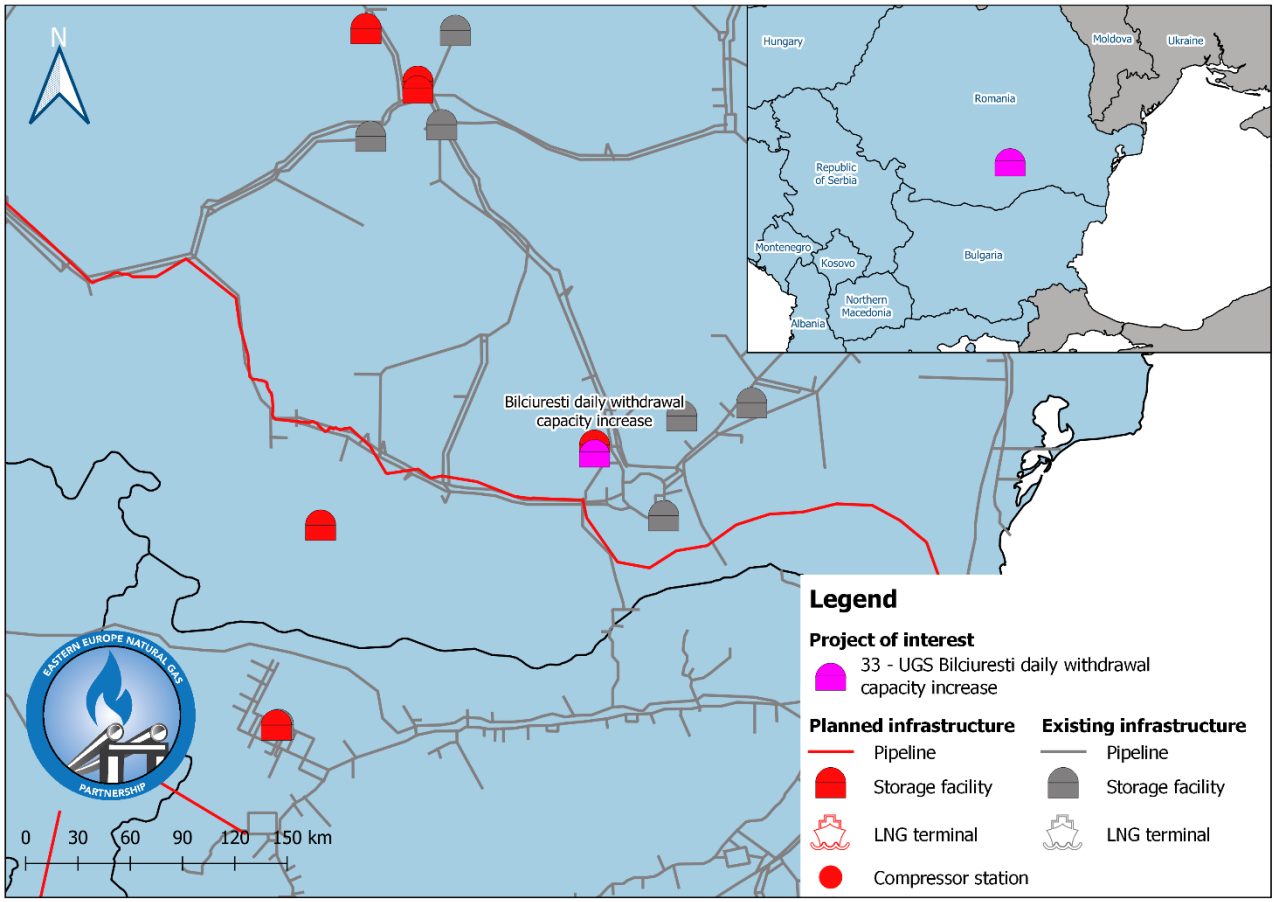
Figure 31: Interconnection Austria - Slovenia



	Interconnection Austria - Slovenia	
Project type	Gas pipeline	
	Country A	Country B
Name of the country	Slovenia	Austria
Promotor	Plinovodi	
Project name	Upgrade of Murfeld/Ceršak interconnection (M1/3 Interconnection Ceršak)	GCA 2015/08: Entry/Exit Murfeld
TYNDP code	TRA-N-389	TRA-A-21
PECI code	6.26.1.	6.26.1.
EIHP code	32	32
Maturity status		
Commissioning year	2023	
CAPEX [mil. EUR]		
OPEX [mil. EUR /yr]		
Length (km)		
Diameter (mm)		
Start point		
End point		
GWh/day exit		
GWh/day entry		

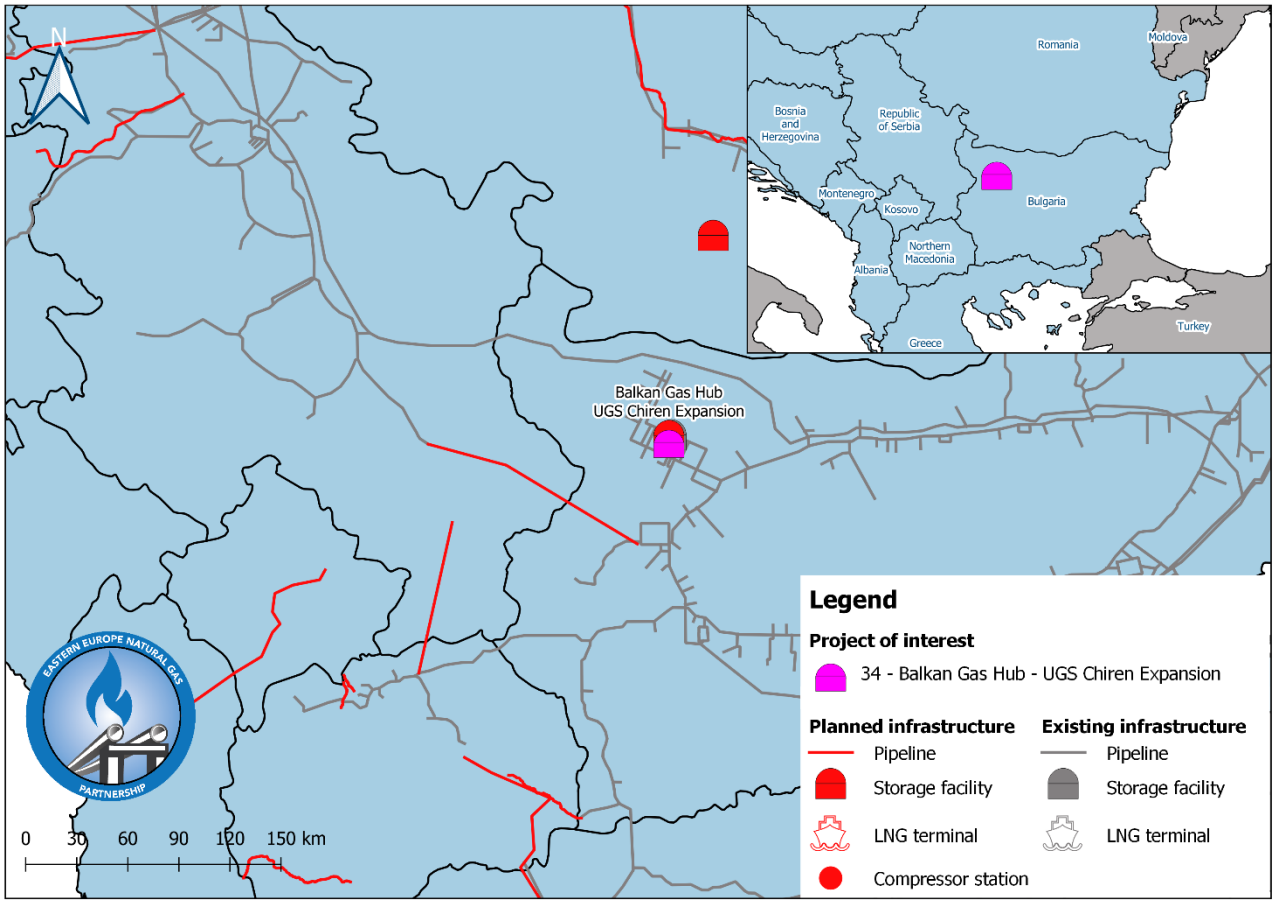
1.10 Underground gas storage projects

Figure 32: UGS Bilciuresti daily withdrawal capacity increase



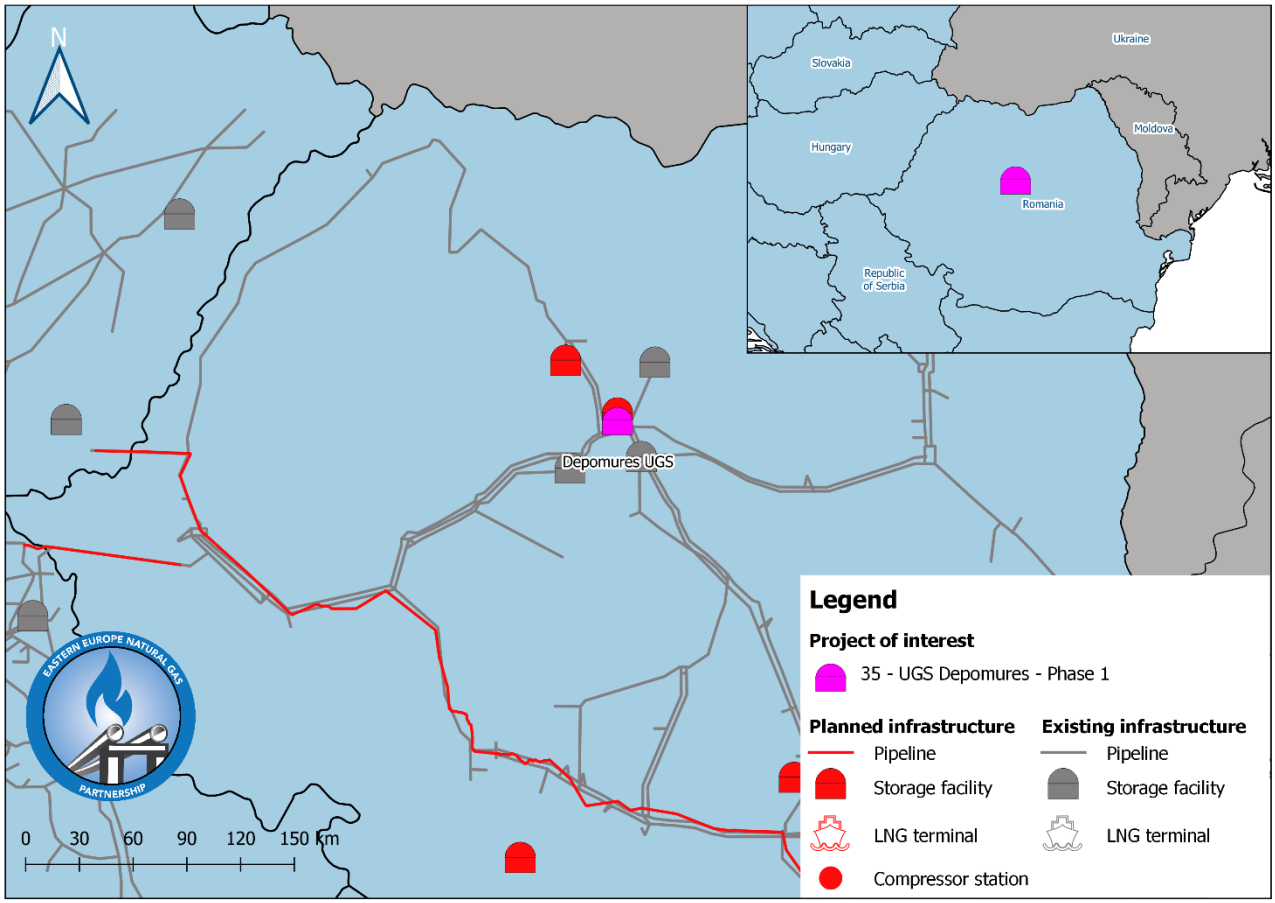
	UGS Bilciuresti daily withdrawal capacity increase
Project type	UGS facility
TYNDP code	UGS-F-311
PECI code	None
EIHP code	33
Country	Romania
Type	Depleted Field
Promoter	SNGN ROMGAZ SA - FILIALA DE INMAGAZINARE GAZE NATURALE DEPOGAZ PLOIESTI SRL
Maturity status	FID
WGW (mcm)	
Withdrawal capacity (mcm/d)	5
Injection Capacity (mcm/d)	
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2025 / On time

Figure 33: Balkan Gas Hub - UGS Chiren Expansion



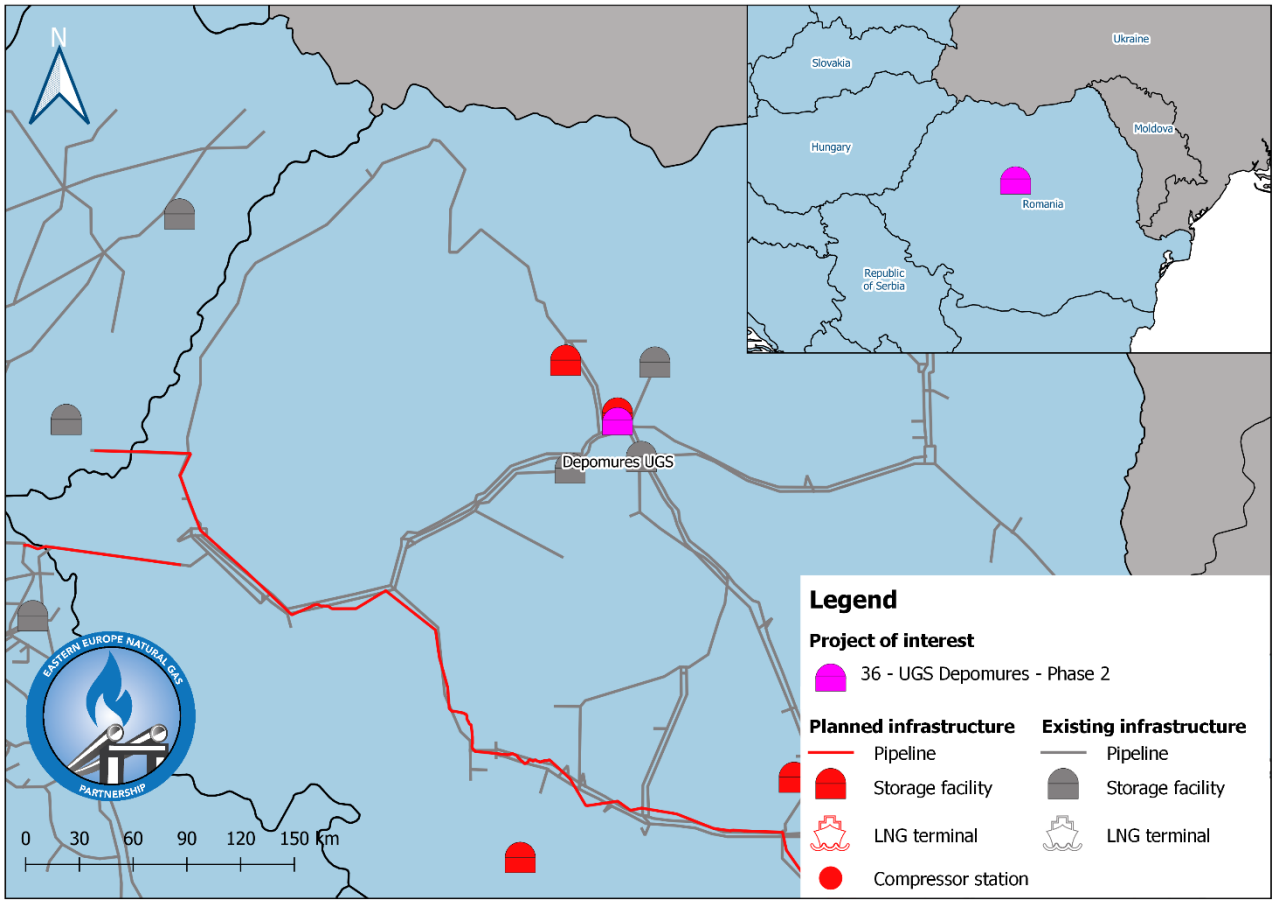
	Balkan Gas Hub - UGS Chiren Expansion
Project type	UGS facility
TYNDP code	UGS-A-138
PECI code	None
EIHP code	34
Country	Bulgaria
Type	Depleted Field
Promoter	Bulgartransgaz EAD
Maturity status	Advanced
WGW (mcm)	1,000
Withdrawal capacity (mcm/d)	9
Injection Capacity (mcm/d)	10
CAPEX [mil. EUR]	226
OPEX [mil. EUR /yr]	
Commission / Schedule	2025 / Delayed

Figure 34: UGS Depomures - Phase 1



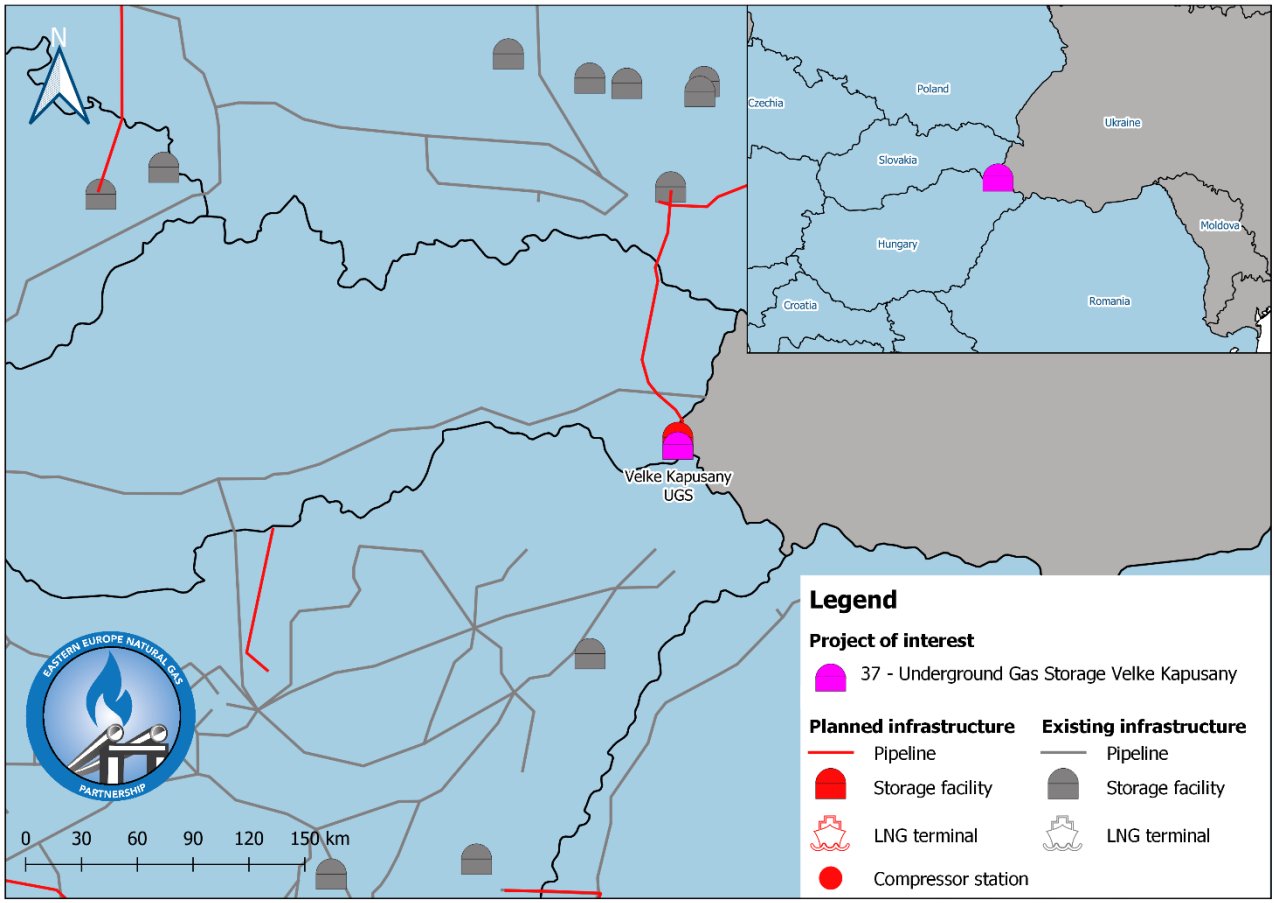
	UGS Depomures - Phase 1
Project type	UGS facility
TYNDP code	UGS-A-233
PECI code	None
EIHP code	35
Country	Romania
Type	Depleted Field
Promoter	Engie Romania SA
Maturity status	Advanced
WGW (mcm)	100
Withdrawal capacity (mcm/d)	2
Injection Capacity (mcm/d)	2
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2024 / Delayed

Figure 35: UGS Depomures - Phase 2



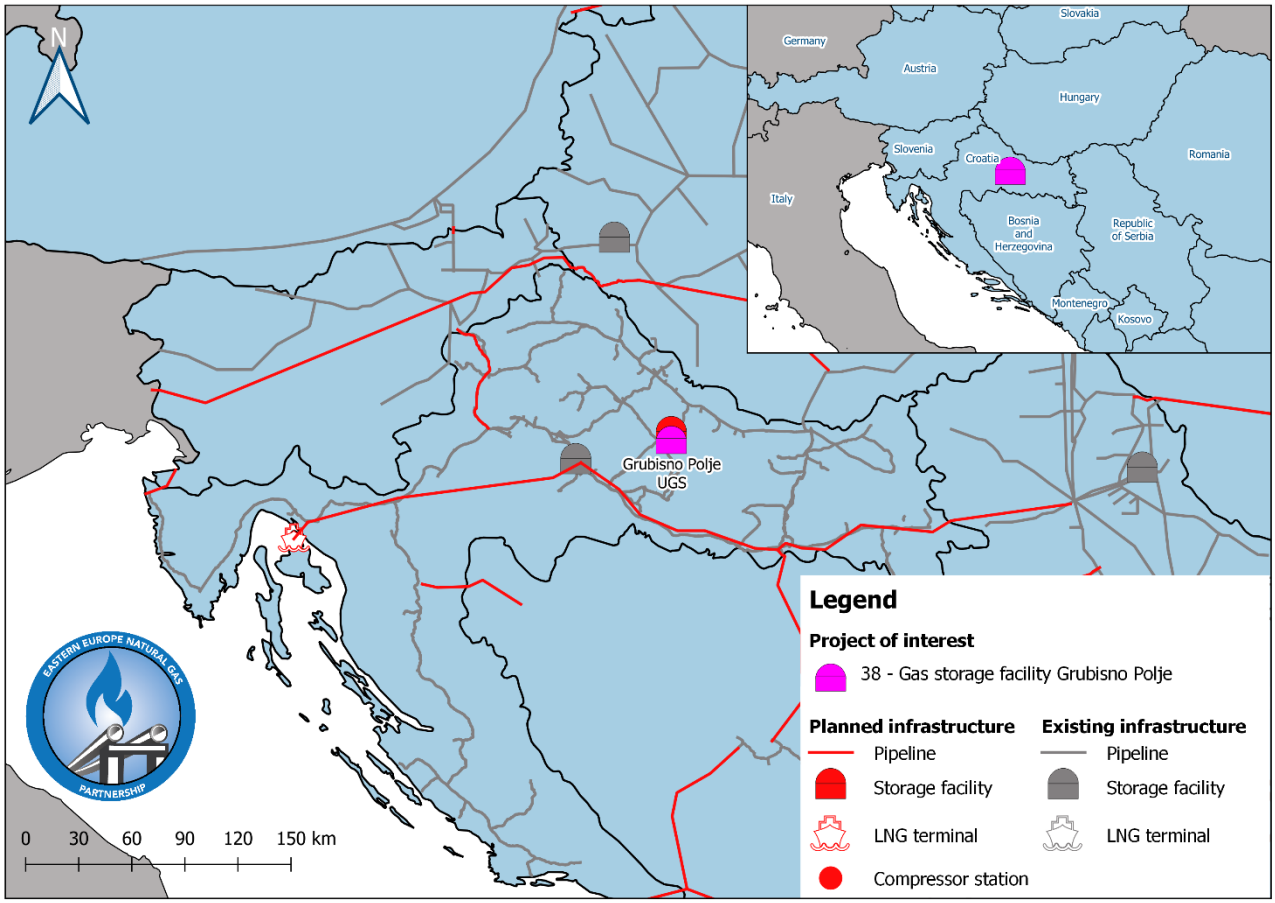
	UGS Depomures - Phase 2
Project type	UGS facility
TYNDP code	UGS-A-233
PECI code	None
EIHP code	36
Country	Romania
Type	Depleted Field
Promoter	Engie Romania SA
Maturity status	Advanced
WGW (mcm)	200
Withdrawal capacity (mcm/d)	2
Injection Capacity (mcm/d)	2
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2024 / Delayed

Figure 36: Underground Gas Storage Velke Kapusany



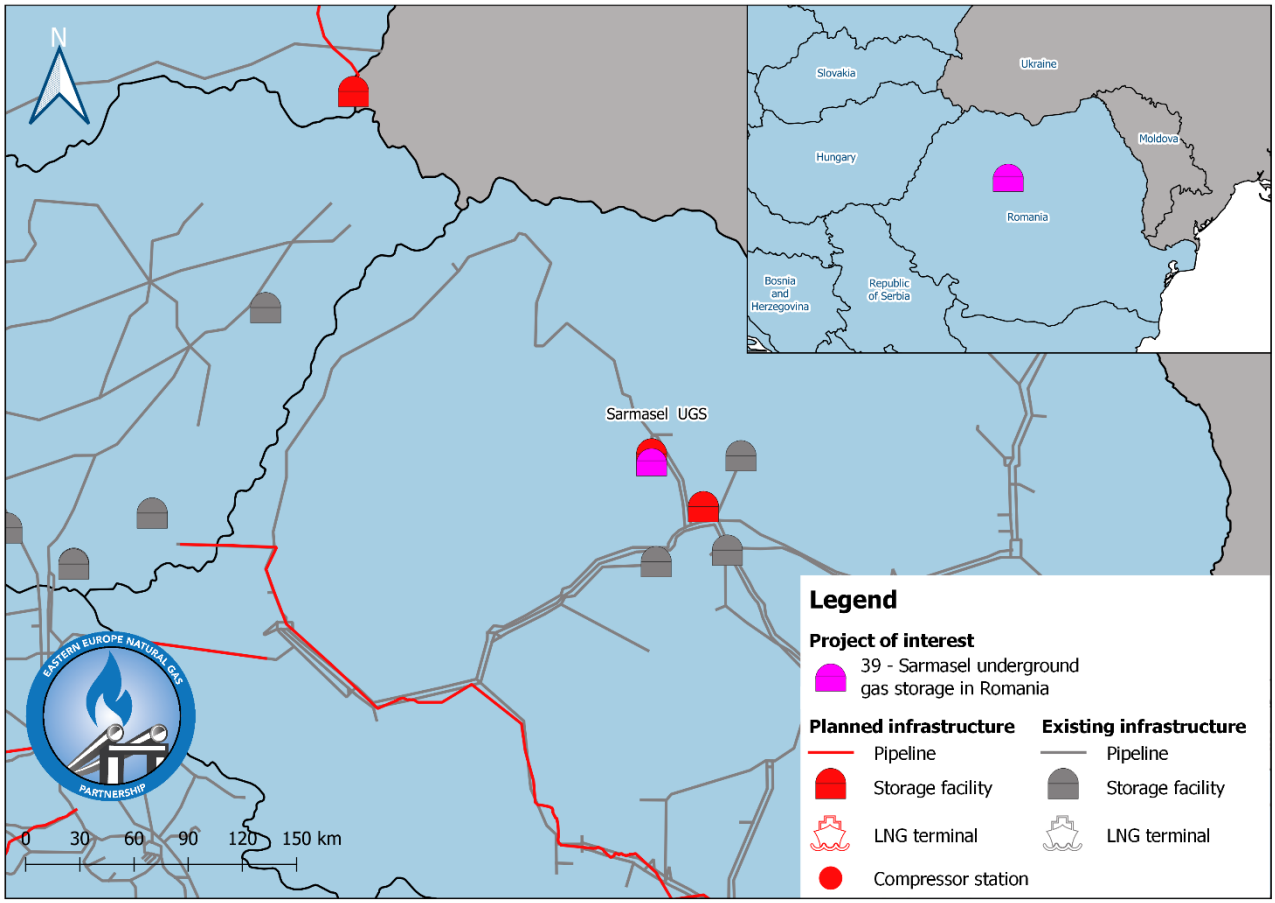
	Underground Gas Storage Velke Kapusany
Project type	UGS facility
TYNDP code	UGS-A-356
PECI code	None
EIHP code	37
Country	Slovakia
Type	Depleted Field
Promoter	NAFTA a.s. (joint stock company)
Maturity status	Advanced
WGW (mcm)	340
Withdrawal capacity (mcm/d)	4
Injection Capacity (mcm/d)	4
CAPEX [mil. EUR]	161
OPEX [mil. EUR /yr]	3
Commission / Schedule	2023 / On time

Figure 37: Gas storage facility Grubisno Polje



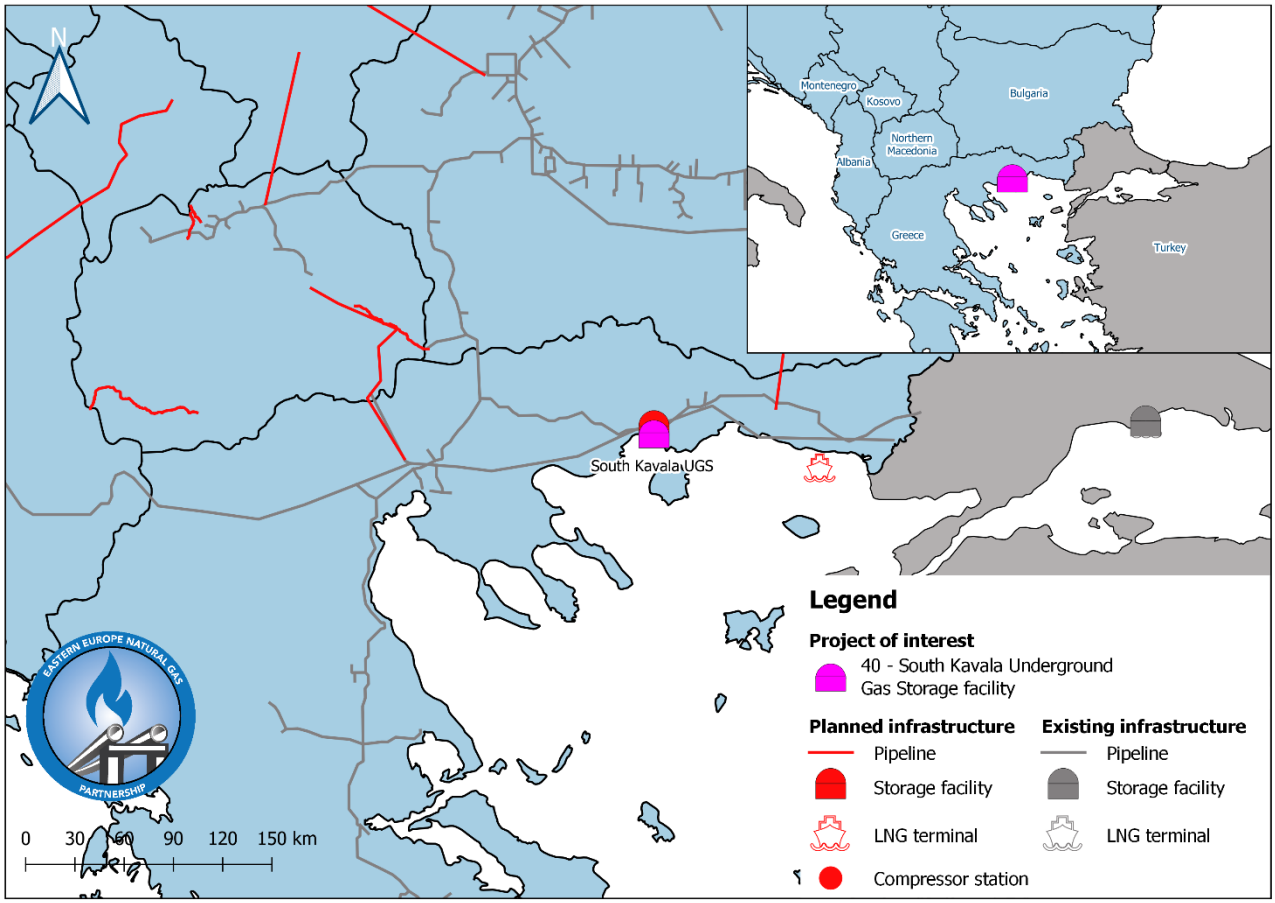
	Gas storage facility Grubisno Polje
Project type	UGS facility
TYNDP code	UGS-N-347
PECI code	None
EIHP code	38
Country	Croatia
Type	Depleted Field
Promoter	Podzemno skladiste plina Ltd
Maturity status	Less-Advanced
WGW (mcm)	60
Withdrawal capacity (mcm/d)	2
Injection Capacity (mcm/d)	2
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2025

Figure 38: Sarmasel underground gas storage in Romania



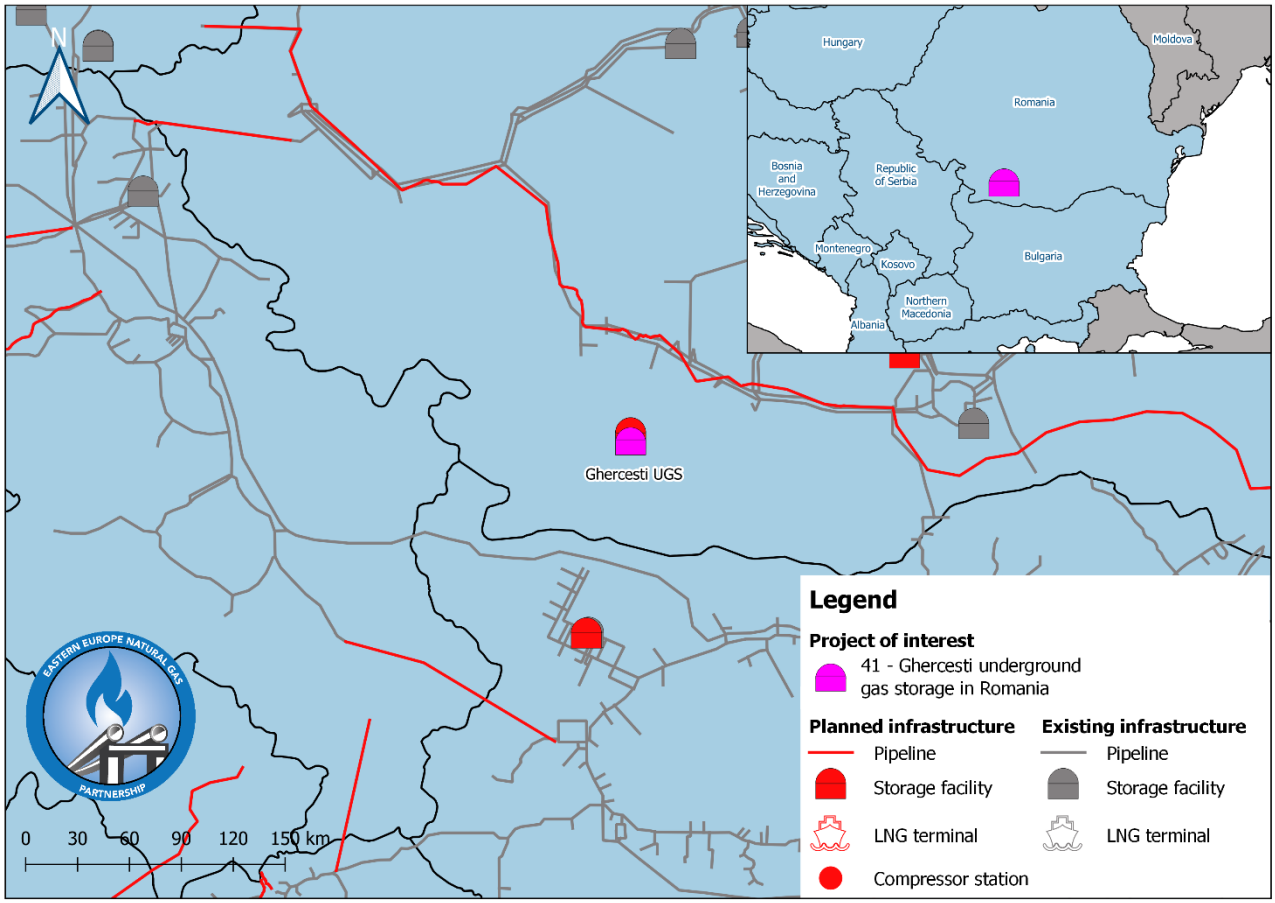
	Sarmasel underground gas storage in Romania
Project type	UGS facility
TYNDP code	UGS-N-371
PECI code	None
EIHP code	39
Country	Romania
Type	Depleted Field
Promoter	SNGN ROMGAZ SA - FILIALA DE INMAGAZINARE GAZE NATURALE DEPOGAZ PLOIESTI SRL
Maturity status	Less-Advanced
WGW (mcm)	650
Withdrawal capacity (mcm/d)	3
Injection Capacity (mcm/d)	4
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2024 / On time

Figure 39: South Kavala Underground Gas Storage facility



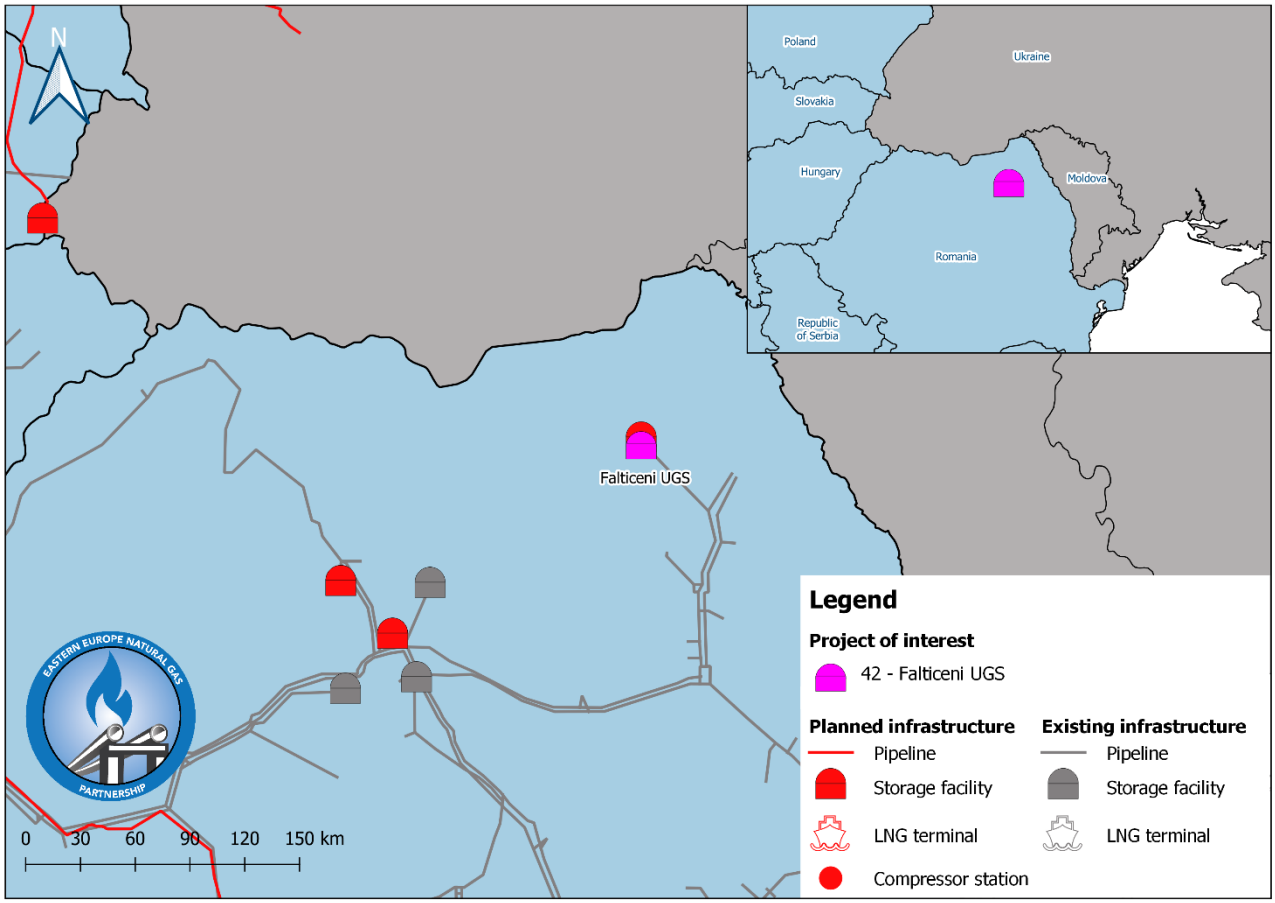
	South Kavala Underground Gas Storage facility
Project type	UGS facility
TYNDP code	UGS-N-385
PECI code	None
EIHP code	40
Country	*Greece*
Type	Depleted Field
Promoter	Hellenic Republic Asset Development Fund
Maturity status	Less-Advanced
WGW (mcm)	720
Withdrawal capacity (mcm/d)	8
Injection Capacity (mcm/d)	9
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2023 / Rescheduled

Figure 40: Ghercesti underground gas storage in Romania



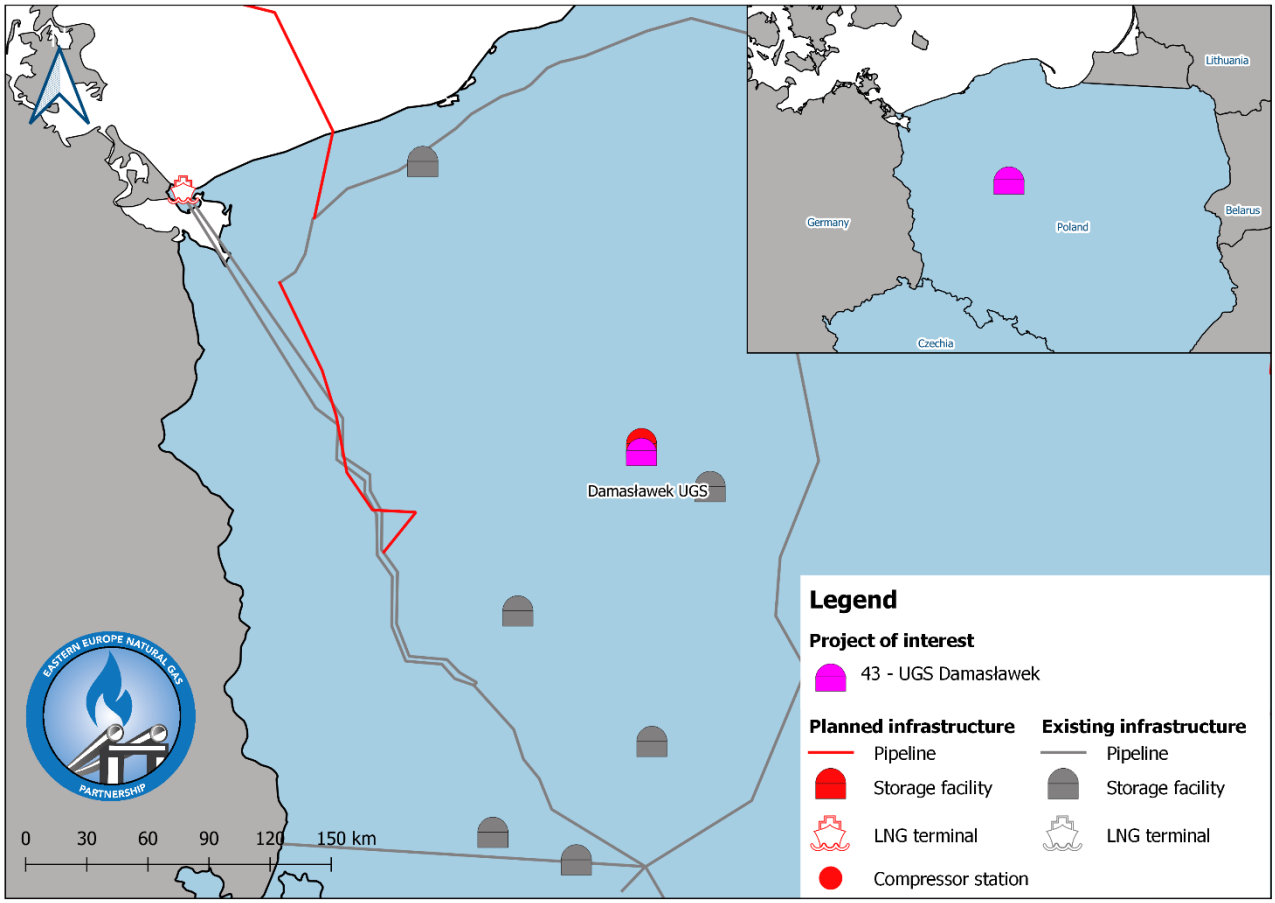
	Ghercesti underground gas storage in Romania
Project type	UGS facility
TYNDP code	UGS-N-398
PECI code	None
EIHP code	41
Country	Romania
Type	Depleted Field
Promoter	SNGN ROMGAZ SA - FILIALA DE INMAGAZINARE GAZE NATURALE DEPOGAZ PLOIESTI SRL
Maturity status	Less-Advanced
WGW (mcm)	450
Withdrawal capacity (mcm/d)	3
Injection Capacity (mcm/d)	
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2026 / Not applicable

Figure 41: Falticeni UGS



	Falticeni UGS
Project type	UGS facility
TYNDP code	UGS-N-399
PECI code	None
EIHP code	42
Country	Romania
Type	Depleted Field
Promoter	SNGN ROMGAZ SA - FILIALA DE INMAGAZINARE GAZE NATURALE DEPOGAZ PLOIESTI SRL
Maturity status	Less-Advanced
WGW (mcm)	200
Withdrawal capacity (mcm/d)	2
Injection Capacity (mcm/d)	1
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2029

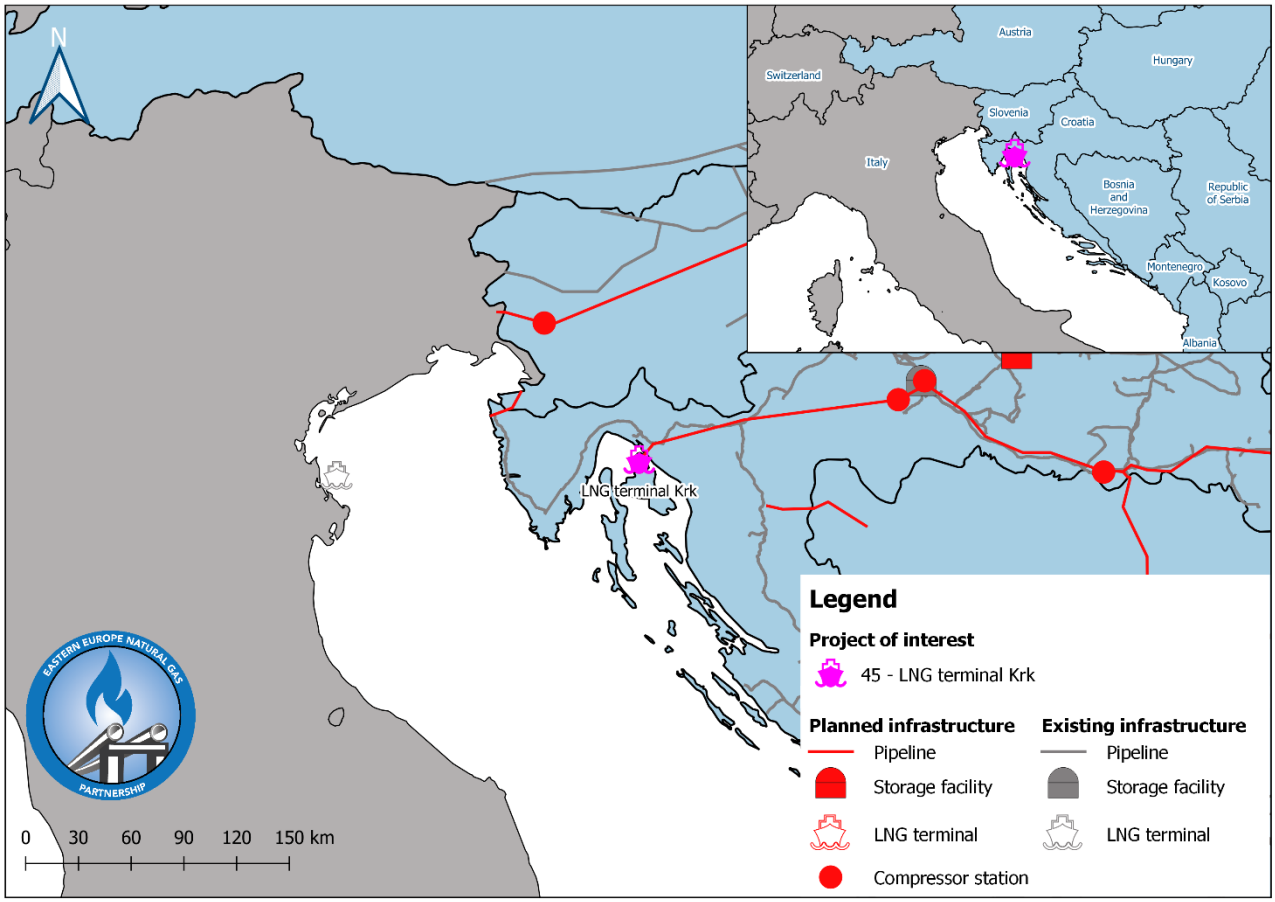
Figure 42: UGS Damasławek



	UGS Damasławek
Project type	UGS facility
TYNDP code	UGS-N-914
PECI code	None
EIHP code	43
Country	Poland
Type	Salt Cavern
Promoter	GAZ-SYSTEM S.A.
Maturity status	Less-Advanced
WGW (mcm)	800
Withdrawal capacity (mcm/d)	9
Injection Capacity (mcm/d)	18
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2026

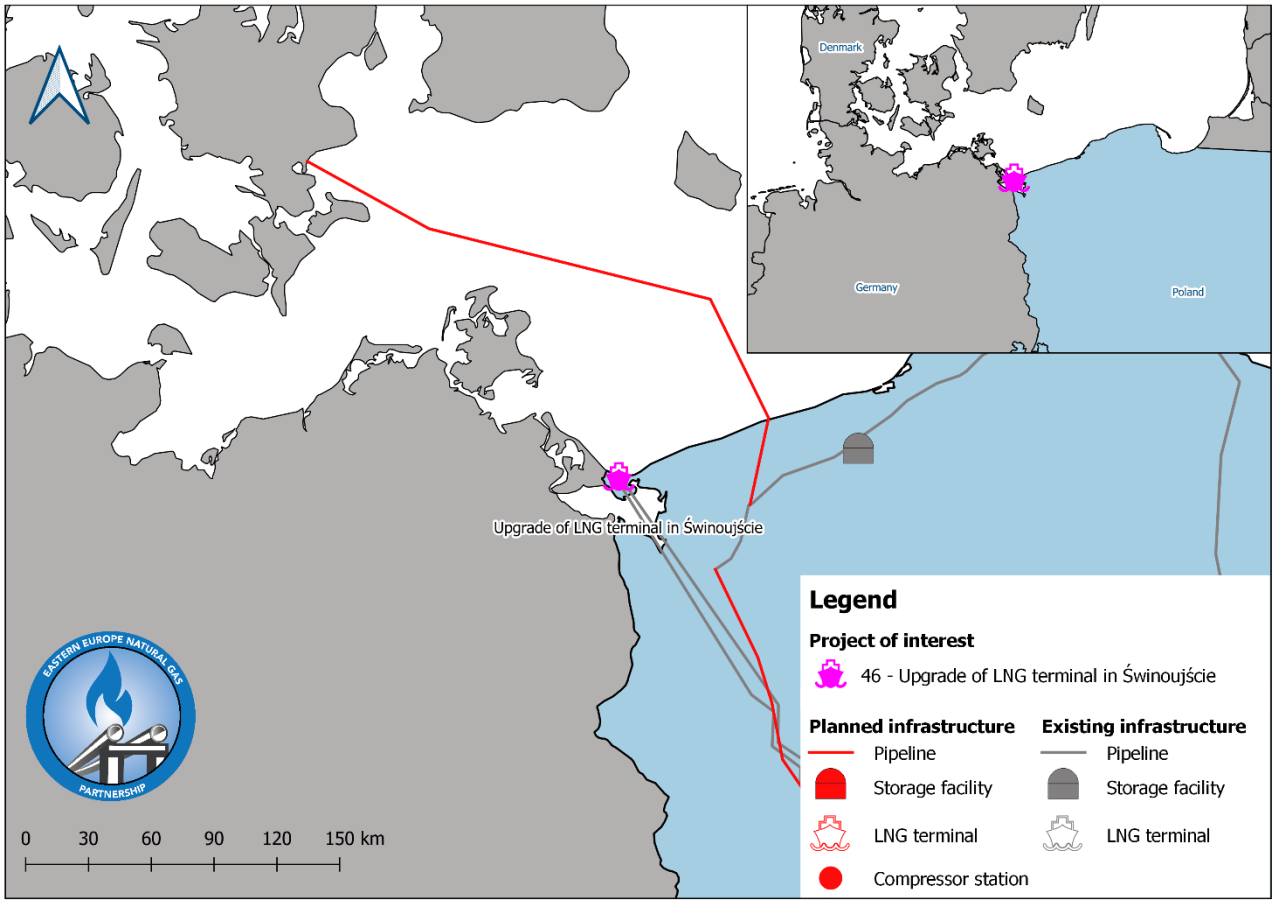
1.11 LNG terminal projects

Figure 43: LNG terminal Krk phase 2



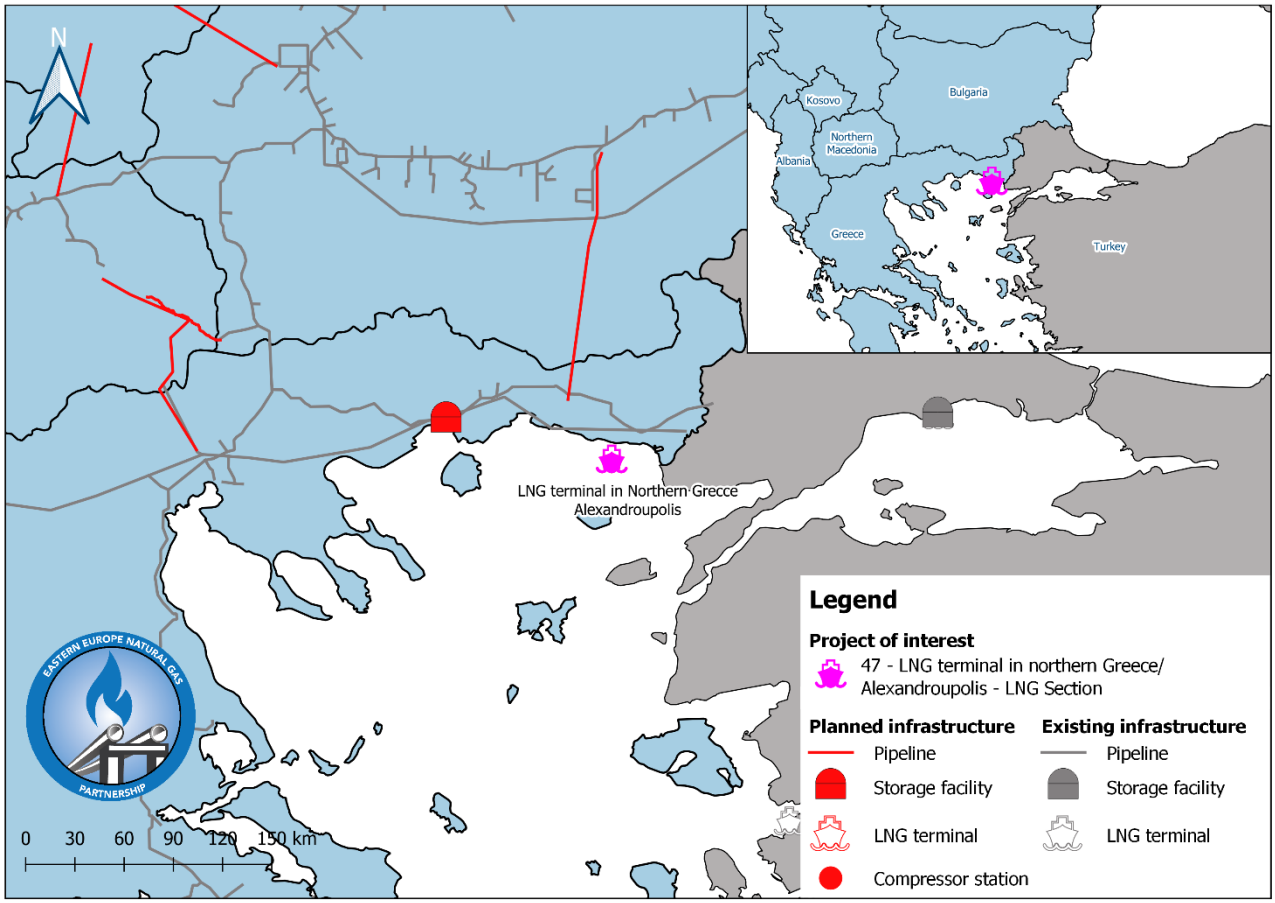
	LNG terminal Krk phase 2
Project type	LNG Terminal
TYNDP code	LNG-F-82
PECI code	None
EIHP code	45
Country	Croatia
Promoter	LNG Hrvatska d.o.o.
Maturity status	FID
Yearly volume (bcm/y)	4.4
Project storage capacity (m3 LNG)	120,000
CAPEX [mil. EUR]	146
OPEX [mil. EUR /yr]	
Commission / Schedule	2021 / Rescheduled

Figure 44: Upgrade of LNG terminal in Świnoujście



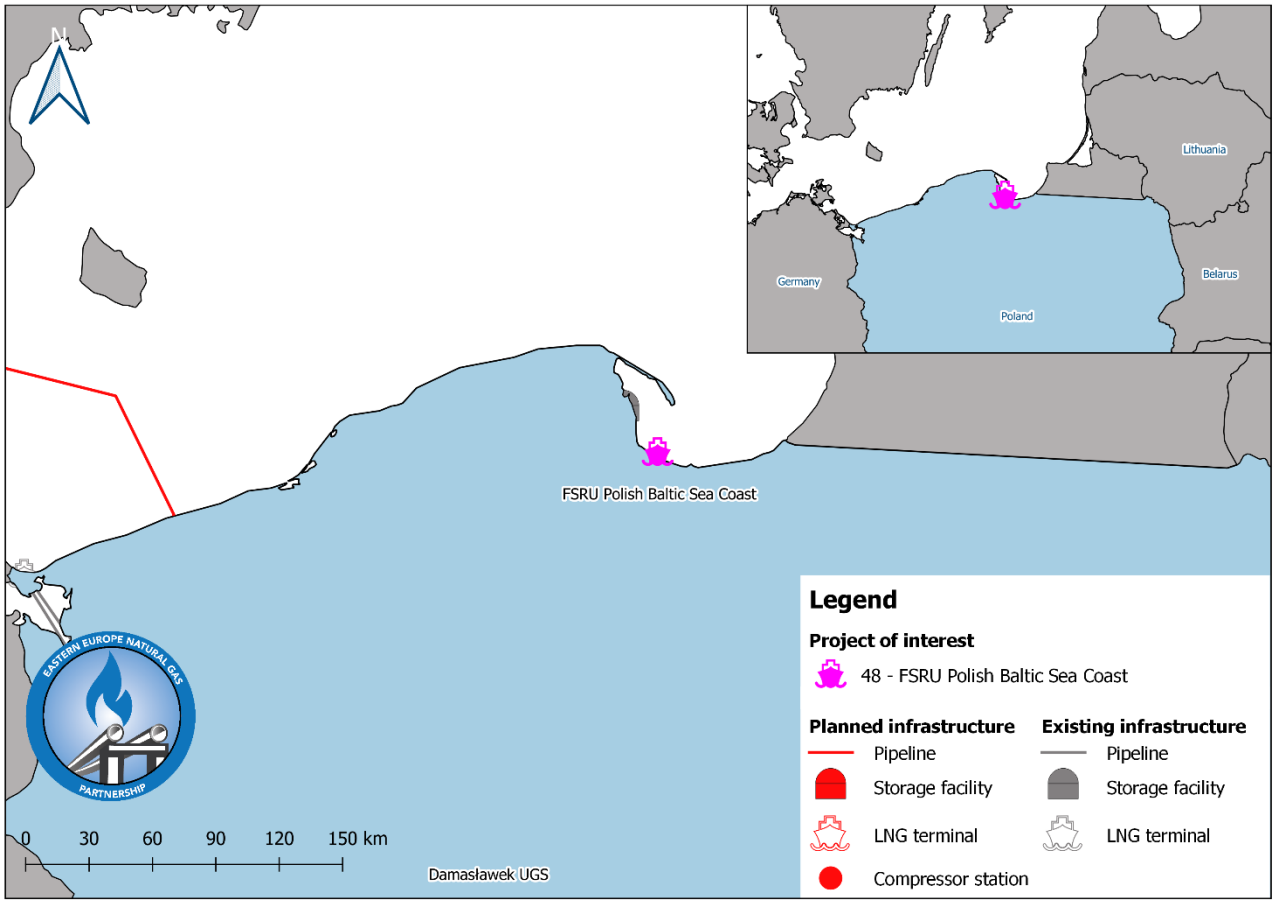
	Upgrade of LNG terminal in Świnoujście
Project type	LNG Terminal
TYNDP code	LNG-F-272
PECI code	None
EIHP code	46
Country	Poland
Promoter	GAZ-SYSTEM S.A.
Maturity status	FID
Yearly volume (bcm/y)	2.5
Project storage capacity (m3 LNG)	90,000
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2023 / On time

Figure 45: LNG Terminal Alexandroupolis



	LNG Terminal Alexandroupolis
Project type	LNG Terminal
TYNDP code	LNG-N-62
PECI code	None
EIHP code	47
Country	Greece
Promoter	Gastrade S.A.
Maturity status	Advanced
Yearly volume (bcm/y)	8.3
Project storage capacity (m3 LNG)	170,000
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2022 / Delayed

Figure 46: FSRU Polish Baltic Sea Coast



	FSRU Polish Baltic Sea Coast
Project type	LNG Terminal
TYNDP code	LNG-N-947
PECI code	None
EIHP code	48
Country	Poland
Promoter	GAZ-SYSTEM S.A.
Maturity status	Less-Advanced
Yearly volume (bcm/y)	4.5
Project storage capacity (m3 LNG)	170,000
CAPEX [mil. EUR]	
OPEX [mil. EUR /yr]	
Commission / Schedule	2025 / On time