

Before going through the content of each specific Project Fiche, please read the introduction document.

Project Group EAST_06a - IGB + IBS + Enabler Bulgaria

Reasons for grouping [ENTSO G]

The project group represents the Greece-Bulgaria interconnector (IGB) and the Bulgarian side of the Bulgaria-Serbia interconnector. Project TRA-F-298 enables the gas from IGB to further flow via the Bulgarian transmission system to the Bulgaria-Serbia interconnector.

Objective of the project(s) in the group [Promoter]

The objective of the group is to create an integrated, competitive and sustainable internal energy market within a region of the EU, every project being a milestone towards this objective. The group of projects aims at enhancing security of supply by securing additional volumes of natural gas in the region; contributing to diversification of entry routes and sources to the SEE region; improving market integration and reduce energy infrastructure bottlenecks; enhancing interoperability and system flexibility; enhancing competition, inter alia by introducing additional supply sources from the Caspian region, Middle East, East Mediterranean and LNG terminals (in Greece and/or Turkey).



Projects constituting the group

TYNDP Project Code	Project Name	Promoter	Hosting Country	Project Status	4th PCI List Code	First Comm. Year	Last Comm. Year	Compared to TYNP 2018
TRA-N-0137	Interconnection Bulgaria - Serbia	Bulgartransgaz EAD	BG	Less-Advanced	6.8.3	2022	2022	Delayed
TRA-F-0298	Modernization and rehabilitation of the Bulgarian GTS	Bulgartransgaz EAD	BG	FID	6.8.2	2021	2024	Delayed
TRA-F-0378	Interconnector Greece-Bulgaria (IGB Project)	ICGB AD	BG	FID	6.8.1	2020	2025	Delayed

Technical Information

TYNDP Project Code	Diameter [mm]	Length [km]	Compressor Power [MW]
TRA-F-0298	700	58	-
TRA-F-0298	700	19	20
TRA-F-0298	700	23	-
TRA-F-0298	1000	20	-
TRA-F-0378	813	182	12
TRA-N-0137	700	62	-
TRA-N-0137	700	108	-

Capacity Increment

The capacity increment values for each project are provided at all related Interconnection points (IP), both for “exit” and “entry” directions, being indicated the operator of the IP as well as the associated commissioning years of the capacity increments.

This information is presented in the table below and should be read per each line as follows: a certain project, TRA-N-123, can bring at a specific “Point Name” operated by “Operator X” an “exit” capacity increment “From System Y” “To System Z” which has associated an “Increment Commissioning Year”. Equally, for the same “Point Name” and operated by the same “Operator X”, an “entry” (reverse) capacity increment can be available to system “Y” from system “Z” which at its turn has associated an “Increment Commissioning Year”.

TYNDP Project Code	Point Name	Operator	From System	Exit Capacity [GWh/d]	Increment Comm. Year	To System	Entry Capacity [GWh/d]	Increment Comm. Year
TRA-F-298	Kulata (BG) / Sidirokastron (GR)	Bulgartransgaz EAD	Transmission Bulgarian Transit Bulgaria (GTNTT)	13.78	2021	Transmission Greece	-	-
TRA-F-298	Strandzha (BG) / Malkoclar (TR)	Bulgartransgaz EAD	Transmission Bulgarian Transit Bulgaria (GTNTT)	58.08	2021	Transmission Turkey (Exports)	-	-
TRA-F-298	Interconnector BG RS	IBS Future Operator	Transmission Bulgaria (NGTS)	19.36	2024	Transmission Serbia	19.36	2024
TRA-F-378	Stara Zagora - IGB / BG	ICGB a.d.	Transmission Interconnector Greece-Bulgaria	90	2020	Transmission Bulgaria (NGTS)	-	-
TRA-F-378	Stara Zagora - IGB / BG	ICGB a.d.	Transmission Interconnector Greece-Bulgaria	60	2025	Transmission Bulgaria (NGTS)	-	-
TRA-F-378	Komotini - TAP / IGB	ICGB a.d.	Transmission Trans-Adriatic Pipeline Greece	-	-	Transmission Interconnector Greece-Bulgaria	90	2020
TRA-F-378	Komotini (DESFA) - GR / IGB	ICGB a.d.	Transmission Greece (Komotini)	-	-	Transmission Interconnector Greece-Bulgaria	90	2020

TRA-F-378	Komotini - TAP / IGB	ICGB a.d.	Transmission Trans-Adriatic Pipeline Greece	-	-	Transmission Interconnector Greece-Bulgaria	60	2025
TRA-F-378	Komotini (DESFA) - GR / IGB	ICGB a.d.	Transmission Greece (Komotini)	-	-	Transmission Interconnector Greece-Bulgaria	60	2025
TRA-N-137	Interconnector BG RS	IBS Future Operator	Transmission Bulgaria (NGTS)	58.5	2022	Transmission Serbia	58.5	2022

B. Project Cost Information

During the TYNDP 2020 Project Data Collection, promoters were asked to indicate whether their costs were confidential or not. The following tables display the costs provided by the promoters (as of June 2019, end of TYNDP 2020 project collection). The amounts provided can differ from the figures used by the project promoters in other contexts, where costs can be updated and/or evaluated using different methodologies or assumptions. For the purposes of this project fiche, in case promoters identified their costs as confidential, alternative costs have been provided by the promoter. The alternative costs are identified with “*”.

	TRA-F-298	TRA-F-378	TRA-N-137	Total Cost
CAPEX [mln EUR]	339.59	240	48	627.59
OPEX [mln EUR/y]	4.55	4.5	1	10.05
Range CAPEX (%)	7	10	20	-
Range OPEX (%)	2	15	20	-

Description of costs and range [Promoter]

The CAPEX of TRA-F-0298 includes all the costs for the implementation of the projects until their commissioning, incl. FEED, supervision, construction works, delivery of materials, project management, publicity, etc. The OPEX figures are a preliminary estimation by the project promoter.

The CAPEX of TRA-N-137 includes the planned expenses for gas pipelines linear part and the following technological facilities: pigging facilities (PF), valve assemblies (VA), two automated gas regulating stations (AGRS) at Slivnitsa and Dragoman as well as a gas metering station (GMS) at Kalotina.

The TRA-F-378 CAPEX is expected to be EUR 240 mln, (excluding VAT) and includes all the costs related to the implementation of the project namely: line pipe, block valves, stations and related facilities (Gas metering/ Automated gas regulation / pigging station and etc.), construction and installation, as well as other facilities - cathodic protection, SCADA system, external infrastructure connections etc; Project management and supervision during construction; Archaeology, Land Acquisition, and all other expenses related to the development of the Project, prior construction start, as FEED, EIA and Permitting activities. All the tender procedures have been awarded and the contracts related to the construction activities are concluded. The construction started in November 2019 and a process of costs update is ongoing based on the actual evolution of the project during the construction. Please note, that the current CAPEX forecast does not include the potential upgrade in 2025 as it is subject to future market test results. The expected range of fluctuations in the CAPEX is around 10%. OPEX includes the following expenses: payroll; utilities; public services; hired and third-party services; expenditure for spare parts and materials and etc., the range of the OPEX is approx. 10 %.

C. Project Benefits

C.1 Summary of project benefits

This section provides a summarised analysis by ENTSG of the main benefits stemming from the realisation of the overall group and according to the guidelines included in the ENTSG 2nd CBA Methodology. More details on the indicators are available in sections D and E.

National Trends

Benefits explained (but Sustainability) [ENTSG]

> Security of Supply:

In Existing Infrastructure Level, the project **increases the Remaining Flexibility** in Bosnia and Herzegovina, Greece and Serbia in all climatic cases and in Hungary in Peak Day. In Low and Advanced infrastructure level, the projects group slightly improves the Remaining flexibility in Greece.

In Existing Infrastructure level, the projects group fully mitigates risk of demand curtailment in Serbia and in Bosnia and Herzegovina.

In the case of **SLID-Greece**, the project reduces the risk of demand curtailment in Greece in all infrastructure levels.

In the case of **SLID-Serbia**, the project mitigates the risk of demand curtailment in Serbia and Bosnia and Herzegovina in Existing infrastructure level and fully mitigates it in Low infrastructure level in 2025 and mitigates it in 2030 and 2040 (scenarios with high demand). In advanced infrastructure level, there is not risk of demand curtailment.

> Competition:

The projects group **improves the diversification of capacities** (LICD indicator) in entry in Bulgaria and Serbia.

The projects group **decreases the dependence of Russian gas** for Bosnia and Herzegovina and Serbia in Low and Advanced infrastructure levels improving the cooperation the region. Also, it decreases the dependence for Bulgaria, Romania and North Macedonia in Low infrastructure level thanks to the consideration in this level of TAP project.

Depending on the infrastructure level considered, **the projects group also increases the number of supply sources** that Bosnia and Herzegovina, Bulgaria, Greece, Hungary, Serbia, Slovakia, North Macedonia have access to. Thanks to the realization of the project the South East region improves the access mainly to Azeri gas and LNG. As well, the project increases the cooperation among the countries and allows to Romania sharing the National Production with the neighbouring countries.

> Market integration:

The project group brings benefits in monetised terms as a reduction of the cost of gas supply. In the reference supply price configuration this can be estimated around 26 Mln EUR/y (on average) in the Existing infrastructure level. Such benefits are driven by the fact that the project allows Europe (especially Greece-Bulgaria-Serbia) to connect to new supply sources from the South. These benefits are lower in Low (19.5 MlnEUR/y on average) and in Advanced infrastructure level (18 Mln EUR/y on average) where, given TYNDP 2020 supply potential available from Southern sources, more projects can share such supply potential to Europe.

Additional benefits compared to the reference situation can be observed in case Southern gas cheaper than the other sources thanks to the new supply source diversification (36 Mln EUR/y on average in LOW infrastructure level).

The project group establishes **bidirectionality** between Bulgaria and Serbia achieving 100% (from 0%).

Distributed Energy

Benefits explained (but Sustainability) [ENTSOG]

> Security of Supply:

The project **increases the Remaining Flexibility** in Bosnia Herzegovina and Serbia in Existing infrastructure level. In Low and Advanced infrastructure level, the projects group slightly improves the Remaining flexibility in Greece.

The project **fully mitigates the risk of demand curtailment** in Bosnia Herzegovina and in Serbia in Existing infrastructure level in 2-Week cold Spell and in 2-Week Dunkelflaute. In Peak day the risk of demand curtailment is fully mitigated in 2025 and mitigated in 2030. In 2040 Bosnia and Herzegovina does not face to risk of demand curtailment and the projects group mitigates risk of demand curtailment in Serbia.

> Competition:

The project group **improves the diversification of capacities** (LICD indicator) in entry in Bulgaria and Serbia.

The project group **decreases the dependence of Russian gas** for Bosnia and Herzegovina and Serbia in Existing and Low infrastructure levels improving the cooperation the region. Also, it decreases the dependence for Bulgaria, Romania and North Macedonia in Low infrastructure level thanks to the consideration in this level of TAP project. The realization of other projects in the area do not allows the project to reduce more the dependence in 2030 but in 2040 no country has dependency of Russian gas (only Romania for 6%) thanks to the high National Production considered in this scenario.

Depending on the infrastructure level considered, **the project group also increases the number of supply sources** that Bosnia Herzegovina, Bulgaria, Romania, Serbia and North Macedonia have access to. Thanks to the realization of the project the South East region improves the access mainly to Azeri gas and LNG supply (in Low infrastructure level). As well, the project increases the cooperation among the countries and allows to Romania sharing the National Production with the neighbouring countries.

> Market integration:

The project group brings benefits in monetised terms as a reduction of the cost of gas supply. In the reference supply price configuration this can be estimated around 22.5 MlnEUR/y (on average) in the Existing infrastructure level. Such benefits are driven by the fact that the project allows Europe (especially Greece-Bulgaria-Serbia) to connect to new supply sources from the South. These benefits are lower in Low (13 MlnEUR/y on average) and in Advanced infrastructure level (11 MlnEUR/y on average) where, given TYNDP 2020 supply potential available from Southern sources, more projects can share such supply potential to Europe.

Additional benefits compared to the reference situation can be observed in case Southern gas cheaper than the other sources thanks to the new supply source diversification (around 23.5 Mln EUR/y on average in LOW infrastructure level).

The project group establishes **bidirectionality** between Bulgaria and Serbia achieving 100% (from 0%).

Global Ambition

Benefits explained (but Sustainability) [ENTSOG]

> Security of Supply:

The project group **increases the Remaining Flexibility** in Bosnia Herzegovina, Serbia and Greece in Existing infrastructure level in all climatic cases and in Hungary in Peak Day. In Low and Advanced infrastructure level, the projects group slightly improves the Remaining flexibility in Greece.

The project **fully mitigates the risk of demand curtailment** in Bosnia Herzegovina and in Serbia in Existing infrastructure level in 2-Week cold Spell and in 2-Week Dunkelflaute. In Peak day the risk of demand curtailment is fully mitigated in 2025 and mitigated in 2030. In 2040 Bosnia and Herzegovina does not face to risk of demand curtailment and the projects group mitigates risk of demand curtailment in Serbia.

In the case of **SLID-Serbia**, the projects group mitigates the risk of demand curtailment in Serbia and Bosnia and Herzegovina in Existing and Low infrastructure level. In advanced infrastructure level, there is not risk of demand curtailment.

> Competition:

The project group **improves the diversification of capacities** (LICD indicator) in entry in Bulgaria and Serbia.

The project group **decreases the dependence of Russian gas** for Bosnia and Herzegovina and Serbia in Existing and Low infrastructure levels improving the cooperation the region. Also, it decreases the dependence for Bulgaria, Romania and North Macedonia in Low infrastructure level thanks to the consideration in this level of TAP project. In Advanced infrastructure level, the realization of other projects in the area do not allow the project to reduce more the dependence.

Depending on the infrastructure level considered, **the project group also increases the number of supply sources** that Bosnia Herzegovina, Bulgaria, Greece, Romania, Serbia and North Macedonia have access to. Thanks to the realization of the project the South East region improves the access mainly to Azeri gas and LNG supply (in Low infrastructure level). As well, the project increases the cooperation among the countries and allows Romania sharing the National Production with the neighbouring countries in Existing infrastructure level (in Low already all countries have access to National Production).

> Market integration:

The project group brings benefits in monetised terms as a reduction of the cost of gas supply. In the reference supply price configuration this can be estimated around 26 MlnEUR/y (on average) in the Existing infrastructure level. Such benefits are driven by the fact that the project allows Europe (especially Greece-Bulgaria-Serbia) to connect to new supply sources from the South. These benefits are lower in Low (19 MlnEUR/y on average) and in Advanced infrastructure level (13 MEUR/y on average) where, given the TYNDP 2020 supply potential available from Southern sources, more projects can share such supply potential to Europe.

Additional benefits compared to the reference situation can be observed in case Southern gas cheaper than the other sources thanks to the new supply source diversification (29.5 MlnEUR/y on average in LOW infrastructure level).

The project group establishes **bidirectionality** between Bulgaria and Serbia achieving 100% (from 0%).

Sustainability benefits explained [ENTSOE]

The ENTSOG analysis shows that, in the yearly assessment, the realization of the project group will help expand the use of natural gas for domestic and industrial needs in the region, thus reducing the emissions of harmful substances in the atmosphere as a result of replacing the use of conventional fuels, mostly in 2025. The project group will enable fuel switch savings between 0.2-2.5 MEUR/y under existing infrastructure level and up to 0.6 MEUR/y under low infrastructure level. The table below shows the related reduction in terms of CO₂eq/y for each scenario and infrastructure level and over the 25-years assessment period of the project group. The contribution of the project group to the CO₂eq/y emissions (positive number indicate reduction in CO₂eq/y emissions) is also displayed for the three simulation configurations that consider different level of tariffs for the project group.

Sustainability		EXISTING			LOW			ADVANCED		
CO ₂ and Other externalities (KtCO ₂ eq/y)	Reference	43 / 63	25 / 46	8 / 30	-1 / 5	3 / 13	1 / 10	0 / 6	-3 / 11	-3 / 12
	Lower Tariff Sensitivity	44 / 64	25 / 47	8 / 31	-2 / 12	5 / 17	0 / 14	0 / 0	-23 / 0	-24 / 0
	Higher Tariff Sensitivity	43 / 63	25 / 46	8 / 30	0 / 1	0 / 0	1 / 5	-67 / -26	-22 / 1	-24 / 0

The minimum and the maximum values displayed in the table above refer respectively to the CO₂eq/y savings in case emissions from the additional gas demand increase not replacing other more polluting fuels are counted in the overall CO₂eq emissions assessment or they are considered neutral. For more information, please consult the Project Fiche introduction document and the TYNDP 2020 Annex D.

Savings have been allocated to the project group based on the flows resulting from ENSTOG simulations under the reference supply price configurations and according to the methodology described in TYNDP 2020 Annex D. Such methodology is also based on the assumption that the use of the infrastructures already included in the different infrastructure levels (versus which the project group is assessed) is always prioritised. Therefore, the highest contribution of the project is observed under the existing infrastructure level.

Most of the savings are observed in Bulgaria and Serbia.

Sustainability benefits explained [Project Promoter]

No additional benefits were provided by promoters.

C.2 Quantitative benefits [ENTSOG]

The following tables display all the benefits quantified by ENTSOG through specific indicators and stemming from the realisation of the considered project group. Some of those benefits are measured through quantitative indicators (i.e. SLID and Curtailment rate) and monetised ex-post. Their monetised value is displayed in section E. When assessing those type of benefits, it is important to avoid any double counting considering them both in quantitative and monetised terms.

EXISTING Infrastructure Level – National Trends

Sum of Value		Column Labels											
		2025			2030			2040					
Row Labels		CBG	GBC			NT			NT				
		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
Bosnia Herzegovina		2	3	1	2	3	1	2	3	1			
Serbia		2	3	1	2	3	1	2	3	1			
LNG and Interconnection Capacity Diversification (LICD)													
Bulgaria		10,000	6,530	-3,470	10,000	6,530	-3,470	10,000	6,530	-3,470	10,000	6,530	-3,470
Serbia		10,000	5,007	-4,993	10,000	5,007	-4,993	10,000	5,082	-4,918	10,000	5,086	-4,914
MASD-RU													
Bosnia Herzegovina		44%	39%	-5%	46%	40%	-6%						
Serbia		44%	39%	-5%	46%	40%	-6%						
Security of Supply													
Curtailment Rate 2-Week Cold Spell (%)													
Bosnia Herzegovina		-8%	0%	8%	-8%	0%	8%	-18%	0%	18%	-14%	0%	14%
Serbia		-7%	0%	7%	-7%	0%	7%	-18%	0%	18%	-13%	0%	13%
Curtailment Rate 2-Week Cold Spell (%) --- DF													
Bosnia Herzegovina		-8%	0%	8%	-8%	0%	8%	-18%	0%	18%	-14%	0%	14%
Serbia		-7%	0%	7%	-7%	0%	7%	-18%	0%	18%	-13%	0%	13%
Curtailment Rate Peak Day (%)													
Bosnia Herzegovina		-18%	0%	18%	-18%	0%	18%	-36%	-27%	9%			
Serbia		-17%	0%	17%	-17%	0%	17%	-34%	-2%	32%	-36%	-3%	33%
Remaining Flexibility 2-Week Cold Spell (%)													
Bosnia Herzegovina		0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	54%	54%
Greece					42%	45%	2%	67%	69%	2%	51%	53%	2%
Serbia		0%	35%	35%	0%	35%	35%	0%	20%	20%	0%	28%	28%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
Bosnia Herzegovina		0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	47%	47%
Greece					36%	38%	2%	34%	36%	2%	28%	30%	2%
Serbia		0%	35%	35%	0%	35%	35%	0%	20%	20%	0%	28%	28%
Remaining Flexibility Peak day (%)													
Bosnia Herzegovina		0%	94%	94%	0%	94%	94%						
Greece		47%	49%	2%	20%	22%	2%	26%	28%	2%	22%	24%	2%
Hungary		72%	77%	5%	64%	69%	5%						
Serbia		0%	21%	21%	0%	21%	21%						
Single Largest Infrastructure Disruption (SLID)-Serbia													
Bosnia Herzegovina		86%	48%	-38%	86%	48%	-38%	90%	60%	-30%	90%	62%	-28%
Serbia		84%	47%	-37%	84%	47%	-37%	88%	59%	-30%	89%	60%	-29%
Market Integration													
Bi-directionality - Country													
BGn <=> RS		0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

LOW Infrastructure Level – National Trends

Sum of Value		Column Labels											
		2025			2030			2040					
		CBG			GBC			NT			NT		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bosnia Herzegovina	2	3	1	2	3	1	2	3	1	2	3	1
	Bulgaria	1	3	2	1	3	2	1	3	2	1	2	1
	North Noth Macedonia	1	2	1	1	2	1	1	2	1			
	Romania							2	3	1	1	2	1
	Serbia	2	3	1	2	3	1	2	3	1	2	3	1
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10,000	5,411	-4,589	10,000	5,411	-4,589	10,000	5,411	-4,589	10,000	5,411	-4,589
	Serbia	10,000	5,007	-4,993	10,000	5,007	-4,993	10,000	5,082	-4,918	10,000	5,086	-4,914
MASD-RU													
	Bosnia Herzegovina	31%	23%	-8%	34%	27%	-7%	32%	12%	-20%	32%	13%	-19%
	Bulgaria	31%	23%	-8%	34%	27%	-7%	32%	12%	-20%	32%	13%	-19%
	North Noth Macedonia	31%	23%	-8%	34%	27%	-7%	32%	12%	-20%	32%	13%	-19%
	Romania	30%	24%	-7%	33%	27%	-6%						
	Serbia	31%	23%	-8%	34%	27%	-7%	32%	12%	-20%	32%	13%	-19%
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Greece				74%	76%	2%				84%	86%	2%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
Remaining Flexibility Peak day (%)													
	Greece	79%	82%	2%	46%	48%	2%	54%	56%	2%	49%	51%	2%
Single Largest Infrastructure Disruption (SLID)-Greece													
	Greece	2%	0%	-2%	20%	18%	-2%	16%	14%	-2%	18%	16%	-2%
Single Largest Infrastructure Disruption (SLID)-Serbia													
	Bosnia Herzegovina	18%	0%	-18%	18%	0%	-18%	36%	27%	-9%			
	Serbia	17%	0%	-17%	17%	0%	-17%	34%	2%	-32%	36%	3%	-33%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

ADVANCED Infrastructure Level – National Trends

Sum of Value		Column Labels											
		2025			2030			2040					
		CBG			GBC			NT			NT		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bulgaria	3	4	1	3	4	1						
	Greece	3	4	1	3	4	1						
	North Noth Macedonia	3	4	1									
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10,000	5,411	-4,589	10,000	5,411	-4,589	5,782	3,666	-2,115	5,741	3,648	-2,093
	Serbia	3,688	2,718	-969	3,692	2,720	-972	3,931	2,823	-1,108	3,940	2,828	-1,113
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Greece				74%	76%	2%				66%	69%	2%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Greece				66%	68%	2%	60%	62%	2%	36%	37%	2%
Remaining Flexibility Peak day (%)													
	Greece	79%	82%	2%	46%	48%	2%	49%	51%	2%	28%	30%	2%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

EXISTING Infrastructure Level – Distributed Energy

Sum of Value		Column Labels											
		2025			2030			2040					
		CBG			GBC			DE			DE		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bosnia Herzegovina	2	3	1	2	3	1	2	3	1			
	Serbia	2	3	1	2	3	1	2	3	1			
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10000	6530	-3470	10000	6530	-3470	10000	6530	-3470	10000	6530	-3470
	Serbia	10000	5007	-4993	10000	5007	-4993	10000	5082	-4918	10000	5086	-4914
MASD-RU													
	Bosnia Herzegovina	44%	39%	-5%	46%	40%	-6%	42%	32%	-10%			
	Hungary										23%	20%	-3%
	Serbia	44%	39%	-5%	46%	40%	-6%	42%	32%	-10%			
Security of Supply													
Curtailment Rate 2-Week Cold Spell (%)													
	Bosnia Herzegovina	-8%	0%	8%	-8%	0%	8%	-18%	0%	18%	-20%	0%	20%
	Serbia	-7%	0%	7%	-7%	0%	7%	-17%	0%	17%	-19%	0%	19%
Curtailment Rate 2-Week Cold Spell (%) --- DF													
	Bosnia Herzegovina	-8%	0%	8%	-8%	0%	8%	-18%	0%	18%	-20%	0%	20%
	Serbia	-7%	0%	7%	-7%	0%	7%	-17%	0%	17%	-19%	0%	19%
Curtailment Rate Peak Day (%)													
	Bosnia Herzegovina	-18%	0%	18%	-18%	0%	18%	-36%	-27%	9%			
	Serbia	-17%	0%	17%	-17%	0%	17%	-34%	-2%	32%	-36%	-3%	33%
Remaining Flexibility 2-Week Cold Spell (%)													
	Bosnia Herzegovina	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	54%	54%
	Greece				42%	45%	2%	16%	18%	2%			
	Serbia	0%	35%	35%	0%	35%	35%	0%	22%	22%	0%	19%	19%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Bosnia Herzegovina	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	47%	47%
	Greece				36%	38%	2%	6%	7%	1%	26%	28%	2%
	Serbia	0%	35%	35%	0%	35%	35%	0%	22%	22%	0%	18%	18%
Remaining Flexibility Peak day (%)													
	Bosnia Herzegovina	0%	94%	94%	0%	94%	94%						
	Greece	47%	49%	2%	20%	22%	2%	5%	7%	1%	47%	48%	2%
	Hungary	72%	77%	5%	64%	69%	5%						
	Romania							85%	86%	1%	68%	69%	1%
	Serbia	0%	21%	21%	0%	21%	21%						
Single Largest Infrastructure Disruption (SLID)-Serbia													
	Bosnia Herzegovina	86%	48%	-38%	86%	48%	-38%	90%	60%	-30%	90%	62%	-28%
	Serbia	84%	47%	-37%	84%	47%	-37%	88%	59%	-30%	89%	60%	-29%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

LOW Infrastructure Level – Distributed Energy

Sum of Value		Column Labels											
		2025						2030			2040		
		CBG			GBC			DE			DE		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bosnia Herzegovina	2	3	1	2	3	1	3	4	1	3	4	1
	Bulgaria	1	3	2	1	3	2	2	3	1	2	4	2
	Estonia										3	4	1
	Latvia										3	4	1
	North Noth Macedonia	1	2	1	1	2	1				3	4	1
	Romania							3	4	1	2	4	2
	Serbia	2	3	1	2	3	1	3	4	1	3	4	1
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10000	5411	-4589	10000	5411	-4589	10000	5411	-4589	10000	5411	-4589
	Serbia	10000	5007	-4993	10000	5007	-4993	10000	5082	-4918	10000	5086	-4914
MASD-RU													
	Bosnia Herzegovina	31%	23%	-8%	34%	27%	-7%	29%	16%	-13%	9%	0%	-9%
	Bulgaria	31%	23%	-8%	34%	27%	-7%	29%	15%	-14%	9%	0%	-9%
	North Noth Macedonia	31%	23%	-8%	34%	27%	-7%	29%	16%	-13%	9%	0%	-9%
	Romania	30%	24%	-7%	33%	27%	-6%	29%	16%	-13%	9%	6%	-3%
	Serbia	31%	23%	-8%	34%	27%	-7%	29%	15%	-14%	9%	0%	-9%
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Greece				74%	76%	2%	39%	41%	2%			
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Greece				66%	68%	2%	28%	29%	1%	50%	52%	2%
Remaining Flexibility Peak day (%)													
	Greece	79%	82%	2%	46%	48%	2%	26%	28%	1%	70%	72%	2%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

ADVANCED Infrastructure Level – Distributed Energy

Sum of Value		Column Labels											
		2025			2030			2040					
		CBG			GBC			DE			DE		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bosnia Herzegovina										4	5	1
	Bulgaria	3	4	1	3	4	1				4	5	1
	Greece	3	4	1	3	4	1						
	North Noth Macedonia	3	4	1							4	5	1
	Romania										4	5	1
	Serbia										4	5	1
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10000	5411	-4589	10000	5411	-4589	5548	3574	-1974	5653	3612	-2041
	Serbia	3688	2718	-969	3692	2720	-972	3931	2823	-1108	3940	2828	-1113
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Greece				74%	76%	2%	37%	39%	2%			
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Greece				66%	68%	2%	25%	26%	1%	33%	34%	2%
Remaining Flexibility Peak day (%)													
	Greece	79%	82%	2%	46%	48%	2%	23%	24%	1%	52%	54%	2%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

EXISTING Infrastructure Level – Global Ambition

Sum of Value		Column Labels											
		2025			2030			2040					
		CBG			GBC			GA			GA		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bosnia Herzegovina	2	3	1	2	3	1	2	3	1	2	3	1
	Serbia	2	3	1	2	3	1	2	3	1	2	3	1
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10,000	6,530	-3,470	10,000	6,530	-3,470	10,000	6,530	-3,470	10,000	6,530	-3,470
	Serbia	10,000	5,007	-4,993	10,000	5,007	-4,993	10,000	5,082	-4,918	10,000	5,086	-4,914
MASD-RU													
	Bosnia Herzegovina	44%	39%	-5%	46%	40%	-6%	48%	39%	-9%	42%	38%	-4%
	Serbia	44%	39%	-5%	46%	40%	-6%	48%	39%	-9%	42%	38%	-4%
Security of Supply													
Curtailment Rate 2-Week Cold Spell (%)													
	Bosnia Herzegovina	-8%	0%	8%	-8%	0%	8%	-24%	0%	24%	-26%	0%	26%
	Serbia	-7%	0%	7%	-7%	0%	7%	-23%	0%	23%	-25%	0%	25%
Curtailment Rate 2-Week Cold Spell (%) --- DF													
	Bosnia Herzegovina	-8%	0%	8%	-8%	0%	8%	-24%	0%	24%	-26%	0%	26%
	Serbia	-7%	0%	7%	-7%	0%	7%	-23%	0%	23%	-25%	0%	25%
Curtailment Rate Peak Day (%)													
	Bosnia Herzegovina	-18%	0%	18%	-18%	0%	18%	-36%	-27%	9%			
	Serbia	-17%	0%	17%	-17%	0%	17%	-34%	-2%	32%	-36%	-3%	33%
Remaining Flexibility 2-Week Cold Spell (%)													
	Bosnia Herzegovina	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	54%	54%
	Greece				42%	45%	2%	2%	4%	1%	30%	32%	2%
	Serbia	0%	35%	35%	0%	35%	35%	0%	13%	13%	0%	10%	10%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Bosnia Herzegovina	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	47%	47%
	Greece				36%	38%	2%				3%	5%	1%
	Serbia	0%	35%	35%	0%	35%	35%	0%	13%	13%	0%	10%	10%
Remaining Flexibility Peak day (%)													
	Bosnia Herzegovina	0%	94%	94%	0%	94%	94%						
	Greece	47%	49%	2%	20%	22%	2%				1%	2%	1%
	Hungary	72%	77%	5%	64%	69%	5%						
	Serbia	0%	21%	21%	0%	21%	21%						
Single Largest Infrastructure Disruption (SLID)-Serbia													
	Bosnia Herzegovina	86%	48%	-38%	86%	48%	-38%	90%	60%	-30%	90%	62%	-28%
	Serbia	84%	47%	-37%	84%	47%	-37%	88%	59%	-30%	89%	60%	-29%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

LOW Infrastructure Level – Global Ambition

Sum of Value		Column Labels											
		2025						2030			2040		
		CBG			GBC			GA			GA		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bosnia Herzegovina	2	3	1	2	3	1	3	4	1	3	4	1
	Bulgaria	1	3	2	1	3	2	2	3	1	2	4	2
	North Noth Macedonia	1	2	1	1	2	1				2	3	1
	Romania							2	3	1	2	4	2
	Serbia	2	3	1	2	3	1	3	4	1	3	4	1
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10,000	5,411	-4,589	10,000	5,411	-4,589	10,000	5,411	-4,589	10,000	5,411	-4,589
	Serbia	10,000	5,007	-4,993	10,000	5,007	-4,993	10,000	5,082	-4,918	10,000	5,086	-4,914
MASD-RU													
	Bosnia Herzegovina	31%	23%	-8%	34%	27%	-7%	34%	26%	-8%	28%	7%	-21%
	Bulgaria	31%	23%	-8%	34%	27%	-7%	34%	26%	-8%	28%	7%	-21%
	North Noth Macedonia	31%	23%	-8%	34%	27%	-7%	34%	27%	-7%	28%	7%	-21%
	Romania	30%	24%	-7%	33%	27%	-6%	34%	27%	-7%			
	Serbia	31%	23%	-8%	34%	27%	-7%	34%	26%	-8%	28%	7%	-21%
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Greece				74%	76%	2%	23%	25%	1%	54%	56%	2%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Greece				66%	68%	2%	9%	11%	1%	24%	25%	1%
Remaining Flexibility Peak day (%)													
	Greece	79%	82%	2%	46%	48%	2%				19%	21%	1%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

ADVANCED Infrastructure Level – Global Ambition

Sum of Value		Column Labels											
		2025			2030			2040					
		CBG			GBC			GA			GA		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Bulgaria	3	4	1	3	4	1						
	Greece	3	4	1	3	4	1						
	North Noth Macedonia	3	4	1									
LNG and Interconnection Capacity Diversification (LICD)													
	Bulgaria	10,000	5,411	-4,589	10,000	5,411	-4,589	5,574	3,583	-1,991	5,640	3,607	-2,033
	Serbia	3,688	2,718	-969	3,692	2,720	-972	3,931	2,823	-1,108	3,940	2,828	-1,113
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Greece				74%	76%	2%	22%	23%	1%	41%	43%	2%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Greece				66%	68%	2%	7%	8%	1%	9%	10%	1%
	North Noth Macedonia							97%	100%	3%			
Remaining Flexibility Peak day (%)													
	Greece	79%	82%	2%	46%	48%	2%				5%	6%	1%
Market Integration													
Bi-directionality - Country													
	BGn <=> RS	0%	100%	100%	0%	100%	100%	0%	100%	100%	0%	100%	100%

C.3 Monetised benefits [ENTSOG]

This section includes all benefits stemming from the realisation of a project that are quantified and monetised. Some benefits are monetised ex-post while others directly as a result of the simulations and are impacted by the modelling assumptions chosen (e.g. tariffs or supply price assumptions). Monetised benefits are showed at EU level. In order to keep the results in a manageable number, those have been aggregated per Infrastructure Level and Demand Scenarios. In line with the CBA Methodology, promoters could provide additional benefits related to Sustainability or Gasification. In the tables below these benefits are displayed separately from the ones computed directly by ENTSG and are labelled as “(Promoter)”. More information on how to read the data in this section is provided in the Introduction Document.

		EXISTING			LOW			ADVANCED		
Benefits (Meur/year)		NATIONAL TRENDS	DISTRIBUTED ENERGY	GLOBAL AMBITION	NATIONAL TRENDS	DISTRIBUTED ENERGY	GLOBAL AMBITION	NATIONAL TRENDS	DISTRIBUTED ENERGY	GLOBAL AMBITION
EU Bill benefits	Reference Supply	26.3	22.6	26.3	19.5	13.2	19.1	17.8	11.0	13.4
	With Tariffs	26.8	24.1	26.4	35.6	23.6	29.5	30.5	24.0	23.6
Security of Supply	Design Case	4.4	4.4	4.5	1.9	1.9	2.0	0.0	0.0	0.2
	2-weeks Cold Spell	10.5	12.4	16.9	0.0	0.0	0.0	0.0	0.0	0.0
	2-weeks Cold Spell DF	10.6	13.4	17.7	0.0	0.0	0.0	0.0	0.0	0.0
Sustainability	CO2 and Other externalities savings	1.8 / 2.5	0.7 / 2	0.2 / 1.2	0 / 0.2	0.4 / 1	0.2 / 0.6	0 / 0.2	0 / 0.7	0.1 / 0.8
	Additional benefit (Promoter)	0	0	0	0	0	0	0	0	0

Comparison between the assessed SCENARIOS

ENTSOG runs the assessment for 5-year-rounded years (2020, 2025, 2030 and 2040) and interpolates these results to compute the benefits for the 25-years economic lifetime of projects. The following tables show the benefits as computed in the specific assessment years.

Year of assessment		2020									2025								
		EXISTING			LOW			ADVANCED			EXISTING			LOW			ADVANCED		
Benefits (Meur/year)		NT	DE	GA	NT	DE	GA	NT	DE	GA	NT	DE	GA	NT	DE	GA	NT	DE	GA
EU Bill benefits With Tariffs	Reference Supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.4	27.4	27.4	20.1	20.1	20.1	19.2	19.2	19.2
	Supply Maximization	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.5	27.5	27.5	31.6	31.6	31.6	49.1	49.1	49.1
Security of Supply	Design Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	21.9	4.3	1.1	1.1	1.1	0.0	0.0	0.0
	2-weeks Cold Spell	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	5.8	5.8	0.0	0.0	0.0	0.0	0.0	0.0
	2-weeks Cold Spell DF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	5.8	5.8	0.0	0.0	0.0	0.0	0.0	0.0
Sustainability	CO2 and Other externalities savings	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	6/7	6/7	6/7	0/0	0/0	0/0	0/0	0/0	0/0
	Additional benefit (Promoter)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Year of assessment		2030									2040								
		EXISTING			LOW			ADVANCED			EXISTING			LOW			ADVANCED		
Benefits (Meur/year)		NT	DE	GA	NT	DE	GA	NT	DE	GA	NT	DE	GA	NT	DE	GA	NT	DE	GA
EU Bill benefits With Tariffs	Reference Supply	27.4	25.7	27.4	19.2	18.8	20.0	17.7	16.9	18.9	27.4	18.9	27.5	21.5	5.0	19.7	18.7	1.6	6.1
	Supply Maximization	29.0	26.4	27.4	39.5	26.9	28.3	23.7	20.3	22.1	27.4	28.3	27.5	39.4	22.3	31.9	32.4	12.0	11.6
Security of Supply	Design Case	4.8	4.8	5.0	2.3	2.3	2.7	0.0	0.0	0.3	4.8	25.9	4.8	2.3	2.3	2.3	0.0	0.0	0.2
	2-weeks Cold Spell	15.7	14.4	21.2	0.0	0.0	0.0	0.0	0.0	0.0	10.9	17.1	23.5	0.0	0.0	0.0	0.0	0.0	0.0
	2-weeks Cold Spell DF	15.8	14.5	23.6	0.0	0.0	0.0	0.0	0.0	0.0	11.2	18.8	23.8	0.0	0.0	0.0	0.0	0.0	0.0
Sustainability	CO2 and Other externalities savings	0/2	0/0	0/0	0/0	0/1	0/0	0/0	0/1	0/0	0/0	0/0	0/0	0/0	1/2	1/1	0/0	0/1	2/2
	Additional benefit (Promoter)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

In line with ENTSG Adapted 2nd CBA Methodology, ENTSG has also run sensitivities on some relevant assumptions such as tariffs, commissioning year and lower supply source price differential. The results included in the tables below have to be compared with the ones included in section C.3. Further information is available in the common introduction (Pages 1-6) to all project fiches. Independently from the source of the input as described in C3 (ENTSG or Promoter), the sensitivity analysis has been carried out by ENTSG and according to the criteria in the approved CBA Methodology.

[illegible]

D. Environmental Impact [Promoter]

Any gas infrastructure has an impact on its surroundings. This impact is of particular relevance when crossing some environmentally sensitive areas. Mitigation measures are taken by the promoters to reduce this impact and comply with the EU and National regulations. The Tables have been filled in by the promoter.

TYNDP Code	Type of infrastructure	Surface of impact	Environmentally sensitive area
TRA-F-298	Gas pipelines; Compressor Stations	Two gas pipeline sections with a total length of about 81 km. Modernization of 3 Compressor Stations.	Protected areas are not affected.
TRA-N-0137	Gas pipeline	Length: 170 km (BG territory 62km)	The issued environmental permits are to be updated.

Potential impact	Mitigation measures	Related costs included in project CAPEX and OPEX	Additional expected costs
The impact on environmental components will have local effect (within the construction site and technological sites) and short-term, limited in the construction phase.	The construction works are carried out in strict compliance with the measures contained in the issued environmental permits.		
The issued environmental permits are to be updated.	The issued environmental permits are to be updated.		

Environmental Impact explained [Promoter]

Environmental impact assessments for the projects have not indicated any substantial and irreversible impacts on the environment. In order to ensure that environmental assessments are correct, environmental monitoring is carried out before, during the construction of the infrastructure.

- **TRA-F-298 Rehabilitation, Modernization and Expansion of the NTS**

The project (two gas pipeline sections with a total length of about 81 km and the modernization of 3 Compressor Stations) is under construction. The construction works are carried out in strict compliance with the measures contained in the issued environmental permits.

- **TRA-N-0137 Interconnection Bulgaria - Serbia**

In the period 2012 – 2015 procedures assessing the impact of the project on the environment have been carried out and two opinions have been issued by the competent environment authority. Due to the expired time limits of these documents Bulgartransgaz EAD, shall submit the required documentation for updating the decisions. However, based on currently available information, the project is unlikely to cause any significant impacts on the environment.

- **TRA-F-0378 Interconnection Greece - Bulgaria (IGB Project)**

ICGB is fulfilling all the national legislation (Greek and Bulgarian) in relation to the Environmental Impact Assessment, as well as all the best practices and requirement imposed from the European Investment Bank., which is providing substantial part of the financing of the project and is monitoring closely all the EIA issues.

E. Other Benefits [Promoter]

Missing benefits are all benefits of a project which may be not captured by the current application in TYNDP 2020 of the 2nd CBA Methodology.

As a necessary condition a missing benefit cannot have discrepancies with the benefits already covered by the assessment run by ENTSG and this condition needs to be proved and justified.

Other benefits explained

N-1 Infrastructure standard for Bulgaria.

The technical parameters of IGB pipeline will allow the transmission of 9.1 million cubic meters per day (with a load factor of 0.9) in the direction of Greece to Bulgaria or 3 billion cubic meters per year. Thus, the implementation of the project will lead to the increase of the N-1 infrastructure standard.

Further it should be noted that four of the five shippers that have reserved capacity through IGB are new participants on the Bulgarian market. This is expected to lead to an increase in the competition between natural gas traders.

F. Useful Links

TRA-F-298:

The project website: <https://www.bulgartransgaz.bg/en/pages/rehabilitaciya-modernizaciya-i-razshirenie-na-sashtestvuvash-133.html>

PCI Fiche: https://ec.europa.eu/energy/maps/pci_fiches/PciFiche_6.8.2.pdf

TRA-N-137:

The project website: <https://www.bulgartransgaz.bg/en/pages/6-8-3-mezhdusistemna-gazova-vrazka-balgariya-sarbiya-ibs-191.html>

PCI Fiche: https://ec.europa.eu/energy/maps/pci_fiches/PciFiche_6.8.3.pdf

Bulgartransgaz EAD Network Development Plan:

https://www.bulgartransgaz.bg/files/useruploads/files/amd/TYNDP_2020_ENG.pdf

TRA-N-378:

The project website: <https://www.icgb.eu/home>

PCI Fiche: https://ec.europa.eu/energy/maps/pci_fiches/PciFiche_6.8.1.pdf

Network Development Plan: <https://www.icgb.eu/commercial/documents>