

Project Group EAST_05B - LNG KrK (2nd phase)

Reasons for grouping [ENTSO G]

Project groups represent the second phases of Krk LNG terminal. It includes:

- > Second phase of Krk LNG terminal and LNG evacuation pipeline
- > Transmission pipelines to transport second phase of the LNG terminal allowing LNG flows to arrive to Slovenia, Austria and Hungary
- > Compressor Station allows to transport gas from LNG terminal into the Croatian and Hungarian gas transmission systems

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

The group aims at enabling the unloading, storage and regasification of LNG and transmission of regasified natural gas from the LNG terminal to the countries of Central Eastern and South Eastern Europe. The evacuation pipelines (TRA-F-90, TRA-N-75, TRA-N-1058) will connect the terminal and the existing HU-HR interconnection Varosföld - Dravaszerdahely-Donji Miholjac-Slobodnica. It will enable transmission of up to 7 bcm/a of gas from LNG terminal Krk to the Hungarian gas market and other gas markets in the countries of the NSI East Group. Also, Project group_05b is a Croatian part of the Baltic-Adriatic gas connection that aims to connect Polish and Croatian LNG terminals. Objectives of this project are to provide viable and secure gas supply to CEE and SEE countries and to provide diversification of gas supply and thus competitive and lower gas price.



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-0075	LNG evacuation pipeline Zlobin-Bosiljevo-Sisak-Kozarac	Plinacro Ltd	HR	Less-Advanced	-	2027	2027	Rescheduled
TRA-F-0090	LNG evacuation pipeline Omišalj - Zlobin (Croatia)	Plinacro Ltd	HR	Advanced	6.5.1	2020	2020	Commissioned
TRA-N-1057	Compressor stations 2 and 3 at the Croatian gas transmission system	Plinacro Ltd	HR	Less-Advanced	6.26.1.3	2029	2029	Rescheduled
TRA-N-1058	LNG Evacuation Pipeline Kozarac-Slobodnica	Plinacro Ltd	HR	Less-Advanced	-	2027	2027	-
LNG-N-815	LNG terminal Krk 2nd phase	LNG Hrvatska	HR	Less-Advanced	6.5.6	2027	2027	Rescheduled

Technical Information

TYNDP Project Code	Diameter [mm]	Length [km]	Compressor Power [MW]
TRA-F-0090	800	18	-
TRA-N-0075	800	20	-
TRA-N-0075	800	58	-
TRA-N-0075	800	102	-
TRA-N-1057	-	-	20
TRA-N-1058	800	128	-

TYNDP Project Code	Yearly Volume [bcm/y]	Storage Capacity [m3 LNG]	Ship Size [m3 LNG]
LNG-N-815	4.4	160000	120000

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
LNG-N-815	Croatia LNG	LNG Hrvatska d.o.o.	LNG Terminals Croatia	109.2	2027	Transmission Croatia	0	-
TRA-N-1058	Dravaszerdahely	Plinacro Ltd	Transmission Croatia	82	2027	Transmission Hungary (MGP)	135.85	2027
TRA-N-1058	Croatia LNG	Plinacro Ltd	LNG Terminals Croatia	0	-	Transmission Croatia	82	2027
TRA-N-75	Dravaszerdahely	Plinacro Ltd	Transmission Croatia	54.34	2027	Transmission Hungary (MGP)	0	-
TRA-N-75	Croatia LNG	Plinacro Ltd	LNG Terminals Croatia	0	-	Transmission Croatia	27.17	2027

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 “*”.

	LNG-N-815	TRA-N-1057	TRA-N-1058	TRA-N-75	Total Cost
CAPEX [min, EUR]	479	-**	141.08	198.4	818.48
OPEX [min, EUR/y]	34	-**	2.54	3.57	40.11
Range CAPEX (%)	0	0	0	0	-
Range OPEX (%)	10	0	0	0	-

** CAPEX and OPEX figures are confidential. In TYNDP 2020 project collection the project did not indicate intention to apply to PCI and it has been introduced in the project group only for capacity reason, therefore no alternative costs have been provided.

Description of costs and range [Promoter]

- **LNG-N-82 LNG terminal Krk**

Description of CAPEX: 100% of the CAPEX of the LNG terminal Krk refers to FSRU vessel, designing and engineering, civil, assembly and installation works, material and equipment, and the construction of a connecting gas pipeline from the LNG terminal to gas node Omišalj.

Description of OPEX: 100% of the cost refers to operational and maintenance costs, labour costs, other fees and insurance.

- **TRA-F-90 LNG evacuation pipeline Omišalj-Zlobin (Croatia); TRA-N-75 LNG evacuation pipeline Zlobin-Bosiljevo-Sisak-Kozarac; TRA-N-1058 LNG evacuation pipeline Kozarac-Slobodnica**

Description of CAPEX: 100% of the CAPEX of projects TRA-F-90, TRA-N-75, TRA-N-1058 refers to designing and engineering; civil, assembly and installation works, material and equipment, supervision and control systems.

Description of OPEX: 100% of the cost refers to operation and maintenance cost. There are no additional costs of own consumption (fuel gas) and labour cost.

Detailed CAPEX values for gas pipelines Omišalj-Zlobin, Zlobin-Bosiljevo-Sisak-Kozarac and Kozarac-Slobodnica has been taken from PLINACRO's TYNDP. Detailed OPEX for gas pipelines Omišalj-Zlobin, Zlobin-Bosiljevo-Sisak-Kozarac and Kozarac-Slobodnica has been calculated according to the actual Plinacro's cost per kilometre for gas transmission pipelines.

- **TRA-N-1057 Compressor stations 2 and 3 at the Croatian gas transmission system**

CAPEX values for the Compressor stations have been taken from PLINACRO's TYNDP. CAPEX are estimated based on the expected units power and expected per MW investment cost. OPEX for the Compressor stations has been estimated by considering maintenance costs and expected CS working hours and gas costs.

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:

The project group **improves the remaining flexibility from 2030** in Croatia under all climatic stress conditions in the existing and low infrastructure levels and in Slovenia in the existing infrastructure level.

Regarding infrastructure disruptions:

In case of **SLID-Croatia** the project group **fully mitigates the risk of demand curtailment** in Croatia in the existing infrastructure level.

In case of **SLID-Slovenia** the project group **fully mitigates the risk of demand curtailment** in Croatia in the existing infrastructure level.

> Competition:

By further reducing the LICD indicator value, the projects group **contributes to the diversification of entry points** in Croatia in the existing infrastructure level and in Hungary for all infrastructure levels.

With the new LNG regasification capacity, in the existing infrastructure level and to a lower extent in the low Infrastructure Level, the project group **reduces the dependency to Russian gas** supply in Croatia, Hungary and Slovenia and in some neighbouring countries thanks to the new access to the LNG source .

The project group increases diversification of gas supply sources in the region. Thanks to the project group, Bosnia and Herzegovina, Croatia, Czechia, Hungary, Romania, Serbia, Slovenia and Slovakia **will have more access to LNG gas supply** from 2030 in the existing infrastructure level. In the low infrastructure level, all countries have already access to LNG thanks to the realization of FiD projects.

> Market integration:

The project group **improves bidirectionality** between Croatia and Hungary.

The project group brings benefits in monetised term as a **reduction of the cost of gas supply**. In the reference supply price configuration this can be estimated around 72 MEur/y (on average) in existing infrastructure level. Such benefits are mainly explained by the lower transportation costs and new gas supplies for the region thanks to the access to the LNG terminal.

Additional benefits compared to the reference situation can be observed in the case of LNG supply cheap and Russian supply expensive (95 Mln EUR/y on average in the existing infrastructure level). Such benefits are driven by the fact that the project group allows Croatia and Hungary to further benefit from a decrease in LNG price while at the same time to rely on alternative sources in case of more expensive Russian gas prices.

The sensitivity on tariffs shows in fact that those benefits are sensitive to the level of tariffs assumed for the project group.

In the low and advanced infrastructure level, benefits from supply cost savings related to the project group considerably decrease due to the implementation of FiD and advanced competing projects. However, in the advanced infrastructure level, under cheap Southern gas supply price configuration, the project group reduces the cost of gas supply in the region (up to 46 MEur/y) thanks to the implementation of other investments.

Distributed Energy

Benefits explained (but Sustainability) [ENTSO G]

> Security of Supply:

The project group **improves the remaining flexibility** in Croatia up to its maximum level and under all climatic stress conditions from 2030.

Regarding infrastructure disruptions:

In case of **SLID-Croatia** the project group **fully mitigates the risk of demand curtailment** in Croatia in the existing infrastructure level in 2030.

> Competition:

By further reducing the LICD indicator value, the projects group **contributes to the diversification of entry points** in Croatia in the existing infrastructure level and in Hungary for all infrastructure levels.

With the new LNG regasification capacity and interconnection capacity, in the existing infrastructure level and to a lower extent in the low Infrastructure Level, the project group **reduces the dependency to Russian gas supply** in Croatia, Slovenia and Hungary (and neighbouring countries), as it allows these countries to benefit from the new LNG source.

The project group increases diversification of gas supply sources in the region. Thanks to the project group, Croatia will have more access to LNG gas supply in 2040 in the existing infrastructure level. However, from 2030, in the low infrastructure level all countries have already access to LNG thanks to the realization of FiD projects.

> Market integration:

The project group **improves bidirectionality** between Croatia and Hungary.

The project group brings benefits in monetised term as a **reduction of the cost of gas supply**. In the reference supply price configuration this can be estimated around 44 MEur/y (on average) in existing infrastructure level. Such benefits are driven by new LNG flows arriving to Croatia and its neighbouring countries through the LNG terminal, substituting a route with higher transportation costs.

Additional benefits compared to the reference situation can be observed in the case of LNG supply cheap and Russian supply expensive (up to 63 MEur/y in the existing infrastructure level). Such benefits are driven by the fact that the project group allows Croatia and Hungary to further benefit from a decrease in LNG price while at the same time to rely on alternative sources in case of more expensive Russian gas prices.

The sensitivity on tariffs shows in fact that those benefits are sensitive to the level of tariffs assumed for the project group.

Regarding benefits from reduction of cost of gas supply, in the low and advanced infrastructure levels these benefits are reduced due to the implementation of other competing investments in the region. In spite of this, in the advanced infrastructure level project, thanks to other investments, the project group brings significant benefits in case of cheap Southern gas supply price configuration (17 MEur/y on average).

Global Ambition

Benefits explained (but Sustainability) [ENTSOG]

> Security of Supply:

The project group **improves the remaining flexibility** in Croatia under all climatic stress conditions from 2030 in the existing and also **improves the remaining flexibility** in Slovenia in 2030 in the existing infrastructure level.

Regarding infrastructure disruptions:

In case of **SLID-Croatia** the project group **fully mitigates the risk of demand curtailment** in Croatia in the existing infrastructure level from 2030.

In case of **SLID-Slovenia** the project group **fully mitigates the risk of demand curtailment** in Croatia in 2030 in the existing infrastructure level in 2030.

> Competition:

By further reducing the LICD indicator value, the projects group **contributes to the diversification of entry points** in Croatia in the existing infrastructure level and in Hungary for all infrastructure levels.

With the new LNG regasification and interconnection capacities, in the existing infrastructure level and to a lower extent in the low Infrastructure Level, the project group **reduces the dependency to Russian gas** supply in Croatia, Slovenia and Hungary and also in other neighbouring countries thanks to the new LNG source.

The project group increases diversification of gas supply sources in the region. Thanks to the project group, in the existing infrastructure level Croatia, Czech Republic, Serbia and Slovakia **will have access to LNG gas supply** in 2030. However, in the low infrastructure level all countries have already access to LNG thanks to the realization of FID projects.

> Market integration:

The project group brings benefits in monetised term as a **reduction of the cost of gas supply**. In the reference supply price configuration this can be estimated around 49 MEur/y (on average) in existing infrastructure level. Such benefits are driven by new LNG flows arriving to Croatia and its neighbouring countries through the LNG terminal, substituting a route with higher transportation costs.

Additional benefits compared to the reference situation can be observed in the case of LNG supply cheap and Russian supply expensive (up to 70 MlnEUR/y on average in the existing infrastructure level). Such benefits are driven by the fact that the project group allows Croatia and Hungary to further benefit from a decrease in LNG price while at the same time to rely on alternative sources in case of more expensive Russian gas prices.

The sensitivity on tariffs shows in fact that those benefits are sensitive to the level of tariffs assumed for the project group.

Regarding benefits from reduction of cost of gas supply, in the low and advanced infrastructure levels these benefits are reduced due to the implementation of other investments in the region. In the advanced infrastructure level project, thanks to other investments, the project group brings significant benefits in case of cheap Southern gas (39 MEUR/y on average).

The project group also **improves bidirectionality** between Croatia and Hungary.

Sustainability benefits explained [ENTSOG]

The ENTSOG analysis shows that, in the yearly assessment, the projects group realisation enhances the replacement of more polluting fuels with natural gas, which enables fuel switch savings between 0.1-2.9 MEUR/y under existing infrastructure level, between 0.1-2.9 MEUR/y under low infrastructure level and between 0.1-1.4 MEUR/y under advanced 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		
CO2 and Other externalities (KtCO2 eq/y)	Reference	3 / 4	28 / 29	53 / 53	2 / 3	15 / 15	51 / 52	2 / 2	10 / 10	24 / 24
	Lower Tariff Sensitivity	3 / 4	30 / 31	54 / 54	2 / 3	33 / 33	52 / 53	2 / 2	16 / 16	32 / 32
	Higher Tariff Sensitivity	2 / 3	5 / 5	21 / 21	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 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.

Given its maturity status (less-advanced) project group EAST_05B do not show benefits before 2030.

Beyond 2030, benefits are compared to the ones observed for EAST_05A (first phase of Krk LNG terminal).

TYNDP 2020 ENTSG and ENTSO-E scenario storylines have identified for DE and GA scenarios the need for hydrogen imports to satisfy the hydrogen demand that cannot be covered by European production of hydrogen (e.g. through power-to-gas). In the future, hydrogen demand not satisfied by locally produced hydrogen could be covered by directly imported hydrogen through hydrogen-compatible infrastructures and/or by natural gas through natural gas pipelines or LNG terminal. In TYNDP 2020 ENTSG has considered fuel switch benefits from hydrogen import in the form of natural gas import then converted into hydrogen in Europe. For project group EAST_05A, such benefits represent, on average, 65% of the benefits from fuel switch in Distributed Energy and Global Ambition scenarios in 2030 and 100% in 2040.


Sustainability benefits explained [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		
		CBG			GBC			NT			NT		
Row Labels		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Austria										2	3	1
	Bosnia Herzegovina							2	3	1	2	3	1
	Croatia							2	3	1	2	3	1
	Czechia							2	3	1	2	3	1
	Denmark										2	3	1
	Germany										2	3	1
	Serbia							2	3	1	2	3	1
	Slovakia							2	3	1	2	3	1
	Slovenia										2	3	1
	Sweden										2	3	1
LNG and Interconnection Capacity Diversification (LICD)													
	Croatia							5,137	3,406	-1,731	5,110	3,393	-1,718
	Hungary							4,532	3,317	-1,215	4,532	3,317	-1,215
MASD-RU													
	Austria							43%	40%	-3%	45%	42%	-3%
	Bosnia Herzegovina										45%	42%	-3%
	Croatia							43%	40%	-3%	45%	41%	-4%
	Czech Republic							43%	40%	-3%	45%	42%	-3%
	Germany							42%	39%	-2%	44%	42%	-2%
	Hungary										45%	42%	-3%
	Poland										45%	42%	-3%
	Serbia										45%	42%	-3%
	Slovakia										45%	42%	-3%
	Slovenia							43%	40%	-3%	45%	41%	-4%
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia							21%	100%	79%	21%	100%	79%
	Slovenia							71%	100%	29%	67%	100%	33%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia							14%	100%	86%	17%	100%	83%
	Italy							72%	73%	1%	55%	55%	1%
	Slovenia							57%	100%	43%	61%	100%	39%
Remaining Flexibility Peak day (%)													
	Croatia							10%	100%	90%	14%	100%	86%
	Slovenia							33%	89%	57%	39%	89%	50%
Single Largest Infrastructure Disruption (SLID)-Croatia													
	Croatia							35%	0%	-35%	35%	0%	-35%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Croatia							25%	0%	-25%	24%	0%	-24%
Market Integration													
Bi-directionality - Country													
	HR <=> HU	17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
	Dravaszerdahely							17%	100%	83%	17%	100%	83%

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													
LNG and Interconnection Capacity Diversification (LICD)													
Hungary								3,044	2,890	-154	3,044	2,871	-173
MASD-RU													
Czech Republic											30%	28%	-2%
Denmark											30%	27%	-3%
Germany								30%	27%	-2%	29%	27%	-2%
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
Croatia								73%	100%	27%	72%	100%	28%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
Croatia								63%	100%	37%	68%	100%	32%
Remaining Flexibility Peak day (%)													
Croatia								55%	100%	45%	62%	100%	38%
Market Integration													
Bi-directionality - Country													
HR <=> HU		17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
Dravaszerdahely								69%	100%	31%	69%	100%	31%


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													
LNG and Interconnection Capacity Diversification (LICD)													
Hungary								2,405	2,158	-247	2,221	2,055	-166
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
Croatia								96%	100%	4%			
Remaining Flexibility Peak day (%)													
Croatia								87%	100%	13%	98%	100%	2%
Germany											38%	39%	1%
Market Integration													
Bi-directionality - Country													
HR <=> HU		17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
Dravaszerdahely								69%	100%	31%	69%	100%	31%


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)													
	Croatia										3	4	1
	Romania										2	3	1
LNG and Interconnection Capacity Diversification (LICD)													
	Croatia							5,002	3,334	-1,667	5,000	3,333	-1,667
	Hungary							4,532	3,317	-1,215	4,532	3,317	-1,215
MASD-RU													
	Austria										23%	19%	-4%
	Bosnia Herzegovina										23%	20%	-3%
	Croatia							42%	39%	-3%	23%	19%	-4%
	Czech Republic										23%	19%	-4%
	Denmark										22%	19%	-3%
	Germany							41%	39%	-3%	22%	19%	-3%
	Hungary										23%	19%	-4%
	Serbia										23%	20%	-3%
	Slovakia										23%	20%	-3%
	Slovenia							42%	39%	-3%	23%	19%	-4%
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia							66%	100%	34%			
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia							55%	100%	45%	81%	100%	19%
Remaining Flexibility Peak day (%)													
	Croatia							51%	100%	49%	89%	100%	11%
Single Largest Infrastructure Disruption (SLID)-Croatia													
	Croatia							8%	0%	-8%			
Market Integration													
Bi-directionality - Country													
	HR <=> HU	17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
	Dravaszerdahely							17%	100%	83%	17%	100%	83%

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													
LNG and Interconnection Capacity Diversification (LICD)													
Hungary													
MASD-RU													
Hungary													
Romania													
Market Integration													
Bi-directionality - Country													
HR <=> HU		17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
Dravaszerdahely													

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													
LNG and Interconnection Capacity Diversification (LICD)													
Hungary													
Market Integration													
Bi-directionality - Country													
HR <=> HU		17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
Dravaszerdahely													

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)													
	Austria							2	3	1			
	Czechia							2	3	1			
	Denmark							2	3	1			
	Germany							2	3	1			
	North Noth Macedonia							2	3	1	2	3	1
	Slovakia							2	3	1			
	Sweden							3	4	1			
LNG and Interconnection Capacity Diversification (LICD)													
	Croatia							5,005	3,336	-1,669	5,000	3,334	-1,667
	Hungary							4,532	3,317	-1,215	4,532	3,317	-1,215
MASD-RU													
	Bosnia Herzegovina							48%	45%	-3%			
	Croatia							47%	44%	-3%	42%	39%	-3%
	Denmark							47%	45%	-2%	42%	39%	-3%
	Germany										42%	40%	-2%
	Hungary							47%	44%	-3%			
	Poland							48%	45%	-3%	42%	40%	-2%
	Serbia							48%	45%	-3%			
	Slovenia							47%	44%	-3%	42%	39%	-3%
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia							60%	100%	40%	70%	100%	30%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia							45%	100%	55%	64%	100%	36%
Remaining Flexibility Peak day (%)													
	Croatia							39%	100%	61%	55%	100%	45%
	Slovenia							73%	81%	7%			
Single Largest Infrastructure Disruption (SLID)-Croatia													
	Croatia							16%	0%	-16%	7%	0%	-7%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Croatia							4%	0%	-4%			
Ukraine Disruption Curtailment Rate Peak Day (%)													
	Croatia							-2%	0%	2%			
	Switzerland							-3%	-2%	1%			
Market Integration													
Bi-directionality - Country													
	HR <=> HU	17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
	Dravaszerdahely							17%	100%	83%	17%	100%	83%

LOW Infrastructure Level – Global Ambition

Sum of Value		Column Labels											
		2025			2030			2040					
Row Labels		CBG			GBC			GA			GA		
		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
LNG and Interconnection Capacity Diversification (LICD)													
Hungary								3,044	2,890	-154	3,044	2,878	-165
MASD-RU													
Croatia								30%	26%	-4%	23%	12%	-11%
Hungary								32%	26%	-6%	26%	13%	-13%
Romania											26%	13%	-13%
Slovenia								29%	26%	-3%	23%	17%	-6%
Security of Supply													
Remaining Flexibility Peak day (%)													
Croatia								97%	100%	3%			
Market Integration													
Bi-directionality - Country													
HR <=> HU		17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
Dravaszerdahely								69%	100%	31%	69%	100%	31%

ADVANCED Infrastructure Level – Global Ambition

Sum of Value		Column Labels											
		2025			2030			2040					
Row Labels		CBG			GBC			GA			GA		
		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
LNG and Interconnection Capacity Diversification (LICD)													
Hungary								2,269	2,082	-187	2,227	2,060	-167
MASD-RU													
Bosnia Herzegovina											14%	11%	-3%
Bulgaria											14%	11%	-3%
Croatia											14%	11%	-3%
Hungary											14%	11%	-3%
Italy											14%	12%	-2%
Romania											14%	11%	-3%
Serbia											14%	11%	-3%
Market Integration													
Bi-directionality - Country													
HR <=> HU		17%	69%	52%	17%	69%	52%	17%	92%	75%	17%	92%	75%
Bi-directionality - Point													
Dravaszerdahely								69%	100%	31%	69%	100%	31%

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 ENTSOG and are labelled as “(Promoter)”. More information on how to read the data in this section is provided in the Introduction Document.

Reference										
		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 With Tariffs	Reference Supply	71.8	44.2	49.3	12.1	5.6	15.8	9.9	4.8	8.8
	Supply Maximization	94.6	62.9	70.5	30.6	19.1	28.9	45.6	17.0	38.6
Security of Supply	Design Case	1.3	0.1	0.4	0.0	0.0	0.0	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
	2-weeks Cold Spell DF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sustainability	Remaining Flexibility DF based	1.6	0.4	0.4	1.5	1.3	1.0	0.0	0.1	0.3
	Flow based	0.1 / 0.2	2.1 / 2.2	2.2 / 2.9	0.1 / 0.1	1 / 1	2.8 / 2.9	0.1 / 0.1	0.8 / 0.8	1.4 / 1.4
	Additional benefit (Promoter)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Comparison between the assessed SCENARIOS

ENTSOE 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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Supply Maximization	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
Security of Supply	Design Case	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
	2-weeks Cold Spell	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
	2-weeks Cold Spell DF	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
Sustainability	Remaining Flexibility DF based	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
	Flow based	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
	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	92.3	64.0	50.5	10.4	12.5	19.6	8.5	2.5	4.8	96.7	52.3	79.3	23.6	4.9	26.0	19.5	10.6	19.3
	Supply Maximization	118.7	89.5	81.8	33.7	29.0	30.9	55.8	37.2	51.4	130.3	76.1	103.7	46.8	21.3	45.1	76.1	20.3	60.9
Security of Supply	Design Case	1.8	0.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.3	0.0	0.0	0.0	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	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sustainability	Remaining Flexibility DF based	3.4	0.0	-0.1	1.7	3.4	2.6	0.0	0.0	0.0	0.5	0.0	0.0	2.2	0.0	0.0	0.0	0.2	0.6
	Flow based	0.3 / 0.4	2.2 / 2.3	3.7 / 3.8	0.2 / 0.3	1.9 / 1.9	3.9 / 4	0.2 / 0.2	0.6 / 0.7	1.5 / 1.5	0 / 0	3.4 / 3.4	4 / 4.1	0 / 0	0.7 / 0.7	3.5 / 3.6	0 / 0	1.4 / 1.4	2.2 / 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-90, TRA-N-75, TRA-N-1058	Transmission gas pipelines	DN 800, length 326 km	NO
TRA-N-1057	Compressor station		NO
LNG-N-82	LNG terminal Krk		NO

Potential impact	Mitigation measures	Related costs included in project CAPEX and OPEX	Additional expected costs
During the construction period (disturbance, traffic disturbance where secondary roads are cut, and impacts due to the dust, noise, transport machinery, and other machineries)	EIA procedures have been carried out, and positive Decisions on acceptability for the environment have been issued by the line Ministry. All EIA procedures were carried out in accordance with national legislation, that is, aligned with EU Directives on the environmental protection.	NA	NA
During the construction period (disturbance, traffic disturbance where secondary roads are cut, and impacts due to the dust, noise, transport machinery, and other machineries)	EIA procedures will be carried out, and positive Decisions on acceptability for the environment will be issued by the line Ministry. All EIA procedures will be carried out in accordance with national legislation, that is, aligned with EU Directives on the environmental protection.	NA	NA
During the construction period (disturbance, traffic disturbance where secondary roads are cut, and impacts due to the dust, noise, transport machinery, and other machineries)	EIA procedures have been carried out, and positive Decisions on acceptability for the environment have been issued by the line Ministry. All EIA procedures were carried out in accordance with national legislation, that is, aligned with EU Directives on the environmental protection.	NA	NA

Environmental Impact explained [Promoter]

Major influences of the projects LNG-N-82, TRA-F-90, TRA-N-75, TRA-N-1058 on the economic and environmental dimensions are to be felt during the construction period (disturbance, traffic disturbance where secondary roads are cut, and impacts due to the dust, noise, transport machinery, and other machineries). On the other hand, major influence of the Compressor stations on the environment will be during its operation. Most likely, the impact on the environment will be emissions of the exhaust gases from the compressor drives.

The impacts on the environment are likely to appear in the following areas: air quality, noise, geomorphology, habitats, flora and fauna, cultural heritage, occupational health, waste and accidents. The proposed Environmental protection measures include measures prescribed by national law and other regulations, protection measures in accidental situations, plans and technical solutions for environmental protection as well as other protective measures. Protection measures for reducing the possible impacts to the lowest possible level are proposed in the EIA procedures.

For the projects LNG-N-82, TRA-F-90, TRA-N-75 and TRA-N-1058 EIA procedures have been carried out, and positive Decisions on acceptability for the environment have been issued by the line Ministry. All EIA procedures were carried out in accordance with national legislation, that is, aligned with EU Directives on the environmental protection.

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 ENTSOG and this condition needs to be proved and justified.

Other benefits explained

Gas infrastructure projects within the Project Group EAST_05b will enable unloading, storage and regasification of LNG and transmission of natural gas in the volume of up to 7 bcm/a from the LNG terminal on the island of Krk to the gas markets of Croatia, Hungary and other CEE and SEE countries.

By implementing the group, the dependence to the Russian gas in the low infrastructure scenario will decrease in Croatia and Hungary from 4 to 13 percent.

Group will increase the remaining flexibility in both Croatia in 2-weeks cold spell and peak day.

Group will increase bidirectional balance at Hungary and Croatia and interconnection at Dravaszerdahely from 17 to 69%.

The group will bring many positive externalities and benefits to the EU Member States and the neighbouring third countries. The group implementation will enable yearly savings in cost of gas supply for EUROPE at the level of 6,9 and up to 180,7 million EUR depending on the gas price and demand scenario.

The implementation of this project group will also enable reduction of emissions other than CO₂ such as reduction of SO₂, NO_x emissions and other particulate matter.

F. Useful Links

The project website: www.plinacro.hr