

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

## Project Group EAST\_14B - Croatia-Slovenia interconnection

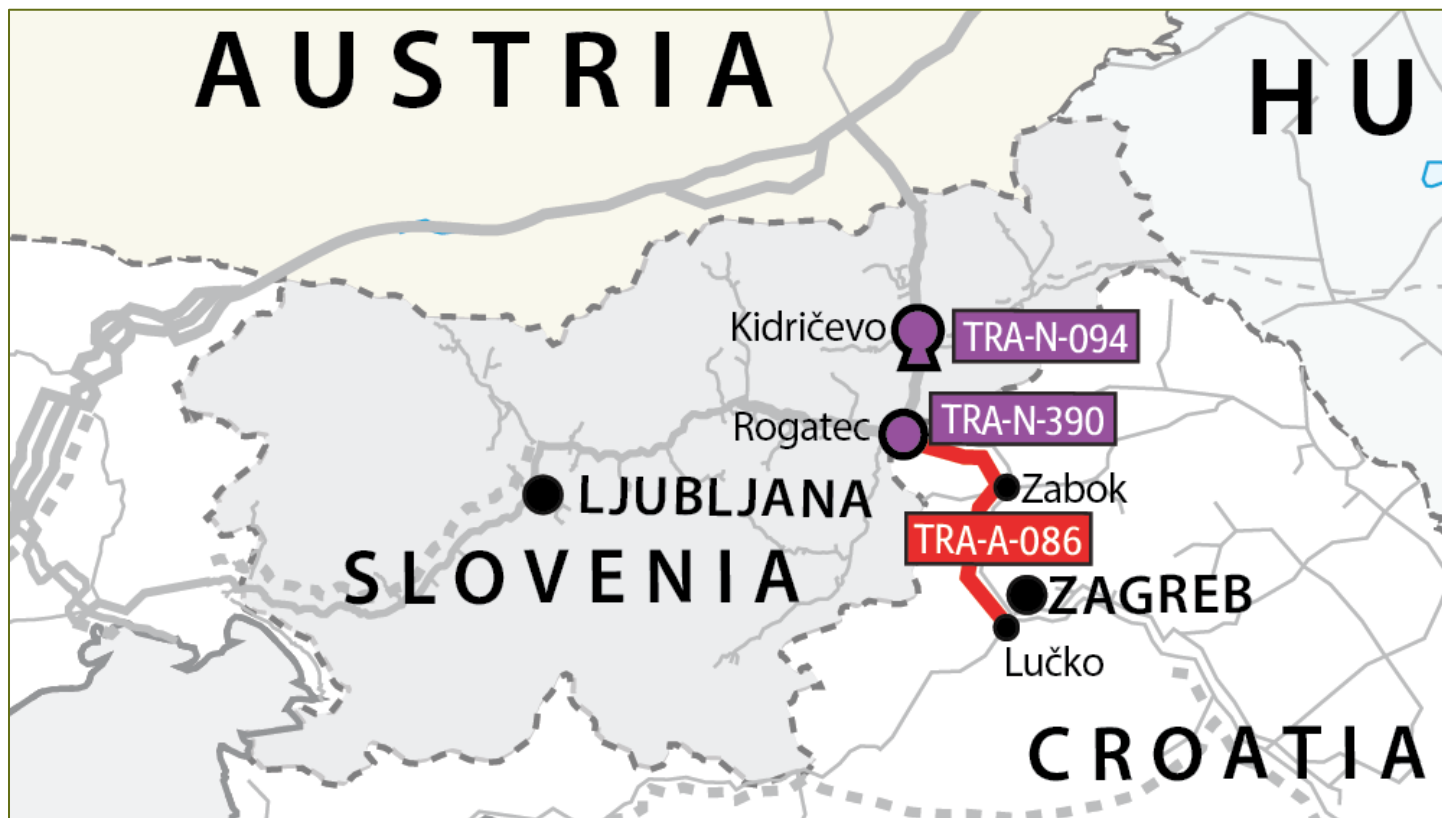
### Reasons for grouping [ENTSO G]

The project group is composed by projects to upgrade the existing interconnection between Croatia and Slovenia at IP Rogatec, as well as the enabler projects (for both sides of the interconnection).

Enabler project TRA-N-94 increases operational pressure in the Slovenian transmission network (M1/1 and M2/1 pipelines), allowing higher flow and bidirectional operation on the gas route AT-SI-HR.

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

The project group aims at: (1) Removing bottlenecks; (2) Allowing the bi-directional gas flow along the route HR-SI-AT; (3) Increasing the security of supply for Austria, Slovenia, Croatia and Hungary; (4) Improving N-1 for both Slovenia and Croatia; (5) Increase of the capacity along the route to provide enhanced access to Baumgarten and access of the gas from the LNG Krk toward Baumgarten as the most important trading hub in the region.



## 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-0094	CS Kidričevo, 2nd phase of upgrade	Plinovodi d.o.o.	SI	Less-Advanced	6.26.1.2	2023	2023	Rescheduled
TRA-N-0086	Interconnection Croatia/Slovenia (Lučko - Zabok - Jezerišće - Sotla)	Plinacro Ltd	HR	Less-Advanced	6.26.1.1	2021	2023	Rescheduled
TRA-N-0390	Upgrade of Rogatec interconnection (M1A/1 Interconnection Rogatec)	Plinovodi d.o.o.	SI	Less-Advanced	6.26.6	2021	2023	Rescheduled

## Projects Overview

### Technical Information – Pipeline/UGS/LNG

TYNDP Project Code	Diameter [mm]	Length [km]	Compressor Power [MW]
TRA-N-0086	700	26	-
TRA-N-0086	700	25	-
TRA-N-0086	700	10	-
TRA-N-0086	700	8	-
TRA-N-0094	-	-	30
TRA-N-0390	800	4	-

## 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-N-390	Rogatec	Plinovodi d.o.o.	Transmission Slovenia	162	2023	Transmission Croatia	121.2	2023
TRA-N-390	Rogatec	Plinovodi d.o.o.	Transmission Slovenia	-	-	Transmission Croatia	40.8	2021
TRA-N-86	Rogatec	Plinacro Ltd	Transmission Croatia	162	2023	Transmission Slovenia	121.2	2023
TRA-N-86	Rogatec	Plinacro Ltd	Transmission Croatia	-	-	Transmission Slovenia	40.8	2021

## 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-N-390	TRA-N-86	TRA-N-94	Total Cost
CAPEX [min, EUR]	12.4	76.05	80.4	<b>168.85</b>
OPEX [min, EUR/y]	0.08	1.37	3.97	<b>5.42</b>
Range CAPEX (%)	10	0	10	-
Range OPEX (%)	10	0	10	-

### Description of costs and range [Promoter]

#### For project TRA-N-94 (CS Kidričevo):

**Description of CAPEX:** the compressor station CS Kidričevo (civil works, equipment and other costs) represents 100% of the cost.

**Description of OPEX:** 67% of costs represent the cost of own consumption of gas (for the operation of the compressor station – CS Kidričevo), 32% of costs represent operation and maintenance cost, and 1% are labor costs (extension of existing compressor station).

#### For project TRA-N-390 (Upgrade of Rogatec IP):

**Description of CAPEX:** the pipeline (construction, connections and other costs) represents 54% of CAPEX and BMRS Rogatec (civil works, equipment and other costs) represents 46% of the cost.

**Description of OPEX:** 100% of costs represent operation and maintenance cost. There are no additional cost of own consumption of gas and labor cost – upgrade of existing interconnection Ceršak.

The above provided descriptions depend on the project TRA-N-389 Upgrade of Murfeld/Ceršak IP.

#### For project TRA-N-86 (Interconnection Croatia/Slovenia) :

**Description of CAPEX:** 100% of the CAPEX of the **Gas pipeline Croatia/Slovenia (Lučko-Zabok-Rogatec)** represents costs of designing and engineering, civil works, assembly and installation works, material and equipment.

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

## 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 **increases the remaining flexibility** in Croatia from 2025 under all climatic stress conditions (peak-day, 2-weeks cold spell and 2-weeks Dunkleflaute) for all infrastructure levels. Additionally, in the low and advanced infrastructure levels, the project group also **increases remaining flexibility** in Slovenia from 2025 under peak day.

Regarding infrastructure disruptions:

For **Single Largest Infrastructure Disruption in Croatia** (SLID-Croatia), with the project group the largest infrastructure will change to the interconnection between Croatia and Slovenia at IP Rogatec (instead of interconnection between Croatia and Hungary). In case of disruption, the project group **reduces the risk of demand curtailment** in Croatia in the existing infrastructure level (there is no risk in the low and advanced infrastructure levels).

In the same way, in case of **disruption of the single largest infrastructure of Slovenia** (SLID-Slovenia), which is the interconnection between Slovenia and Austria at Murfeld (AT) / Ceršak (SI), the project group **fully mitigates the risk of demand curtailment** in Croatia and Slovenia from 2025 in the existing infrastructure level and only in Slovenia in the low and advanced levels.

###### > Competition:

The project group **slightly contributes to the diversification of entry points** (precondition for competition and arbitrage), further reducing the LICD indicator value, in Slovenia in all infrastructure levels.

In the advanced infrastructure level, the project group **increases the number of sources** in Slovenia. Thanks to the realisation of the enhancement of the interconnection between Croatia and Slovenia plus the implementation of the second capacity increments between Hungary and Romania related to BRUA project phase II, Slovenia can have access to National Production in 2025 CBG and 2030.

###### > Market integration:

The **bidirectionality between Croatia and Slovenia** is **improved** from 14% to 100% with the creation of additional capacity at Rogatec IP. The enabler project '*2nd phase of upgrade of Compressor Station Kidričevo*' increases operational pressure in the Slovenian transmission network allowing higher flows and bidirectional operation on the gas route Austria-Slovenia-Croatia.

The project brings benefits in monetised terms as a **reduction of cost of gas supply** in case of expensive Russian gas price configuration (up to 0.2 MEUR/y in the existing infrastructure level). Such benefits are linked to a reduction in the marginal prices triggered by tariffs savings by the utilisation of this new supply route that allows to flow more gas from Slovenia to Croatia reducing Russian flows from the interconnection Hungary-Croatia. This is confirmed by the sensitivity on tariffs where benefits increase in case of even lower tariffs while decrease to zero in the reference supply price configuration in case of more expensive tariffs compared to the other possible routes.

Additional benefits compared to the existing and low infrastructure levels can be observed in case of the advanced infrastructure level, not only for reference supply price configuration, but also in case of cheap Russian gas (up to 1 MEUR/y in the advanced infrastructure level). Such benefits are mainly explained by tariffs savings by the utilisation of this new supply route that allows Slovenia for a more direct gas access through Croatia thanks to the FID and advanced-status projects commissioned in Croatia allowing Slovenia to access LNG.

## Distributed Energy

### Benefits explained (but Sustainability) [ENTSO G]

#### > Security of Supply:

In the existing infrastructure level, the project group **increases the remaining flexibility** in Croatia from 2025 under all climatic stress conditions (peak-day, 2-weeks cold spell and 2-weeks dunkleflaute). In the low and advanced infrastructure levels the project group only improves remaining flexibility in Croatia only in 2025, since with the implementation of FID and advanced projects remaining flexibility reaches its maximum level due to the lower gas demand and higher indigenous production considered in this demand scenario. The project group also **increases remaining flexibility** in Slovenia from 2025 under peak day in the existing infrastructure level and in 2025 and 2040 in the low and advanced levels.

Regarding infrastructure disruptions:

For **Single Largest Infrastructure Disruption in Croatia** (SLID-Croatia), with the project group the largest infrastructure will change to the interconnection between Croatia and Slovenia at IP Rogatec (instead of interconnection between Croatia and Hungary). In the existing infrastructure level, in case of disruption SLID-HR, the project group **reduces the risk of demand curtailment** in Croatia in 2025 and **fully mitigates the risk of demand curtailment** in Croatia in 2030. There is no risk in low and advanced infrastructure levels.

In the same way, in the case of **disruption of the single largest infrastructure of Slovenia** (SLID-Slovenia), which is the interconnection between Slovenia and Austria at Murfeld (AT) / Ceršak (SI), the project group **fully mitigates the risk of demand curtailment** in Croatia and Slovenia from 2025 and for all infrastructure levels.

#### > Competition:

The project group **slightly contributes to the diversification of entry points** (precondition for competition and arbitrage), further reducing the LICD indicator value, in Slovenia in all infrastructure levels.

The project group **increases the number of sources** Slovenia has access to in low and advanced infrastructure levels from 2030. Thanks to the realisation of the interconnection between Croatia and Slovenia and the enhancement of the interconnection between Croatia and Hungary, Slovenia will have access to national production in the low infrastructure level. The access to this new supply will increase in the advanced infrastructure level, thanks to the realisation of the interconnection between Croatia and Slovenia together with the enhancement in the interconnection between Hungary and Romania and the increase of Romanian national production foreseen in this infrastructure level.

#### > Market integration:

The **bidirectionality between Croatia and Slovenia** is improved from 14% to 100% with the creation of additional capacity at Rogatec IP. The enabler project '*2nd phase of upgrade of Compressor Station Kidričevo*' increases operational pressure in the Slovenian transmission network allowing higher flows and bidirectional operation on the gas route Austria-Slovenia-Croatia.

The project brings benefits in monetised terms as a **reduction of cost of gas supply** in case of cheap Russian gas supply price configuration (up to 0.3 MEUR/y in the existing infrastructure level). Such benefits are linked to a reduction in the marginal prices triggered by tariffs savings by the utilisation of this new supply route that allows to flow more gas from Slovenia to Croatia reducing Russian flows arriving to Croatia from the interconnection Hungary-Croatia. This is confirmed by the sensitivity on tariffs where benefits increase in case of even lower tariffs while decrease to zero in the reference supply price configuration in case of more expensive tariffs compared to the other possible routes.

Additional benefits compared to the existing infrastructure can be observed in case of low and advanced infrastructure levels, not only for reference supply price configuration, but also in case of cheap Russian gas and expensive LNG (up to 3 MEUR/y in the low infrastructure level). Such benefits are explained by tariffs savings by the utilisation of this new supply route that allows Slovenia for a more direct gas access through Croatia thanks to the FID and advanced-status projects commissioned in Croatia allowing Slovenia to have access to a new gas supply source (LNG). Nevertheless, the benefits in advanced infrastructure level decreased compared to low driven by the flows from Croatia to Serbia (allowed by the interconnection Serbia-Croatia, advanced-status project), which reduces available gas to flow to Slovenia.

## Global Ambition

### Benefits explained (Sustainability) [ENTSO G]

#### > Security of Supply:

The project group **increases the remaining flexibility** in Croatia for all climatic stress conditions and in the existing (from 2025) and low (only 2025) infrastructure levels, reaching 100% remaining flexibility in the advanced infrastructure level. The project group also **increases the remaining flexibility** in Slovenia in the existing (only in 2040), and in the low and advanced infrastructure levels (from 2025 for peak case and in 2040 for 2-weeks cold spell and 2-weeks dunkelflaute).

Regarding infrastructure disruptions:

For **Single Largest Infrastructure Disruption in Croatia** (SLID-Croatia), with the project group the largest infrastructure will change to the interconnection between Croatia and Slovenia at IP Rogatec (instead of interconnection between Croatia and Hungary). In the existing infrastructure level, in case of disruption SLID-HR, the project group **reduces the risk of demand curtailment** in Croatia in 2025 and **fully mitigates the risk of demand curtailment** in Croatia in 2030. There is no risk in the low and advanced infrastructure levels.

In the case of **SLID-Slovenia**, Murfeld (AT) / Ceršak (SI), the project group **fully mitigates the risk of demand curtailment** in Croatia (only in the existing infrastructure level) and Slovenia in all infrastructure levels.

#### > Competition:

The project group **slightly contributes to the diversification of entry points** (precondition for competition and arbitrage), further reducing the LICD indicator value, in Slovenia in all infrastructure levels.

The project group **increases the number of sources** Slovenia has access to in low and advanced infrastructure levels from 2030. Thanks to the realisation of the interconnection between Croatia and Slovenia and the enhancement of the interconnection between Croatia and Hungary, Slovenia will have access to national production in the low infrastructure level. The access to this new supply will increase in the advanced infrastructure level, thanks to the realisation of the interconnection between Croatia and Slovenia together with the enhancement in the interconnection between Hungary and Romania and the increase of Romanian national production foreseen in this infrastructure level.

#### > Market integration:

The **bidirectionality between Croatia and Slovenia** is improved from 14% to 100% with the creation of additional capacity at Rogatec IP. The enabler project '2nd phase of upgrade of Compressor Station Kidričevo' increases operational pressure in the Slovenian transmission network allowing higher flows and bidirectional operation on the gas route Austria-Slovenia-Croatia.

The project brings benefits in monetised terms as a **reduction of cost of gas supply** in case of cheap Russian gas supply price configuration (up to 0.5 MEUR/y in the existing infrastructure level). Such benefits are linked to a reduction in the marginal prices triggered by tariffs savings by the utilisation of this new supply route that allows to flow more gas from Slovenia to Croatia reducing Russian flows from the interconnection Hungary-Croatia. This is confirmed by the sensitivity on tariffs where benefits increase in case of even lower tariffs while decrease to zero in the reference supply price configuration in case of more expensive tariffs compared to the other possible routes.

Additional benefits compared to the existing infrastructure can be observed in case of low and advanced infrastructure levels, not only for reference supply price configuration, but also in case of cheap Russian gas and expensive LNG (up to 4.4 MEUR/y in the low infrastructure level). Such benefits are mainly explained by tariffs savings by the utilisation of this new supply route that allows Slovenia for a more direct gas access through Croatia thanks to the FID and advanced-status projects commissioned in Croatia allowing Slovenia to have access to a new gas supply source (LNG). Nevertheless, the benefits in advanced infrastructure level decreased compared to low driven by the flows from Croatia to Serbia (allowed by the interconnection Serbia-Croatia, advanced-status project), which reduces available gas to flow to Slovenia.

## Sustainability benefits explained [ENTSOG]

The ENTSG 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 mostly in Slovenia and up to 0.6 MEUR/y under both low and advanced infrastructure levels. The table below shows the related reduction in terms of CO<sub>2</sub>eq/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 CO<sub>2</sub>eq/y emissions (positive number indicate reduction in CO<sub>2</sub>eq/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 <sub>2</sub> and Other externalities (KtCO <sub>2</sub> eq/y)	Reference	0 / 0	0 / 0	0 / 0	0 / 0	3 / 5	6 / 12	1 / 3	2 / 5	5 / 13
	Lower Tariff Sensitivity	0 / 0	0 / 0	0 / 0	0 / 2	3 / 5	5 / 12	1 / 3	3 / 5	6 / 12
	Higher Tariff Sensitivity	0 / 0	0 / 0	0 / 0	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 CO<sub>2</sub>eq/y savings in case emissions from the additional gas demand increase not replacing other more polluting fuels are counted in the overall CO<sub>2</sub>eq 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.

Also, in line with the analysis of this project group impact on the cost of gas supply reduction (see EU Bill benefits in section C.3) there are no flows in the existing infrastructure level. Therefore, no benefits from fuel switch were allocated under this infrastructure level.

Furthermore, as observed in the analysis described in the “market integration” section, the sensitivity on tariffs shows that the contribution of the project to the savings varies when the project group tariffs change, particularly under low and advanced infrastructure levels. Benefits are significantly reduced in case of high tariffs sensitivity due to the lower utilisation of the assessed project group under both low and advanced infrastructure levels.

TYNDP 2020 ENTSG and ENTSO-E scenario storylines have identified for Distributed Energy and Global Ambition 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\_14B, such benefits represent around 50% and 65% of the benefits from fuel switch respectively in Distributed Energy and Global Ambition scenarios in 2030 and 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													
LNG and Interconnection Capacity Diversification (LICD)													
	Croatia	5,174	5,000	-174	5,174	5,032	-141	5,137	5,000	-137	5,110	5,000	-110
	Slovenia	4,205	3,390	-815	4,252	3,408	-844	4,238	3,403	-835	4,253	3,409	-844
Security of Supply													
Curtailment Rate Peak Day (%)													
	Croatia				-1%	0%	1%						
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia	10%	19%	9%	5%	14%	9%	21%	32%	10%	21%	32%	11%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia	7%	16%	9%	3%	12%	9%	14%	24%	10%	17%	28%	11%
Remaining Flexibility Peak day (%)													
	Croatia	3%	7%	5%	0%	4%	4%	10%	14%	5%	14%	19%	5%
	Hungary	72%	74%	1%	64%	65%	1%						
Single Largest Infrastructure Disruption (SLID)-Croatia													
	Croatia	35%	23%	-12%	37%	26%	-11%	35%	21%	-14%	35%	20%	-15%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Croatia	27%	0%	-27%	30%	0%	-30%	25%	0%	-25%	24%	0%	-24%
	Slovenia	53%	0%	-53%	53%	0%	-53%	54%	0%	-54%	54%	0%	-54%
Ukraine Disruption Curtailment Rate Peak Day (%)													
	Croatia				-4%	-2%	2%						
	Hungary				-3%	-2%	1%						
Market Integration													
Bi-directionality - Country													
	HR <=> SI	14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
	Rogatec	14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%




## LOW 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													
LNG and Interconnection Capacity Diversification (LICD)													
Slovenia		4,205	3,390	-815	4,252	3,408	-844	4,238	3,403	-835	4,253	3,409	-844
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
Croatia		53%	62%	9%	46%	55%	9%	73%	84%	11%	72%	84%	12%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
Croatia		49%	58%	9%	43%	52%	9%	63%	73%	10%	68%	79%	11%
Remaining Flexibility Peak day (%)													
Croatia		42%	47%	5%	37%	41%	5%	55%	61%	5%	62%	68%	6%
Slovenia		93%	100%	7%	93%	100%	7%	89%	100%	11%	89%	100%	11%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
Slovenia		53%	0%	-53%	53%	0%	-53%	54%	0%	-54%	54%	0%	-54%
Market Integration													
Bi-directionality - Country													
HR <=> SI		14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
Rogatec		14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

## ADVANCED 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)													
Slovenia		3	4	1				3	4	1			
LNG and Interconnection Capacity Diversification (LICD)													
Slovenia		4,205	3,390	-815	4,252	3,408	-844	4,238	3,403	-835	4,253	3,409	-844
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
Croatia		84%	90%	7%	76%	82%	7%						
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
Croatia		79%	86%	7%	72%	79%	6%	96%	100%	4%			
Remaining Flexibility Peak day (%)													
Croatia		70%	73%	3%	64%	67%	2%	87%	91%	5%	98%	100%	2%
Slovenia		93%	100%	7%	93%	100%	7%	89%	100%	11%	89%	100%	11%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
Slovenia		53%	0%	-53%	53%	0%	-53%	54%	0%	-54%	54%	0%	-54%
Market Integration													
Bi-directionality - Country													
HR <=> SI		14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
Rogatec		14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

## EXISTING Infrastructure Level – Distributed Energy

Sum of Value		Column Labels 											
		2025			2030			2040					
Row Labels		CBG			GBC			DE			DE		
		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
LNG and Interconnection Capacity Diversification (LICD)													
	Croatia	5,174	5,000	-174	5,174	5,032	-141						
	Slovenia	4,205	3,390	-815	4,252	3,408	-844	4,153	3,370	-783	4,292	3,424	-868
Security of Supply													
Curtailment Rate Peak Day (%)													
	Croatia				-1%	0%	1%						
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia	10%	19%	9%	5%	14%	9%	66%	96%	30%			
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia	7%	16%	9%	3%	12%	9%	55%	82%	26%	81%	100%	19%
Remaining Flexibility Peak day (%)													
	Croatia	3%	7%	5%	0%	4%	4%	51%	70%	18%	89%	100%	11%
	Slovenia										95%	100%	5%
Single Largest Infrastructure Disruption (SLID)-Croatia													
	Croatia	35%	23%	-12%	37%	26%	-11%	8%	0%	-8%			
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Croatia	27%	0%	-27%	30%	0%	-30%						
	Slovenia	53%	0%	-53%	53%	0%	-53%	39%	0%	-39%	32%	0%	-32%
Ukraine Disruption Curtailment Rate Peak Day (%)													
	Croatia				-4%	-2%	2%						
	Hungary				-3%	-2%	1%						
Market Integration													
Bi-directionality - Country													
	HR <=> SI	14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
	Rogatec	14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

## LOW Infrastructure Level – Distributed Energy

Sum of Value		Column Labels											
		2025			2030			2040					
Row Labels		CBG	GBC			DE			DE				
		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
Slovenia								3	4	1			
LNG and Interconnection Capacity Diversification (LICD)													
Slovenia		4,205	3,390	-815	4,252	3,408	-844	4,153	3,370	-783	4,292	3,424	-868
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
Croatia		53%	62%	9%	46%	55%	9%						
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
Croatia		49%	58%	9%	43%	52%	9%						
Remaining Flexibility Peak day (%)													
Croatia		42%	47%	5%	37%	41%	5%						
Slovenia		93%	100%	7%	93%	100%	7%				95%	100%	5%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
Slovenia		53%	0%	-53%	53%	0%	-53%	39%	0%	-39%	32%	0%	-32%
Market Integration													
Bi-directionality - Country													
HR <=> SI		14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
Rogatec		14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

## ADVANCED Infrastructure Level – Distributed Energy

Sum of Value		Column Labels											
		2025			2030			2040					
Row Labels		CBG	GBC			DE			DE				
		WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA	WITHOUT	WITH	DELTA
Competition													
Commercial Supply Access (CSA)													
	Slovenia	3	4	1				3	4	1			
LNG and Interconnection Capacity Diversification (LICD)													
	Slovenia	4,205	3,390	-815	4,252	3,408	-844	4,153	3,370	-783	4,292	3,424	-868
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia	84%	90%	7%	76%	82%	7%						
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia	79%	86%	7%	72%	79%	6%						
Remaining Flexibility Peak day (%)													
	Croatia	70%	73%	3%	64%	67%	2%						
	Slovenia	93%	100%	7%	93%	100%	7%				95%	100%	5%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Slovenia	53%	0%	-53%	53%	0%	-53%	39%	0%	-39%	32%	0%	-32%
Market Integration													
Bi-directionality - Country													
	HR <=> SI	14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
	Rogatec	14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

## 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													
LNG and Interconnection Capacity Diversification (LICD)													
	Croatia	5,174	5,000	-174	5,174	5,032	-141						
	Slovenia	4,205	3,390	-815	4,252	3,408	-844	4,281	3,420	-861	4,515	3,513	-1,002
Security of Supply													
Curtailment Rate Peak Day (%)													
	Croatia				-1%	0%	1%						
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia	10%	19%	9%	5%	14%	9%	60%	77%	17%	70%	85%	15%
	Slovenia										95%	100%	5%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia	7%	16%	9%	3%	12%	9%	45%	60%	15%	64%	74%	11%
	Slovenia										88%	99%	11%
Remaining Flexibility Peak day (%)													
	Croatia	3%	7%	5%	0%	4%	4%	39%	44%	5%	55%	56%	1%
	Hungary	72%	74%	1%	64%	65%	1%						
	Slovenia										63%	72%	9%
Single Largest Infrastructure Disruption (SLID)-Croatia													
	Croatia	35%	23%	-12%	37%	26%	-11%	16%	0%	-16%	7%	0%	-7%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Croatia	27%	0%	-27%	30%	0%	-30%	4%	0%	-4%			
	Slovenia	53%	0%	-53%	53%	0%	-53%	53%	0%	-53%	50%	0%	-50%
Ukraine Disruption Curtailment Rate Peak Day (%)													
	Croatia				-4%	-2%	2%						
	Hungary				-3%	-2%	1%						
	Switzerland							-3%	-2%	1%			
Market Integration													
Bi-directionality - Country													
	HR <=> SI	14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
	Rogatec	14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

## 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)													
	Slovenia							3	4	1	3	4	1
LNG and Interconnection Capacity Diversification (LICD)													
	Slovenia	4,205	3,390	-815	4,252	3,408	-844	4,281	3,420	-861	4,515	3,513	-1,002
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia	53%	62%	9%	46%	55%	9%						
	Slovenia										95%	100%	5%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia	49%	58%	9%	43%	52%	9%						
	Germany							91%	92%	1%			
	Slovenia										88%	100%	12%
Remaining Flexibility Peak day (%)													
	Belgium							53%	59%	5%			
	Croatia	42%	47%	5%	37%	41%	5%	97%	100%	3%			
	France							20%	22%	2%	44%	46%	2%
	Italy							15%	17%	1%	35%	37%	2%
	Netherlands							24%	27%	2%	53%	56%	3%
	Slovenia	93%	100%	7%	93%	100%	7%	81%	100%	19%	63%	100%	37%
	United Kingdom							18%	20%	2%			
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Slovenia	53%	0%	-53%	53%	0%	-53%	53%	0%	-53%	50%	0%	-50%
Market Integration													
Bi-directionality - Country													
	HR <=> SI	14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
	Rogatec	14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

## 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)													
	Slovenia	3	4	1				3	4	1			
LNG and Interconnection Capacity Diversification (LICD)													
	Slovenia	4,205	3,390	-815	4,252	3,408	-844	4,281	3,420	-861	4,515	3,513	-1,002
Security of Supply													
Remaining Flexibility 2-Week Cold Spell (%)													
	Croatia	84%	90%	7%	76%	82%	7%						
	Slovenia										95%	100%	5%
Remaining Flexibility 2-Week Cold Spell (%) --- DF													
	Croatia	79%	86%	7%	72%	79%	6%						
	Slovenia										88%	100%	12%
Remaining Flexibility Peak day (%)													
	Croatia	70%	73%	3%	64%	67%	2%						
	France							46%	47%	1%	53%	55%	2%
	Netherlands							55%	56%	2%	64%	66%	2%
	Slovenia	93%	100%	7%	93%	100%	7%	81%	100%	19%	63%	100%	37%
Single Largest Infrastructure Disruption (SLID)-Slovenia													
	Slovenia	53%	0%	-53%	53%	0%	-53%	53%	0%	-53%	50%	0%	-50%
Market Integration													
Bi-directionality - Country													
	HR <=> SI	14%	79%	64%	14%	79%	64%	14%	79%	64%	14%	79%	64%
Bi-directionality - Point													
	Rogatec	14%	100%	86%	14%	100%	86%	14%	100%	86%	14%	100%	86%

### 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.

Benefits (Meur/year)		EXISTING			LOW			ADVANCED		
		NATIONAL TRENDS	DISTRIBUTED ENERGY	GLOBAL AMBITION	NATIONAL TRENDS	DISTRIBUTED ENERGY	GLOBAL AMBITION	NATIONAL TRENDS	DISTRIBUTED ENERGY	GLOBAL AMBITION
EU Bill benefits	Reference Supply	0.0	0.0	0.0	0.4	2.5	3.4	0.5	1.4	2.3
With Tariffs	Supply Maximization	0.2	0.3	0.5	0.6	3.0	4.4	1.0	2.0	3.5
Security of Supply	Design Case	2.8	1.6	2.1	1.3	0.9	1.4	1.3	0.9	1.4
	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	CO2 and Other externalities savings	0 / 0	0 / 0	0 / 0	0 / 0	0.2 / 0.4	0.3 / 0.6	0 / 0.1	0.1 / 0.3	0.3 / 0.6
	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	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.9
	Supply Maximization	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.5	0.5	0.5	1.1	1.1	1.1
Security of Supply	Design Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	6.2	3.4	1.2	1.2	1.2	1.2	1.2	1.2
	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	CO2 and Other externalities savings	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	0.0	0.0	0.0	1.0	4.3	4.7	0.4	1.6	3.2	0.0	0.0	0.0	0.3	2.9	4.7	0.2	1.5	2.7
	Supply Maximization	0.5	0.6	0.6	1.1	5.7	5.8	1.5	3.3	5.1	0.0	0.3	0.7	0.3	3.5	6.4	0.7	1.8	4.0
Security of Supply	Design Case	2.6	0.8	1.5	1.3	0.8	2.3	1.3	0.8	1.3	2.5	0.8	1.5	1.3	0.8	1.5	1.3	0.8	1.5
	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	CO2 and Other externalities savings	0/0	0/0	0/0	0/0	0/0	0/1	0/0	0/0	0/1	0/0	0/0	0/0	0/0	0/0	0/1	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



## C.4 Sensitivities analysis on monetised benefits [ENTSOG]

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-N-0086	Transmission gas pipeline	DN 700 (28"), length 69 km	No

Potential impact	Mitigation measures	Related costs included in project CAPEX and OPEX	Additional expected costs
TRA-N-0086 During construction period the potential impacts on the environment are likely for: air quality, noise, geomorphology, habitats, cultural heritage	For the project TRA-N-0086, EIA procedures have been carried out and Decisions on acceptability have been issued by the Croatian line Ministry. The Ministry Decisions on acceptability includes prescribed relevant environmental protection measures for reducing the potential impacts to the lowest level. EIA procedures were carried out in accordance with Croatian national legislation that is aligned with EU requirements.	Included in project CAPEX	Not expected

### Environmental Impact explained [Promoter]

**Croatia:** Major influences of the project TRA-N-86 on the economic and environmental dimensions are to be considered during the construction period (disturbance, traffic disturbance where secondary roads are cut, and impacts due to the dust, noise, transport machinery, and other machineries). 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 mitigation 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. Mitigation measures for reducing the possible impacts to the lowest possible level are proposed in the EIA procedures.

## 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

The Group provides security of supply and improves N-1 criteria for both Croatia and Slovenia. It will increase the capacity of interconnection between Croatia and Slovenia up to 5 bcm/y, in both directions. Considering all existing and potentially new supply routes in the surrounding region this Group enables significant transit potential in both directions. Implementation of this Group will enable supply of Slovenian other gas markets in CEE with the gas from planned LNG terminal Krk. Other expected benefits of this Group are:

- Reducing energy prices for the end users (reduction of marginal gas prices in Croatia and Hungary for several price and demand scenarios)
- Providing additional gas transmission and transit of gas to the neighbouring SEE countries
- Facilitating market integration

Regarding the HHI and N-1 standard, the project will crucial contributed to improve the HHI and N-1 standard.

The implementation of this project group will also enable reduction of emissions other than CO<sub>2</sub> such as reduction of SO<sub>2</sub>, NO<sub>x</sub> emissions and other particulate matter.

Gas pipeline TRA-N-86 Croatia/Slovenia goes parallel with the existing gas pipeline and is first step in development of Croatian hydrogen supply system. In methane to hydrogen transitional period one pipeline will serve for methane and other for hydrogen supply.

## F. Useful Links

### The project website

#### Plinacro Project link:

<http://www.plinacro.hr/default.aspx?id=913>

#### Network Development Plan:

##### PLINACRO:

<http://www.plinacro.hr/UserDocsImages/dokumenti/Desetogodi%C5%A1nji%20plan%20razvoja%20PTS%202018-2027.pdf>, (NDP 2018-2027, page 63)

#### Plinovodi National Development Plan 2020-2029 link:

<http://www.plinovodi.si/en/transmission-system/development-plan/>

<http://www.plinovodi.si/en/transmission-system/projects-of-common-interest-pci/>