Project Sheet

New SK-HU intercon. - phase 1

Project type	transmission
Project id	48
Created by	
Created on	Feb 8, 2021 2:43:54 PM

Index

Key Information 3
Description 3
Project Description & Context 5
Project Investments 5
System Needs addressed by the project 6
Interconnection targets 6
Project Assessment 10
Transfer capacity increase (National Trends 2025) 10
CBA results 10
Central scenario: National Trends 10
Scenarios: Distributed Energy & Global Ambition 12
Non scenario-dependent indicator(s) 13
Sensitivity Study: Current Trends 14
Residual impact 15
Project Costs 15

ENTSOE

Key Information

Cross Border Project
AC transmission line
New

PCI number 3.16, 3.17 (4th list, 31 Oct. 2019)
Under Construction

Description

This project will increase the transfer capacity between the Slovak and Hungarian transmission systems, improve security and reliability of operation both transmission systems and support North - South RES power flows in CCE region. Main investments of this project are double circuit AC OHL 400 kV from new Gabcikovo (Slovakia) substation to Gonyu (Hungary) substation, with one circuit connected to the Velky Dur (Slovakia) substation and double circuit AC OHL (preliminary armed only with one circuit on Hungarian side) 400 kV from Rimavska Sobota (Slovakia) substation to Sajoivanka (Hungary) substation.

Project promoters

MAVIR

SEPS

Countries

Hungary
Slovakia

National development plan(s)

A Magyar Villamosenergia-rendszer Hálózatfejlesztési Terve 2017., Hungary, 2017, Page 5, Desaťročný plán rozvoja prenosovej sústavy na roky 2020-2029 (for the time being only Slovak version is available), Slovakia, 2019, Page 34.

Additional information on the project

Project PCI website:

https://ec.europa.eu/energy/sites/ener/files/documents/pci_3_16_1_en.pdf

https://ec.europa.eu/energy/sites/ener/files/documents/pci_3_16_2_en.pdf

https://ec.europa.eu/energy/sites/ener/files/documents/pci_3_16_3_en.pdf

https://ec.europa.eu/energy/sites/ener/files/documents/pci_3_17_en.pdf

Slovak website for the PCI projects 3.16 and 3.17:

https://www.mhsr.sk/energetika/medzinarodna-spolupraca/projekty-spolocneho-zaujmu-pci/elektroenergetika/3161-vedenie-2-x-400-kv-gabcikovo-sk-goenyu-hu-velky-dur-sk

https://www.mhsr.sk/energetika/medzinarodna-spolupraca/projekty-spolocneho-zaujmu-pci/elektroenergetika/317-vedenie-2-x-400-kv-rimavska-sobota-sk-sajoivanka-hu

Hungarian website for the PCI projects 3.16 and 3.17:

http://www.mavir.hu/web/mavir/pci-jeloltek

http://www.mavir.hu/web/mavir-en/eu-projects-of-common-interest-to-be-implemented-by-mavir

2nd PCI list:
https://ec.europa.eu/energy/sites/ener/files/documents/5_2%20PCI%20annex.pdf

Slovak TYNDP document:
https://www.sepsas.sk/Dokumenty/ProgRozvoj/2019/11/DPR_PS_2020_2029.pdf

Hungarian National Development Plan (only in Hungarian):
https://www.mavir.hu/documents/10258/15454/HFT_2019.pdf

3rd PCI list:
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0540&from=EN

4th PCI list:
https://ec.europa.eu/energy/sites/ener/files/c_2019_7772_1_annex.pdf

The costs of investments ""HUnew1"" and ""HUnew2"" are inclued in ""2. SK-HU interconnection"" (same as in the PCI process).

Project sheet backlog

6 Nov. 2020 - Publication as part of the draft TYNDP 2020 package for consultation

Project Description & Context

Project Investments

Main investment(s):

"New interconnection (new 2x400 kV tie-line) between SK and HU starting from Gabcikovo substation (SK) to the Gonyu substation (HU), with one circuit connected to Velky Dur (SK) substation. Project does not include the erection of new switching station Gabcikovo next to the existing one. It includes extension of the new Gabcikovo substation by the two 400 kV bays where the new double line will be connected."

Connection of the two existing substations Rimavska Sobota (SK) - Sajoivanka (HU) by the new double 400 kV OHL armed only with one circuit on the both sides.

Type of element	Total route length (km)	From substation 1	To substation 2	Present status	Commissioning year	Progress of the investment	Explanation in case of delay or reclustering
AC transmission line	110	Gabcikovo (SK)	Gonyu (HU)	Under Construction	2020	Investment on time	
AC transmission line	48	Rimavska Sobota (SK)	Sajoivanka (HU)	Under Construction	2020	Investment on time	

Other investments

Description	Type of element	Total route length (km)	From substation 1	To substation 2	Present status	Commissioning year	Progress of the investment	Explanation in case of delay or reclustering
2x70 Mvar shunt reactors in station Sajóivánka (HU)	Reactive compensation device				Under Construction	2020	Investment on time	
Second 400/120 kV transformer in station Sajóivánka (HU)	Transformer				Under Construction	2020	Investment on time	

Reason for investment clustering

The two cross-border elements are on the Western and Eastern part of the HU-SK profile, and both are needed to ensure the NTC increase potential of the project, taking into account as well as improvement of the N-1 criterion fulfilment at the SK-HU profile. The two Hungarian internal investments in substation Sajóivánka are needed for the connection of cross-border line Sajóivánka-Rimavská Sobota.

Is the project in the reference grid?

Yes

System Needs addressed by the project

Project promoter(s) selected up to 4 system needs that are addressed by their project in a predefined list. Available needs ranged from reduction of price differentials between countries, improvement of system flexibility and stability, enabling cost-efficient connection of high volumes of RES, improvement of voltage stability...
As part of the TYNDP 2020, ENTSO-E released a study investigating cross-border system needs in the 2030 and 2040 horizons.

Need		How the project addresses each need (explanation provided by the project promoter(s))
	Infrastructure to reduce price differentials between EU and/or non-EU countries	The project decreases the marginal costs difference between HU and SK, based on the market simulation results, so it improves market integration.
	Infrastructure to improve system flexibility and stability e.g. improve system or local ramp rate, improve transient stability or RoCoF to meet system Needs.	The project increases system flexibility and stability during maintenance periods in North-Eastern Hungary.
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	The project improves operational security at the SK-HU cross-border profile, as without the project cross-border and loop flows in scenarios could violate fulfillment of N-1 security criterion.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	The project improves accomodation of the north-south flows caused by new RES connections.

Interconnection targets

In 2017, the Interconnection Target Expert Group proposed alternative indicators to the 15% interconnection criteria for every country and electrified island with a new methodology developed collaboratively between the European Commission, ENTSO-E, ENTSOG, industry, universities and other experts. The methodology is based on three indicators:
1. Price differential between EU countries, with an objective to reduce it below 2 EUR/MWh

2. Ratio between nominal transmission capacity and installed RES capacity, with a target of past 30%
3. Ratio between nominal transmission capacity and peak load, with a target of past 30%

The following maps show the ITEG methodology applied to the TYNDP 2030 scenarios, with the 2020 grid.

ENTSO-E

ENTSOE

ENTSOE

Project Assessment

Transfer capacity increase (National Trends 2025)

	Border	A B	B A
Transfer capacity increase (in MW)	Hungary - Slovakia	800	1300

CBA results

ENTSO-E has assessed the benefits delivered by each project in 2025 (scenario National Trends 2025) and in 2030 (three scenarios: National Trends, Distributed Energy and Global Ambition). Indicators B1 to B6 were computed by ENTSO-E, while promoters had the possibility to compute and submit so-called project-level benefits (B7 to B10). The benefits must be understood as benefits for Europe as a whole, not for the promoters of the project.
Results are presented per scenario.

Central scenario: National Trends

National Trends is the central policy scenario of the TYNDP2020, designed to reflect EU member state's National Energy and Climate Plans (NECP), in line with the requirement to meet current European 2030 energy strategy targets.

			Comparison of the COP21 scenarios with NT2030 average result		
	NT2025	**NT2030**	**DE2030 is < or > than NT2030**	**GA2030 is < or > than NT2030**	

Increase in socio-economic welfare

B1 Annual Socio-Economic Welfare (SEW) increase (M € / year)	max average min	7 6 4	16 11 6	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	-2 -6 -12	10 4 0	>	>	ENTSO-E assessment
B1_RES Annual Socio-Economic	max average	2 1	9 3	<	<	ENTSO-E assessment

Welfare increase resulting from RES integration	min	0	0			

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	256	58	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	-15	-10	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	528	107	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	510	1169	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	3	4	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	498	1157	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	502 280 97	-7 -138 -372	< 	< 	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from CO2 variation from market simulation monetised (M € / year)	CO2 price	60€/ ton 100€/ ton 189€/ ton	-10 -22 -46	4 10 22	< > >	>> > >	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	87	61	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price	60€/ ton 100€/	-3 -7 -15	-2 -4 -10	n/a	n/a	ENTSO-E assessment

CO2 variation from network simulation monetised (M € / year)	ton 189€/ ton					

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min	41 16 0	243 88 1	<	<	ENTSO-E assessment
B3a Connected RES (MW)	-			n/a	n/a	ENTSO-E assessment

Impact on grid losses

B5 Variation of network losses (GWh / year)	average	123	86	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	5	5	n/a	n/a	ENTSO-E assessment

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		0	n/a	n/a	ENTSO-E assessment
B6_€ Annual Socio-Economic Welfare increase resulting from reduction in Energy Not Served monetised (M€ / year)	average	n/a	0	>	n/a	ENTSO-E assessment

Scenarios: Distributed Energy & Global Ambition

DE and GA are two scenarios created in line with the COP21 targets to understand the impact on infrastructure needs agains different pathways reducing EU-28 emissions to net-zero by 2050. For these two scenarios, projects were assessed with a subset of CBA parameters.

		DE2030	GA2030	
Increase in socio-economic welfare				
B1 Annual Socio-Economic Welfare (SEW) increase (M€ / year)	average	16	18	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	16	10	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	2	3	ENTSO-E assessment
Reduction of CO2 and GHG emissions				
B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-299	-280	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from CO2 variation from market simulation monetised (M€ / year)	CO2 price 60€/ ton 100€/ ton 189€/ ton	2 14 41	7 18 43	ENTSO-E assessment
Integration of renewable energy sources				
B3 Annual avoided curtailment (RES integration) (GWh / year)	average	52	69	ENTSO-E assessment
B3a Connected RES (MW)	-			ENTSO-E assessment

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
Hunew 1 (MSC /MSR (Mechanically Switched Capacitors/Reactors))	0	+	0	Qualitative assessment by ENTSO-E based on information on the project technology provided by the project promoter(s). This indicator is not dependent on scenarios or time horizons.
1. SK-HU interconnection (New AC line)	++	++	0	
2. SK-HU interconnection (New AC line)	++	++	0	

Sensitivity Study: Current Trends

'Current Trends' describes a future where the energy transition is slower than planned.

	CT2030	

Increase in socio-economic welfare

B1 Annual Socio-Economic Welfare (SEW) increase (M€ / year)	average	7	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	-5	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	0	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	192	ENTSO-E assessment
B2a_€ Annual		-6	ENTSO-E assessment

Societal cost variation resulting from CO2 variation from market simulation monetised (M€ / year)	CO2 price 60€/ ton 100€/ ton 189€/ ton	-14 -31	

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	5	ENTSO-E assessment
B3a Connected RES (MW)	-		ENTSO-E assessment

Residual impact

Information on the residual impact of the project was provided by the project promoter(s).

Residual environmental impact

Investment	Investment status	Distance (km)	Type of sensitivity

Project Costs

The project costs were provided by the project promoter(s).

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
696. Hunew 1	0.5	±10%	0.0097
697. Hunew 2	2.1	±10%	0.0387
1500. 1. SK-HU interconnection	27.65	±10%	0.7308
1501. 2. SK-HU interconnection	51.38	±10%	0.6904
Total	81.63		1.4696

Explanation provided by the project promoter on the CAPEX uncertainty range:

696	
697	
1500	The costs of the investment are in 2018 price levels, when the estimation of the project investment cost have been done. The value of the costs provided includes implementation phase costs (studies, permissions, etc.), construction costs of the lines and the costs for the substations extensions. All possible factors that can influence the investment costs value are therefore considered in the "Cost Uncertainty Range".

1501 The costs of the investment are in 2018 price levels, when the estimation of the project investment cost have been done. The value of the costs provided includes implementation phase costs (studies, permissions, etc.), construction costs of the lines and the costs for the substations extensions. All possible factors that can influence the investment costs value are therefore considered in the "Cost Uncertainty Range".

ENTSOE