Project Sheet

Swiss Ellipse I

Project type	transmission
Project id	266
Created by	
Created on	Feb 11, 2021 11:44:36 AM

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Key Information

Internal Project
AC transmission line
Mostly New

In Permitting

Description

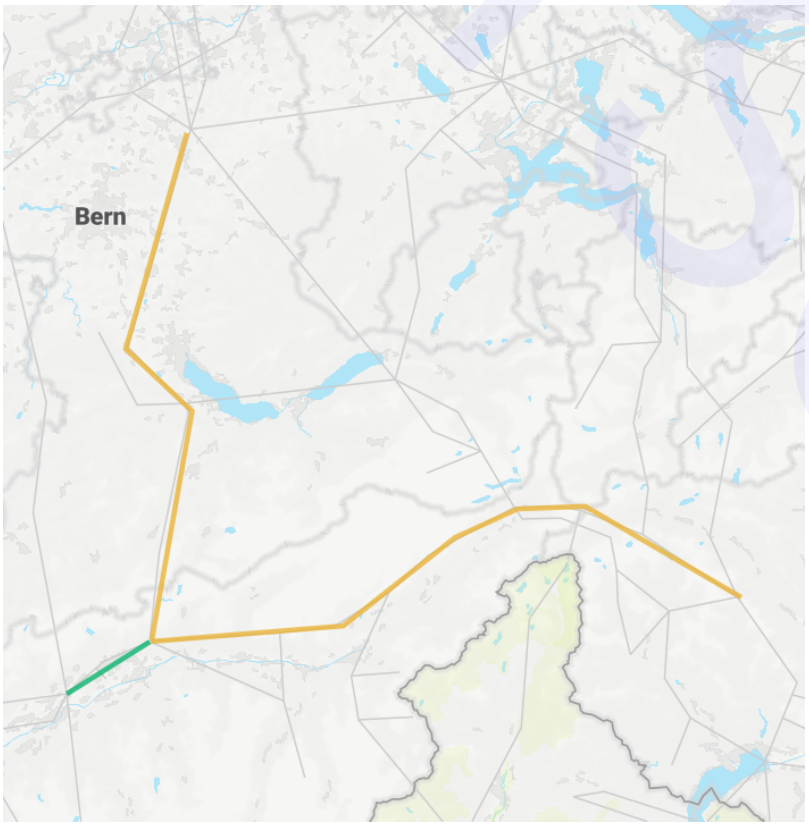
The project helps accommodate new pump storage units which mainly support the increasing RES generation in the European areas with solar and wind generation and increase the DE-CH NTC.

Project promoters

SWISSGRID

Countries

Switzerland



National development plan(s)

https://www.swissgrid.ch/dam/swissgrid/projects/strategic-grid/sg2025-technical-report-de.pdf , Switzerland, 2015, page 148

Additional information on the project

https://www.swissgrid.ch/en/home/projects/strategic-grid.html

Bickigen - Chippis

https://www.swissgrid.ch/content/swissgrid/en/home/projects/project-overview/bickigen-chippis.html

Chamoson - Chippis

https://www.swissgrid.ch/content/swissgrid/en/home/projects/project-overview/chamoson-chippis.html

Chippis - Lavorgo

https://www.swissgrid.ch/content/swissgrid/en/home/projects/project-overview/moerel-ulrichen.html

https://www.swissgrid.ch/content/swissgrid/en/home/projects/project-overview/airolo-lavorgo.html

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): Reinforcement by construction of a new 380 kV route including a new 380/220 kV transformer in Mörel

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	124	Chippis	Lavorgo	In Permitting	2029	Delayed	Permitting Procedure

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
Bickigen - Chippis: Optimisation of the existing route by voltage conversion to 380 kV	AC transmission line	106.6	Bickigen	Chippis	In Permitting	2027	Delayed	Permitting procedure
Chamoson - Chippis: Reinforcement by new construction of a 380 kV route New 380/220 kV transformer in Chippis	AC transmission line	30	Chamoson	Chippis	Under Construction	2022	Delayed	Permitting procedure

Reason for investment clustering

The investments of the Swiss Stategic Grid 2025 that chiefly contribute to accommodating the new pump storage units in the Swiss Alps are clustered in the project Swiss Ellipse I.

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 address system adequacy deficiencies and/or mitigate the risk of power failures.	This project contributes to the adequacy in view of the nuclear phase-out and the development of renewables and pump hydro storage devices.
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	This project is located in a highly meshed part of the transmission grid and therefore helps accommodate such flows.
	Infrastructure to reduce price differentials between EU and/or non-EU countries	This project contributes to lowering the price differentials between Switzerland on the one hand and Germany on the other hand.

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.

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Project Assessment

Transfer capacity increase (National Trends 2025)

	Border	A B	B A
Transfer capacity increase (in MW)	Switzerland - Germany	800	800

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	25 20 16	70 59 48	>	<	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	8 5 1	22 18 15	>	>	ENTSO-E assessment
B1_RES Annual Socio-Economic	max average	12 10	35 33	<	<	ENTSO-E assessment

Welfare increase resulting from RES integration	min	9	31			

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	263	510	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	2	8	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	222	345	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	-1700	-1149	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	7	15	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-1720	-1192	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)	max average min	-34 -199 -343	-536 -645 -770	>	<	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	7 15 33	21 46 104	< < <	< < <	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)	average	7	3	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price 60€/ ton 100€/	0 -1 -1	0 0 -2	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	254 208 172	973 836 733	<	<	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	28	262	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	-2	0	n/a	n/a	ENTSO-E assessment

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		698	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	6.98	>	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	60	55	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	29	23	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	24	28	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-551	-646	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	4 26 75	16 42 100	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	462	632	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	
Chippis - Lavorgo (New AC line)	++	++	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.
Bickigen - Chippis (New AC line)	++	++	0	
Chamoson - Chippis (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	24	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	7	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	13	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-251	ENTSO-E assessment
B2a_€ Annual		8	ENTSO-E assessment

Societal cost variation resulting from CO2 variation from market simulation monetised (M€ / year)	CO2 price 60€/ ton 100€/ ton 189€/ ton	18 40	

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	242	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).

Project Costs

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1286. Chippis - Lavorgo	360	+/- 10%	1.8
1733. Bickigen - Chippis	50	+ / - 10%	0.25
1734. Chamoson - Chippis	166	+/- 10 %	0.83
Total	576		2.88

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

1286	unknown outcome of the tendering process
1733	
1734	unknown outcome of the tendering process