HI WEST 11 (Less-Advanced)

RHYn

Reasons for grouping [ENTSOG]

The project group aims at interconnecting future hydrogen infrastructure, producers and consumers between France and Germany by repurposing methane infrastructure.

The group includes investments in France (HYD-N-969) and Germany (HYD-N-1096).

Objective of the group [Promoter]

RHYn & RHYn Interco are two connecting projects specifically designed to reply to the industrial demand in Grand Est and in Baden Württemberg. Their objective is to bring large-scale hydrogen transport infrastructure to the region of Upper Rhine and to support major industrial clients committed to their decarbonization path.

The projects will connect available H2 production with its consumption on the regional level and satisfy the supply needs of the chemical industry, fertilizers production, food production, energy production, as well as the various actors of mobility such as aviation, river transport, heavy and light road transport, etc. In later stages, steel production can be reached by RHYn Interco.

By 2028, an approx.100 km network with a high share of repurposed parts of at least 60 km in France, and 30 km in Germany will strongly contribute to green the local industrial and energy sectors for which hydrogen is an important part of the decarbonization mix.

Efficient usage of existing infrastructure will support the energy transition, save costs and without any doubt limit environmental impacts of new construction.

The projects maintain local employment and help support highly skilled local workforce.

From a broader perspective, the region will also obtain additional sources of hydrogen once the projects will interconnect BarMar-H2Med and HY-FEN projects.

A. Project group technical information [Promoter/ ENTSOG]

Project technical information [Promoter]

Hydrogen Transmission

TYNDP Project code	Section name	New / Repurposing	Nominal Diameter [mm]	Section Length [km]	Correction [km]	Compressor power [MW]
HYD-N-1096	Section 1 - Rhine crossing to Tunsel	New	400	15		
HYD-N-1096	Section 2 – Tunsel to Freiburg	Repurposing	400	20		
HYD-N-1096	Section 3 - Freiburg area	Repurposing	400/200	10		
HYD-N-1096	Section 4 - Freiburg to Offenburg	Mix	400	65		
HYD-N-969	RHYn – phase 1 - Fessenheim –	Mix	400	30	38	

	Ottmarsheim-Mulhouse					
HYD-N-969	RHYn – phase 2 – Basel Airport Connection	Mix	250	30	25 if repurpose, 21 if new	
HYD-N-969	RHYn – phase 3 – Fessenheim - Marckolsheim	Repurposing	400/100	38		
HYD-N-969	RHYn – phase 4 – Fessenheim (FR) – Tunsel (DE)	Mix	400	20	5	

Capacity increment [ENTSOG]

TYNDP Project code	Point name	Operator	From system	To system	Capacity increment [GWh/d]	Comm. year
HYD-N-1096	H2_IP_DE-FR	terranets bw GmbH	Transmission France (FR Hydrogen)	Transmission Germany (DE Hydrogen)	12	2028
HYD-N-1096	H2_IP_DE-FR	terranets bw GmbH	Transmission Germany (DE Hydrogen)	Transmission France (FR Hydrogen)	12	2028
HYD-N-969	H2_IP_DE-FR	GRTgaz	Transmission France (FR Hydrogen)	Transmission Germany (DE Hydrogen)	12	2028
HYD-N-969	H2_IP_DE-FR	GRTgaz	Transmission Germany (DE Hydrogen)	Transmission France (FR Hydrogen))	12	2028

B. Project Cost Information

During the TYNDP 2022 Project Data Collection, promoters were asked to indicate whether their costs were confidential or not. The following tables display the non-confidential costs provided by the promoters (as of December 2022, end of PCI 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.

[ENTSOG]

TYNDP Project code	CAPEX [M€]	CAPEX range [%]	OPEX [M€]	OPEX range [%]
HYD-N-1096	86	40%	1,4	40%
HYD-N-969	88	40%	1,8	40%

Description of the cost and range [Promoter]

The cost estimation is based on the pre-feasibility study of the first 3 phases of the RHYn project and on internal calculation of the interconnection France-Germany.

Details of the main CAPEX expenditure items:
Studies (project management, land purchase studies, impact assessment, hazard study, public dialog, route study…)
Repurposed pipelines

- Adaptation of existing gas grid
- Various equipment changes (measuring, etc.) for H2 acceptance

New pipelines:

- Supply and installation of pipelines and sectioning equipment
- Construction of delivery and injection facilities
- Crossing of Rhine river

Details of the main OPEX expenditure items:
It was made on the basis of ratios proposed from the analysis of maintenance costs evaluated on the existing natural gas network. These ratios have been increased due to the need to develop dedicated hydrogen IT tools and due to higher maintenance standards.

Given the state of the studies to date and the information gathered at this stage, we propose to retain standard contingencies of the order of 40% of the total amount. These contingencies take into account our experience on the various projects, as well as current assumptions concerning specific price variations such as the impact of economic events (e.g. rise in raw materials prices). As the international situation is currently having a particular impact, these assumptions may change over the course of the project's phases.

C. Project Benefits [ENTSOG]

C.1 Summary of benefits

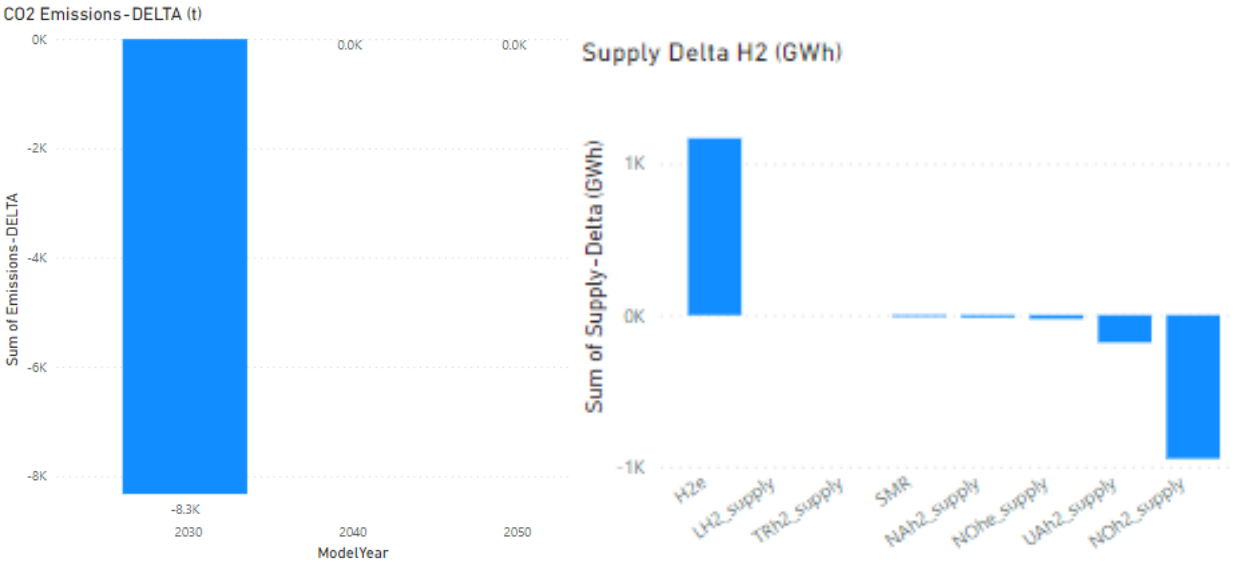
This section provides a summarised analysis by ENTSOG of the main benefits stemming from the realisation of the overall group. More details on the indicators are available in Annex D of TYNDP 2022[1].

[1] https://www.entsog.eu/sites/default/files/2023-04/ENTSOG_TYNDP_2022_Annex_D_Methodology_230411.pdf

Distributed Energy

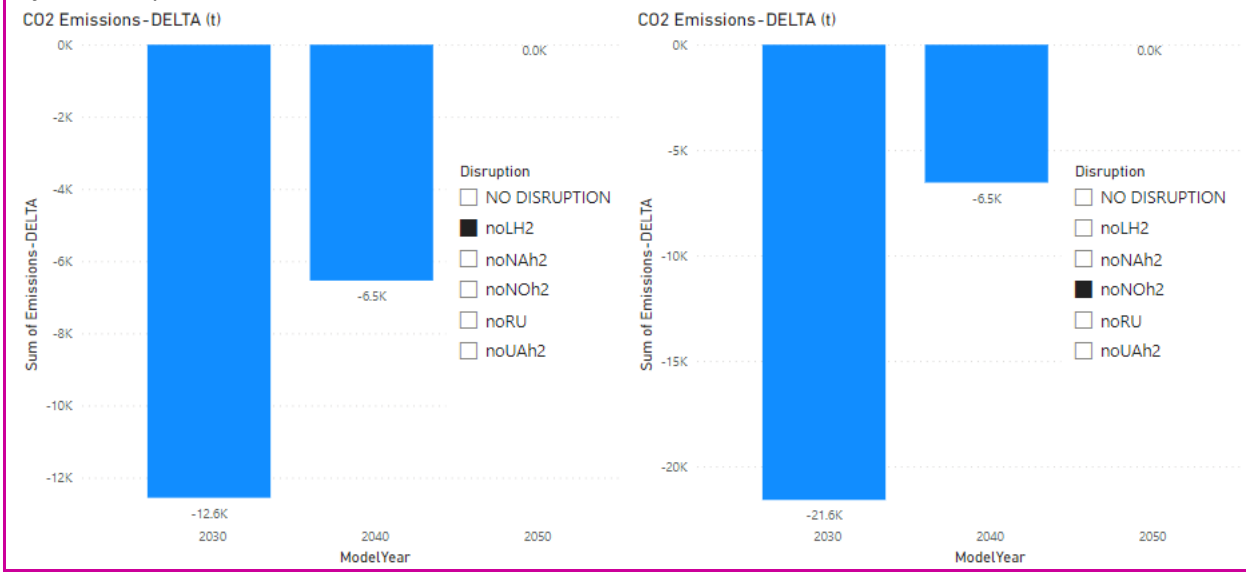
Sustainability benefits

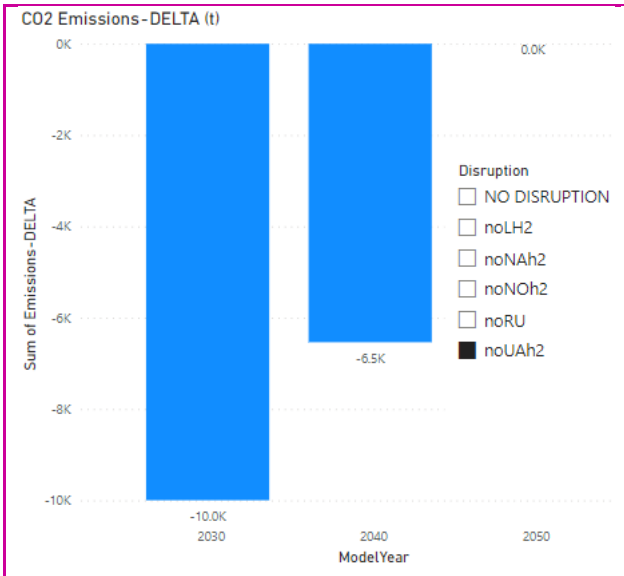
In the reference case, which analyses yearly demand in two periods (average winter and average summer), the project group will contribute to sustainability by reducing overall CO2 emissions by 8,3 kt in 2030. The project group enables the transport of green hydrogen and so then replacing use of Norwegian supply which is considered as blue hydrogen in 2030.

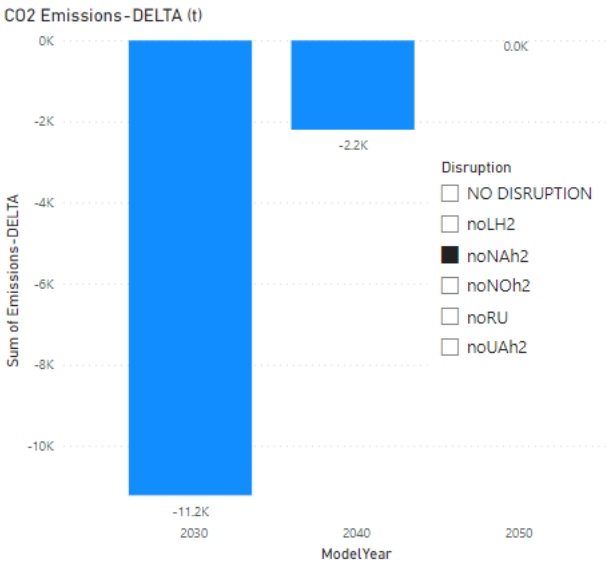


Similar trend is expected under any supply disruption in 2030. Moreover, sustainability benefits are expected under any disruption in 2040.

1 noLH2 : LH2 disruption / 2 noNOh2 : Norway disruption / 3 noUAh2 : Ukraine disruption/ 4 noNAh2 : North Africa disruption







Security of Supply:[2]

It is important to notice as the capacities are very low, small SOS benefits are expected with this project.

> Reference case

In the reference case, the project is contributing to further mitigation of hydrogen demand curtailment risk in average summer and average winter a little from 2030, that cannot be displayed on the map.

> Climatic stress cases

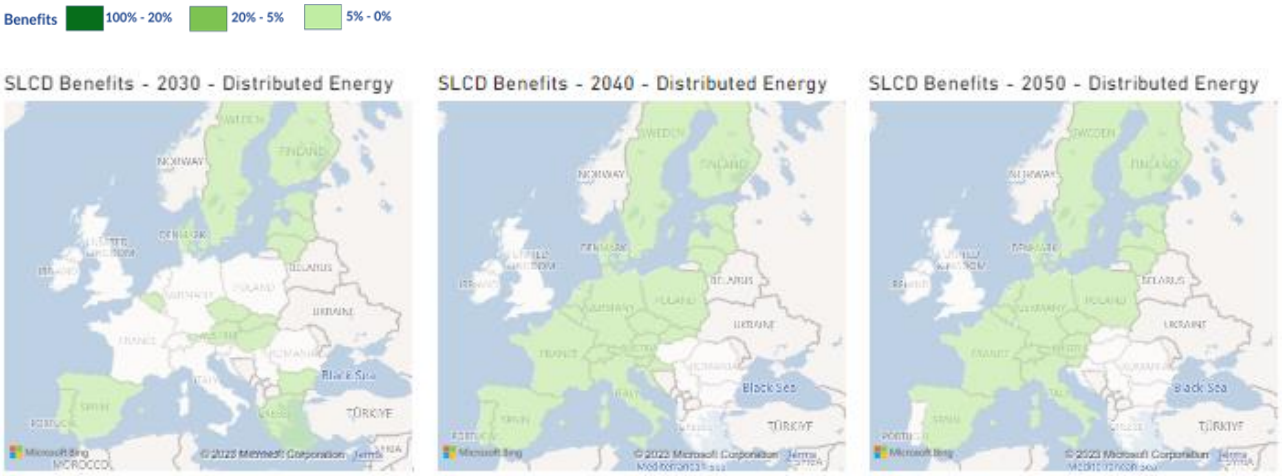
Under 2 -week and 2-week dunkelflaute climatic stress case, as well as under peak day climatic case the project group is also not showing security of supply benefits.

[2] *As for the hydrogen system there is no existing infrastructure level available yet, ENTSOG has identified a possible hydrogen network according to the information provided by promoters in their project submission for the TYNDP/PCI process (i.e., H2 Infrastructure level). Therefore, the System Assessment shows the results that could be reached (for different timestamps) under the hypothesis of a full commissioning of the H2 infrastructure projects that were submitted by project promoters but that are not yet in place. Therefore, even in configurations where no demand curtailment is identified (e.g., average winter in 2030) these results should not be read as an absence of H2 infrastructure needs for the given scenario. On the contrary, the full availability of the planned infrastructures composing the H2 infrastructure level is assumed to avoid the potential demand curtailment.*

> Disruption cases (S-1):

Similarly, under supply disruption cases, the project group is not further contributing to the mitigation of hydrogen demand curtailment risk.

> Single largest capacity disruption (SLCD):

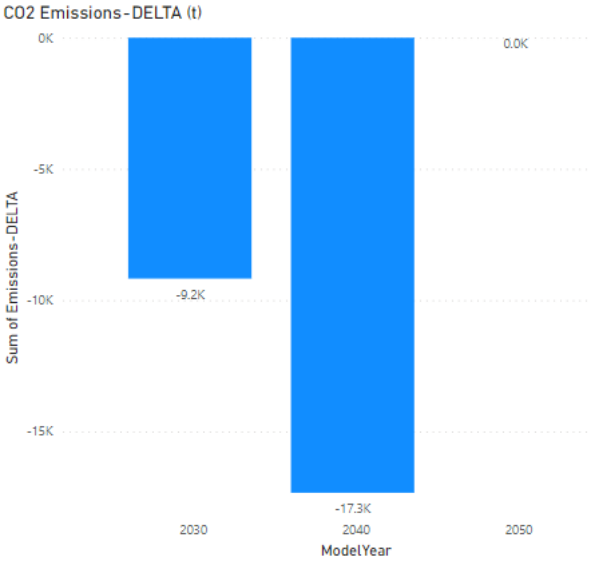


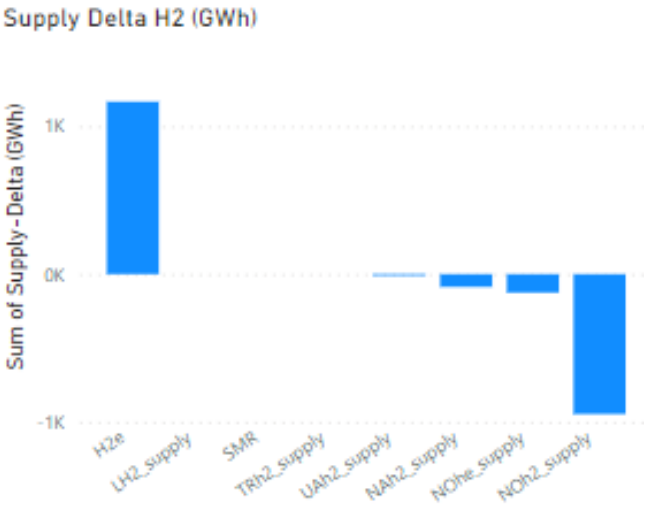
In case of single largest capacity disruption (SLCD), the project group reduces the risk of demand curtailment in some countries by 1% in 2030. In addition, from 2040, the project group helps to mitigate the risk of demand curtailment due in almost all countries.

Global Ambition

Sustainability benefits

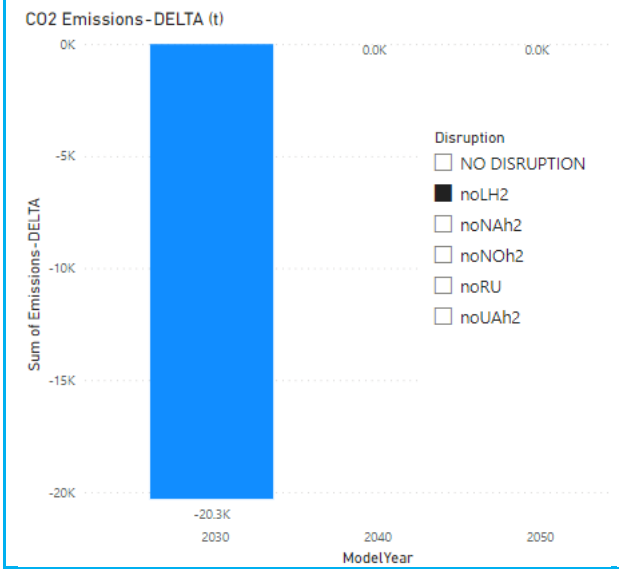
In the reference case, which analyses yearly demand in two periods (average winter and average summer), the project group will contribute to sustainability by reducing overall CO2 emissions by 9,2 kt in 2030 and 17,3 kt in 2040. The project group enables the transport of green hydrogen and so then replacing use of Norwegian supply which is considered as blue hydrogen in 2030.

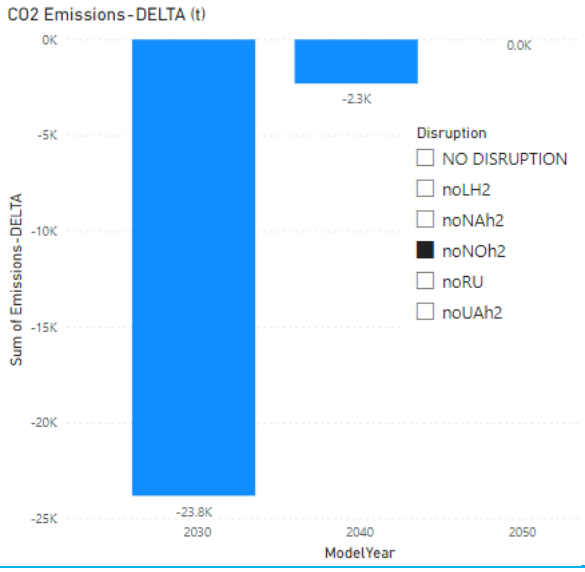


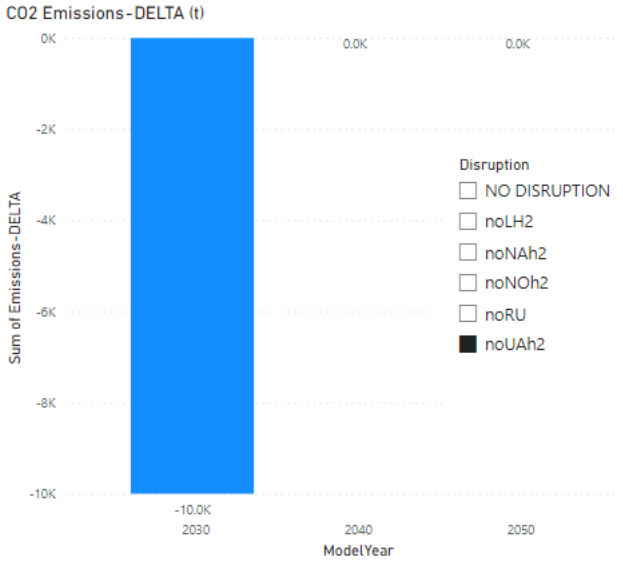


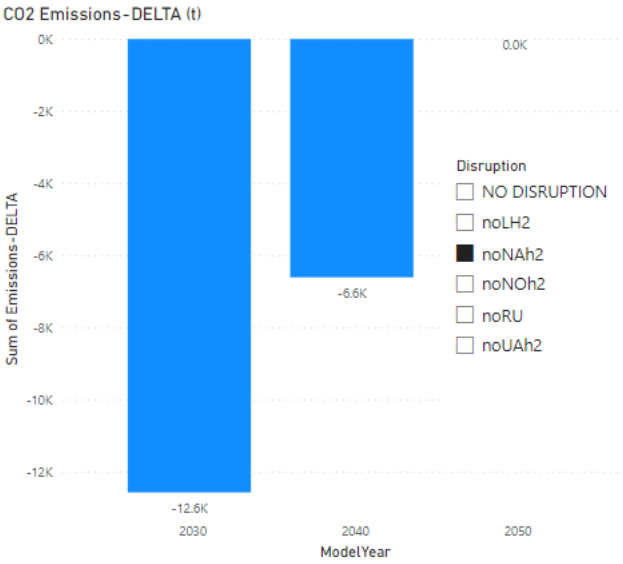
A similar trend is expected under any supply disruptions.

1 noLH2 : LH2 disruption / 2 noNOh2 : Norway disruption / 3 noUAh2 : Ukraine disruption/ 4 noNAh2 : North Africa disruption









Security of supply benefits

> Reference case

In the reference case, the project is contributing to further mitigation of hydrogen demand curtailment risk in average summer and average winter a little in 2040, that cannot be displayed on the map.

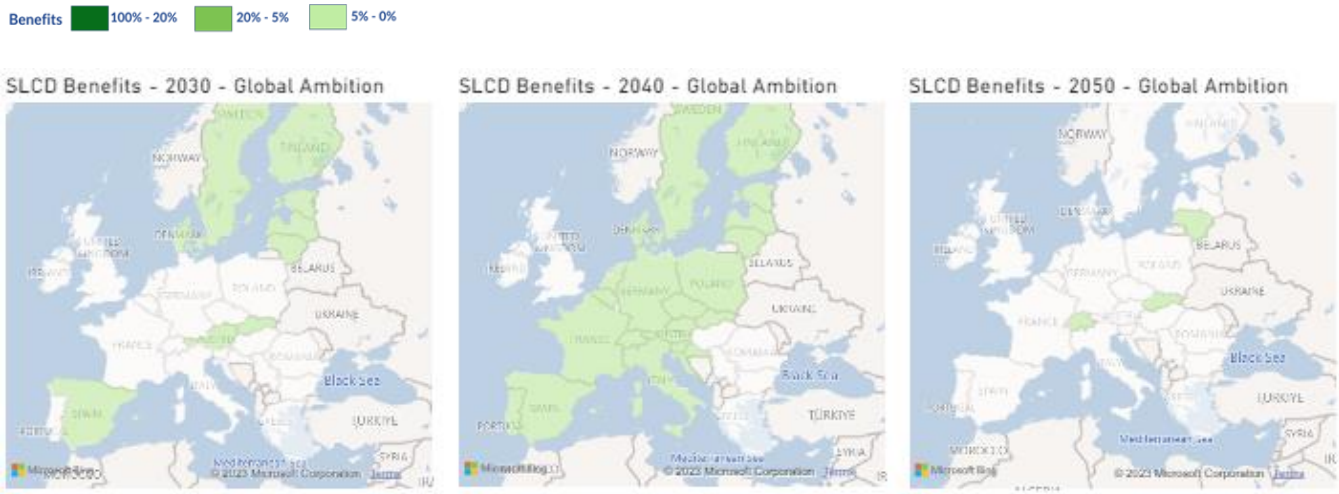
> Climatic stress cases

Under 2 -week and 2-week dunkelflaute climatic stress case, as well as under peak day climatic case the project group is also not showing security of supply benefits.

> Disruption cases (S-1):

Similarly, under supply disruption cases, the project group is not further contributing to the mitigation of hydrogen demand curtailment risk.

> *Single* largest capacity disruption *(SLCD):*



In case of single largest capacity disruption (SLCD), the project group reduces the risk of demand curtailment in some countries by 1% in 2030. In addition, in 2040, the project group helps to mitigate the risk of demand curtailment due in almost all countries.

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.

CO2 Emissions:

ModelYear	Disruption	Scenario	Unit	Emissions-DELTA	Emissions-PLUS	Emissions-MINUS
2030	NO DISRUPTION	DE	tonne	-8326,51	538677299	538685625,5
2030	noLH2	DE	tonne	-12555,47	540175890,2	540188445,7
2030	noNAh2	DE	tonne	-11219,80	539785356,1	539796575,9
2030	noNOh2	DE	tonne	-21583,44	538877197,8	538898781,3
2030	noUAh2	DE	tonne	-9997,29	539378771,9	539388769,2
2030	NO DISRUPTION	GA	tonne	-9176,48	592910448,4	592919624,9
2030	noLH2	GA	tonne	-20305,74	594817481,2	594837786,9
2030	noNAh2	GA	tonne	-12573,01	594141433,2	594154006,2
2030	noNOh2	GA	tonne	-23802,03	593310994,3	593334796,3
2030	noUAh2	GA	tonne	-9997,29	593627617,9	593637615,2
2040	NO DISRUPTION	DE	tonne	0,00	392077044	392077044
2040	noLH2	DE	tonne	-6536,68	392213883,4	392220420
2040	noNAh2	DE	tonne	-2202,58	392188097,7	392190300,3
2040	noNOh2	DE	tonne	-6536,68	392144022,6	392150559,3
2040	noUAh2	DE	tonne	-6536,68	392399182,9	392405719,6
2040	NO DISRUPTION	GA	tonne	-17336,41	396523251,6	396540588
2040	noLH2	GA	tonne	0,00	397455196,7	397455196,7
2040	noNAh2	GA	tonne	-6607,73	397301976,6	397308584,4
2040	noNOh2	GA	tonne	-2298,71	397450977,1	397453275,8
2040	noUAh2	GA	tonne	0,00	397478498,3	397478498,3
2050	NO DISRUPTION	DE	tonne	0,00	232557734,8	232557734,8
2050	noLH2	DE	tonne	0,00	232557734,8	232557734,8
2050	noNAh2	DE	tonne	0,00	232557734,8	232557734,8
2050	noNOh2	DE	tonne	0,00	232557734,8	232557734,8
2050	noRU	DE	tonne	0,00	232557734,8	232557734,8
2050	noUAh2	DE	tonne	0,00	232557734,8	232557734,8
2050	NO DISRUPTION	GA	tonne	0,00	228306706,5	228306706,5
2050	noLH2	GA	tonne	0,00	228306706,5	228306706,5
2050	noNAh2	GA	tonne	0,00	228306706,5	228306706,5
2050	noNOh2	GA	tonne	0,00	228306706,5	228306706,5
2050	noRU	GA	tonne	0,00	228306706,5	228306706,5
2050	noUAh2	GA	tonne	0,00	228306706,5	228306706,5

Curtailment Rate (SLCD):

Country	2030-DE-DELTA	2030-GA-DELTA	2040-DE-DELTA	2040-GA-DELTA	2050-DE-DELTA	2050-GA-DELTA
Belgium	0%	0%	-2%	-1%	-1%	0%
Czechia	0%	0%	-2%	-2%	-2%	0%
Estonia	0%	0%	-2%	-1%	-2%	0%
Finland	0%	0%	-2%	-1%	-2%	0%
Germany	0%	0%	-2%	-1%	-1%	0%
Latvia	0%	0%	-2%	-1%	-1%	0%
Lithuania	0%	0%	-2%	-1%	-1%	-1%
Poland	0%	0%	-2%	-1%	-1%	0%
Portugal	0%	-1%	-2%	-1%	0%	0%
Slovenia	0%	0%	-2%	-1%	-1%	0%
Sweden	0%	0%	-2%	-1%	-2%	0%
Switzerland	0%	0%	-2%	-1%	-1%	-1%
France	0%	0%	-2%	-1%	-1%	0%
The Netherlands	0%	0%	-1%	-1%	-2%	0%
Austria	0%	0%	-1%	-1%	-2%	0%
Denmark	0%	0%	-1%	-1%	-1%	0%
Italy	0%	0%	-1%	-1%	-2%	0%
Spain	0%	0%	-1%	-1%	-1%	0%
Greece	0%	0%	-1%	0%	0%	0%

Curtailment Rate (Climatic Stress):

SimulationPeriod	Country	2030-DE-DELTA	2030-GA-DELTA	2040-DE-DELTA	2040-GA-DELTA	2050-DE-DELTA	2050-GA-DELTA
Average2W	Austria	0%	0%	0%	0%	0%	0%
Average2W	Belgium	0%	0%	0%	0%	0%	0%
Average2W	Bulgaria	0%	0%	0%	0%	0%	0%
Average2W	Croatia	0%	0%	0%	0%	0%	0%
Average2W	Cyprus	0%	0%	0%	0%	0%	0%
Average2W	Czechia	0%	0%	0%	0%	0%	0%
Average2W	Denmark	0%	0%	0%	-1%	0%	0%
Average2W	Estonia	0%	0%	0%	0%	0%	0%
Average2W	Finland	0%	0%	0%	0%	0%	0%
Average2W	France	0%	0%	0%	0%	0%	0%
Average2W	Germany	0%	0%	0%	0%	0%	0%
Average2W	Greece	0%	0%	0%	0%	0%	0%
Average2W	Hungary	0%	0%	0%	0%	0%	0%
Average2W	Ireland	0%	0%	0%	0%	0%	0%
Average2W	Italy	0%	0%	0%	0%	0%	0%
Average2W	Latvia	0%	0%	0%	0%	0%	0%
Average2W	Lithuania	0%	0%	0%	0%	0%	0%
Average2W	Luxembourg	0%	0%	0%	0%	0%	0%
Average2W	Malta	0%	0%	0%	0%	0%	0%
Average2W	Poland	0%	0%	0%	0%	0%	0%
Average2W	Portugal	0%	0%	0%	0%	0%	0%

Average2W	Romania	0%	0%	0%	0%	0%	0%
Average2W	Serbia	0%	0%	0%	0%	0%	0%
Average2W	Slovakia	0%	0%	0%	0%	0%	0%
Average2W	Slovenia	0%	0%	0%	0%	0%	0%
Average2W	Spain	0%	0%	0%	0%	0%	0%
Average2W	Sweden	0%	0%	0%	0%	0%	0%
Average2W	Switzerland	0%	0%	0%	0%	0%	0%
Average2W	The Netherlands	0%	0%	0%	0%	0%	0%
Average2W	United Kingdom	0%	0%	0%	0%	0%	0%
Average2WDF	Austria	0%	0%	0%	0%	0%	0%
Average2WDF	Belgium	0%	0%	0%	0%	0%	0%
Average2WDF	Bulgaria	0%	0%	0%	0%	0%	0%
Average2WDF	Croatia	0%	0%	0%	0%	0%	0%
Average2WDF	Cyprus	0%	0%	0%	0%	0%	0%
Average2WDF	Czechia	0%	0%	0%	0%	0%	0%
Average2WDF	Denmark	0%	0%	0%	0%	0%	0%
Average2WDF	Estonia	0%	0%	0%	0%	0%	0%
Average2WDF	Finland	0%	0%	0%	0%	0%	0%
Average2WDF	France	0%	0%	0%	0%	0%	0%
Average2WDF	Germany	0%	0%	0%	0%	0%	0%
Average2WDF	Greece	0%	0%	0%	0%	0%	0%
Average2WDF	Hungary	0%	0%	0%	0%	0%	0%
Average2WDF	Ireland	0%	0%	0%	0%	0%	0%
Average2WDF	Italy	0%	0%	0%	0%	0%	0%
Average2WDF	Latvia	0%	0%	0%	0%	0%	0%
Average2WDF	Lithuania	0%	0%	0%	0%	0%	0%
Average2WDF	Luxembourg	0%	0%	0%	0%	0%	0%
Average2WDF	Malta	0%	0%	0%	0%	0%	0%
Average2WDF	Poland	0%	0%	0%	0%	0%	0%
Average2WDF	Portugal	0%	0%	0%	0%	0%	0%
Average2WDF	Romania	0%	0%	0%	0%	0%	0%
Average2WDF	Serbia	0%	0%	0%	0%	0%	0%
Average2WDF	Slovakia	0%	0%	0%	0%	0%	0%
Average2WDF	Slovenia	0%	0%	0%	0%	0%	0%
Average2WDF	Spain	0%	0%	0%	0%	0%	0%
Average2WDF	Sweden	0%	0%	0%	0%	0%	0%
Average2WDF	Switzerland	0%	0%	0%	0%	0%	-1%
Average2WDF	The Netherlands	0%	0%	0%	0%	0%	0%
Average2WDF	United Kingdom	0%	0%	0%	0%	0%	0%
DC	Austria	0%	0%	0%	0%	0%	0%
DC	Belgium	0%	0%	0%	0%	0%	0%
DC	Bulgaria	0%	0%	0%	0%	0%	0%
DC	Croatia	0%	0%	0%	0%	0%	0%
DC	Cyprus	0%	0%	0%	0%	0%	0%
DC	Czechia	0%	0%	0%	0%	0%	0%

DC	Denmark	0%	0%	0%	0%	0%	0%
DC	Estonia	0%	0%	0%	0%	0%	0%
DC	Finland	0%	0%	0%	0%	0%	0%
DC	France	0%	0%	0%	0%	0%	0%
DC	Germany	0%	0%	0%	0%	0%	0%
DC	Greece	0%	0%	0%	0%	0%	0%
DC	Hungary	0%	0%	0%	0%	0%	0%
DC	Ireland	0%	0%	0%	0%	0%	0%
DC	Italy	0%	0%	0%	0%	0%	0%
DC	Latvia	0%	0%	0%	0%	0%	0%
DC	Lithuania	0%	0%	0%	0%	0%	0%
DC	Luxembourg	0%	0%	0%	0%	0%	0%
DC	Malta	0%	0%	0%	0%	0%	0%
DC	Poland	0%	0%	0%	0%	0%	0%
DC	Portugal	0%	0%	0%	0%	0%	0%
DC	Romania	0%	0%	0%	0%	0%	0%
DC	Serbia	0%	0%	0%	0%	0%	0%
DC	Slovakia	0%	0%	0%	0%	0%	0%
DC	Slovenia	0%	0%	0%	0%	0%	0%
DC	Spain	0%	0%	0%	0%	0%	0%
DC	Sweden	0%	0%	0%	0%	0%	0%
DC	Switzerland	0%	0%	0%	0%	0%	0%
DC	The Netherlands	0%	0%	0%	0%	0%	0%
DC	United Kingdom	0%	0%	0%	0%	0%	0%

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.

TYNDP Code	Type of infrastructure	Surface of impact	Environmentally sensitive area
HYD-N-969	H2 transmission	5,4 km, Area of Fessenheim	Several parcels in the phase 1 are concerned by the following protection measures: Important birds area, Natural areas of ecological interest in fauna and flora, Natura 2000
HYD-N-969	H2 transmission	2 km, Proximity of Chalampé and Ottmarsheim	Several parcels in the phase 1 are concerned by the following protection measures: Important birds area, Natura 2000.
HYD-N-969	H2 transmission	3,1 km Ottmarsheim - Hombourg	Several parcels in the phase 2 are concerned by the following protection measures: Important birds area, Natura 2000
HYD-N-969	H2 transmission	5,5 km Area of Kembs	Several parcels in the phase 2 are concerned by the following protection measures: Important birds area, Natura 2000
HYD-N-969	H2 transmission	21 km Hombourg – Saint Louis	Several parcels in the phase 2 are concerned by the following protection measures: Important birds area, Natura 2000. Necessity to cross forest area.
HYD-N-1096	H2 transmission	20 km, Tunsel-Freiburg i.B.	Several parcels are concerned by the following protection measures: important birds area, FFH-Area, Natural areas of ecological interest in fauna and flora, Natura 2000;
HYD-N-1096	H2 transmission	50 km, Freibug-Offenburg i.B.	Several parcels are concerned by the following protection measures: important birds area, FFH-Area, Natural areas of ecological interest in fauna und flora, Natura 2000;

Potential impact	Mitigation measures	Related costs included in project CAPEX and OPEX	Additional expected costs
Industrial Safety Measures	Specific design and studies about safety with their impacts and mitigations measures to avoid or accept them. (Maintenance		**Industrial Safety Measures**

Environmental Impacts (ecological, humans, society, industrial and economical)	equipment, mechanical protections, monitoring systems) Specific study by independent consultant to analyze and propose the best corridor (menus impact). Measuring all the impact and looking for solutions to avoid or compensate (animals, flowers, water, protected areas…).	CAPEX : 7% of the Project Cost OPEX : 30% of Project Studies (pre-commissioning) 1% of the Project Cost (for monitoring)	**Environmental Impacts (ecological, humans, society, industrial and economical)**

Environmental Impact explained [Promoter]

The repurposing of pipelines only has a very limited impact on the countryside and the established environment and biodiversity, the environmental impacts concern mainly new pipelines. To manage these parts of their respective projects, GRTgaz and terranets bw will capitalize on their strong track-record in carrying out natural gas infrastructure projects. Applying the "*Avoid / Reduce / Compensate*" principle helps us to limit environmental impacts during the realization and the life of our projects. Specific study led by an independent consultant at the very beginning of the FEED allow to adapt the project's layout (to circumvent sensitive areas) and identify needed measures to reduce or compensate. In parts with persisting risks, mitigations measures are used which is why they are systematically budgeted and thoroughly implemented.

In France, the specific environmental requirements defined by this study will be followed by French authorities all along the pipeline's life. A team within GRTgaz is dedicated to the follow-up of this topic.

E. Other benefits [Promoter]

Missing benefits are all benefits of a project which may be not captured by ENTSOG analysis.

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.

Description of Other benefits [Promoter]

RHYn will provide **significant benefits** to European consumers by ensuring **increased hydrogen market integration, energy autonomy and security of supply**, as well as helping key European industrial and mobility sectors to future-proof and adapt their activity to a carbon-neutral future.

The course of the pipelines along the French-German boarder lays the foundation of the interconnection phase, in which a section of pipeline below the Rhine will connect the French and German networks. Fostering potential synergies in Franco-German energy networks is a goal for both countries, reconfirmed in the Declaration of Franco-German Solidarity in November 2022. Through the interconnection, industrial areas in both Grand Est, France and Baden Württemberg, Germany are progressively going to benefit from the hydrogen network, with possible connections to project HY-FEN embedding the project fully into the future European hydrogen network, so that at full expansion, several member states will benefit from project RHYn.

RHYn's **significant hydrogen transmission capacity of 190 000 t/year,** provided over and above what is required by the demand in its local hub, will constitute a key milestone in the development of a renewable hydrogen market as envisioned by the European Commission. The interconnection with RHYn Interco is primarily driven by the decarbonisation efforts of the industrial and energy sector in France, Germany (and later Switzerland) and the associated demand for renewable and low carbon H2. It will immediately connect France and Germany, while a Swiss connection is planned for the future.

Securing renewable and low carbon H2 supply will enable significant emissions reductions in essential industries, such as the chemical industry, glass production, food industry, power production, paper and steel production in a strategically important industrial cluster, spreading across all three participating countries.

On the French side, RHYn project is expected to transport up to **7,5 TWh$_{HCV}$/year of low carbon and renewable hydrogen, which represents 14% of current French hydrogen demand or c. 8% of current German hydrogen demand**. The economic value associated with the reduction of GHG emissions of 1.9 million tonnes of CO2eq avoided per year *alone* outweighs the costs of the project.

The interconnection with the German side and RHYn Interco project is planned with a transport capacity of 12 GWh/d in order to meet the demand for low carbon and renewable hydrogen of the

clients from the industrial and energy sectors in the Upper Rhine region. Replacing fossil fuels with hydrogen can lead to CO2 savings of up to 500,000 t per year.

As a result, the projects contribute to a significant increase of renewable and low carbon hydrogen in the French, German and European energy systems compared to today. Further, the project's focus on developing an open-access pipeline network partially based on repurposed natural gas assets, represents a cost-efficient approach and supports a quicker uptake of renewable and low carbon hydrogen across a much larger territory than would have been possible without pipeline usage. This approach also allows for RHYn to easily be extended and interconnected with other hydrogen projects – notably HY-FEN and RHYn Interco, but also other projects beyond terranets' grid ultimately supporting the development of an integrated and cross-border European hydrogen network. The expanded conversion of existing natural gas pipelines can also be used to cost-effectively extend RHYn Interco into the northern area of the Upper Rhine region.

Interconnecting it with other French and European hydrogen projects will subsequently foster wider European market integration and contribute to the development of a cross-border hydrogen backbone. This will significantly promote competition, security of supply and energy independence in line with the EU's ambitious REPowerEU targets.

It will also ensure cost efficiency through largely relying on repurposing existing assets, better allocation of resources and back-up solutions to smooth over any supply or demand shocks.

GRTgaz, terranets bw and badenovaNETZE (connected German distribution system operator) organize a Call for interest for RHYN and RHYN Interco projects from 18th September to 17th November 2023. The objective is to confirm market players' interests in planned projects and to advance to the feasibility phase and subsequent technical studies.

F. Useful links [Promoter]

Useful links:

https://www.terranets-bw.de/rhyn_interco

https://badenovanetze.de/rhyn-interco

https://www.grtgaz.com/nos-actions/gaz-renouvelables-economie-circulaire/rhyn