HI WEST 12 (Less-Advanced)

H2ercules South and IP Bavaria and Austria (DE-AT)

Reasons for grouping [ENTSOG]

The project group aims at interconnecting future hydrogen infrastructure between Austria and Germany by partially repurposing existing natural gas infrastructure and further connect to hydrogen infrastructure in Germany with potential interconnection to France and Czech Republic.

The group includes investments in Germany (HYD-N-1052 and HYD-N-642) and Austria (HYD-N-757).

Objective of the group [Promoter]

The project group enables bidirectional transport of hydrogen between Germany and Austria linking potential hydrogen sources from Northern Germany, Northern Africa (e.g. Tunisia) via Italy or Eastern Europe (e.g. Ukraine) via Slovakia with hydrogen demand centers, e.g. industrial sites in Austria, Germany and the neighboring region in Central Europe. In addition, connections to storage sites for hydrogen will be established.

The project constitutes an important contribution in achieving the objectives of the REPowerEU plan as well as the European Green Deal. The project is fully in line with TEN-E, as it meets the criteria for sustainability, security of supply of green energy and, due to the connection to several sources, also security of supply through diversification of routes.

HYD-N-1052 **H2ercules Network South**

Comm. Year **2029**

HYD-N-642 **HyPipe Bavaria – The Hydrogen Hub**

Comm. Year **2027-2030**

HYD-N-757 **H2 Backbone WAG + Penta West**

Comm. Year **2030**

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]	Compressor power [MW]
HYD-N-1052	Repurposing I – MEGAL (H2ercules Network South)	Repurposing	1100	458	no compression planned
HYD-N-1052	Repurposing II - Connection Ingolstadt (H2ercules Network South)	Repurposing	1000	103	no compression planned
HYD-N-642	HyPipe Bavaria - The Hydrogen Hub	Repurposing	From 450 to 700	280	---
HYD-N-642	HyPipe Bavaria - The Hydrogen Hub	New	From 700 to 800	14	26
HYD-N-757	H2 Backbone WAG + Penta West	Repurposing	1200	140	
HYD-N-757	H2 Backbone WAG + Penta West	New	From 800 to 1200	200	16

Capacity increment [ENTSOG]

TYNDP Project code	Point name	Operator	From system	To system	Capacity increment [GWh/d]	Comm. year
HYD-N-642	H2_IP_DE-AT	bayernets GmbH	Transmission Germany (DE Hydrogen)	Transmission Austria (AT Hydrogen)	150	2027-2030
HYD-N-642	H2_IP_DE-AT	bayernets GmbH	Transmission Austria (AT Hydrogen)	Transmission Germany (DE Hydrogen)	150	2027-2030
HYD-N-757	H2_IP_DE-AT	Gas Connect Austria GmbH	Transmission Germany (DE Hydrogen)	Transmission Austria (AT Hydrogen)	150	2030
HYD-N-757	H2_IP_DE-AT	Gas Connect Austria GmbH	Transmission Austria (AT Hydrogen)	Transmission Germany (DE Hydrogen)	150	2030
HYD-N-1052	H2_IP_CZ-DE	Open Grid Europe GmbH	Transmission Czechia (CZ Hydrogen)	Transmission Germany (DE Hydrogen)	144	2029

HYD-N-1052	H2_IP_DE-FR	Open Grid Europe GmbH	Transmission France (FR Hydrogen)	Transmission Germany (DE Hydrogen)	192	2029

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-1052	170	30%	21	30%
HYD-N-642	163	30 %	0,761	30 %
HYD-N-757	1035	25 %	41	50 %

Description of the cost and range [Promoter]

DE (OGE/bayernets): CAPEX and OPEX are based on best estimates at the time of project submission in December 2022 and might be subject to changes, e.g. due to supplier price adjustments or concretization of project scope. Cost deviations are already considered in both CAPEX and OPEX cost ranges.

AT (GCA): The above-indicated costs for HYD-N-757 were calculated based on the unit prices of the EHB study. The National Development Plan 2022 (approved 05/2023) includes updated figures as follows: CAPEX 921 MEUR, OPEX 37 MEUR.

C. Project Benefits [ENTSOG]

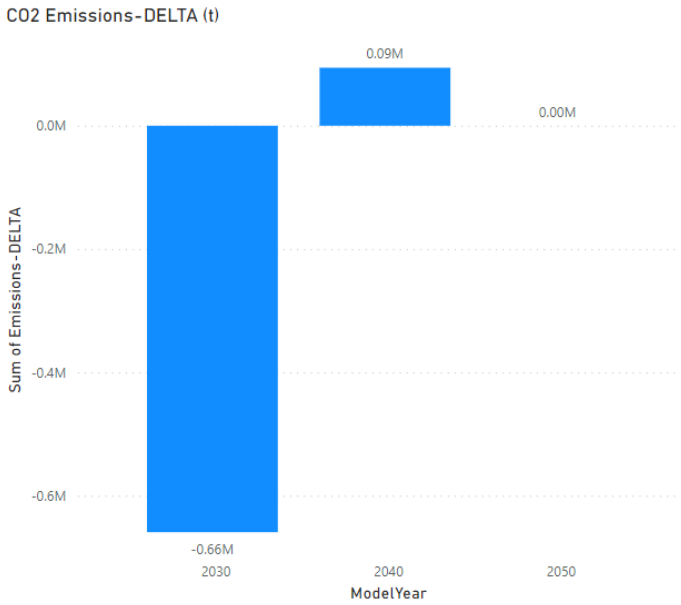
C.1 Summary of benefits

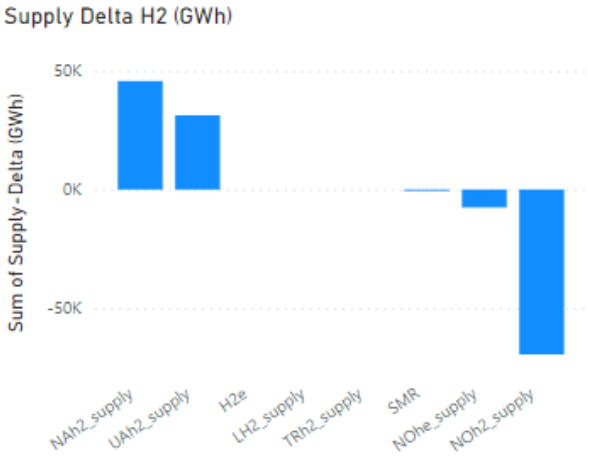
This section provides a summarised analysis by ENTSOG of the main benefits stemming from the realisation of the overall group. More details on the indicators are available in Annex D of TYNDP 2022[1].

Distributed Energy

Sustainability benefits

Thanks to the project group cooperation between central European countries and Western European countries will be facilitated. 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 660 kt in 2030. In 2030 the project group will enable transport of green hydrogen produced in Ukraine and North Africa and therefore, will reduce blue hydrogen imports from Norway.

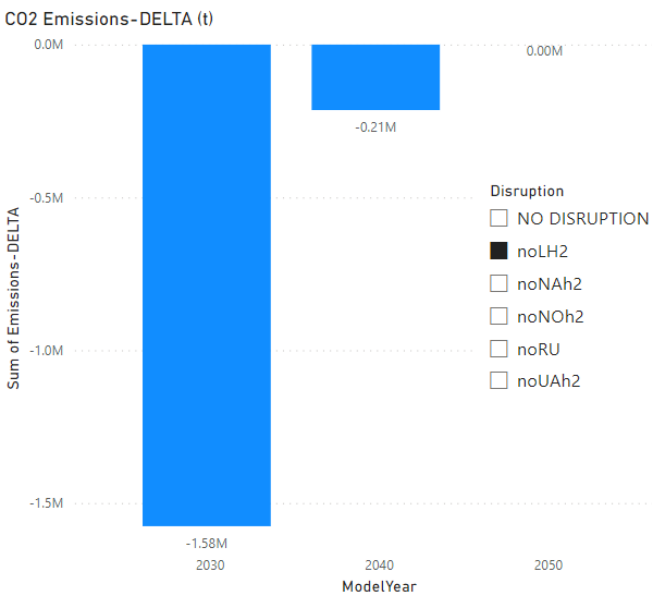


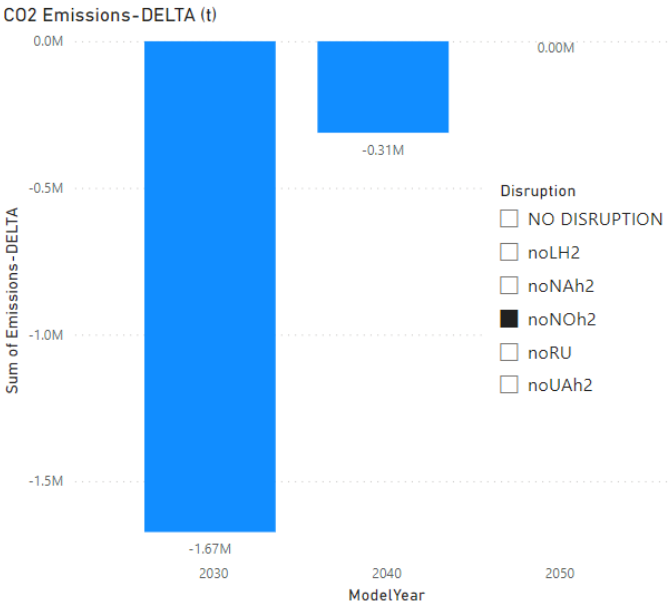


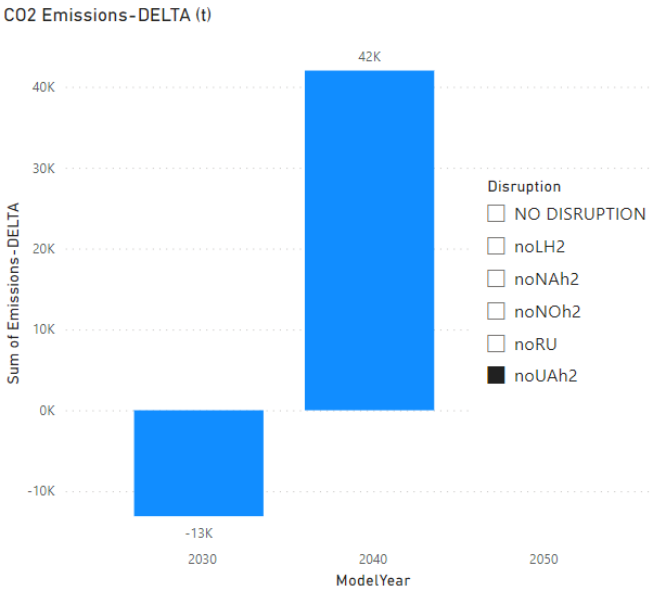
Increased benefits are expected in 2030 and 2040 under disruption cases, such as LH2, Norway and North Africa disruption.

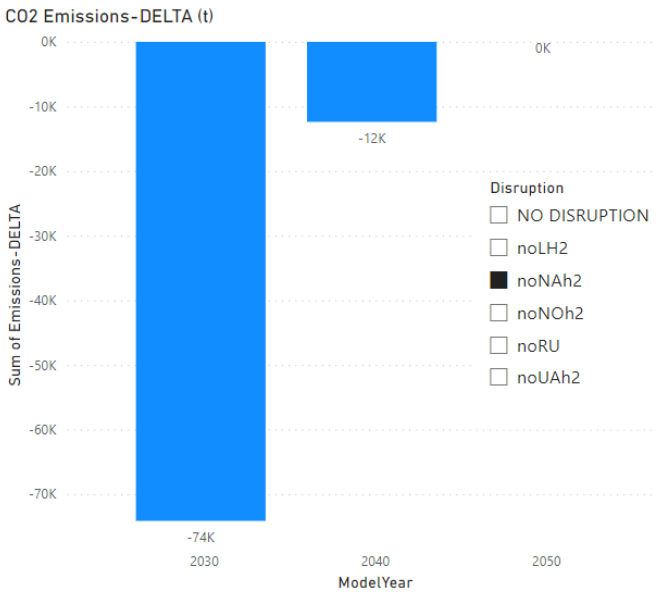
1 noLH2 : LH2 disruption / 2 noNOh2 : Norway disruption / 3 noUAh2 : Ukraine disruption/ 4 noNAh2 : North Africa disruption

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









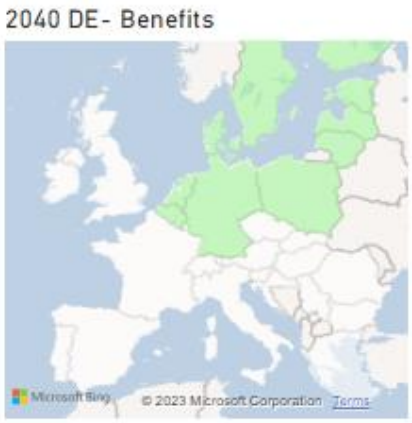
Security of Supply:[2]

> Reference case:

The conversion of the existing natural gas infrastructure doesn't impact the methane demand and will bring positive security of supply benefits for European states mainly located at the North- and Baltic Sea for 2040 and

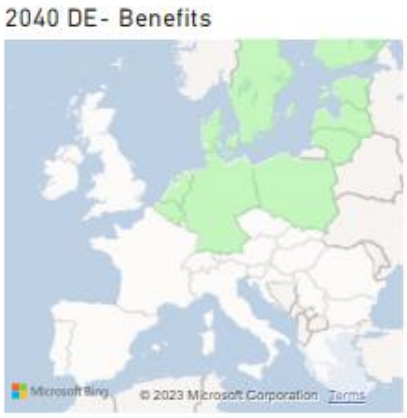
[2] *As for the hydrogen system there is no existing infrastructure level available yet, ENTSOG has identified a possible hydrogen network according to the information provided by promoters in their project submission for the TYNDP/PCI process (i.e., H2 Infrastructure level). Therefore, the System Assessment 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.*

2050. Respective countries can reduce the risk of demand curtailment in average Winter by 3-4% in 2030 and by 5% in 2040.



> Climatic stress cases:

Under 2 -week and 2-week dunkelflaute climatic stress case, as well as under peak day climatic case the project group increases mitigation of risk of hydrogen demand curtailment in many European countries by 3-7% in 2030. In 2040 and 2050 project group shows under climatic stress cases similar results as in the reference case.

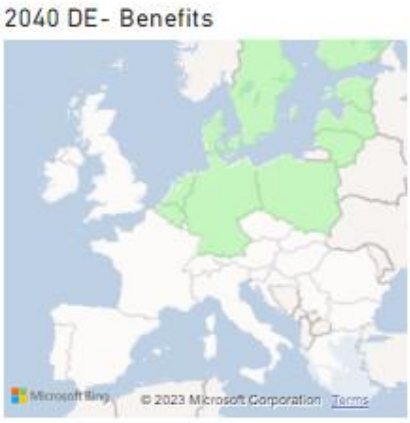


> Disruption cases (S-1):

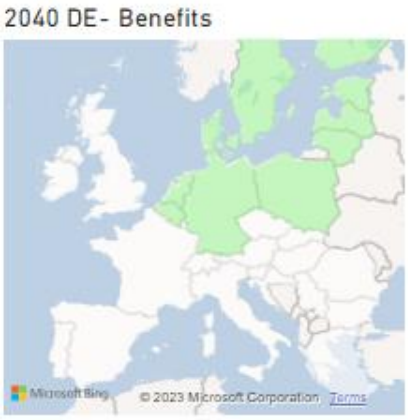
Similarly, under supply disruption cases, such as LH2 and Norway disruption the project group increases mitigation of demand curtailment in respective countries. For example, under Norway disruption in 2040 countries such as Germany, Denmark and Poland can reduce the risk of demand curtailment by 10%. In case of Ukraine Disruption in 2040 Austria, Slovakia, Slovenia, Croatia, Hungary, Romania, Bulgaria and Greece can reduce the risk of demand curtailment by 5-8%.

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

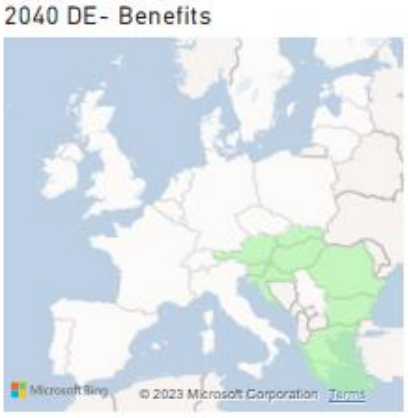
1 noLH2: LH2 disruption

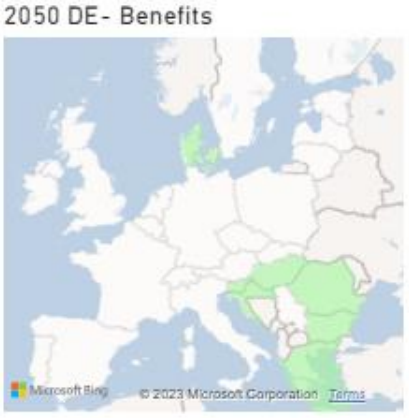


2 noNOh2: Norway disruption



3 noUAh2: Ukraine disruption

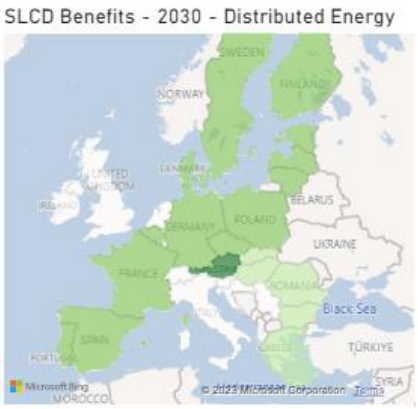


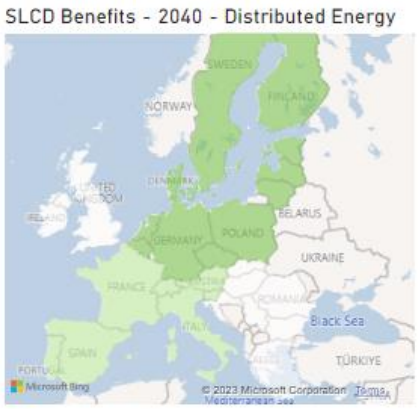


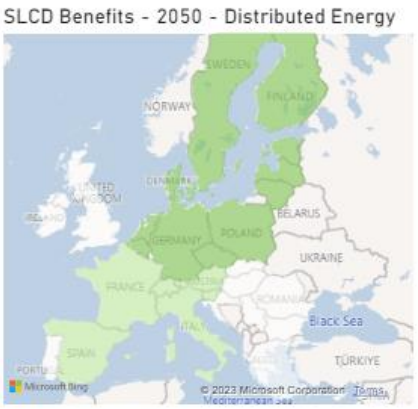
4 noNAh2: North Africa disruption

> Single largest capacity disruption (SLCD):

In case of SLCD many European countries benefitting from this project group by mitigating the risk of demand curtailment. The highest benefits are recorded in 2030, including 24% for Austria and 8% for Sweden, Finland, Estonia, Latvia, Lithuania, Poland, Germany, Denmark Belgium, France, Spain and Portugal.



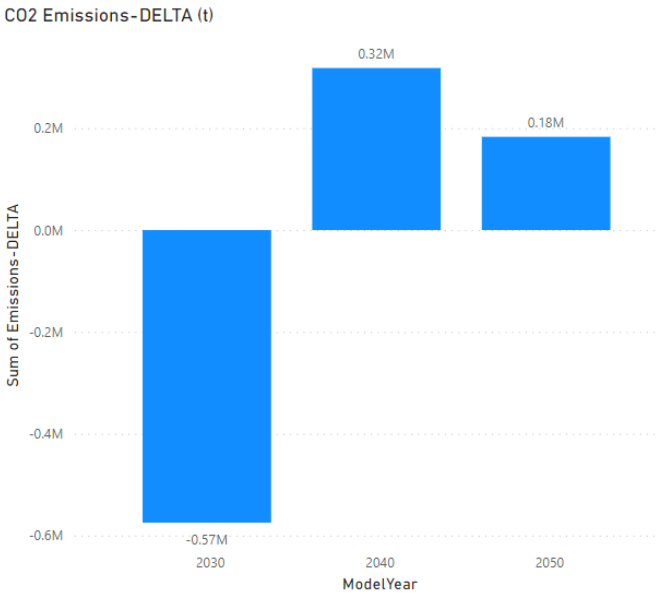


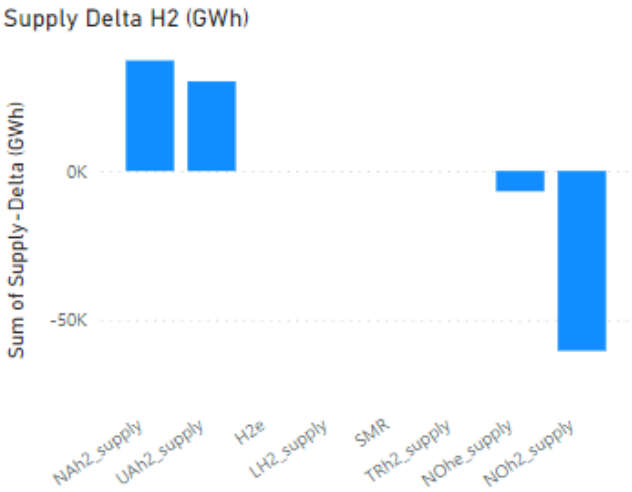


Global Ambition

Sustainability benefits

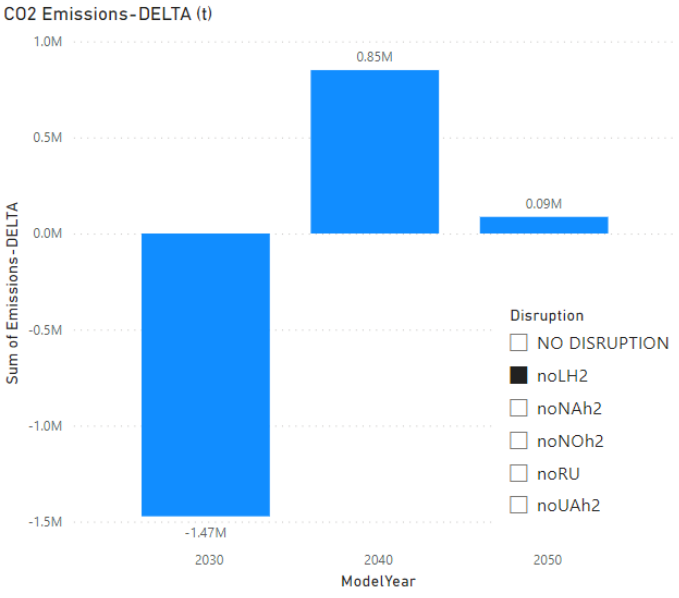
In the reference case, which analyses yearly demand in two periods (average winter and average summer), the project group will contribute to sustainability by reducing overall CO2 emissions by 570 kt in 2030. In 2030 the project group will enable transport of green hydrogen produced in Ukraine and North Africa and therefore, will reduce blue hydrogen imports from Norway. In 2040 and 2050 the project group enables more cooperation and to reduce demand curtailment more blue hydrogen (i.e. SMR) will be used.

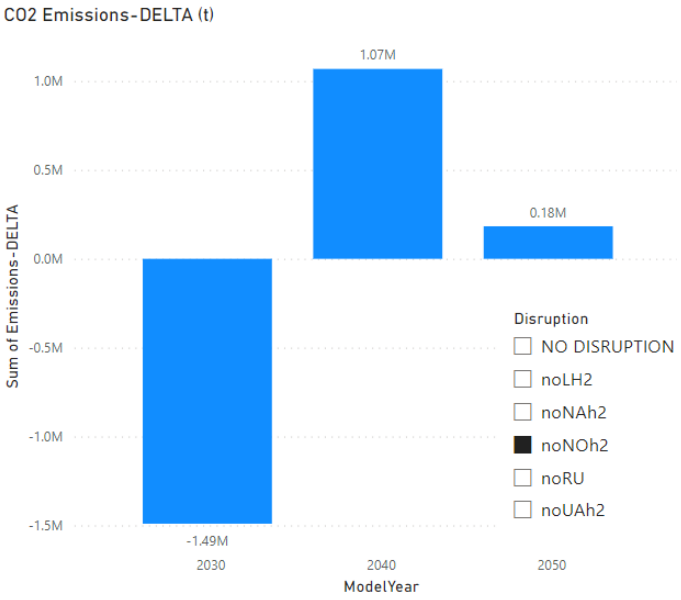


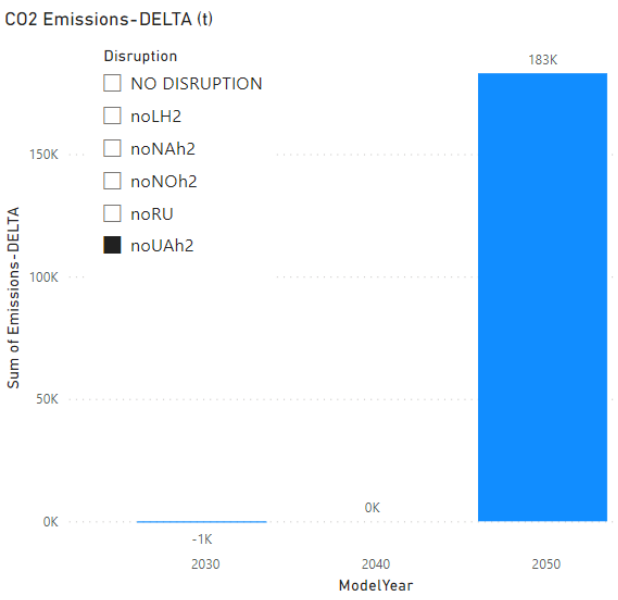


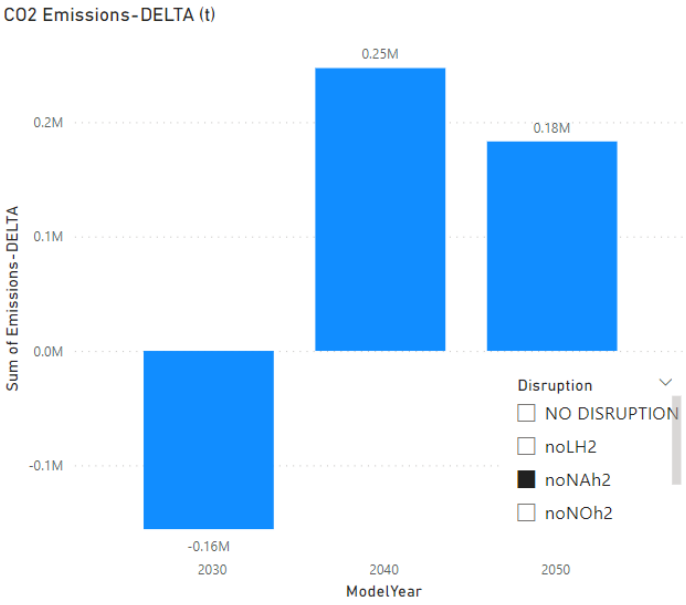
Increased benefits are expected in 2030 under LH2 and Norway disruption cases. For example, in case of Norway disruption the project group reduces overall CO2 emissions by 1490 kt in 2030. Under Ukraine and North Africa Disruption sustainability are limited as an important source of green hydrogen is missing and the enabled cooperation leads to higher production of blue hydrogen to reduce the risk of demand curtailment.

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









Security of supply:

> Reference case

The conversion of the existing natural gas infrastructure doesn't impact the methane demand and will bring positive security of supply benefits for Belgium, Netherlands, Germany, Denmark, Finland, Sweden, Estonia, Latvia, Lithuania, and Poland in 2040 and 2050. Respective countries can reduce the risk of demand curtailment in average Winter by 2-5%.

> Climatic stress cases

Under 2 -week and 2-week dunkelflaute climatic stress case, as well as under peak day climatic case the project group can reduce demand curtailment in 2030 for Portugal, Spain, Belgium, Germany, Denmark, Poland, Lithuania, Latvia, Estonia, Sweden and Finland by 7-8%. In 2050 under climatic stress cases Portugal, Spain, Switzerland, Austria, Italy and Slovenia show security of supply benefits.

> Disruption cases (S-1):

Similarly, under supply disruption cases, such as LH2 and Norway disruption the project group increases mitigation of demand curtailment in respective countries. For example, under Norway disruption in 2040 respective countries such as Germany, Denmark and Poland can reduce the risk of demand curtailment by 10%. In case of Ukraine Disruption in 2040 Austria, Slovakia, Slovenia, Croatia, Hungary, Romania, Bulgaria and Greece can reduce the risk of demand curtailment by 8-11%. In case of North Africa Disruption Italy and Austria are benefitting in all three-time stamps, including a maximum of 21% mitigation of demand curtailment in Austria for 2050.

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

1 noLH2: LH2 disruption

2 noNOh2: Norway disruption

3 noUAh2: Ukraine disruption

4 noNAh2: North Africa disruption

> Single largest capacity disruption *(SLCD):*

In case of SLCD many European countries benefitting from this project group by mitigating the risk of demand curtailment. The highest benefits are recorded in 2030, including 24% for Austria and 7-11% for Sweden, Finland, Estonia, Latvia, Lithuania, Poland, Germany, Denmark, Belgium, France, Spain and Portugal.

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	-659219,15	538677299	539336518,2
2030	noLH2	DE	tonne	-1575489,44	540175890,2	541751379,7
2030	noNAh2	DE	tonne	-74127,72	539785356,1	539859483,8
2030	noNOh2	DE	tonne	-1673376,33	538877197,8	540550574,1
2030	noUAh2	DE	tonne	-13099,27	539378771,9	539391871,2
2030	NO DISRUPTION	GA	tonne	-574545,40	592910448,4	593484993,8
2030	noLH2	GA	tonne	-1472443,06	594817481,2	596289924,2
2030	noNAh2	GA	tonne	-155842,52	594141433,2	594297275,7
2030	noNOh2	GA	tonne	-1490446,89	593310994,3	594801441,2
2030	noUAh2	GA	tonne	-510,34	593627617,9	593628128,3
2040	NO DISRUPTION	DE	tonne	94077,90	392077044	391982966,1
2040	noLH2	DE	tonne	-214175,19	392213883,4	392428058,6
2040	noNAh2	DE	tonne	-12381,49	392188097,7	392200479,2
2040	noNOh2	DE	tonne	-311918,96	392144022,6	392455941,6
2040	noUAh2	DE	tonne	42014,36	392399182,9	392357168,5
2040	NO DISRUPTION	GA	tonne	318257,18	396523251,6	396204994,4
2040	noLH2	GA	tonne	850865,96	397455196,7	396604330,8
2040	noNAh2	GA	tonne	247262,07	397301976,6	397054714,6
2040	noNOh2	GA	tonne	1068370,38	397450977,1	396382606,7
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	183134,78	228306706,5	228123571,8
2050	noLH2	GA	tonne	86636,50	228306706,5	228220070
2050	noNAh2	GA	tonne	183109,62	228306706,5	228123596,9
2050	noNOh2	GA	tonne	183134,78	228306706,5	228123571,8
2050	noRU	GA	tonne	183060,39	228306706,5	228123646,2
2050	noUAh2	GA	tonne	183023,26	228306706,5	228123683,3

Curtailment Rate (SLCD):

Country	2030-DE-DELTA	2030-GA-DELTA	2040-DE-DELTA	2040-GA-DELTA	2050-DE-DELTA	2050-GA-DELTA
Germany	-8%	-10%	-7%	-4%	-6%	-1%
Belgium	-8%	-8%	-7%	-3%	-6%	-1%
Denmark	-8%	-11%	-7%	-4%	-6%	-2%
Estonia	-8%	-11%	-7%	-4%	-6%	-2%
Finland	-8%	-11%	-7%	-3%	-6%	-1%
Latvia	-8%	-11%	-7%	-4%	-6%	-2%
Lithuania	-8%	-11%	-7%	-4%	-6%	-2%
Poland	-8%	-10%	-7%	-4%	-6%	-2%
Sweden	-8%	-11%	-7%	-3%	-6%	-2%
Czechia	-6%	-3%	-6%	-4%	-6%	-2%
The Netherlands	0%	0%	-6%	-4%	-6%	-1%
Portugal	-8%	-7%	-2%	-1%	0%	-3%
Spain	-8%	-7%	-2%	-1%	-1%	-2%
Austria	-24%	-24%	-2%	-6%	-5%	-10%
France	-8%	-7%	-2%	-1%	-1%	-3%
Italy	0%	-2%	-1%	-1%	-2%	-3%
Slovenia	0%	0%	-1%	-7%	-5%	-10%
Switzerland	0%	0%	-1%	-1%	-2%	-3%
Bulgaria	-3%	0%	0%	0%	0%	-2%
Croatia	0%	0%	0%	0%	0%	-2%
Greece	-3%	0%	0%	0%	0%	-2%
Hungary	-3%	0%	0%	0%	0%	-2%
Romania	-2%	0%	0%	0%	0%	-2%
Slovakia	-2%	0%	0%	0%	0%	-2%

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%	-2%
Average2W	Belgium	-7%	-7%	-4%	-1%	-3%	0%
Average2W	Bulgaria	0%	0%	0%	0%	0%	0%
Average2W	Croatia	0%	0%	0%	0%	0%	-1%
Average2W	Cyprus	0%	0%	0%	0%	0%	0%
Average2W	Czechia	0%	0%	0%	0%	0%	-1%
Average2W	Denmark	-7%	-8%	-4%	-1%	-4%	-1%
Average2W	Estonia	-7%	-7%	-3%	-1%	-4%	-1%
Average2W	Finland	-7%	-7%	-4%	-1%	-4%	-1%
Average2W	France	-6%	-8%	0%	0%	0%	0%
Average2W	Germany	-8%	-7%	-4%	-1%	-3%	-1%
Average2W	Greece	0%	0%	0%	0%	0%	0%
Average2W	Hungary	0%	0%	0%	0%	0%	-1%
Average2W	Ireland	0%	0%	0%	0%	0%	0%
Average2W	Italy	0%	0%	0%	0%	0%	-1%
Average2W	Latvia	-7%	-7%	-4%	-1%	-3%	-1%

Average2W	Lithuania	-7%	-7%	-4%	-1%	-3%	-1%
Average2W	Luxembourg	0%	0%	0%	0%	0%	0%
Average2W	Malta	0%	0%	0%	0%	0%	0%
Average2W	Poland	-7%	-7%	-4%	-1%	-3%	-1%
Average2W	Portugal	-7%	-7%	0%	0%	0%	-1%
Average2W	Romania	0%	0%	0%	0%	0%	-1%
Average2W	Serbia	0%	0%	0%	0%	0%	0%
Average2W	Slovakia	0%	0%	0%	0%	0%	-1%
Average2W	Slovenia	0%	0%	0%	0%	0%	-1%
Average2W	Spain	-7%	-7%	0%	0%	0%	-2%
Average2W	Sweden	-7%	-8%	-4%	-1%	-4%	-1%
Average2W	Switzerland	0%	0%	0%	0%	0%	-1%
Average2W	The Netherlands	0%	0%	-4%	-1%	-4%	0%
Average2W	United Kingdom	0%	0%	0%	0%	0%	0%
Average2WDF	Austria	0%	0%	0%	0%	0%	-3%
Average2WDF	Belgium	-8%	-7%	-3%	-1%	-3%	0%
Average2WDF	Bulgaria	0%	0%	0%	0%	0%	0%
Average2WDF	Croatia	0%	0%	0%	0%	0%	-1%
Average2WDF	Cyprus	0%	0%	0%	0%	0%	0%
Average2WDF	Czechia	0%	0%	0%	0%	0%	-1%
Average2WDF	Denmark	-7%	-8%	-4%	-1%	-4%	-1%
Average2WDF	Estonia	-7%	-7%	-3%	-1%	-4%	-1%
Average2WDF	Finland	-7%	-7%	-4%	-1%	-4%	0%
Average2WDF	France	-7%	-8%	0%	0%	0%	0%
Average2WDF	Germany	-8%	-7%	-4%	-1%	-3%	-1%
Average2WDF	Greece	0%	0%	0%	0%	0%	0%
Average2WDF	Hungary	0%	0%	0%	0%	0%	-1%
Average2WDF	Ireland	0%	0%	0%	0%	0%	0%
Average2WDF	Italy	0%	0%	0%	0%	0%	-1%
Average2WDF	Latvia	-7%	-7%	-4%	-1%	-3%	-1%
Average2WDF	Lithuania	-7%	-7%	-4%	-1%	-3%	-1%
Average2WDF	Luxembourg	0%	0%	0%	0%	0%	0%
Average2WDF	Malta	0%	0%	0%	0%	0%	0%
Average2WDF	Poland	-7%	-7%	-4%	-1%	-3%	-1%
Average2WDF	Portugal	-7%	-7%	0%	0%	0%	-2%
Average2WDF	Romania	0%	0%	0%	0%	0%	-1%
Average2WDF	Serbia	0%	0%	0%	0%	0%	0%
Average2WDF	Slovakia	0%	0%	0%	0%	0%	-1%
Average2WDF	Slovenia	0%	0%	0%	0%	0%	-3%
Average2WDF	Spain	-7%	-7%	0%	0%	0%	-1%
Average2WDF	Sweden	-7%	-8%	-4%	-1%	-4%	0%
Average2WDF	Switzerland	0%	0%	0%	0%	0%	-2%
Average2WDF	The Netherlands	0%	0%	-4%	-1%	-4%	0%
Average2WDF	United Kingdom	0%	0%	0%	0%	0%	0%
DC	Austria	0%	0%	0%	0%	0%	-1%

DC	Belgium	-5%	-5%	-4%	-2%	-3%	-1%
DC	Bulgaria	0%	0%	0%	0%	0%	-1%
DC	Croatia	0%	0%	0%	0%	0%	-1%
DC	Cyprus	0%	0%	0%	0%	0%	0%
DC	Czechia	0%	0%	0%	0%	0%	-1%
DC	Denmark	-5%	-5%	-4%	-2%	-3%	-1%
DC	Estonia	-5%	-5%	-4%	-2%	-4%	-1%
DC	Finland	-5%	-5%	-4%	-2%	-3%	-1%
DC	France	-5%	-4%	0%	0%	0%	0%
DC	Germany	-5%	-5%	-4%	-2%	-3%	-1%
DC	Greece	0%	0%	0%	0%	0%	0%
DC	Hungary	0%	0%	0%	0%	0%	-1%
DC	Ireland	0%	0%	0%	0%	0%	0%
DC	Italy	0%	0%	0%	0%	0%	0%
DC	Latvia	-5%	-5%	-5%	-2%	-3%	-1%
DC	Lithuania	-5%	-5%	-5%	-2%	-3%	0%
DC	Luxembourg	0%	0%	0%	0%	0%	0%
DC	Malta	0%	0%	0%	0%	0%	0%
DC	Poland	-5%	-5%	-5%	-2%	-3%	0%
DC	Portugal	-5%	-4%	0%	0%	0%	-1%
DC	Romania	0%	0%	0%	0%	0%	-1%
DC	Serbia	0%	0%	0%	0%	0%	0%
DC	Slovakia	0%	0%	0%	0%	0%	-1%
DC	Slovenia	0%	0%	0%	0%	0%	-1%
DC	Spain	-5%	-5%	0%	0%	0%	-1%
DC	Sweden	-5%	-5%	-4%	-1%	-3%	-1%
DC	Switzerland	0%	0%	0%	0%	0%	0%
DC	The Netherlands	0%	0%	-4%	-2%	-4%	-1%
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-1052	Repurposing of pipelines for hydrogen transport	Reconstruction of existing above-ground objects or locally limited interferences	Minimal environmental impacts expected due to repurposing of pipeline or locally limited interferences.
HYD-N-757	Pipelines and compressor stations	To minimise the environmental impact, existing pipelines are used or, where new construction is necessary, laid in the same route as an existing pipeline system (parallel). Compressor stations are integrated into existing stations in order to use access routes and the existing infrastructure.	The project implementation will follow best practice, comply with EU and national regulations, and all necessary measures will be taken to mitigate potential impacts on land and environment. State-of-the-art technologies such as fibre sensing, EMAT pigging or laser detection measurements reflect the highest standard of environmentally friendly work management

HYD-N-642	Pipelines and compressor station	The environmental impact can be reduced to a minimum by mainly using an existing pipeline system. In order to reduce the impact on the environment and nature as much as possible the principle of pipeline bundling for additional new constructions will be applied.	The project will be mainly centred around the usage of the existing pipeline system (95%). All appropriate technical safety precautions necessary to ensure safe operation at all times are taken. Mitigation measures and environmental works will follow best practice and will comply with national and EU-regulations.

Potential impact	Mitigation measures	Related costs included in project CAPEX and OPEX	Additional expected costs
HYD-N-1052	Minimal environmental impacts expected due to repurposing of pipeline and or locally limited interferences	detailed calculation not available yet	Not expected
HYD-N-757 will not substantially and irreversibly affect the environment.	In order to ensure that environmental assessments are correct, environmental monitoring will be carried out before, during and after the construction of the infrastructure.	Related costs have been considered in CAPEX & OPEX estimations	N/A
HYD-N-642: The environmental impact will be reduced to a minimum by using existing pipeline routes. Additionally, compressor stations are expected to be built at locations of existing ones.	Mitigation measures and environmental works will follow best practice and will comply with national and EU-regulations.	Related costs have been considered in CAPEX & OPEX estimations	N/A

Environmental Impact explained [Promoter]

No serious environmental threats have been identified as the repurposing will take place mostly in the existing above-ground objects or locally limited interferences. The impact of works will be reduced with the maximum effort by selecting the most suitable technology during the implementation of the project. In order to protect air and water pollution, respective measures will be taken during construction phase.

The construction sites will be equipped with technical means for the possible remediation of leakage of fuel or other harmful substances that may endanger the quality of surface or underground water. All produced waste will be collected, disposed of, or recycled in accordance with applicable legislation. Waste collection containers will be placed in designated places and marked accordingly. Further detailed measures will be described in building permit design and agreed with the concerned environmental authority.

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]

The project grouping can make a central contribution to the emergence of a Union-wide network for the transport and storage of hydrogen by connecting renewable sources with end customers.

It is necessary to provide hard to abate sectors with of green hydrogen to reach the European climate targets. Furthermore, a resilient hydrogen network that allows short-term demand variations is needed to ensure security of supply. The project grouping contributes to the climate goals and the competitiveness of the European Union by delivering affordable and renewable hydrogen which allows the reduction of GHG emissions and other non-CO2 negative pollutants.

HI WEST 12 proposes an infrastructure as a solution for reliable and sufficient hydrogen transport across European borders. The group consisting of the projects HYD-N-1052, HYD-N-642 and HYD-N-757 enables market integration between France-Germany (IP Medelsheim), Germany-Austria (IP Ueberackern) and Germany-Czech Republic (IP Waidhaus).

The selected pipelines ensure large hydrogen transport capacities. The project group contributes to the security of supply of Central Europe as well as of neighbouring regions by diversifying supply sources and increasing transit capacity.

F. Useful links [Promoter]

Useful links:

H$_2$ercules (h2ercules.com)

https://www.hypipe-bavaria.com

H2 Backbone WAG+PW (h2backbone-wag-pw.at)

H2EU+Store

SoutH2 - Home (south2corridor.net)

Austrian Coordinated Network Development Plan 2022

H2 Infrastructure Map Europe