HI WEST 6 B (Less-Advanced)

Guitiriz - Zamora H2 Pipeline + Spanish Hydrogen Backbone

Reasons for grouping [ENTSOG]

The project group includes two hydrogen transmission projects in Spain.

The Spanish hydrogen backbone (HYD-N-1149): which is divided into two sections Axis 1 and Axis 2.

The Guitiriz-Zamora pipeline (HYD-N-1273) located in the Northwest of the Iberian peninsula.

This project will enable transport of green hydrogen production in Spain.

Objective of the group [Promoter]

Spanish hydrogen backbone gathers hydrogen transmission and storage projects developing the national renewable hydrogen network. Hydrogen transmission pipelines will be developed linking production to consumption and storages in the North West of Spain, enabling also future cross border trade flows between Spain and Portugal. Hydrogen transmission pipelines will also be developed in the Northeastern side of the country enabling cross border of hydrogen flows with France and establishing a hydrogen supply corridor to North West Europe from the Iberian Peninsula. The Spanish Hydrogen Backbone is an enabler of H2Med.

The Guitiriz-Zamora pipeline is part of the Spanish hydrogen backbone to guarantee the security of supply in the Northwest area and to link the renewable hydrogen production in this area to demand and cross-border flows. In this sense, the Guitiriz-Zamora pipeline will be connected to the H2Pole project (ENTSOG code HYD-A-427), a hydrogen valley to install 100 MW of electrolysis that will contribute to cross border flows between Spain and Portugal.

Additionally, two H2 storage facilities, are enablers of the Spanish Hydrogen Backbone with the aim of increasing the flexibility of the new system and guaranteeing continuity of supply through H2Med.

These projects will help to accelerate the decarbonization of Spain and Europe by helping to integrate low-cost intermittent renewable energy in the Iberian Peninsula and replacing fossil fuels in the demand clusters.

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-1149	Axis-1 Route: Gijón-Torrelavega-Vizcaya-Álava-La Rioja-Zaragoza-Teruel, Teruel-Tarragona, Tarragona-Barcelona, Teruel-Castellón-puerto Sagunto,	Mix		1500 (aprox. 225 km repurposed)	

	Puerto Sagunto-Cartagena				
HYD-N-1149	Axis-2 Route: Gijón-Musel, Gijón-Avilés, Gijón-Salamanca, Salamanca-Mérida, Mérida-Huelva, Mérida-Vegas Altas-Saceruela-Puertollano	Mix		1250	
HYD-N-1273	Guitiriz-Zamora	New		318	

Capacity increment [ENTSOG]

TYNDP Project code	Point name	Operator	From system	To system	Capacity increment [GWh/d]	Comm. year
HYD-N-1149	NPcESh2	Enagas Infraestructuras de Hidrógeno	NPcESh2	Esh2	50	2027
HYD-N-1149	NPcESh2	Enagas Infraestructuras de Hidrógeno	NPcESh2	Esh2	310	2029
HYD-N-1273	NPcESh2	Reganosa	NPcESh2	Esh2	100	2026

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-1149	3500	30%	122,5	30%
HYD-N-1273	250	40%	4,7	40%

Description of the cost and range [Promoter]

HYD-N-1149 Spanish Hydrogen Backbone: Enagas is expecting a 30% CAPEX range based on some degree of uncertainty at this stage coupled with Enagas' cost estimates on how equipment and materials related might evolve overtime due to potential impact of inflation on prices. 30% range in OPEX estimate is driven by the volatility on energy prices witnessed after Russian invasion of Ukraine. Combined CAPEX range will result around 35% while OPEX range is about 30%.

HYD-N-1273 Guitiriz-Zamora pipeline: Reganosa is expecting a 40% CAPEX range based on the degree of uncertainty considered in the project status. 40% range in OPEX estimate is driven by the volatility on energy prices.

C. Project Benefits [ENTSOG]

C.1 Summary of benefits

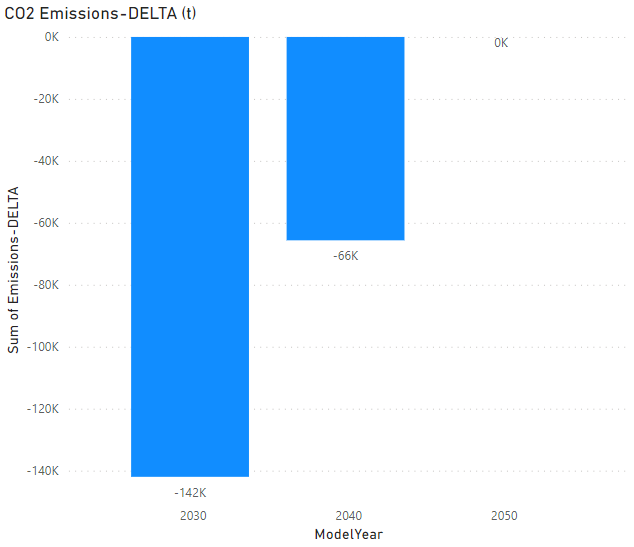
This section provides a summarised analysis by ENTSOG of the main benefits stemming from the realisation of the overall group. More details on the indicators are available in Annex D of TYNDP 2022[1].

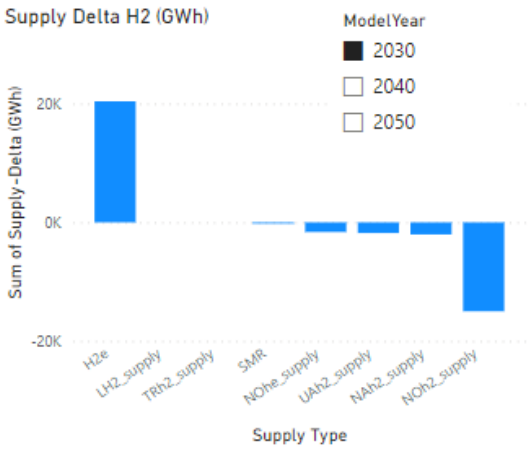
Distributed Energy

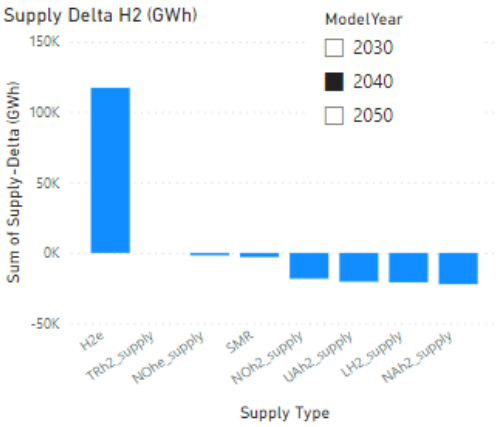
Sustainability benefits

Project group will enable transport of green hydrogen national production in Spain from 2027 reaching full capacity in 2030, and therefore, improving diversification of Spanish hydrogen supplies and potentially other European countries.

In the reference case, which analyses yearly demand in two periods (average winter and average summer), the project group will significantly contribute to sustainability by reducing overall CO2 emissions by 142kt in 2030 and 66kt in 2040. This can be explained as from 2030 the project group will enable the replacement of blue hydrogen imports with green hydrogen Spanish national production. Similar trend is observed in 2040, with higher volumes of Spanish production will replace Norwegian blue hydrogen imports and SMR.

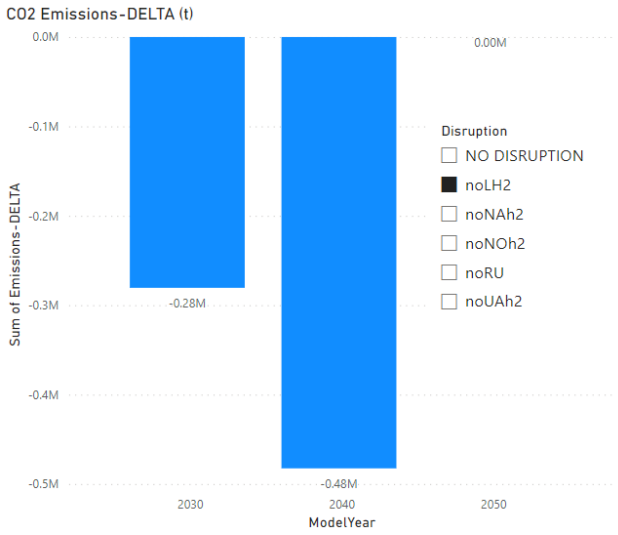


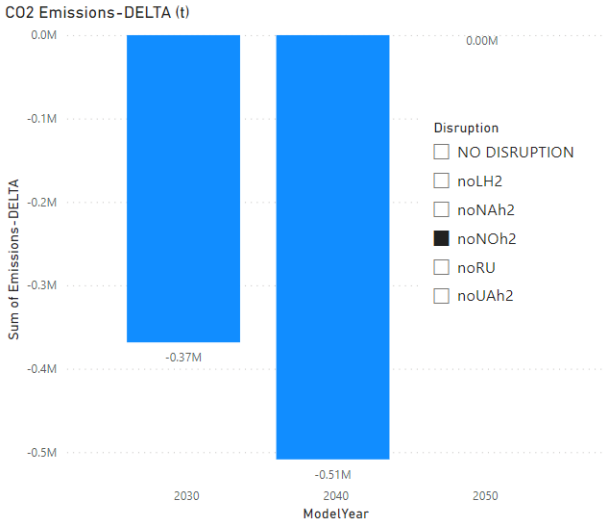


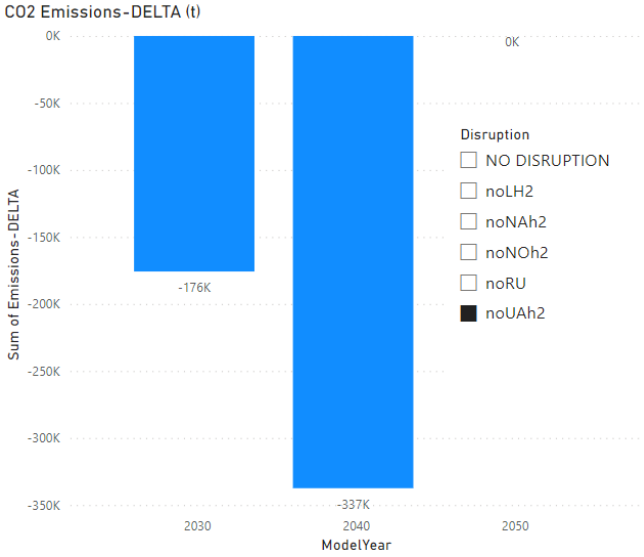


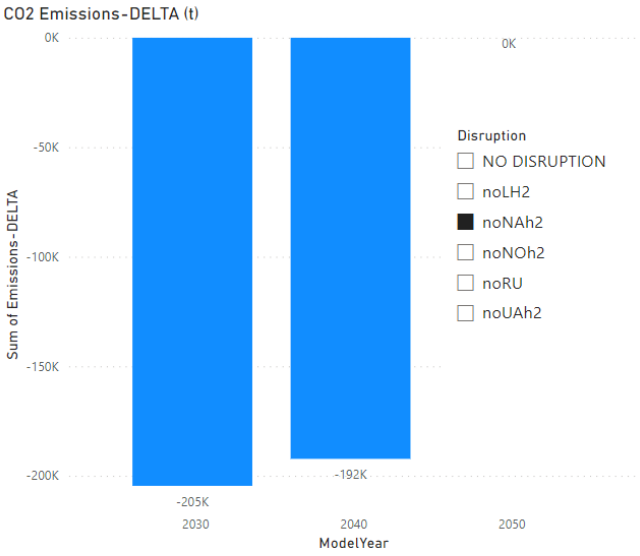
Higher sustainability benefits are expected in 2030 and 2040 under disruption cases, due to the lower availability of supply, higher SMR production is required, and subsequently higher GHG emissions savings are expected.

1 noLH2: Liquid hydrogen disruption/ 2. noNOh2 : Norway disruption / 3. noUAh2 : Ukraine disruption/ 4. noNAh2 : North Africa disruption









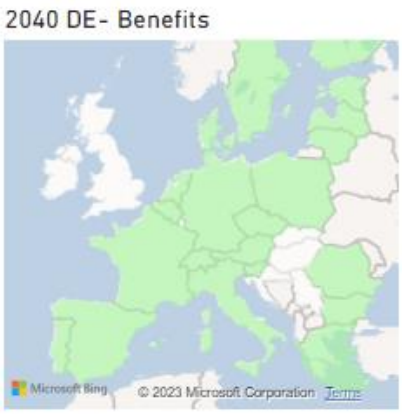
Security of Supply:[2]

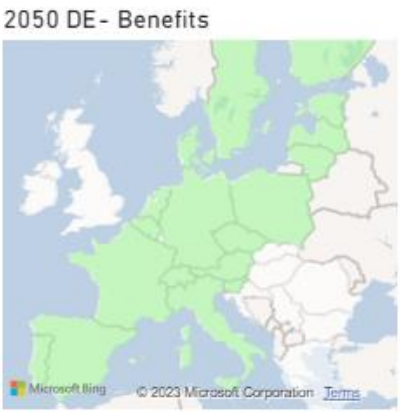
> Reference case:

In the reference case, the projects group mitigates the risk of hydrogen demand curtailment in Spain, Portugal and France (between 5-6%) and in other European countries to a lower extent (around 3%) as

[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.*

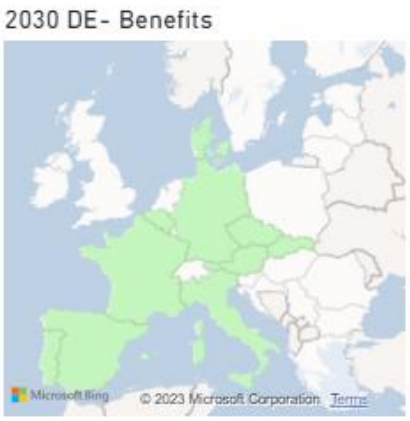
the project group together with the cross-border interconnection between FR and ES, will allow green hydrogen supplies to flow throughout Europe. This is observed from 2040, as in 2030 yearly hydrogen demand is significantly lower and available supplies can satisfy demand without any risk of demand curtailment.

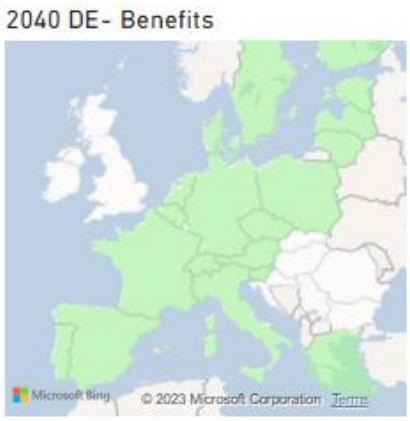




> Climatic stress cases:

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 2030 in western Europe (ES,PT,FR, BE, DE, DK, IT, AT, CZ and SK).



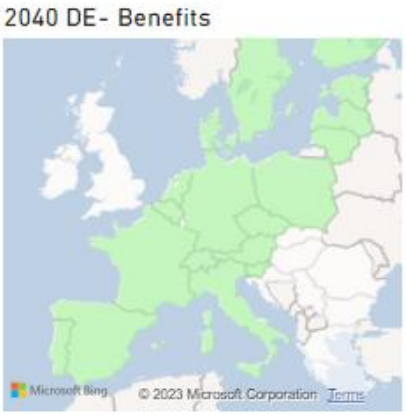


> Disruption cases (S-1):

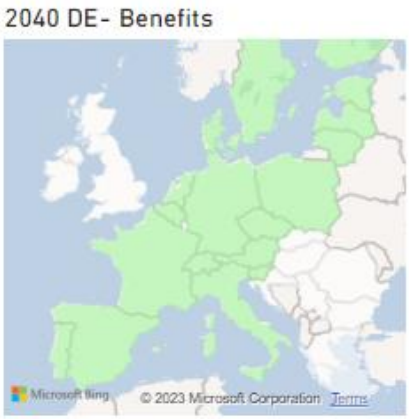
Similar SoS benefits are expected for yearly supply disruptions cases. In addition, regarding Ukrainian disruption, project group will contribute to the mitigation of risk of demand curtailment in Eastern European countries also in 2050.

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

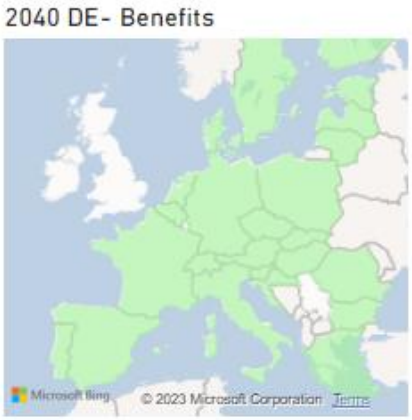
1 noLH2 : LH2 disruption



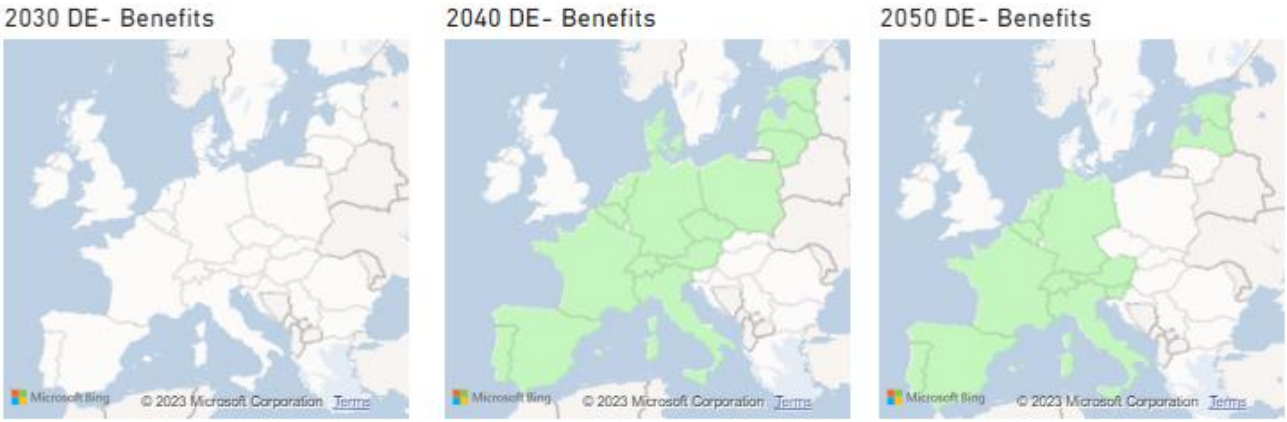
2 noNOh2 : Norway disruption



3 noUAh2 : Ukraine disruption

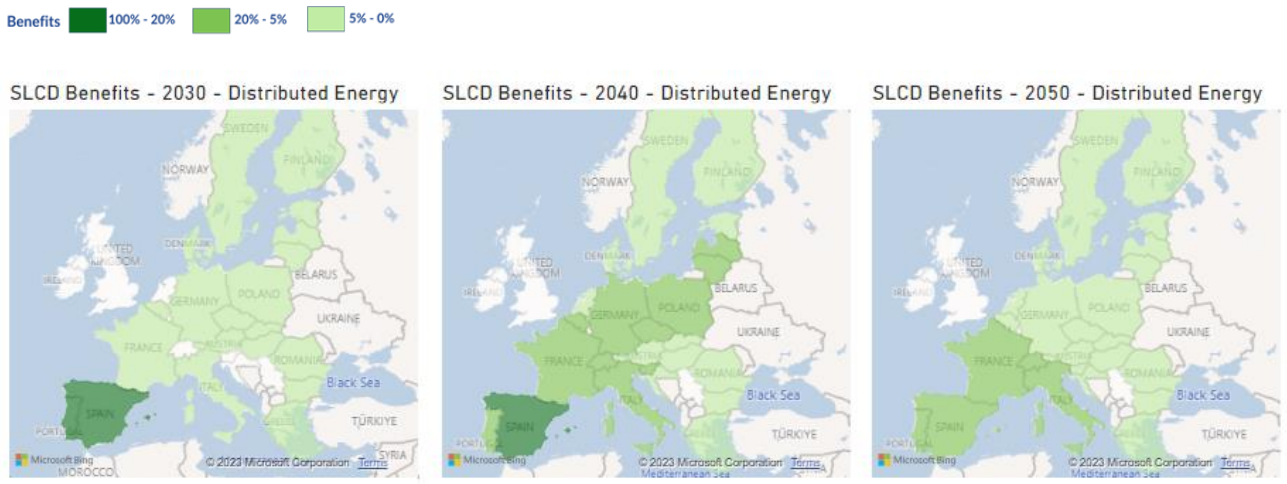


4 noNAh2 : North Africa disruption



> Single largest capacity disruption (SLCD):

The projects group mitigates risk of demand curtailment in 2040 and 2050 in most European countries by 3% to 6% and in Italy by 13%, Switzerland by 14%, In Spain by 29% and in Portugal by 17% (in 2040) and in Spain by 16% , in Portugal by 16%, in Switzerland by 10%, Italy by 10%, France by 9% (in 2050).

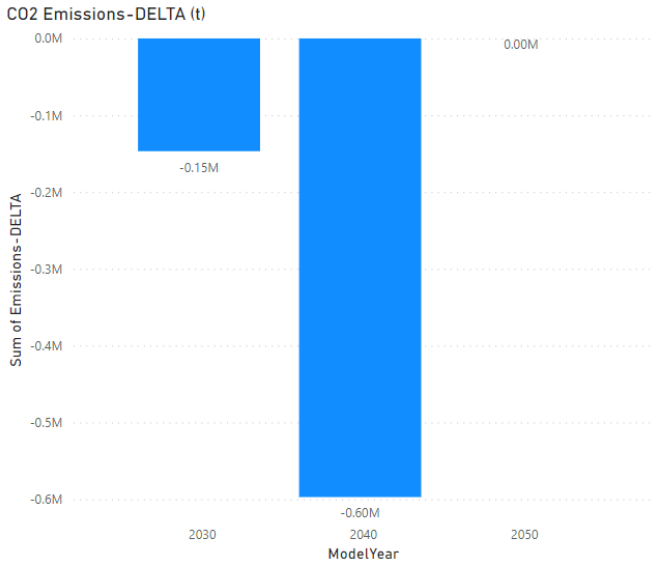


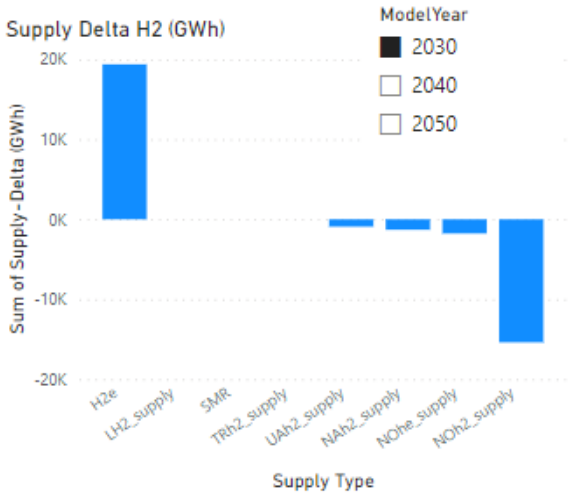
Global Ambition

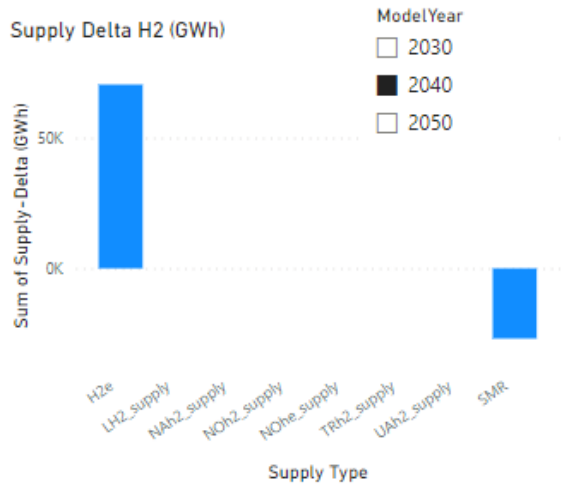
Sustainability benefits

Project group will enable transport of green hydrogen national production in Spain from 2027 reaching full capacity in 2030, and therefore, improving diversification of Spanish hydrogen supplies and potentially other European countries.

In the reference case, which analyses yearly demand in two periods (average winter and average summer), the project group will significantly contribute to sustainability by reducing overall CO2 emissions by 150 kt in 2030 and 600 kt in 2040. This can be explained as from 2030 the project group will enable the replacement of blue hydrogen imports with green hydrogen Spanish national production. Similar trend is observed in 2040, with considerably higher volumes of Spanish production will replace Norwegian blue hydrogen imports and SMR.







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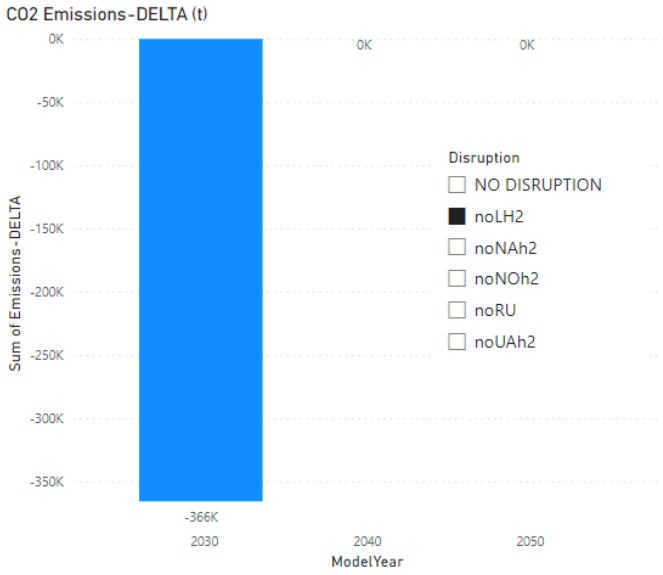
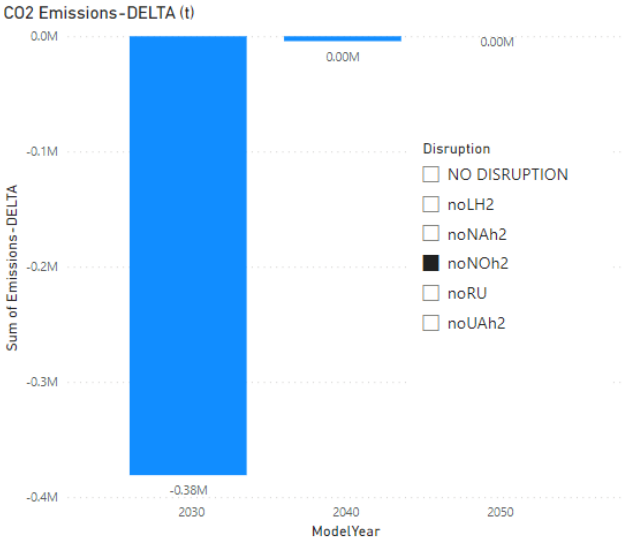
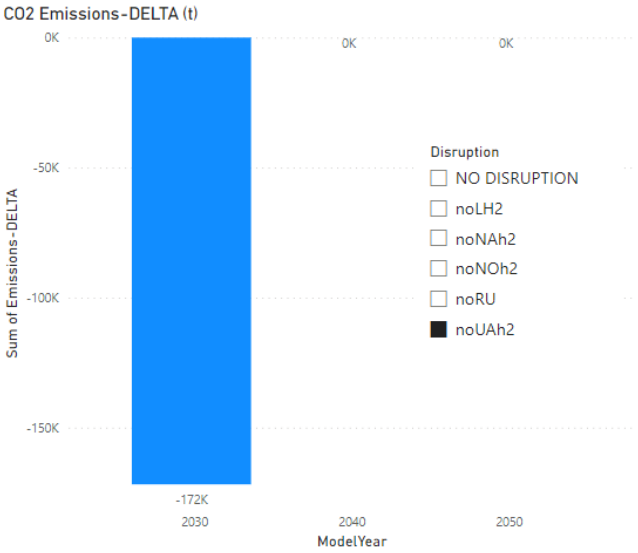
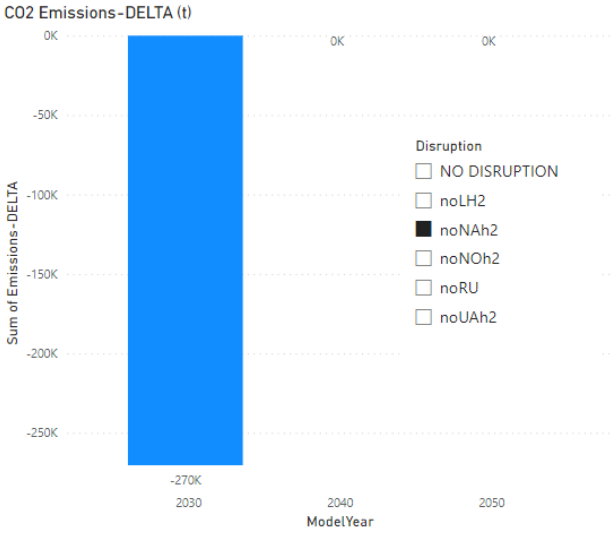




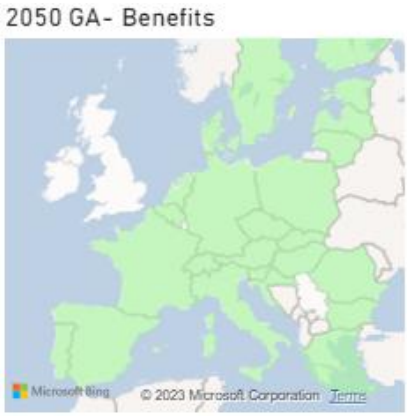




Security of supply benefits

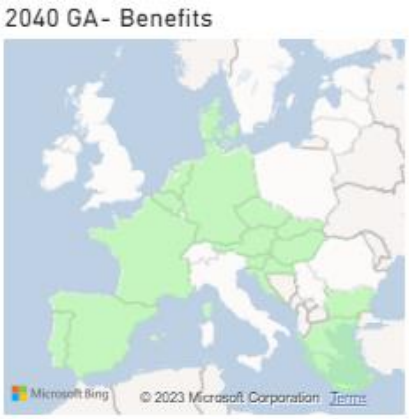
> Reference case:

In the reference case, the projects group mitigates the risk of hydrogen demand curtailment in Spain, Portugal (up to 15-16% in 2050) and France (up 4% in 2050), Italy (up to 7% in 2050) and in other European countries to a lower extent (around 3%) as the project group together with the cross-border interconnection between FR and ES, will allow green hydrogen supplies to flow throughout Europe. This is observed from 2040, as in 2030 yearly hydrogen demand is significantly lower and available supplies can satisfy demand without any risk of demand curtailment.



> Climatic stress cases:

Under climatic stress cases, such as 2-weeks, 2-week dunkelflaute or peak day the projects group also mitigates the risk of hydrogen demand curtailment in Europe from 2030 due to the higher hydrogen demand. However, in 2050 project group mitigates the risk of demand curtailment in the Iberian Peninsula, Italy and Switzerland, as in the remaining countries higher flexibility of supplies, and more specifically, storages, will help fulfil hydrogen demand under climatic stress cases.



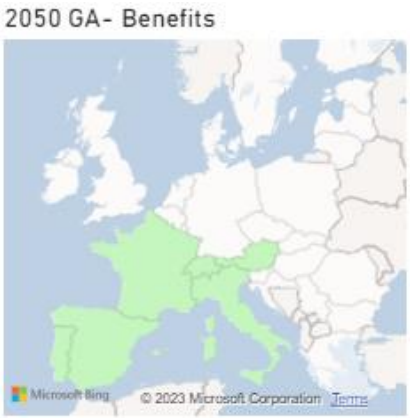
> Disruption cases (S-1):

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

2030 GA- Benefits

2040 GA- Benefits

2050 GA- Benefits

> Single largest capacity disruption (SLCD):

The projects group mitigates risk of demand curtailment in 2030 in most European countries by 2%-3% and in Spain and Portugal by 19%. In additiona, in 2040 project group also reduces risk of demand curtailment in Italy and Switzerland by 6%. In 2050, project group reduces the risk of demand curtailment in Spain and Portugal by 11%, in Switzerland, Italy, Austria and Slovenia by 6-7%.

SLCD Benefits - 2030 - Global Ambition

SLCD Benefits - 2040 - Global Ambition

SLCD Benefits - 2050 - Global Ambition

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	-141993,38	538677299	538819292,4
2030	noLH2	DE	tonne	-280540,28	540175890,2	540456430,5
2030	noNAh2	DE	tonne	-204595,34	539785356,1	539989951,4
2030	noNOh2	DE	tonne	-368375,22	538877197,8	539245573
2030	noUAh2	DE	tonne	-175737,47	539378771,9	539554509,4
2030	NO DISRUPTION	GA	tonne	-146836,93	592910448,4	593057285,4
2030	noLH2	GA	tonne	-365822,50	594817481,2	595183303,7
2030	noNAh2	GA	tonne	-270362,60	594141433,2	594411795,8
2030	noNOh2	GA	tonne	-380890,19	593310994,3	593691884,5
2030	noUAh2	GA	tonne	-171798,78	593627617,9	593799416,7
2040	NO DISRUPTION	DE	tonne	-65648,91	392077044	392142692,9
2040	noLH2	DE	tonne	-482465,62	392213883,4	392696349
2040	noNAh2	DE	tonne	-192271,04	392188097,7	392380368,7
2040	noNOh2	DE	tonne	-508701,54	392144022,6	392652724,2
2040	noUAh2	DE	tonne	-337436,41	392399182,9	392736619,3
2040	NO DISRUPTION	GA	tonne	-597202,41	396523251,6	397120454
2040	noLH2	GA	tonne	0,00	397455196,7	397455196,7
2040	noNAh2	GA	tonne	0,00	397301976,6	397301976,6
2040	noNOh2	GA	tonne	-4219,61	397450977,1	397455196,7
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	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
Spain	-26%	-18%	-29%	-19%	-16%	-11%
Portugal	-26%	-18%	-17%	-18%	-17%	-11%
Switzerland	0%	0%	-14%	-6%	-10%	-6%
Italy	-2%	-2%	-13%	-6%	-10%	-6%
Czechia	-3%	-2%	-6%	-4%	-5%	-1%
Latvia	-3%	-2%	-6%	-3%	-4%	-1%
Lithuania	-3%	-2%	-6%	-3%	-4%	-1%
Poland	-2%	-2%	-6%	-3%	-4%	-1%
Slovenia	0%	0%	-6%	-3%	-5%	-7%
France	-3%	-2%	-6%	-3%	-9%	-7%
Belgium	-2%	-2%	-6%	-3%	-4%	-1%
Germany	-2%	-2%	-6%	-3%	-4%	-1%
Austria	-2%	-2%	-5%	-3%	-5%	-6%
Denmark	-2%	-2%	-5%	-3%	-4%	-1%
Estonia	-3%	-2%	-5%	-3%	-5%	-1%
Finland	-3%	-3%	-5%	-2%	-4%	-1%
Sweden	-3%	-2%	-5%	-2%	-4%	-1%
The Netherlands	0%	0%	-5%	-3%	-5%	-1%
Bulgaria	-2%	-2%	-4%	-2%	-3%	-5%
Croatia	0%	0%	-4%	-2%	-3%	-4%
Greece	-2%	-1%	-4%	-2%	-3%	-5%
Hungary	-2%	-2%	-4%	-2%	-2%	-4%
Romania	-2%	-2%	-4%	-2%	-3%	-4%
Slovakia	-2%	-2%	-4%	-2%	-3%	-4%

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

Average2W	Lithuania	-2%	-2%	-3%	-1%	-3%	0%
Average2W	Luxembourg	0%	0%	0%	0%	0%	0%
Average2W	Malta	0%	0%	0%	0%	0%	0%
Average2W	Poland	-2%	-2%	-3%	-1%	-3%	0%
Average2W	Portugal	-2%	-2%	-15%	-11%	0%	-15%
Average2W	Romania	0%	-2%	-1%	-1%	0%	0%
Average2W	Serbia	0%	0%	0%	0%	0%	0%
Average2W	Slovakia	-2%	-2%	-1%	-2%	0%	0%
Average2W	Slovenia	0%	0%	-3%	-2%	-3%	0%
Average2W	Spain	-2%	-2%	-15%	-10%	-14%	-15%
Average2W	Sweden	-2%	-2%	-3%	-1%	-3%	0%
Average2W	Switzerland	0%	0%	-4%	-1%	-3%	-4%
Average2W	The Netherlands	0%	0%	-4%	-2%	-3%	0%
Average2W	United Kingdom	0%	0%	0%	0%	0%	0%
Average2WDF	Austria	-2%	-2%	-4%	-2%	-3%	0%
Average2WDF	Belgium	-3%	-2%	-3%	-2%	-3%	0%
Average2WDF	Bulgaria	0%	-2%	-2%	-1%	0%	0%
Average2WDF	Croatia	0%	0%	-2%	-1%	0%	0%
Average2WDF	Cyprus	0%	0%	0%	0%	0%	0%
Average2WDF	Czechia	-2%	-2%	-3%	-2%	-3%	0%
Average2WDF	Denmark	-2%	-2%	-4%	-2%	-3%	0%
Average2WDF	Estonia	-2%	-2%	-3%	-1%	-3%	0%
Average2WDF	Finland	-2%	-2%	-3%	-2%	-3%	0%
Average2WDF	France	-2%	-2%	-4%	-1%	-3%	0%
Average2WDF	Germany	-2%	-2%	-3%	-1%	-2%	0%
Average2WDF	Greece	0%	-2%	-2%	-1%	0%	0%
Average2WDF	Hungary	0%	-2%	-2%	-1%	0%	0%
Average2WDF	Ireland	0%	0%	0%	0%	0%	0%
Average2WDF	Italy	-2%	0%	-4%	-1%	-3%	-4%
Average2WDF	Latvia	-2%	-2%	-3%	-1%	-3%	0%
Average2WDF	Lithuania	-2%	-2%	-3%	-1%	-3%	0%
Average2WDF	Luxembourg	0%	0%	0%	0%	0%	0%
Average2WDF	Malta	0%	0%	0%	0%	0%	0%
Average2WDF	Poland	-2%	-2%	-3%	-1%	-3%	0%
Average2WDF	Portugal	-2%	-2%	-15%	-10%	0%	-14%
Average2WDF	Romania	0%	-2%	-1%	-1%	0%	0%
Average2WDF	Serbia	0%	0%	0%	0%	0%	0%
Average2WDF	Slovakia	-2%	-2%	-2%	-1%	0%	0%
Average2WDF	Slovenia	0%	0%	-4%	-2%	-3%	0%
Average2WDF	Spain	-2%	-2%	-15%	-10%	-14%	-14%
Average2WDF	Sweden	-2%	-2%	-3%	-2%	-3%	0%
Average2WDF	Switzerland	0%	0%	-4%	-1%	-3%	-4%
Average2WDF	The Netherlands	0%	0%	-3%	-1%	-3%	0%
Average2WDF	United Kingdom	0%	0%	0%	0%	0%	0%
DC	Austria	-2%	-2%	-3%	-2%	-3%	-1%

DC	Belgium	-2%	-2%	-4%	-2%	-3%	0%
DC	Bulgaria	0%	-1%	-1%	-2%	0%	0%
DC	Croatia	0%	0%	-1%	-2%	0%	-1%
DC	Cyprus	0%	0%	0%	0%	0%	0%
DC	Czechia	-2%	-1%	-3%	-2%	-3%	-1%
DC	Denmark	-2%	-1%	-3%	-2%	-3%	0%
DC	Estonia	-1%	-2%	-4%	-1%	-3%	-1%
DC	Finland	-1%	-2%	-3%	-1%	-3%	0%
DC	France	-2%	-2%	-4%	-2%	-3%	0%
DC	Germany	-2%	-1%	-4%	-2%	-2%	-1%
DC	Greece	0%	-1%	-2%	-2%	0%	0%
DC	Hungary	0%	-1%	-1%	-2%	0%	-1%
DC	Ireland	0%	0%	0%	0%	0%	0%
DC	Italy	-1%	-1%	-4%	-1%	-4%	-6%
DC	Latvia	-1%	-2%	-4%	-1%	-3%	-1%
DC	Lithuania	-1%	-2%	-4%	-1%	-3%	0%
DC	Luxembourg	0%	0%	0%	0%	0%	0%
DC	Malta	0%	0%	0%	0%	0%	0%
DC	Poland	-1%	-2%	-4%	-1%	-3%	0%
DC	Portugal	-2%	-2%	-5%	-2%	0%	-6%
DC	Romania	0%	-2%	-1%	-1%	0%	-1%
DC	Serbia	0%	0%	0%	0%	0%	0%
DC	Slovakia	-2%	-2%	-1%	-2%	0%	-1%
DC	Slovenia	0%	0%	-4%	-2%	-3%	-1%
DC	Spain	-2%	-3%	-4%	-2%	-7%	-7%
DC	Sweden	-1%	-2%	-3%	-1%	-3%	0%
DC	Switzerland	0%	0%	-4%	-1%	-4%	-5%
DC	The Netherlands	0%	0%	-3%	-2%	-3%	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-1149	New and repurposed pipeline	Approx. 1.500 km	The routing is designed according to division 1 and 2 ASME B-31.12 (rural and very low populated areas)
HYD-N-1149	New and repurposed pipeline	Approx. 1.250 km	The routing is designed according to division 1 and 2 ASME B-31.12 (rural and very low populated areas)
HYD-N-1273	New pipeline	Approx. 318 km	The routing is designed according to division 1 and 2 ASME B-31.12 12 (rural and very low populated areas)

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 equipment, mechanical protections, monitoring systems) Specific study by independent engineering to analyze and propose the best route (minimum impact).	CAPEX: • Around 5% of the Project Cost OPEX: • Around 25% of Project Studies (pre-commissioning) • Around 2% of the Project Cost (for monitoring)	
Environmental Impacts (ecological, humans, society, industrial and economical)	Measuring all the impact and looking for solutions to avoid or compensate (animals, flowers, water, protected areas…)		

Environmental Impact explained [Promoter]

Enagás has a strong track record concerning limitation of the impact on environment due to new pipelines and/or potential repurposing. Mitigations measures are included in the costing and respect the Avoid / Reduce / Compensate principle. The specific study led by an independent consultant at the very beginning of the FEED allow to adapt the project's layout (to Avoid sensitive areas) and identify needed measures to reduce or compensate.

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

Moreover, explicit support from the region and main stakeholders will further allow to reduce the risk from public and local opposition.

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 avoid air and water pollution, respective measures will be taken during the 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 regulation. Waste collection containers will be placed in designated places and marked accordingly. Further detailed measures will be described in the 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]

Sustainability: From an environmental point of view, renewable hydrogen means a decarbonisation of the power system, the shift from the energy from fossil fuels and the maximisation of the potential of renewables, which will have as a consequence the decrease of the emissions of greenhouse gases, as well as the quality of the air. Currently, only a fraction of the final energy consumption of the European Union is based on electricity and most of the economy will continue to depend on molecules, as stated in the European Commission 2030 Climate Target Plan Impact Assessment, which recognises that gaseous fuels share to total EU energy consumption will stay relevant in the long run. Therefore, electrification on its own will not allow deep decarbonisation of activities in a timely, fair and profitable manner.

Market integration: Mitigation of current energy isolation of the Iberian Peninsula (energy island) and development of the value chain of renewable hydrogen promoting the use of hydrogen in a variety of sectors. As envisaged under the Energy System Integration strategy, a more Energy System Integration strategy, a more circular approach, a higher electrification and a higher renewable and low-carbon fuels penetration, will be the basis for a more integrated energy system. Therefore, renewable and low-carbon gases play an important role in decarbonising the energy sector and consumption areas such as industry and mobility. Considering that the Spanish Hydrogen Backbone (including the Guitiriz-Zamora pipeline) is an enabler of H2Med-BarMar, the projects will contribute to increase the integration of both the emerging hydrogen market and in terms of global energy. The share of carriers trade at cross-border interconnections will increase and will contribute to reduce the energy isolation of the Iberian Peninsula in global energy terms (electricity, gas, and hydrogen).

Competition: It will allow access to multiple supply sources and network users on a transparent and non-discriminatory basis.

Others: Industrial development, innovation development, investment attraction, just transition, employment and contribution to local economies.

Additionally, Reganosa have developed a proprietary tool which optimises and simulates both statically and dynamically the different cost functions in gas systems. Regarding hydrogen and renewables gases, this tool takes into account the gas quality propagation and different blending strategies, as well as optimal location of the new infrastructures and costs. From the point of view of energy storages, the tool also could calculate the linepack management to provide the most appropriate strategy for energy storage backup.

F. Useful links [Promoter]

Useful links:

https://www.enagas.es/es/transicion-energetica/red-gasista/infraestructuras-energeticas/transporte-hidrogeno/

https://reganosa.com/es/la-primera-gran-planta-de-hidr%C3%B3geno-verde-de-galicia-inicia-su-tramitaci%C3%B3n

https://www.reganosa.com/