HI WEST 26 (Less-Advanced)

Interconnection Netherlands - Germany at Vlieghuis

Reasons for grouping [ENTSOG]

The project group aims at interconnecting threw a future hydrogen infrastructure, producers and consumers between the Netherlands and Germany.

The group includes investments in the Netherlands (HYD-N-468) and in Germany (HYD-N-906).

Objective of the group [Promoter]

The objective of the group is to import increasing amounts of climate-neutral hydrogen from production sites in the Netherlands to customers in West Germany via the IP Vlieghuis. The IP Vlieghuis will be the first IP to connect all production sites in the Netherlands with heavy industry in Ruhr area (Germany). Both HNS and Thyssengas have a backbone grid planned behind the depicted route from Elim over Vlieghuis to Duisburg, which allows a lot of customers in western Germany to get hydrogen from several production sites in the Netherlands. The Objective is to finish the connection by end of 2026.

HYD-N-906 **Vlieghuis-Ochtrup**

Comm. Year **2026**

HYD-N-468 **National H2 Backbone (Part)**

Comm. Year **2026**

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-468	Hydrogen network phase 1	Repurposing	400-600	3	-
HYD-N-906	Vlieghuis – Kalle	Repurposing	400	12,2	-
HYD-N-906	Kalle – Ochtrup	Repurposing	600	38	-

Capacity increment [ENTSOG]

TYNDP Project code	Point name	Operator	From system	To system	Capacity increment [GWh/d]	Comm. year
HYD-N-468	H2_IP_DE-NL	N.V. Nederlandse Gasunie	Transmission Netherlands (NL Hydrogen)	Transmission Germany (DE Hydrogen)	14,4	2027
HYD-N-468	H2_IP_DE-NL	N.V. Nederlandse Gasunie	Transmission Germany (DE Hydrogen)	Transmission Netherlands (NL Hydrogen)	14,4	2027
HYD-N-468	H2_IP_DE-NL	N.V. Nederlandse Gasunie	Transmission Netherlands (NL Hydrogen)	Transmission Germany (DE Hydrogen)	19,2	2029
HYD-N-468	H2_IP_DE-NL	N.V. Nederlandse Gasunie	Transmission Germany (DE Hydrogen)	Transmission Netherlands (NL Hydrogen)	19,2	2029
HYD-N-468	H2_IP_DE-NL	N.V. Nederlandse Gasunie	Transmission Netherlands (NL Hydrogen)	Transmission Germany (DE Hydrogen)	31,2	2031
HYD-N-468	H2_IP_DE-NL	N.V. Nederlandse Gasunie	Transmission Germany (DE Hydrogen)	Transmission Netherlands (NL Hydrogen)	31,2	2031
HYD-N-906	H2_IP_DE-NL	Thyssengas GmbH	Transmission Germany (DE Hydrogen)	Transmission Netherlands (NL Hydrogen)	14,4	2027

HYD-N-906	H2_IP_DE-NL	Thyssengas GmbH	Transmission Netherlands (NL Hydrogen)	Transmission Germany (DE Hydrogen)	14,4	2027
HYD-N-906	H2_IP_DE-NL	Thyssengas GmbH	Transmission Germany (DE Hydrogen)	Transmission Netherlands (NL Hydrogen)	19,2	2029
HYD-N-906	H2_IP_DE-NL	Thyssengas GmbH	Transmission Netherlands (NL Hydrogen)	Transmission Germany (DE Hydrogen)	19,2	2029
HYD-N-906	H2_IP_DE-NL	Thyssengas GmbH	Transmission Germany (DE Hydrogen)	Transmission Netherlands (NL Hydrogen)	31,2	2031
HYD-N-906	H2_IP_DE-NL	Thyssengas GmbH	Transmission Netherlands (NL Hydrogen)	Transmission Germany (DE Hydrogen)	31,2	2031

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-468	48	40%	1	40%
HYD-N-906	26,81	30%	0,36	30%

Description of the cost and range [Promoter]

Costs as delivered in the IPCEI application, cost range of 30% due to uncertainties of planning costs and cost escalation.

OPEX are assumed to underlie the same uncertainty of 30% due to increasing energy and personnel costs**.**

NL (Gasunie): Supported by the conclusions of HyWay27, Gasunie continued with the preparations for the development of the national hydrogen network, “the hydrogen backbone”. The input in the template is based on figures from Hyway27. Since the publication of Hyway27, there are new developments around the backbone. The latest information, scope and timing can be found on our website: https://www.hynetwork.nl/

DE (Thyssengas): Costs as delivered in the IPCEI application, cost range of 30% due to uncertainties of planning costs and cost escalation. OPEX are assumed to underlie the same uncertainty of 30% due to increasing energy and personnel costs.

C. Project Benefits [ENTSOG]

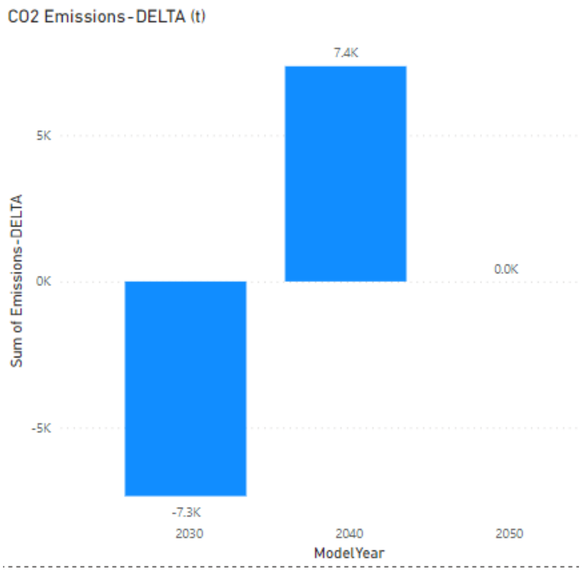
C.1 Summary of benefits

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

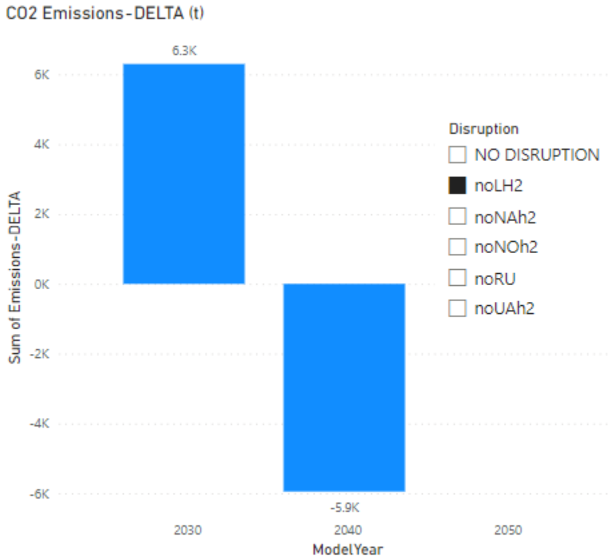
In the reference case, which analyses yearly demand in two periods (average winter and average summer), the project group will contribute to sustainability by reducing overall CO2 emissions by 7,3 kt in 2030. The project group enables the transport of green hydrogen and so then replacing use of SMR's. However, in 2040, triggered by the higher hydrogen demand project group will increase overall CO2 emissions by using more SMRs and hence reduce demand curtailment.

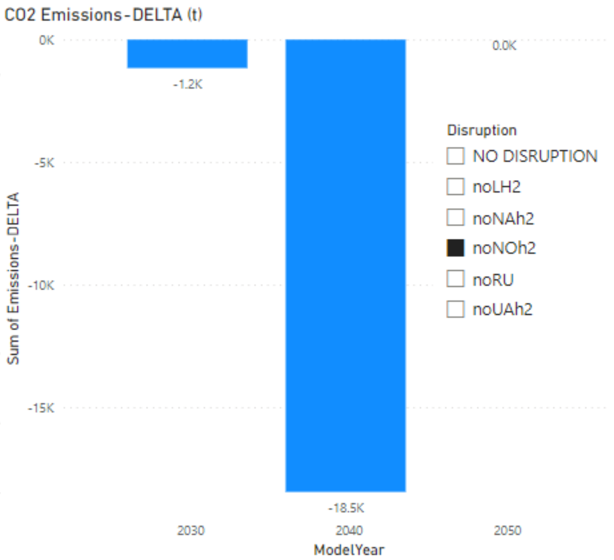


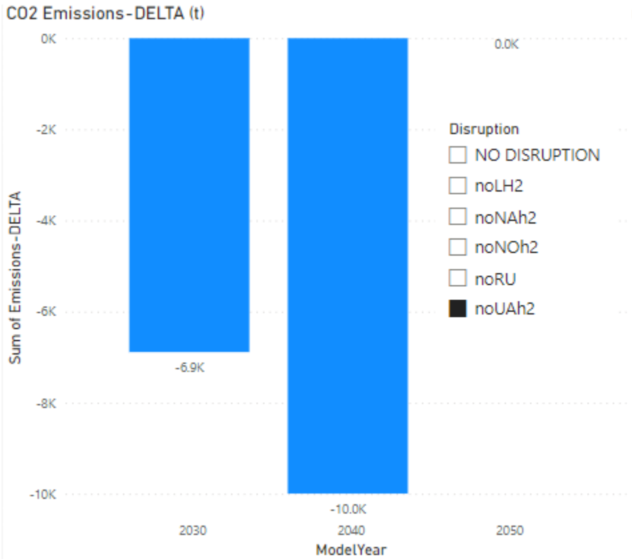
Similar trend is expected under any supply disruption.

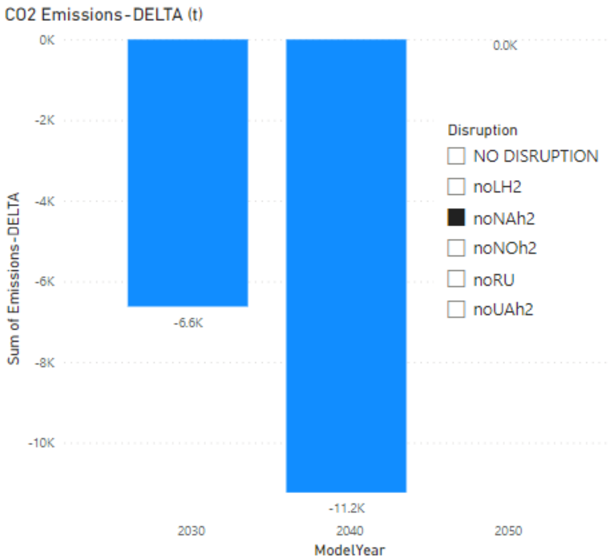
1 noLH2 : LH2 disruption / 2 noNOh2 : Norway disruption / 3 noUAh2 : Ukraine disruption/ 4 noNAh2 : North Africa disruption

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









Security of Supply:[2]

Because of competing projects groups, between the Netherlands and Germany, benefits could be limited.

> Reference case:

In the reference case, the project is not further mitigating hydrogen demand curtailment risk in average summer and average winter for European countries.

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[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.*

> Climatic stress cases:

Under 2 -week and 2-week dunkelflaute climatic stress case, as well as under peak day climatic case the projects group is contributing to mitigate demand curtailment in the Netherlands in 2030. Moreover, in 2040, group mitigates demand curtailment in almost all the European countries.

> Disruption cases (S-1):

Similarly, under disruptions cases, projects group is mitigating demand curtailment. First in case of noLH2, group is mitigating demand curtailment in the Netherlands in 2030, then under other supplies disruptions in different countries in 2040, depending on the case.

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

1 noLH2 : LH2 disruption

2030 DE- Benefits

2040 DE- Benefits

2050 DE- Benefits

2 noNOh2 : Norway

2030 DE- Benefits

2040 DE- Benefits

2050 DE- Benefits

3 noUAh2 : Ukraine disruption

2030 DE- Benefits

2040 DE- Benefits

2050 DE- Benefits

4 noNAh2 : North Africa disruption

2030 DE- Benefits

2040 DE- Benefits

2050 DE- Benefits

> Single largest capacity disruption (SLCD):

In case of SLCD many European countries benefitting on small scale from this project group by mitigating the risk of demand curtailment from 2040 by 1-2%.

Benefits 100% - 20% 20% - 5% 5% - 0%

SLCD Benefits - 2030 - Distributed Energy

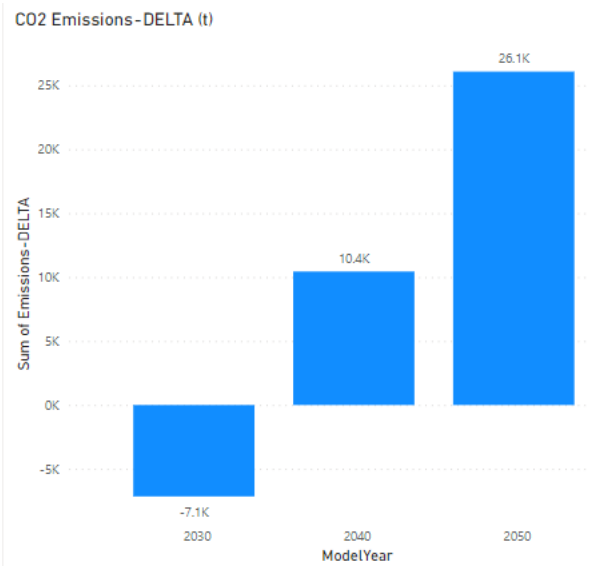
SLCD Benefits - 2040 - Distributed Energy

SLCD Benefits - 2050 - Distributed Energy

Global Ambition

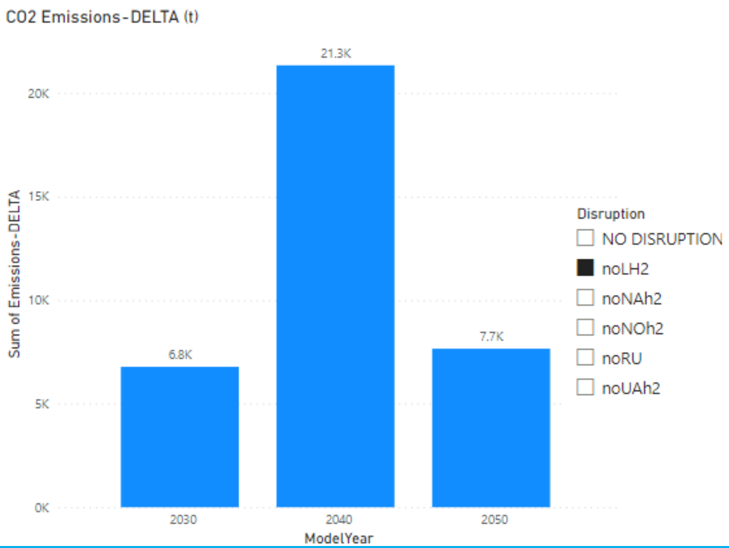
Sustainability benefits

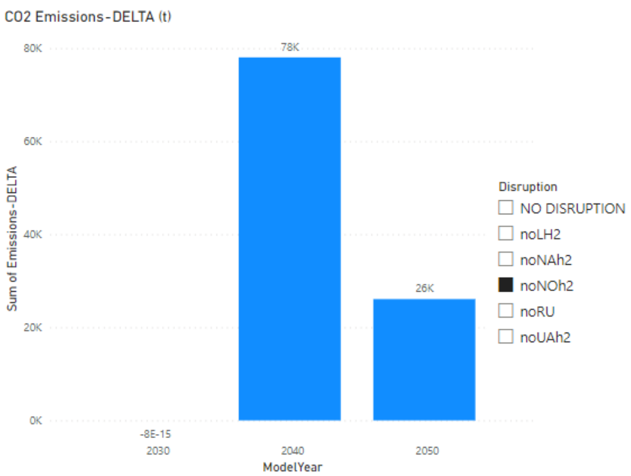
In the reference case, which analyses yearly demand in two periods (average winter and average summer), the project group will contribute to sustainability by reducing overall CO2 emissions by 7,1 kt in 2030. The project group enables the transport of green hydrogen and so then replacing use of SMR's. However, in 2040 and 2050, triggered by the higher hydrogen demand project group will increase overall CO2 emissions by using more SMRs and hence reduce demand curtailment.

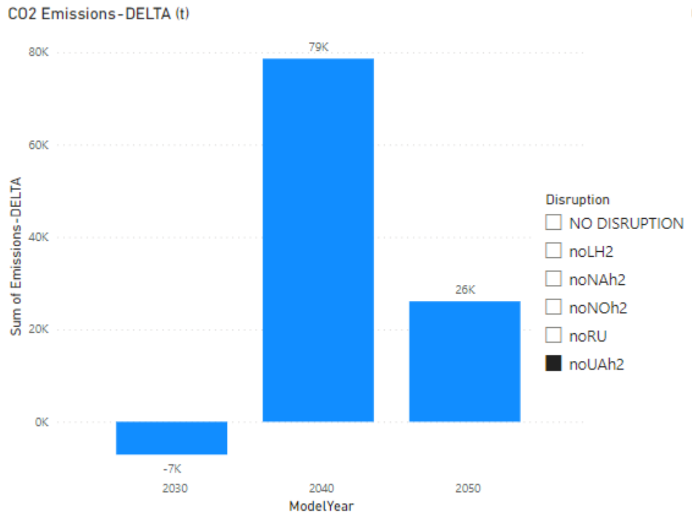


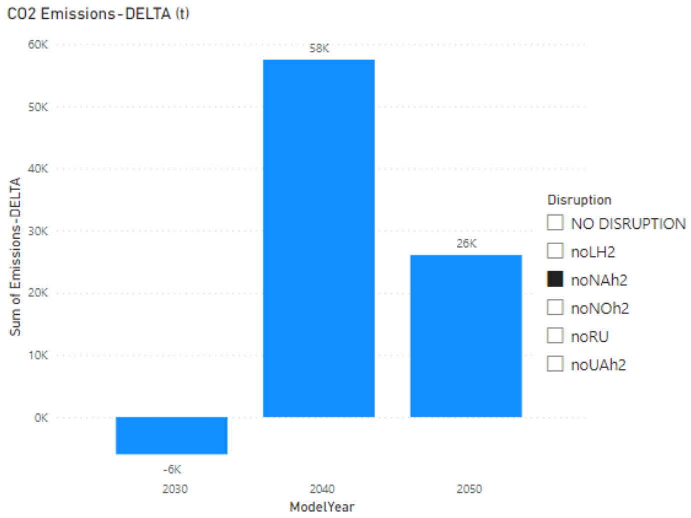
Sustainability benefits are increased under supply disruption cases, such as Norway, Ukraine, or North Africa Disruption for 2030. For example, in case of North Africa disruption the project group will reduce CO2 emissions by 100 kt in 2030.

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 projects group is contributing to mitigate demand curtailment in almost all European countries in 2040.

> Climatic stress cases

Under 2 -week and 2-week dunkelflaute climatic stress case, as well as under peak day climatic case the projects group is contributing to mitigate demand curtailment in the Netherlands in 2030. Moreover, in 2040, group mitigates demand curtailment in Denmark, Czechia and Slovenia.

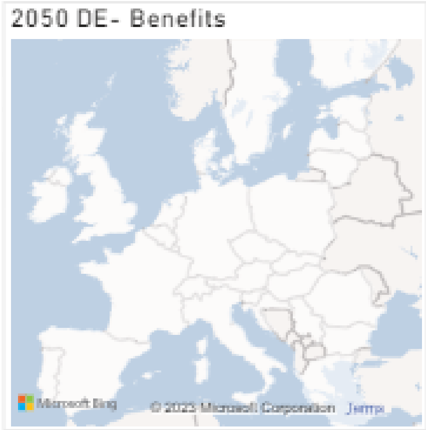
> Disruption cases (S-1)

Similarly under disruptions cases, projects group is mitigating demand curtailment. First in case of noLH2, group is mitigating demand curtailment in the Netherlands in 2030, then under other supplies disruptions in different countries in 2040, depending on the case.

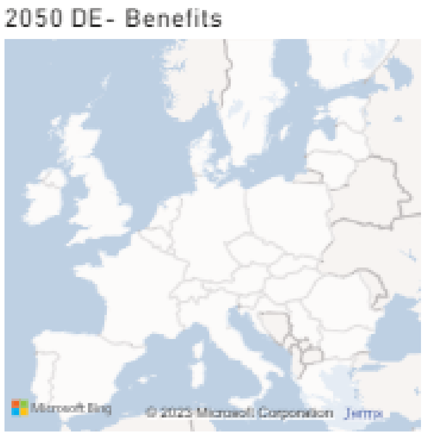
1 noLH2 : LH2 disruption / 2 noNOh2 : Norway disruption / 3 noUAh2 : Ukraine disruption/ 4 noNAh2 : North Africa disruption

1 noLH2 : LH2 disruption

2 noNOh2 : Norway



3 noUAh2 : Ukraine disruption



4 noNAh2 : North Africa disruption

> Single largest capacity disruption (SLCD):

In case of SLCD many European countries benefitting on small scale from this project group by mitigating the risk of demand curtailment in 2040 by 1-2%.

Benefits 100% - 20% 20% - 5% 5% - 0%


SLCD Benefits - 2030 - Global Ambition
SLCD Benefits - 2040 - Global Ambition
SLCD Benefits - 2050 - Global Ambition
NORWAY
BELARUS
UKRAINE
Black Sea
TÜRKIYE
POLAND
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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	-7339,07	538677299	538669960
2030	noLH2	DE	tonne	6296,83	540175890,2	540182187,1
2030	noNAh2	DE	tonne	-6623,24	539785356,1	539778732,9
2030	noNOh2	DE	tonne	-1160,15	538877197,8	538876037,7
2030	noUAh2	DE	tonne	-6887,55	539378771,9	539371884,4
2030	NO DISRUPTION	GA	tonne	-7116,00	592910448,4	592903332,4
2030	noLH2	GA	tonne	6783,70	594817481,2	594824264,9
2030	noNAh2	GA	tonne	-5985,61	594141433,2	594135447,6
2030	noNOh2	GA	tonne	0,00	593310994,3	593310994,3
2030	noUAh2	GA	tonne	-7115,88	593627617,9	593620502
2040	NO DISRUPTION	DE	tonne	7359,41	392077044	392084403,4
2040	noLH2	DE	tonne	-5945,69	392213883,4	392207937,7
2040	noNAh2	DE	tonne	-11235,08	392188097,7	392176862,6
2040	noNOh2	DE	tonne	-18458,35	392144022,6	392125564,3
2040	noUAh2	DE	tonne	-9994,11	392399182,9	392389188,8
2040	NO DISRUPTION	GA	tonne	10441,31	396523251,6	396533692,9
2040	noLH2	GA	tonne	21346,61	397455196,7	397476543,3
2040	noNAh2	GA	tonne	57516,44	397301976,6	397359493,1
2040	noNOh2	GA	tonne	78034,53	397450977,1	397529011,7
2040	noUAh2	GA	tonne	78615,60	397478498,3	397557113,9
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	26075,04	228306706,5	228332781,6
2050	noLH2	GA	tonne	7657,79	228306706,5	228314364,3
2050	noNAh2	GA	tonne	26075,04	228306706,5	228332781,6
2050	noNOh2	GA	tonne	26075,04	228306706,5	228332781,6
2050	noRU	GA	tonne	26075,04	228306706,5	228332781,6
2050	noUAh2	GA	tonne	26075,04	228306706,5	228332781,6

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%

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%	0%	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%	-1%	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-468	Hydrogen pipelines (Repurposed part)	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-906	Hydrogen pipelines (Repurposed part)	Reconstruction of existing above-ground objects or locally limited interferences	Minimal environmental impacts expected due to repurposing of pipeline or locally limited interferences.

Potential impact	Mitigation measures	Related costs included in project CAPEX and OPEX	Additional expected costs
HYD-N-468	Minimal environmental impacts expected due to repurposing of pipeline and or locally limited interferences and as much reduced environmental impact as possible for new built parts in accordance with applicable regulations	detailed calculation not available yet	Not expected
HYD-N-906	Minimal environmental impacts expected due to repurposing of pipeline and or locally limited interferences and as much reduced environmental impact as possible for new built parts in accordance with applicable regulations	detailed calculation not available yet	Not expected

Environmental Impact explained [Promoter]

DE (Thyssengas):

As both of the Thyssengas projects within this group are repurposed natural gas pipelines, we see only marginal impact on the surroundings of these pipelines. As there will be no further transport of CH4 with these pipelines, a CO2 emission reduction is achieved via the switch to hydrogen transport (no further transport emissions). As one of the main customers is a huge steel production, the hydrogen transported via this pipeline system achieves a crucial reduction of CO2 emissions from the steel sector in this area. By constructing a reliable pipeline based on infrastructure, which is to 100 % dedicated to the transport of H_2, Thyssengas directly contributes to the reduction of GHG emissions and lowering market entry barriers and, thus, can (1) incentivise the development of H_2 production capacities, (2) incentivise the construction of storage-capacities, which offer a buffer function for value-chains and as such are necessary for scaling-up the industrial-usage of H_2, and (3) incentivise the usage of H_2 to decarbonise industrial processes and thus contribute to CO_2 reduction targets.

Furthermore, the project is subject to a strict environmental impact assessment according to the “Umweltverträglichkeitsprüfungsgesetz (UVPG)”. Due to the primary use of existing infrastructures for the conversion and construction of the planned pipeline system, Thyssengas minimises any impact on nature. The preservation of the use of these infrastructures consolidates the value of the assets, secures jobs and reduces alternative dismantling obligations, which would have a significantly greater impact on people and nature. The project of Thyssengas does not involve the use of water and is subject to environmental impact assessment under national legislation (UVPG). During the construction phase, all required measures and pre-cautions will be taken to prevent pollution of surface and ground water. The project of Thyssengas does not impact the status of marine waters.

Thyssengas complies with applicable laws in the disposal of waste. The basis for this is the “Kreislaufwirtschafts- und Abfallgesetz” Recycling and Waste Management Act (KrWG / AbfG). Here, the various disposal paths are described. In addition, the “Abfallverzeichnisverordnung” Waste Catalogue Ordinance (AVV), the “Nachweisverordnung” Ordinance on Waste Recovery and Disposal Records (NachwV) and the “Gewerbeabfallverordnung” Commercial Waste Ordinance (GewAbfV) apply.

For example, for this project, existing natural gas pipelines will be converted (pipelines between Ochtrup – Kalle and Kalle Vlieghuis) for the use of H_2. In this way, existing material is used and less material is introduced into the circular economy as through the construction of new pipelines.

The project of Thyssengas (construction/conversion of pipelines and construction of gas-pressure and control units) will not lead to emissions of pollutants that are within / lower than the emission levels associated with best available techniques ranges set out in the latest best available techniques conclusions for the activity concerned. The project also does not relate to the manufacturing or use of any of the substance mentioned above (a-g). For the creation of the planned H_2 infrastructure, existing pipelines will be converted to a large extent. This approach minimises pollutant emissions from the construction phase, e.g., due to construction machinery and supply chains. In addition, the development of a H_2 infrastructure supports further decarbonisation, as it enables the switch from fossil fuels (such as natural gas) to carbon-free energy sources, especially in industry. Accordingly, the project results in a significant reduction of CO_2 emissions.

NL (Gasunie):

The project will follow the strict EIA regulatory framework as required by the Dutch Ministry for Economic Affairs and Climate and will consider all environmental impact aspect during the permitting procedures. No significant harm to the environment or any negative effect on climate change will be created by the project.

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]

DE (Thyssengas):

Initial kick-off for decarbonizing steel industry

Setting the first IP from NL to DE

Connecting all production facilities in NL with customers in Ruhr area (DE)

Connecting two storages in NL and DE near the border

Lowering the system costs by using high percentage of repurposed pipelines

NL(Gasunie): Hydrogen is expected to make up 20-25% of the total energy demand of the EU and the UK by 2050 but infrastructure connecting H2 producers and consumers is lacking. The objective of the H2 Backbone project is to create an open access non-discriminatory national and cross-border network for hydrogen transportation. The existing natural gas network will be repurposed for H2-transport (85% of the network), with the addition of new pipes in areas where connections are not yet available. Once complete, the Dutch H2 Backbone will connect on- and off-shore H2 sources with consumers in the Netherlands, Germany and Belgium. As such, the H2 Backbone will form a vital part of the European Hydrogen Backbone and help kickstart the shift towards carbon-neutral energy in Europe.

NL(Gasunie): Market Integration, inter alia through connecting existing or emerging hydrogen networks of Member States, or otherwise contributing to the emergence of an Union-wide network for the transport and storage of hydrogen, and ensuring interoperability of connected systems.

NL(Gasunie) Security of Supply and flexibility, inter alia through appropriate connections and facilitating secure and reliable system operation.

NL(Gasunie) Sustainability, including by reducing greenhouse gas emissions, by enhancing the deployment of renewable or low carbon hydrogen, with an emphasis on hydrogen from renewable.

NL(Gasunie) Competition, inter alia by allowing access to multiple supply sources and network users on a transparent and non- discriminatory basis.

F. Useful links [Promoter]

Useful links:

https://www.get-h2.de/

https://www.thyssengas.com/

https://www.hynetwork.nl/

www.hyway27.nl