# BEMIP HYD 7 (Less-Advanced)

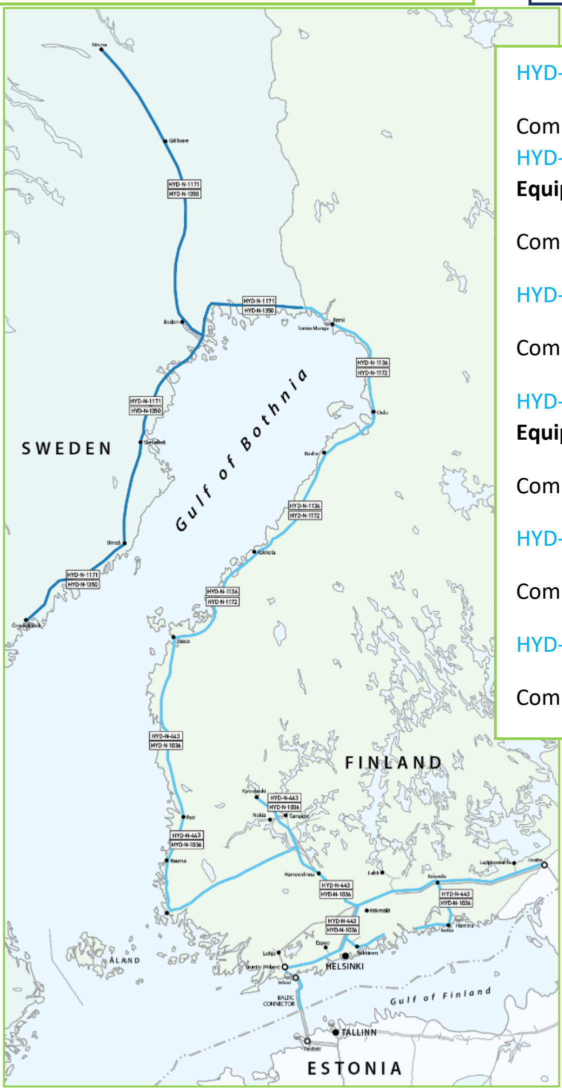
# Finland-Sweden

## Reasons for grouping [ENTSOG]

The project group aims to connect Sweden (HYD-N-1171 & HYD-N-1350) and Finland (HYD-N-1136 & HYD-N-1172) through a new route around gulf of Bothnia and further extend through network in Finland including part of a interconnections towards Estonia (HYD-N-1036 & HYD-N-433)

## Objective of the group [Promoter]

The main purpose of grouping the Nordic Hydrogen Route and Nordic-Baltic Hydrogen Corridor has been to provide hydrogen transmission via pipeline from the Nordics to Germany through Estonia, Latvia, Lithuania and Poland. The Finnish sections are integral parts of the whole Nordic-Baltic Hydrogen Corridor and this is why other sections from BEMIP HYD groups (3&6) should be included.




HYD-N-1136 **Nordic Hydrogen Route – Bothnian Bay – Finnish section**

Comm. Year **2028**

HYD-N-1172 **Nordic Hydrogen Route – Bothnian Bay – Finnish section – Equipment**

Comm. Year **2028**

HYD-N-1171 **Nordic Hydrogen Route - Bothnian Bay- Swedish section**

Comm. Year **2028**

HYD-N-1350 **Nordic Hydrogen Route - Bothnian Bay- Swedish section - Equipment**

Comm. Year **2028**

HYD-N-1036 **Nordic-Baltic Hydrogen Corridor - FI section – Equipment**

Comm. Year **2029**

HYD-N-443 **Nordic-Baltic Hydrogen Corridor - FI section - Pipeline**

Comm. Year **2029**

# 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] | Maximum depth [m] |
|---|---|---|---|---|---|---|
| HYD-N-1136 | NHR – Finnish section pipeline | New | 1200 | 478 | 260 | |
| HYD-N-1171 | NHR – Swedish section pipeline | New | 1200 | 786 | 260 | |
| HYD-N-443 | Baltic Hydrogen Corridor - FI section | New | 1200 | 1080 | 470 | |

## Capacity increment [ENTSOG]

| TYNDP Project code | Point name | Operator | From system | To system | Capacity increment [GWh/d] | Comm. year |
|---|---|---|---|---|---|---|
| HYD-N-1136 | H2_IP_FI_SE | Gasgrid Finland Oy | Transmission Sweden (FI Hydrogen) | Transmission Finland (FI Hydrogen) | 162 | 2028 |
| HYD-N-1136 | H2_IP_FI_SE | Gasgrid Finland Oy | Transmission Finland (FI Hydrogen) | Transmission Sweden (FI Hydrogen) | 162 | 2028 |
| HYD-N-1171 | H2_IP_FI_SE | Nordion Energi AB | Transmission Finland (FI Hydrogen) | Transmission Sweden (FI Hydrogen) | 162 | 2028 |
| HYD-N-1171 | H2_IP_FI_SE | Nordion Energi AB | Transmission Sweden (FI Hydrogen) | Transmission Finland (FI Hydrogen) | 162 | 2028 |
| HYD-N-443 | H2_IP_FI_EE | Gasgrid Finland Oy | Transmission Finland (FI Hydrogen) | Transmission Estonia (EE Hydrogen) | 200 | 2029 |
| HYD-N-443 | H2_IP_FI_EE | Gasgrid Finland Oy | Transmission Estonia (EE Hydrogen) | Transmission Finland (FI Hydrogen) | 100 | 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-1136 | 1652 | 40% | 8,3 | 40% |
| HYD-N-1171 | 1652 | 40% | 8,3 | 40% |
| HYD-N-443 | 1890 | 40% | 9,5 | 40% |

### Description of the cost and range [Promoter]

The CAPEX and OPEX for each section are highly indicative and were set according to European Hydrogen Backbone estimates. More precise CAPEX and OPEX will be estimated during pre-feasibility study.

# C. Project Benefits [ENTSOG]

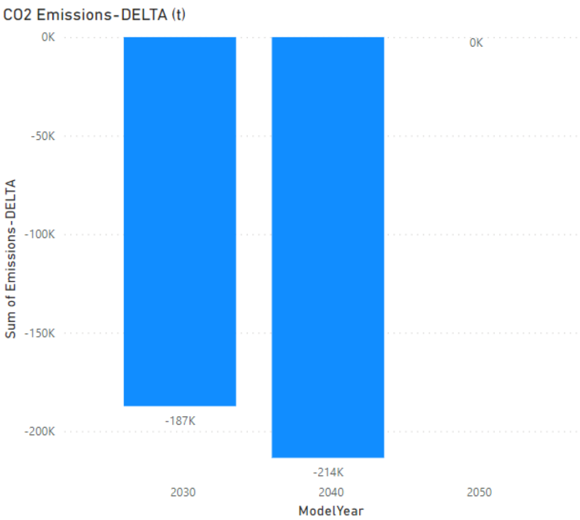
## C.1 Summary of benefits

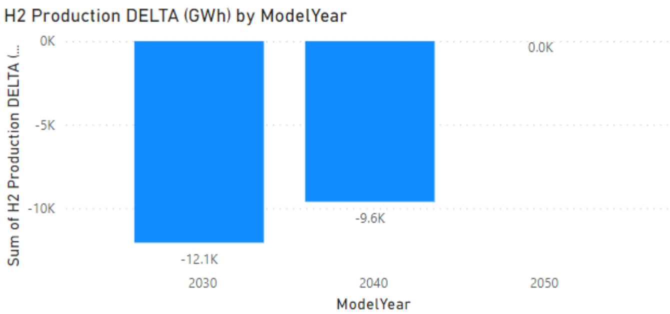
This section provides a summarised analysis by ENTSOG of the main benefits stemming from the realisation of the overall group. More details on the indicators are available in Annex D of TYNDP 2022[1].

### Distributed Energy

#### Sustainability:

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 187 kt in 2030 and 214 kt in 2040. This is explained as the project group will enable replacement of blue hydrogen supplies and, therefore, will reduce natural gas imports, with different hydrogen supply sources.

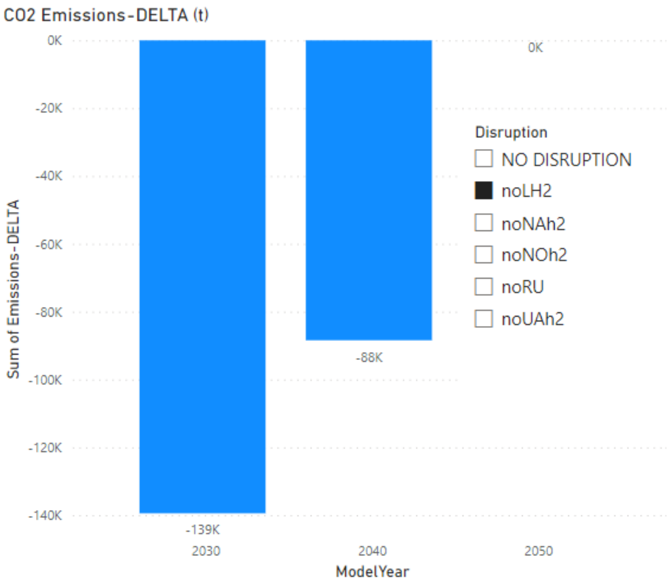


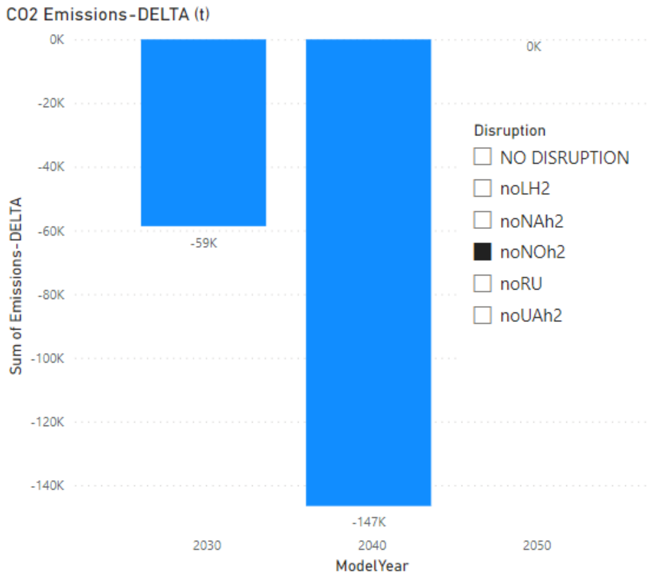



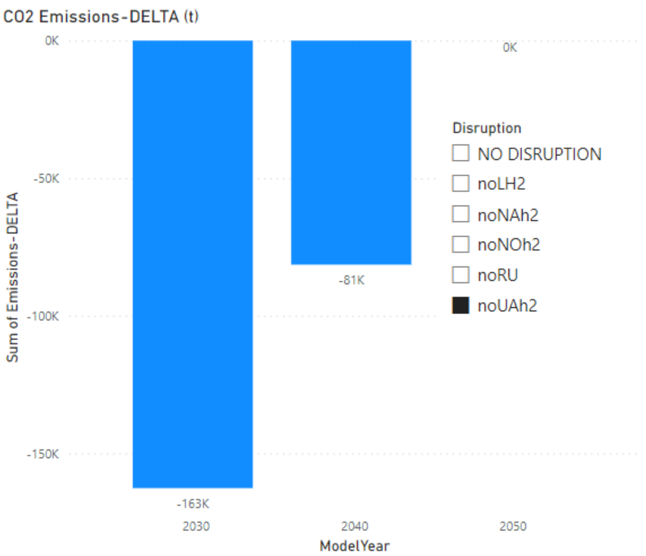

Similar sustainability benefits are expected under supply disruption cases (such as LH2, North African or Norwegian imports), as lower availability of hydrogen supplies will allow the project group to contribute to the reduction of CO2 emissions and will enable the cooperation within the Baltic states.

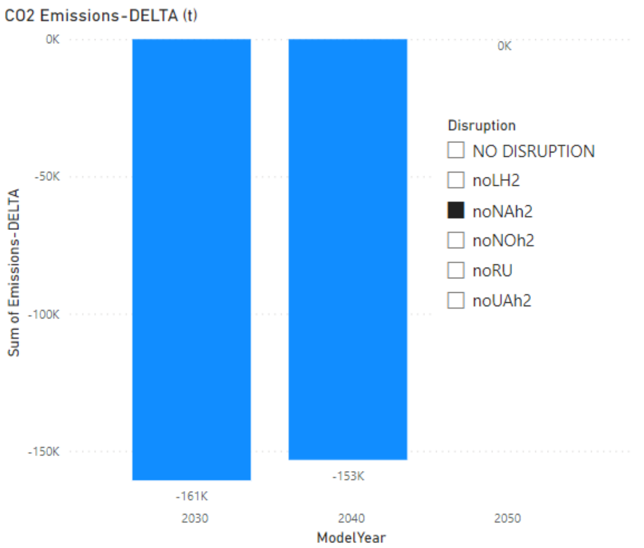
*1 noLH2 : LH2 disruption / 2 noNOh2 : Norway disruption / 3 noUAh2 : Ukraine disruption/ 4 noNAh2 : North Africa disruption*

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



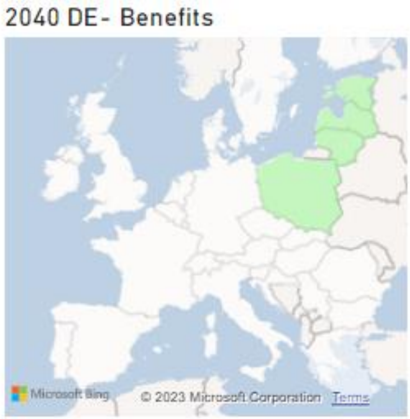



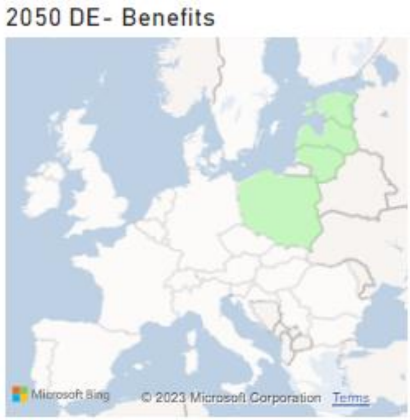




**Security of Supply:**[2]

> Reference case

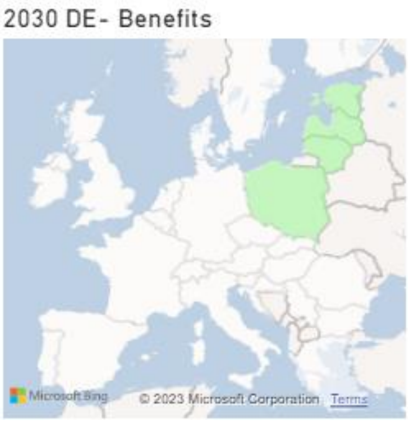
[2] *As for the hydrogen system there is no existing infrastructure level available yet, ENTSOG has identified a possible hydrogen network according to the information provided by promoters in their project submission for the TYNDP/PCI process (i.e., H2 Infrastructure level). Therefore, the System Assessment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

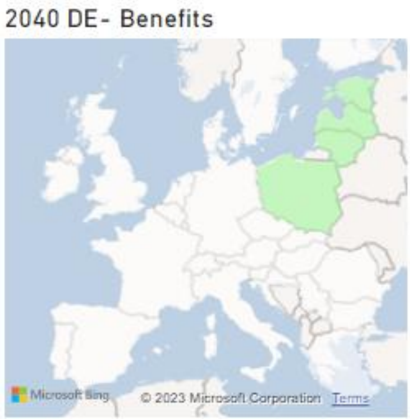



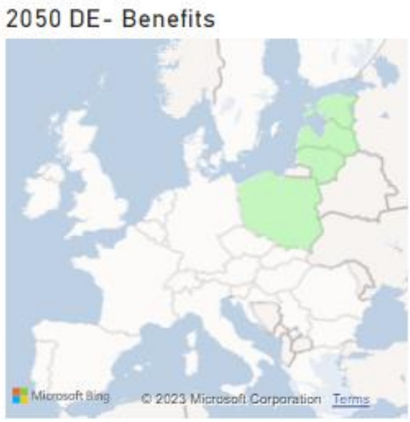




In the reference case, the project group mitigates the risk of hydrogen demand curtailment in Estonia, Latvia, Lithuania, and Poland from 2040 in average summer and average winter. The project group improves cooperation between countries along the Baltic Sea.

> Climatic stress cases




For all three climatic stress cases, under peak day, 2-week and 2-week dunkelflaute climatic stress cases, the project group is mitigating demand curtailment in Estonia, Latvia, Lithuania, and Poland from 2030.

> Disruption cases (S-1):

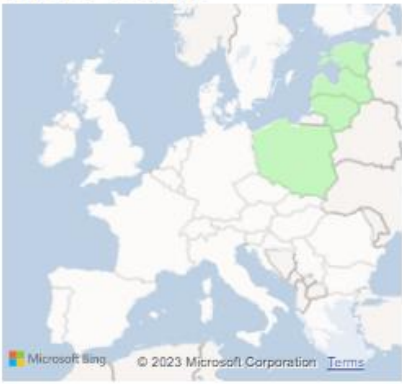
Similar to the reference case, the project group is mitigating the risk of demand curtailment in case of disruption cases from 2040 by enabling extended cooperation and allowing hydrogen supplies to reach Baltic states.

*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

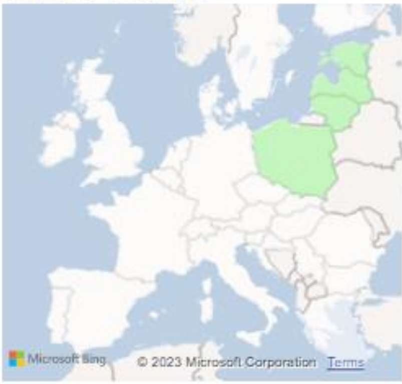



2050 DE- Benefits


*2 noNOh2 : Norway disruption*

2030 DE- Benefits


2040 DE- Benefits

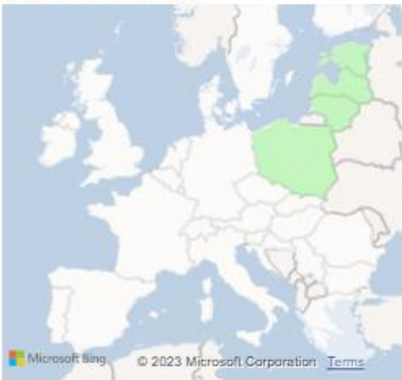



2050 DE- Benefits


*3 noUAh2 : Ukraine disruption*

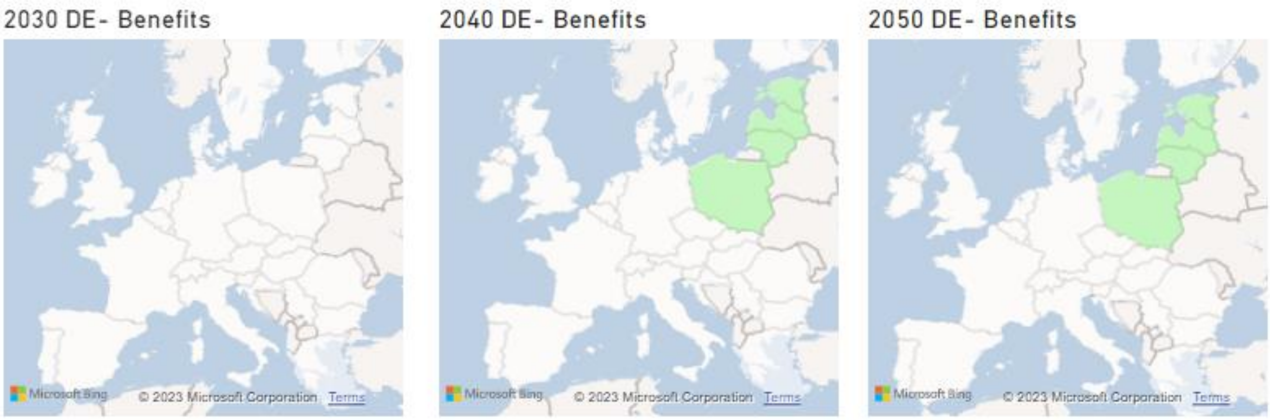
2030 DE- Benefits


2040 DE- Benefits

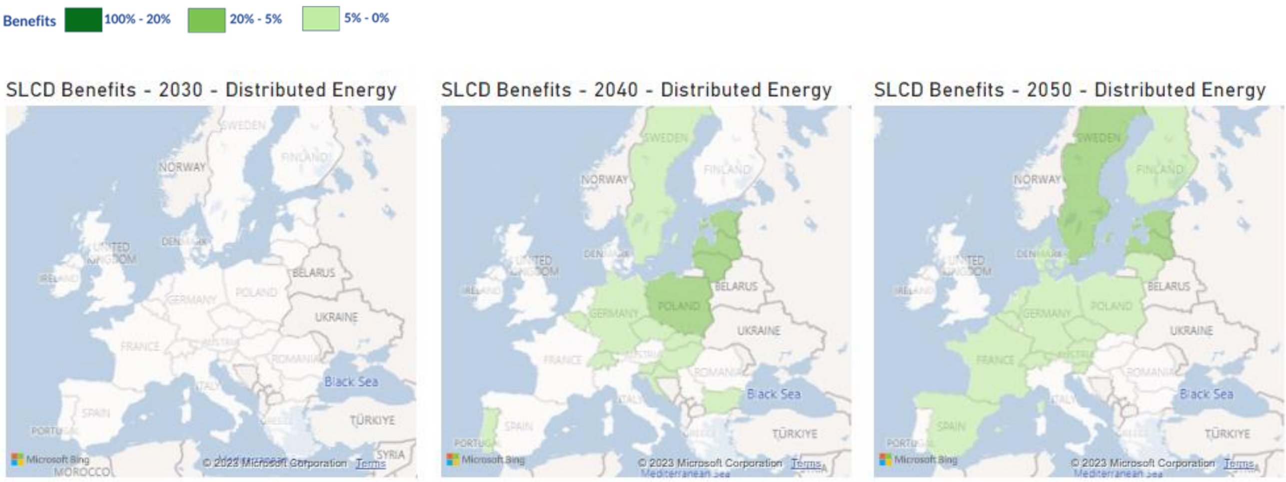



2050 DE- Benefits

*4 noNAh2 : North Africa disruption*




> Single largest capacity disruption (SLCD):



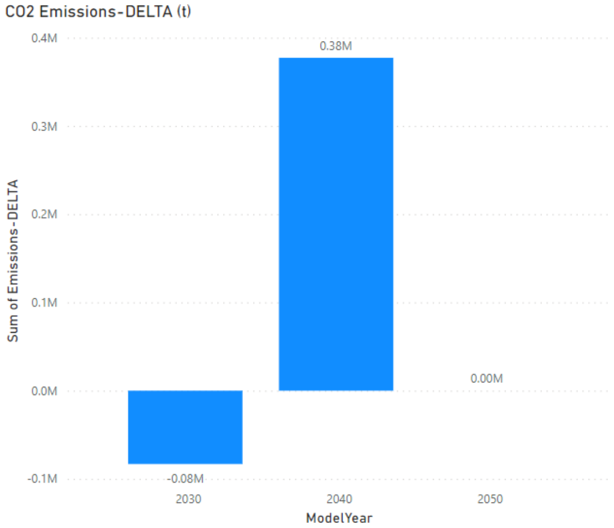

In case of single largest capacity disruption (SLCD), the project reduces the risk of demand curtailment in Estonia, Latvia, Lithuania, and Poland in 2040 but also helps to mitigate supply shortage in other European countries due to the cooperation between Sweden, Finland, and Estonia. In 2050 the project group reduces the risk of demand curtailment in Sweden, Estonia, and Lithuania but also in a wider range with the rest of Europe.

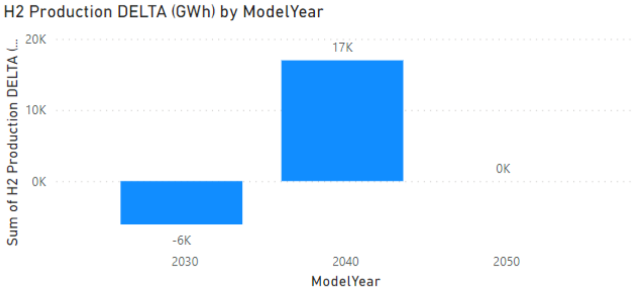
## Global Ambition

### Sustainability benefits

In the reference case, the project group will contribute to sustainability by reducing overall CO2 emissions by 80 kt (0.08 mt) in 2030. The project group will enable replacement of blue hydrogen supplies and, therefore, will reduce natural gas imports, with different hydrogen supply sources.

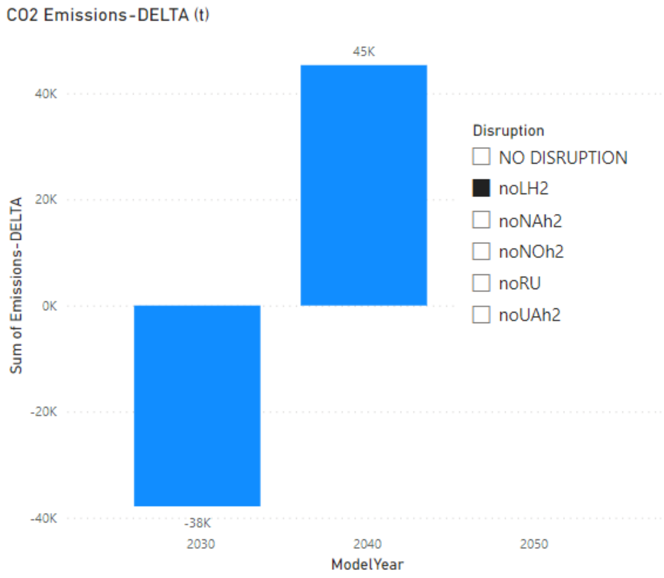
However, in 2040 triggered by the higher hydrogen demand assumed for Global Ambition Scenario, the project group will increase overall CO2 emissions. Due to the higher cooperation between countries more hydrogen demand curtailment can be avoided by enabling an enhanced production of hydrogen using natural gas, mainly LNG imports. As all green hydrogen supply sources (both locally produced and imported) are already used at their maximum capacity.

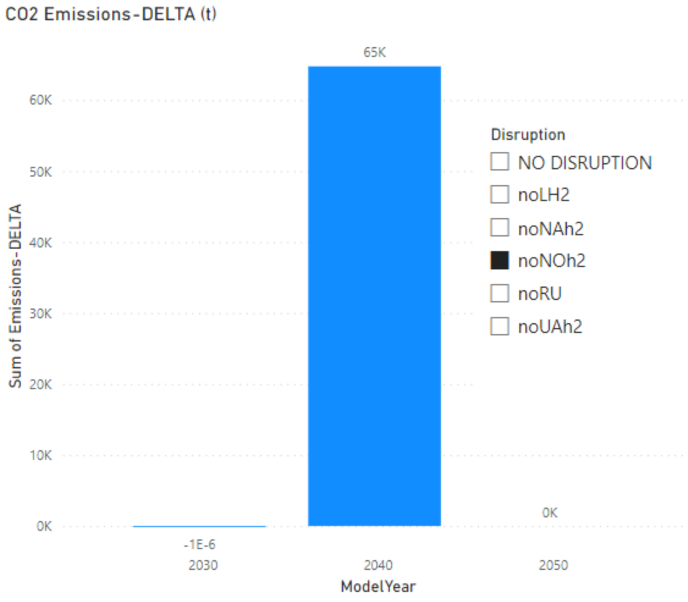


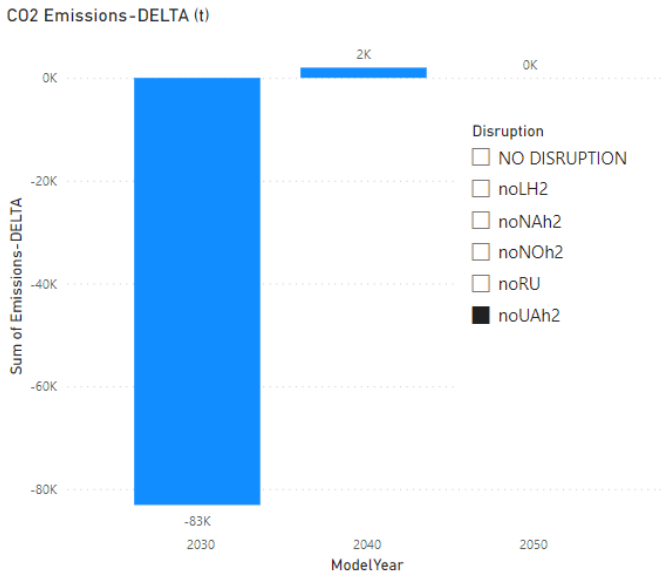



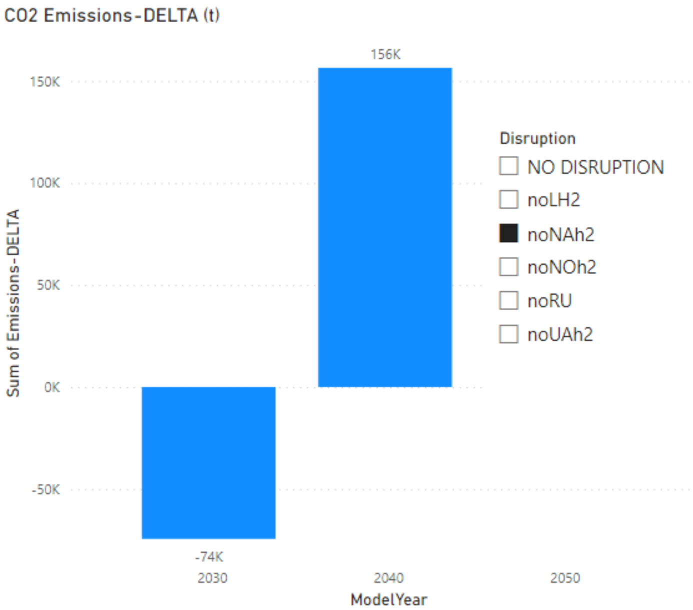

Similar trend for sustainability benefits is observed under different supply disruption cases (such as LH2, North African or Norwegian imports.

*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 group mitigates the risk of hydrogen demand curtailment in Estonia, Latvia, Lithuania, and Poland from 2040 in average summer and average winter. The project group improves cooperation between countries along the Baltic Sea.

### > Climatic stress cases

In addition, under peak day climatic case, enhanced security of supply benefits are expected due to the increased hydrogen demand compared to the yearly average demand, already from 2030. The project group will allow for cooperation between Sweden, Finland and Estonia and will allow to reduce the risk of demand curtailment in Estonia, Latvia, Lithuania and Poland.

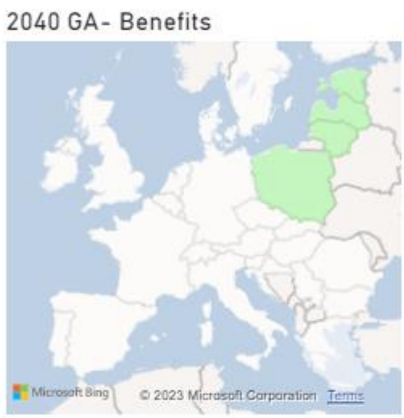
Similar security of supply benefits than for reference case are expected under 2-week and 2-week dunkelflaute climatic stress cases.

### > Disruption cases (S-1)

Similar security of supply benefits than for reference case are expected for most supply route 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*

2030 GA- Benefits


2040 GA- Benefits

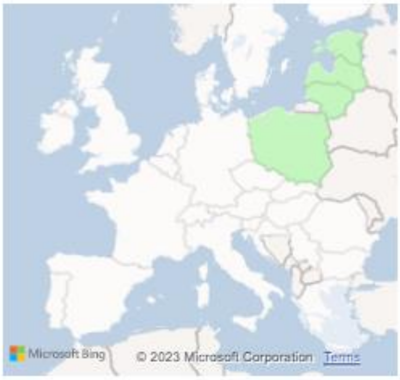

2050 GA- Benefits


*3 noUAh2 : Ukraine disruption*

2030 GA- Benefits


2040 GA- Benefits


2050 GA- Benefits

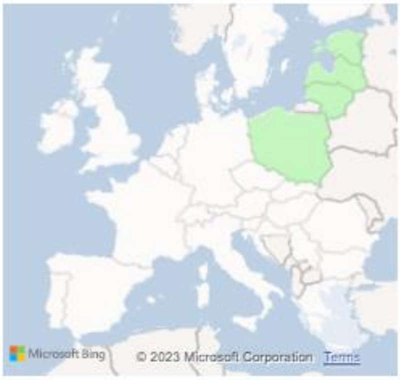



*4 noNAh2 : North Africa disruption*

2030 GA- Benefits


2040 GA- Benefits


2050 GA- Benefits



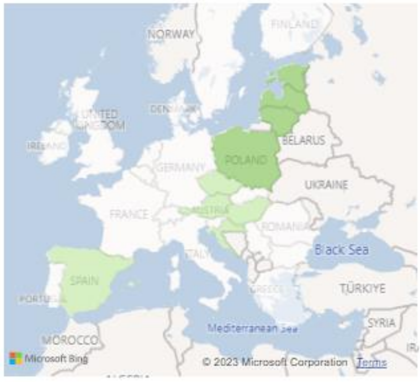

## > Single largest capacity disruption (SLCD)

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

SLCD Benefits - 2030 - Global Ambition


SLCD Benefits - 2040 - Global Ambition


SLCD Benefits - 2050 - Global Ambition




In case of single largest capacity disruption (SLCD), the project group significantly reduces the risk of demand curtailment in Estonia, Latvia, Lithuania, and Poland from 2040. In addition, further benefits are seen in Czechia and from 2050 in other European countries as well. As Global ambition scenario considers higher hydrogen demand the contribution of the hydrogen supply enabled by the project group is lower than in Distributed Energy scenario.

## C.2 Quantitative benefits [ENTSOG]

The following tables display all the benefits quantified by ENTSOG through specific security of supply and sustainability indicators.

**CO2 Emissions:**

| ModelYear | Disruption | Scenario | Unit | Emission Delta | Emission Plus | Emission Minus |
|---|---|---|---|---|---|---|
| 2030 | NO DISRUPTION | DE | tonne | -187.296 | 538.677.299 | 538.864.595 |
| 2030 | NO DISRUPTION | GA | tonne | -83.095 | 592.910.448 | 592.993.543 |
| 2030 | noLH2 | DE | tonne | -139.419 | 540.175.890 | 540.315.310 |
| 2030 | noLH2 | GA | tonne | -37.852 | 594.817.481 | 594.855.333 |
| 2030 | noNAh2 | DE | tonne | -160.722 | 539.785.356 | 539.946.078 |
| 2030 | noNAh2 | GA | tonne | -74.431 | 594.141.433 | 594.215.864 |
| 2030 | noNOh2 | DE | tonne | -58.648 | 538.877.198 | 538.935.845 |
| 2030 | noNOh2 | GA | tonne | 0 | 593.310.994 | 593.310.994 |
| 2030 | noUAh2 | DE | tonne | -162.642 | 539.378.772 | 539.541.414 |
| 2030 | noUAh2 | GA | tonne | -83.106 | 593.627.618 | 593.710.724 |
| 2040 | NO DISRUPTION | DE | tonne | -213.520 | 392.077.044 | 392.290.564 |
| 2040 | NO DISRUPTION | GA | tonne | 377.259 | 396.523.252 | 396.145.993 |
| 2040 | noLH2 | DE | tonne | -88.410 | 392.213.883 | 392.302.293 |
| 2040 | noLH2 | GA | tonne | 45.308 | 397.455.197 | 397.409.889 |
| 2040 | noNAh2 | DE | tonne | -153.257 | 392.188.098 | 392.341.355 |
| 2040 | noNAh2 | GA | tonne | 156.467 | 397.301.977 | 397.145.510 |
| 2040 | noNOh2 | DE | tonne | -146.542 | 392.144.023 | 392.290.564 |
| 2040 | noNOh2 | GA | tonne | 64.755 | 397.450.977 | 397.386.222 |
| 2040 | noUAh2 | DE | tonne | -81.404 | 392.399.183 | 392.480.587 |
| 2040 | noUAh2 | GA | tonne | 2.004 | 397.478.498 | 397.476.495 |
| 2050 | NO DISRUPTION | DE | tonne | 0 | 232.557.735 | 232.557.735 |
| 2050 | NO DISRUPTION | GA | tonne | 0 | 228.306.707 | 228.306.707 |
| 2050 | noLH2 | DE | tonne | 0 | 232.557.735 | 232.557.735 |
| 2050 | noLH2 | GA | tonne | 0 | 228.306.707 | 228.306.707 |
| 2050 | noNAh2 | DE | tonne | 0 | 232.557.735 | 232.557.735 |
| 2050 | noNAh2 | GA | tonne | 0 | 228.306.707 | 228.306.707 |
| 2050 | noNOh2 | DE | tonne | 0 | 232.557.735 | 232.557.735 |
| 2050 | noNOh2 | GA | tonne | 0 | 228.306.707 | 228.306.707 |
| 2050 | noRU | DE | tonne | 0 | 232.557.735 | 232.557.735 |
| 2050 | noRU | GA | tonne | 0 | 228.306.707 | 228.306.707 |
| 2050 | noUAh2 | DE | tonne | 0 | 232.557.735 | 232.557.735 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2050 | noUAh2 | GA | tonne | 0 | 228.306.707 | 228.306.707 |

### Curtailment Rate (SLCD):

| Country | 2030-DE-DELTA | 2030-GA-DELTA | 2040-DE-DELTA | 2040-GA-DELTA | 2050-DE-DELTA | 2050-GA-DELTA |
|---|---|---|---|---|---|---|
| Estonia | -26% | -16% | -14% | -14% | -5% | -10% |
| Latvia | -26% | -16% | -14% | -14% | -6% | -10% |
| Lithuania | -25% | -16% | -14% | -13% | -5% | -9% |
| Poland | -24% | -14% | -13% | -13% | -4% | -10% |
| Sweden | -31% | -20% | -5% | 0% | -11% | 0% |
| Belgium | 0% | 0% | -1% | 0% | -1% | 0% |
| Bulgaria | 0% | 0% | -1% | 0% | 0% | 0% |
| Croatia | 0% | 0% | -1% | 0% | 0% | -1% |
| Czechia | 0% | 0% | -1% | -1% | -2% | -1% |
| Germany | 0% | 0% | -1% | 0% | -1% | 0% |
| Hungary | 0% | 0% | -1% | 0% | 0% | -1% |
| Portugal | 0% | 0% | -1% | 0% | 0% | -1% |
| Slovakia | 0% | 0% | -1% | 0% | 0% | 0% |
| Slovenia | 0% | 0% | -1% | 0% | -1% | 0% |
| Switzerland | 0% | 0% | -1% | 0% | -1% | 0% |
| France | 0% | 0% | -1% | 0% | -1% | 0% |
| Greece | 0% | 0% | -1% | 0% | 0% | 0% |
| Italy | 0% | 0% | 0% | 0% | -1% | 0% |
| Romania | 0% | 0% | 0% | 0% | 0% | -1% |
| Austria | 0% | 0% | 0% | 0% | -1% | -1% |
| Denmark | 0% | 0% | 0% | 0% | -1% | 0% |
| Finland | -5% | -13% | 0% | 0% | -1% | 0% |
| Spain | 0% | 0% | 0% | 0% | -1% | -1% |
| The Netherlands | 0% | 0% | 0% | 0% | -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 | -23% | -10% | -13% | -14% | -5% | -10% |
| 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 | -23% | -10% | -14% | -15% | -4% | -9% |
| Average2W | Lithuania | -23% | -10% | -14% | -14% | -4% | -9% |
| Average2W | Luxembourg | 0% | 0% | 0% | 0% | 0% | 0% |
| Average2W | Malta | 0% | 0% | 0% | 0% | 0% | 0% |
| Average2W | Poland | -23% | -10% | -13% | -14% | -3% | -9% |
| 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 | -23% | -10% | -13% | -13% | -5% | -10% |
| 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 | -23% | -10% | -14% | -14% | -4% | -9% |
| Average2WDF | Lithuania | -23% | -10% | -14% | -13% | -4% | -9% |
| Average2WDF | Luxembourg | 0% | 0% | 0% | 0% | 0% | 0% |
| Average2WDF | Malta | 0% | 0% | 0% | 0% | 0% | 0% |
| Average2WDF | Poland | -23% | -10% | -13% | -13% | -3% | -9% |
| 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% | 0% |
| 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 | -22% | -13% | -13% | -12% | -5% | -9% |
| 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 | -22% | -13% | -14% | -13% | -5% | -9% |
| DC | Lithuania | -22% | -13% | -14% | -12% | -5% | -8% |
| DC | Luxembourg | 0% | 0% | 0% | 0% | 0% | 0% |
| DC | Malta | 0% | 0% | 0% | 0% | 0% | 0% |
| DC | Poland | -21% | -12% | -13% | -12% | -4% | -9% |
| 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-1136 | n.a | n.a | n.a |
| HYD-N-1171 | n.a | n.a | n.a |
| HYD-N-443 | n.a | n.a | n.a |

| Potential impact | Mitigation measures | Related costs included in project CAPEX and OPEX | Additional expected costs |
|---|---|---|---|
| | | | |

**Environmental Impact explained** [Promoter]

The status of each project section in the BEMIP HYD 7 group is at the beginning of pre-feasibility phase. Environmental impact assessment for each project has not yet started. The preparation of Environmental Impact documents will be carried out in accordance with the applicable Environmental Law of each country, adopted in accordance with EU legislation.

## E. Other benefits [Promoter]

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

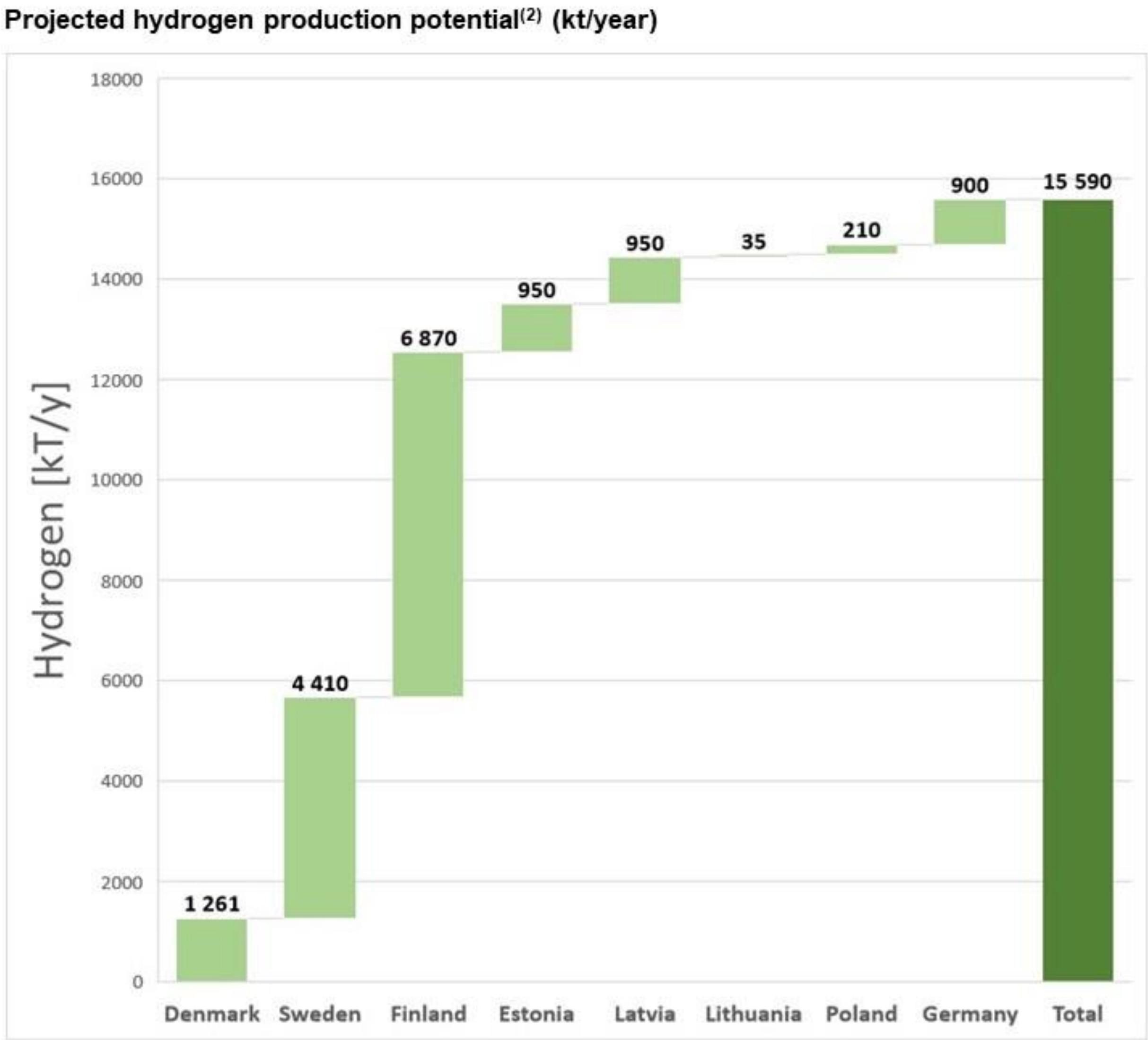
As a necessary condition a missing benefit cannot have discrepancies with the benefits already covered by the assessment run by ENTSOG and this condition needs to be proved and justified.

### Description of Other benefits [Promoter]

Nordic Hydrogen Route and Nordic-Baltic Hydrogen Corridor projects together will support development of integrated energy and hydrogen markets in the Baltic Sea region.

- **Nordic Hydrogen Route - Bothnian Bay** enabling significant deployment of H2 production based new RES based (mainly onshore wind and solar) in Finland and Sweden and advancing the decarbonisation of regional industrial emissions in both Finland and Sweden by providing a range of off-takers with access to a low carbon fuel and raw material supply.
- **Nordic-Baltic Hydrogen Corridor** enabling significant deployment H2 production based on new RES (mainly onshore wind and solar) in Finland and Estonia and connecting green H2 supply with off-takers in Finland, Sweden, Estonia, Latvia, Lithuania, Poland and Germany.

With the latest supply potential estimates, The Nordic - Baltic Hydrogen Corridor as a whole (project sections from BEMIP HYD groups 3, 6 & 7) and the Nordic Hydrogen Route, will guarantee the supply of substantial volumes of low-cost renewable hydrogen from the Nordics and East Baltic region to the Central Europe. The hydrogen produced within the Baltic Sea region will provide an adequate supply basis for various industries as well as for transport sector.



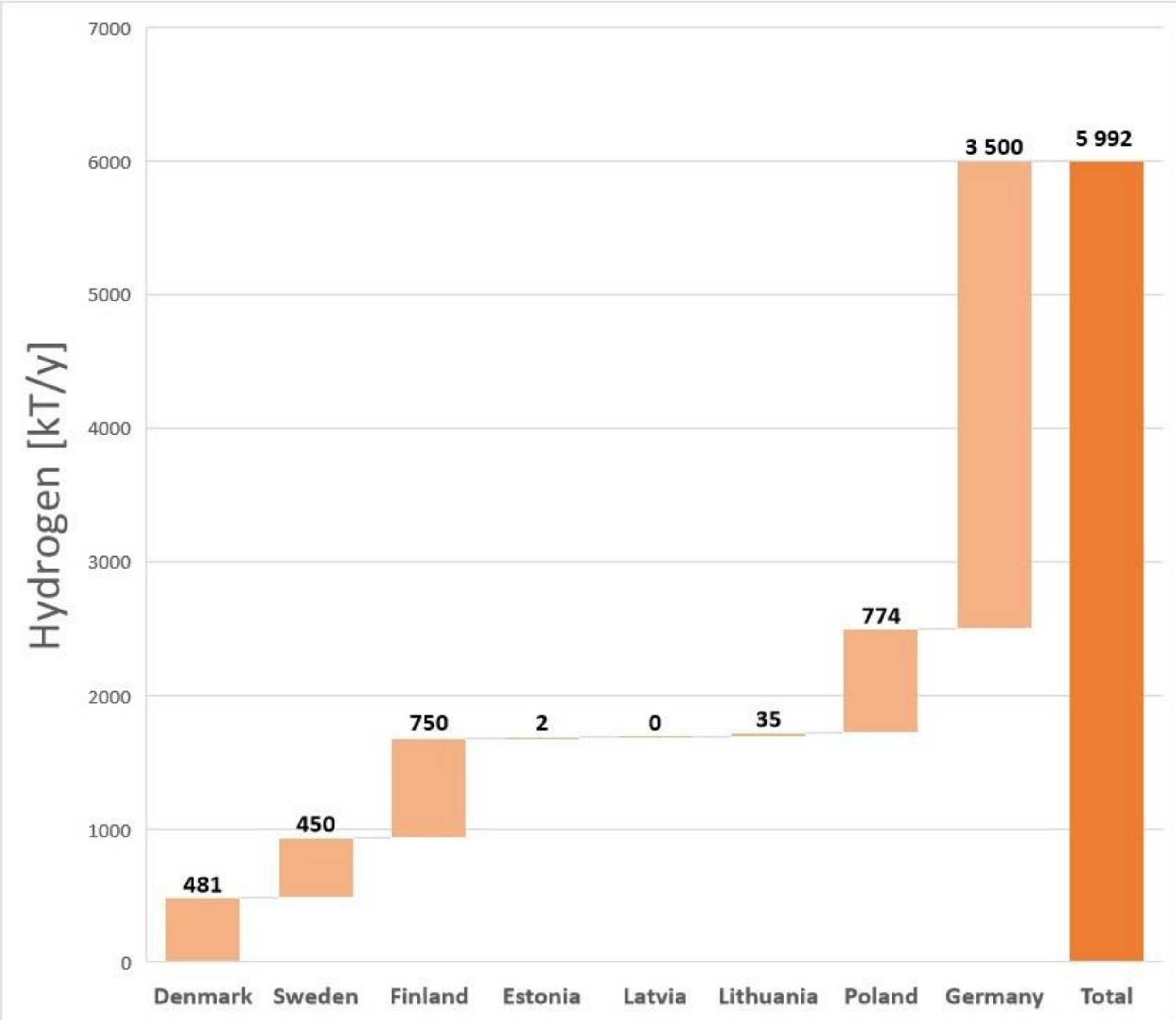

(2) For Denmark, Sweden, Finland and Estonia hydrogen production potential is based on the onshore and offshore wind potentials shown on the map.
For Lithuania, Poland and Germany the potential is based on the Member State data for 2030 provided during the March 2023.

Projects enable together access to developing geological hydrogen storages in the Baltics and Central Europe, therefore it may significantly contribute to strengthening European energy independence, security of supply, energy system resilience and flexibility, market integration and promotion of renewable energy production within the EU.

Projects will strengthen the regions energy security as well as will reduce the dependency on imported fossil energy and contribute to REPowerEU ambitions to make full use of domestically produced hydrogen when decarbonising EU economies. The implementation of the hydrogen pipeline infrastructure will significantly contribute to the creation of a strong hydrogen market region enabling access to competitive renewable energy resources that are abundantly available in the countries around the Baltic Sea.

Projects will stimulate market processes among producers, consumers, and trading companies that may participate in the hydrogen markets across Finland, Sweden, Estonia, Latvia, Lithuania, Poland, Germany, and beyond. As a result, it has the potential to accelerate the development of an integrated hydrogen market within the European Union. Ambitious decarbonization targets of the Baltic Sea countries will result in the demand increasing to the level of 5992 kT by 2030.

**Hydrogen demand around the Baltic Sea region(1) by 2030 (kt/year)**




(1) For Poland the current demand based on the Member State data provided during the March 2023 is assumed to be decarbonized by 2030.
For other countries the Member State data for 2030 demand is used (provided during the March 2023).

## F. Useful links [Promoter]

**Useful links:**

From vision to action - Six partners have signed a cooperation agreement to develop Nordic-Baltic Hydrogen Corridor – Gasgrid Finland

Nordic Hydrogen Route - Bothnian Bay