

Project Group WEST_04 - France and Belgium L/H gas conversion

Reasons for grouping [ENTSOG]

The project group includes conversion projects from the existing L-gas infrastructure in Belgium and France into H-gas infrastructure ensuring flows of H-gas. France and Belgium use the same infrastructure from the same single supply in the Netherlands, the projects are coordinated and therefore considered together.

Objective of the project(s) in the group [Promoter]

main objectives of the group of projects is to adapt the transmission network and storage facility:

- to convert L-gas customer to H-gas as scheduled in coordination with DSO, industrial customers and neighbouring countries.
- to avoid any gas curtailment in the L-gas areas.
- to transport new H-gas supplies to newly converted H-gas consumers, so they can benefit from the same competitive and secured supply as H-gas consumers.



Projects constituting the group

| TYNDP Project Code | Project Name | Promoter | Hosting Country | Project Status | 4th PCI List Code | First Comm. Year | Last Comm. Year | Compared to TYNP 2018 |
|--------------------|---------------------------|----------------|-----------------|----------------|-------------------|------------------|-----------------|-----------------------|
| TRA-A-0429 | Adaptation L- gas - H-gas | GRTgaz | FR | Less-Advanced | 5.21 | 2025 | 2025 | On time |
| TRA-F-0500 | L/H Conversion Belgium | Fluxys Belgium | BE | Less-Advanced | 5.21 | 2026 | 2026 | On time |

Technical Information

| TYNDP Project Code | Diameter [mm] | Length [km] | Compressor Power [MW] |
|--------------------|---------------|-------------|-----------------------|
| TRA-A-0429 | 300 | 8 | - |
| TRA-A-0429 | 200 | 2 | - |
| TRA-F-0500 | - | - | - |

Capacity Increment

| TYNDP Project Code | Point Name | Operator | From System | Exit Capacity [GWh/d] | Increment Comm. Year 1 | To System | Entry Capacity [GWh/d] | Increment Comm. Year 2 |
|--------------------|---------------------------------------|----------|-------------------------------|-----------------------|------------------------|--|------------------------|------------------------|
| TRA-A-429 | Blaregnies L (BE) / Taisnières B (FR) | GRTgaz | Transmission Belgium (L-Zone) | 0 | - | Transmission France (FR PEG North L-Gas) | -115 | 2025 |

B. Project Cost Information

During the TYNDP 2020 Project Data Collection, promoters were asked to indicate whether their costs were confidential or not. The following tables display the costs provided by the promoters (as of June 2019, end of TYNDP 2020 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. For the purposes of this project fiche, in case promoters identified their costs as confidential, alternative costs have been provided by the promoter. The alternative costs are identified with “*”.

| | TRA-A-429 | TRA-F-500 | Total Cost |
|-------------------|-----------|-----------|------------|
| CAPEX [min, EUR] | 123 | 50 | 173 |
| OPEX [min, EUR/y] | 1.5 | 1 | 2.5 |
| Range CAPEX (%) | 30 | 5 | - |
| Range OPEX (%) | 30 | 0 | - |

Description of costs and range [Promoter]

The indicative investment cost for the PCI is 173M€ over the period 2020-2029, including 123M€ in France (GRTgaz and Storengy) and 50M€ in Belgium (Fluxys Belgium, Indicative Investment Plan 2020-2029).

The range of CAPEX reflects the level of maturity reached at the time in each country.

In France, FID has been taken by *GRTgaz* for the pilot phase (42M€) in 2016 over the period 2016-2019 and for the first step of the deployment phase (30.9 M€ over the period 2019-2024) in 2019.

C. Project Benefits

C.1 Summary of project benefits

This section provides a summarised analysis by ENTSOG of the main benefits stemming from the realisation of the overall group and according to the guidelines included in the ENTSOG 2nd CBA Methodology. More details on the indicators are available in sections D and E.

National Trends

Benefits explained (but Sustainability) [ENTSOG]

> Security of Supply:

Without the project group realisation, areas in Belgium and France today supplied by low calorific gas will be permanently curtailed due to the decrease of low calorific gas production from 2030 onward. The project group completely mitigates the risk of demand curtailment in low calorific gas areas in Belgium and France under permanent disruption of L-gas supplies.

Monetised benefits have been calculated using two different values of lost load:

- > For SoS benefits, and disruption occurring in case of climatic stress conditions (peak, 2- week and 2-week dunkelflaute), a 600€/MWh value is used, considering a probability of 1 in 20.
- > For annual curtailment, a lesser value is used (147€/MWh) corresponding to the Value of Lost Load for Belgium in the residential sector from ACER study ('Study on the estimation of the cost of disruption of gas supply in Europe').

In addition, the implementation of the project improves remaining flexibility in the Netherlands under all climatic stress cases (peak, 2-week cold spell and 2-week dunkelflaute) in all infrastructure levels.

> Competition:

Project group allows to decrease dependency on Russian gas in the Netherlands in the existing infrastructure level and in Belgium in the low infrastructure level.

Distributed Energy

Benefits explained (but Sustainability) [ENTSOG]

> Security of Supply:

Without the project group realisation, areas in Belgium and France today supplied by low calorific gas will be permanently curtailed due to the decrease of low calorific gas production from 2030 onward. The project group completely mitigates the risk of demand curtailment in low calorific gas areas in Belgium and France under permanent disruption of L-gas supplies.

Monetised benefits have been calculated using two different values of lost load:

- > For SoS benefits, and disruption occurring in case of climatic stress conditions (peak, 2- week and 2-week dunkelflaute), a 600€/MWh value is used, considering a probability of 1 in 20.
- > For annual curtailment, a lesser value is used (147€/MWh) corresponding to the Value of Lost Load for Belgium in the residential sector from ACER study ('Study on the estimation of the cost of disruption of gas supply in Europe').

In addition, the implementation of the project improves remaining flexibility in the Netherlands under all climatic stress cases (peak, 2-week cold spell and 2-week dunkelflaute) in all infrastructure levels.

> **Competition:**

Project group allows to decrease dependency on Russian gas in Netherlands in the existing infrastructure level in 2040.

Global Ambition

Benefits explained (but Sustainability) [ENTSOG]

> **Security of Supply:**

Without the project group realisation, areas in Belgium and France today supplied by low calorific gas will be permanently curtailed due to the decrease of low calorific gas production from 2030 onward. The project group completely mitigates the risk of demand curtailment in low calorific gas areas in Belgium and France under permanent disruption of L-gas supplies.

Monetised benefits have been calculated using two different values of lost load:

- > For SoS benefits, and disruption occurring in case of climatic stress conditions (peak, 2- week and 2-week dunkelflaute), a 600€/MWh value is used, considering a probability of 1 in 20.
- > For annual curtailment, a lesser value is used (147€/MWh) corresponding to the Value of Lost Load for Belgium in the residential sector from ACER study ('Study on the estimation of the cost of disruption of gas supply in Europe').

In addition, the implementation of the project improves remaining flexibility in the Netherlands under all climatic stress cases (peak, 2-week cold spell and 2-week dunkelflaute) in all infrastructure levels.

> **Competition:**

Project group allows to decrease dependency from Russian gas in Netherlands in the existing infrastructure level in 2030.

Sustainability benefits [Promoter]

Not applicable but natural gas use maintained.

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. Some of those benefits are measured through quantitative indicators (i.e. SLID and Curtailment rate) and monetised ex-post. Their monetised value is displayed in section E. When assessing those type of benefits, it is important to avoid any double counting considering them both in quantitative and monetised terms.

EXISTING Infrastructure Level – National Trends

| Sum of Value | | Column Labels | | | | | | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|-------|---------|------|---------|---------|----------|---------|------|----------|
| | | 2020 | | | 2025 | | | 2030 | | | 2040 | | | | | | | |
| Row Labels | | BE | | | CBG | | | GBC | | | NT | | | NT | | | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | | |
| Competition | | | | | | | | | | | | | | | | | | |
| ▣ MASD-LNGall | | | | | | | | | | | | | | | | | | |
| | Belgium | | | | | | | | | | | | 11% | 8% | -3% | 10% | 7% | -3% |
| ▣ MASD-LNGME | | | | | | | | | | | | | | | | | | |
| | Belgium | | | | | | | | | | | | 4% | 0% | -4% | 4% | 0% | -4% |
| ▣ MASD-NO | | | | | | | | | | | | | | | | | | |
| | Belgium | | | | | | | | | | | | 4% | 0% | -4% | 4% | 0% | -4% |
| ▣ MASD-RU | | | | | | | | | | | | | | | | | | |
| | Belgium | | | | | | | | | | | | | | | 4% | 0% | -4% |
| | Netherlands | | | | 24% | 21% | -3% | | | | | | 28% | 25% | -3% | | | |
| Security of Supply | | | | | | | | | | | | | | | | | | |
| ▣ Remaining Flexibility 2-Week Cold Spell (%) | | | | | | | | | | | | | | | | | | |
| | Netherlands | | | | 96% | 100% | 4% | 93% | 99% | 6% | 99% | 100% | 1% | | | | | |
| ▣ Remaining Flexibility 2-Week Cold Spell (%) --- DF | | | | | | | | | | | | | | | | | | |
| | Netherlands | | | | 96% | 100% | 4% | 93% | 99% | 6% | 98% | 99% | 1% | | | | | |
| ▣ Remaining Flexibility Peak day (%) | | | | | | | | | | | | | | | | | | |
| | Netherlands | 75% | 76% | 1% | | | | | | | | | 64% | 66% | 1% | | | |
| Yearly curtailment (GWh/year) | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

LOW Infrastructure Level – National Trends

| Sum of Value | | Column Labels | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|----------|---------|------|----------|
| | | 2025 | | | | | | 2030 | | | 2040 | | |
| Row Labels | | CBG | | | GBC | | | NT | | | NT | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA |
| Competition | | | | | | | | | | | | | |
| ▢ MASD-LNGall | Belgium | | | | | | | 8% | 5% | -3% | 8% | 4% | -4% |
| ▢ MASD-LNGME | Belgium | | | | | | | 4% | 0% | -4% | 4% | 0% | -4% |
| ▢ MASD-NO | Belgium | | | | | | | 4% | 0% | -4% | 4% | 0% | -4% |
| ▢ MASD-RU | Belgium | | | | | | | 8% | 6% | -2% | 8% | 5% | -3% |
| Security of Supply | | | | | | | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) | Netherlands | 85% | 93% | 8% | 81% | 89% | 8% | 88% | 90% | 2% | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | 84% | 92% | 8% | 81% | 89% | 8% | 86% | 89% | 2% | | | |
| ▢ Remaining Flexibility Peak day (%) | Netherlands | 46% | 54% | 8% | 46% | 47% | 1% | 50% | 52% | 2% | | | |
| Yearly curtailment (GWh/year) | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

ADVANCED Infrastructure Level – National Trends

| Sum of Value | | Column Labels | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|----------|---------|------|----------|
| | | 2025 | | | 2030 | | | 2040 | | | | | |
| Row Labels | | CBG | | | GBC | | | NT | | | NT | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA |
| Competition | | | | | | | | | | | | | |
| ▢ MASD-LNGall | Belgium | | | | | | | 5% | 1% | -4% | 5% | 1% | -4% |
| ▢ MASD-LNGME | Belgium | | | | | | | 4% | 0% | -4% | 4% | 0% | -4% |
| ▢ MASD-NO | Belgium | | | | | | | 4% | 0% | -4% | 4% | 0% | -4% |
| Security of Supply | | | | | | | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) | Netherlands | 85% | 93% | 8% | 81% | 89% | 8% | 88% | 90% | 2% | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | 84% | 92% | 8% | 81% | 89% | 8% | 86% | 89% | 2% | | | |
| ▢ Remaining Flexibility Peak day (%) | Netherlands | 46% | 54% | 8% | 46% | 54% | 8% | 50% | 52% | 2% | | | |
| Yearly curtailment (GWh/year) | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

EXISTING Infrastructure Level – Distributed Energy

| Sum of Value | | Column Labels | | | | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|-------|---------|------|----------|---------|------|----------|
| | | 2020 | | | 2025 | | | 2030 | | | 2040 | | | | | |
| Row Labels | | BE | | | CBG | | | GBC | | | DE | | | DE | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA |
| Competition | | | | | | | | | | | | | | | | |
| ▣ MASD-LNGall | Belgium | | | | | | | | | | 11% | 8% | -3% | 5% | 0% | -5% |
| ▣ MASD-LNGME | Belgium | | | | | | | | | | 4% | 0% | -4% | 5% | 0% | -5% |
| ▣ MASD-NO | Belgium | | | | | | | | | | 4% | 0% | -4% | 5% | 0% | -5% |
| ▣ MASD-RU | Belgium | | | | | | | | | | 4% | 0% | -4% | 5% | 0% | -5% |
| | Netherlands | | | | 24% | 21% | -3% | | | | 24% | 21% | -3% | | | |
| Security of Supply | | | | | | | | | | | | | | | | |
| ▣ Remaining Flexibility 2-Week Cold Spell (%) | Netherlands | | | | 96% | 100% | 4% | 93% | 99% | 6% | | | | | | |
| ▣ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | | | | 96% | 100% | 4% | 93% | 99% | 6% | | | | | | |
| ▣ Remaining Flexibility Peak day (%) | Netherlands | 75% | 76% | 1% | | | | | | | 74% | 77% | 3% | | | |
| Yearly curtailment (GWh/year) | | | | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

LOW Infrastructure Level – Distributed Energy

| Sum of Value | | Column Labels | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|----------|---------|------|----------|
| | | 2025 | | | 2030 | | | 2040 | | | | | |
| Row Labels | | CBG | | | GBC | | | DE | | | DE | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA |
| Competition | | | | | | | | | | | | | |
| ▢ MASD-LNGall | | | | | | | | 8% | 5% | -3% | 5% | 0% | -5% |
| ▢ MASD-LNGME | Belgium | | | | | | | 4% | 0% | -4% | 5% | 0% | -5% |
| ▢ MASD-NO | Belgium | | | | | | | 4% | 0% | -4% | 5% | 0% | -5% |
| ▢ MASD-RU | Belgium | | | | | | | | | | 5% | 0% | -5% |
| Security of Supply | | | | | | | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) | | | | | | | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | 85% | 93% | 8% | 81% | 89% | 8% | | | | | | |
| ▢ Remaining Flexibility Peak day (%) | | | | | | | | | | | | | |
| ▢ Remaining Flexibility Peak day (%) | Netherlands | 84% | 92% | 8% | 81% | 89% | 8% | 98% | 100% | 2% | | | |
| Yearly curtailment (GWh/year) | | | | | | | | | | | | | |
| Yearly curtailment (GWh/year) | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | | | | | | |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | | | | | | |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | | | | | | |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

ADVANCED Infrastructure Level – Distributed Energy

| Sum of Value | | Column Labels | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|----------|---------|------|----------|
| | | 2025 | | | 2030 | | | 2040 | | | | | |
| Row Labels | | CBG | | | GBC | | | DE | | | DE | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA |
| Competition | | | | | | | | | | | | | |
| ▢ MASD-LNGall | Belgium | | | | | | | 5% | 1% | -4% | 5% | 0% | -5% |
| ▢ MASD-LNGME | Belgium | | | | | | | 4% | 0% | -4% | 5% | 0% | -5% |
| ▢ MASD-NO | Belgium | | | | | | | 4% | 0% | -4% | 5% | 0% | -5% |
| ▢ MASD-RU | Belgium | | | | | | | | | | 5% | 0% | -5% |
| Security of Supply | | | | | | | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) | Netherlands | 85% | 93% | 8% | 81% | 89% | 8% | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | 84% | 92% | 8% | 81% | 89% | 8% | 98% | 100% | 2% | | | |
| ▢ Remaining Flexibility Peak day (%) | Netherlands | 46% | 54% | 8% | 46% | 54% | 8% | 61% | 63% | 2% | | | |
| Yearly curtailment (GWh/year) | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

EXISTING Infrastructure Level – Global Ambition

| Sum of Value | | Column Labels | | | | | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|-------|---------|---------|-------|----------|---------|-------|----------|
| | | 2020 | | | 2025 | | | 2030 | | | 2040 | | | | | | |
| Row Labels | | BE | | | CBG | | | GBC | | | GA | | | GA | | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | |
| Competition | | | | | | | | | | | | | | | | | |
| ▢ MASD-LNGall | Belgium | | | | | | | | | | | | | 8% | 5% | -3% | |
| ▢ MASD-LNGME | Belgium | | | | | | | | | | | 3% | 0% | -4% | 4% | 0% | -4% |
| ▢ MASD-NO | Belgium | | | | | | | | | | | 4% | 1% | -3% | 4% | 0% | -4% |
| ▢ MASD-RU | Belgium | | | | | | | | | | | | | | 4% | 0% | -4% |
| | Netherlands | | | | 24% | 21% | -3% | | | | | | | | | | |
| Security of Supply | | | | | | | | | | | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) | Netherlands | | | | 96% | 100% | 4% | 93% | 99% | 6% | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | | | | 96% | 100% | 4% | 93% | 99% | 6% | | | | | | | |
| ▢ Remaining Flexibility Peak day (%) | Netherlands | 75% | 76% | 1% | | | | | | | | | | | | | |
| Yearly curtailment (GWh/year) | | | | | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

LOW Infrastructure Level – Global Ambition

| Sum of Value | | Column Labels | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|------|----------|---------|------|----------|
| | | 2025 | | | | | | 2030 | | | 2040 | | |
| Row Labels | | CBG | | | GBC | | | GA | | | GA | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA |
| Competition | | | | | | | | | | | | | |
| ▣ MASD-LNGall | Belgium | | | | | | | | | | 6% | 2% | -4% |
| ▣ MASD-LNGME | Belgium | | | | | | | 3% | 0% | -4% | 4% | 0% | -4% |
| ▣ MASD-NO | Belgium | | | | | | | 3% | 0% | -4% | 4% | 0% | -4% |
| ▣ MASD-RU | Belgium | | | | | | | | | | 6% | 4% | -3% |
| Security of Supply | | | | | | | | | | | | | |
| ▣ Remaining Flexibility 2-Week Cold Spell (%) | Netherlands | 85% | 93% | 8% | 81% | 89% | 8% | | | | | | |
| ▣ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | 84% | 92% | 8% | 81% | 89% | 8% | | | | | | |
| ▣ Remaining Flexibility Peak day (%) | Netherlands | 46% | 54% | 8% | 46% | 47% | 1% | | | | | | |
| Yearly curtailment (GWh/year) | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

ADVANCED Infrastructure Level – Global Ambition

| Sum of Value | | Column Labels | | | | | | | | | | | | |
|--|-------------|---------------|------|-------|---------|------|-------|---------|---------|-------|----------|---------|-------|----------|
| | | 2025 | | | 2030 | | | 2040 | | | | | | |
| Row Labels | | CBG | | | GBC | | | GA | | | GA | | | |
| | | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | WITHOUT | WITH | DELTA | |
| Competition | | | | | | | | | | | | | | |
| ▢ MASD-LNGall | Belgium | | | | | | | | | | | 4% | 0% | -4% |
| ▢ MASD-LNGME | Belgium | | | | | | | 3% | 0% | -4% | 4% | 0% | -4% | |
| ▢ MASD-NO | Belgium | | | | | | | 3% | 0% | -4% | 4% | 0% | -4% | |
| ▢ MASD-RU | Belgium | | | | | | | | | | | 15% | 13% | -2% |
| Security of Supply | | | | | | | | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) | Netherlands | 85% | 93% | 8% | 81% | 89% | 8% | | | | | | | |
| ▢ Remaining Flexibility 2-Week Cold Spell (%) --- DF | Netherlands | 84% | 92% | 8% | 81% | 89% | 8% | | | | | | | |
| ▢ Remaining Flexibility Peak day (%) | Netherlands | 46% | 54% | 8% | 46% | 54% | 8% | | | | | | | |
| Yearly curtailment (GWh/year) | | | | | | | | | 7243.88 | 0.00 | -7243.88 | 6943.38 | 0.00 | -6943.38 |
| Curtailment Rate Peak Day (GWh/d) | | | | | | | | | 289.30 | 0.00 | -289.30 | 315.00 | 0.00 | -315.00 |
| Curtailment Rate 2-Week Cold Spell (GWh/d) | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |
| Curtailment Rate 2-Week Dunkelflaute (GWh/d) | | | | | | | | | 232.20 | 0.00 | -232.20 | 206.50 | 0.00 | -206.50 |

C.3 Monetised benefits

This section includes all benefits stemming from the realisation of a project that are quantified and monetised. Some benefits are monetised ex-post while others directly as a result of the simulations and are impacted by the modelling assumptions chosen (e.g. tariffs or supply price assumptions). Monetised benefits are showed at EU level. In order to keep the results in a manageable number, those have been aggregated per Infrastructure Level and Demand Scenarios. Independently from the source of the input as described in C3 (ENTSOG or Promoter), the sensitivity analysis has been carried out by ENTSOG and according to the criteria in the approved CBA Methodology. More information on how to read the data in this section is provided in the Introduction Document.

| Benefits (Meur/year) | | EXISTING | | | LOW | | | ADVANCED | | |
|----------------------|-------------------------------|-----------------|--------------------|-----------------|-----------------|--------------------|-----------------|-----------------|--------------------|-----------------|
| | | NATIONAL TRENDS | DISTRIBUTED ENERGY | GLOBAL AMBITION | NATIONAL TRENDS | DISTRIBUTED ENERGY | GLOBAL AMBITION | NATIONAL TRENDS | DISTRIBUTED ENERGY | GLOBAL AMBITION |
| Yearly Curtailment | Yearly Curtailment | 996.64 | 996.64 | 996.64 | 996.64 | 996.64 | 996.64 | 996.64 | 996.64 | 996.64 |
| Security of Supply | Design Case | 8.78 | 8.78 | 8.78 | 8.78 | 8.78 | 8.78 | 175.58 | 175.58 | 175.58 |
| | 2-weeks Cold Spell | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 |
| | 2-weeks Cold Spell DF | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 | 87.36 |
| Sustainability | Flow based | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Additional benefit (Promoter) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Comparison between the assessed SCENARIOS

ENTSOG runs the assessment for 5-year-rounded years (2020, 2025, 2030 and 2040) and interpolates these results to compute the benefits for the 25-years economic lifetime of projects. The following tables show the benefits as computed in the specific assessment years.

| Benefits (Meur/year) | | 2030 | | | | | | | | | 2040 | | | | | | | | |
|----------------------|-------------------------------|----------|---------|---------|---------|---------|---------|----------|---------|---------|----------|---------|---------|---------|---------|---------|----------|---------|---------|
| | | EXISTING | | | LOW | | | ADVANCED | | | EXISTING | | | LOW | | | ADVANCED | | |
| | | NT | DE | GA | NT | DE | GA | NT | DE | GA | NT | DE | GA | NT | DE | GA | NT | DE | GA |
| Yearly Curtailment | Yearly curtailment | 1064.85 | 1064.85 | 1064.85 | 1064.85 | 1064.85 | 1064.85 | 1064.85 | 1064.85 | 1064.85 | 1020.68 | 1020.68 | 1020.68 | 1020.68 | 1020.68 | 1020.68 | 1020.68 | 1020.68 | 1020.68 |
| Security of Supply | Design Case | 8.68 | 8.68 | 8.68 | 8.68 | 8.68 | 8.68 | 8.68 | 8.68 | 8.68 | 9.45 | 9.45 | 9.45 | 9.45 | 9.45 | 9.45 | 9.45 | 9.45 | 9.45 |
| | 2-weeks Cold Spell | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 |
| | 2-weeks Cold Spell DF | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 97.52 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 | 86.73 |
| Sustainability | Flow based | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Additional benefit (Promoter) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

For this project group the yearly break down displays results only from 2026 (the project assessed for its first full year of operation being year 2026).

C.4 Sensitivities analysis on monetised benefits

In line with ENTSG Adapted 2nd CBA Methodology, ENTSG has also run sensitivities on some relevant assumptions such as tariffs, commissioning year and lower supply source price differential. The results included in the tables below have to be compared with the ones included in section C.3. Further information is available in the common introduction (Pages 1-6) to all project fiches.

| <i>Sensitivity I Commissioning Year</i> | | | | | | | | | | |
|---|-------------------------------|--------------------------------------|---------------------------|------------------------|---------------------------------|---------------------------|------------------------|--------------------------------------|---------------------------|------------------------|
| | | <i>EXISTING Infrastructure Level</i> | | | <i>LOW Infrastructure Level</i> | | | <i>ADVANCED Infrastructure Level</i> | | |
| Benefits (Meur/year) | | NATIONAL TRENDS | DISTRIBUTED ENERGY | GLOBAL AMBITION | NATIONAL TRENDS | DISTRIBUTED ENERGY | GLOBAL AMBITION | NATIONAL TRENDS | DISTRIBUTED ENERGY | GLOBAL AMBITION |
| Yearly Curtailment Benefits | Yearly Curtailment | 1037.46 | 1037.46 | 1037.46 | 1037.46 | 1037.46 | 1037.46 | 1037.46 | 1037.46 | 1037.46 |
| | Design Case | 9.16 | 9.16 | 9.16 | 9.16 | 9.16 | 9.16 | 9.16 | 9.16 | 9.16 |
| Security of Supply | 2-weeks Cold Spell | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 |
| | 2-weeks Cold Spell DF | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 | 90.83 |
| Sustainability | Flow based | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Additional benefit (Promoter) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

D. Environmental Impact

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. The Tables have been filled in by the promoter.

| TYNDP Code | Type of infrastructure | Surface of impact | Environmentally sensitive area |
|------------|------------------------|-------------------------|--|
| TRA-A-429 | Transport | No impact (under study) | Natura 2000 "Cinq Tailles" at 14km |
| TRA-F-500 | Transport | No impact | Natura 2000 "Valleigebied Kampenhout" at 5km |

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

Environmental Impact explained [Promoter]

Environmental impact assessments for the projects have not indicated any substantial and irreversible impacts on the environment. In order to ensure that environmental assessments are correct, environmental monitoring is carried out before, during and after the construction of the infrastructure.

The physical intervention planned within the scope of PCI is limited in size and no significant environmental impact/damage is expected from the realisation of the infrastructural elements for the deployment. Fluxys Belgium and GRTgaz will bear all costs required by the Belgian and French permit process. They will follow guidelines for avoiding, mitigating or compensating negative environmental impacts of the Action "5.21 Adaptation low to high calorific gas in France and Belgium". Concerning the impacts that could not be avoided or reduced, Fluxys and GRTgaz will implement actions under the supervision of the competent administration to offset these impacts.

Additional information (Environmental Impact) [Promoter]

Regarding the Netherlands' planning to stop the supply of low calorific gas (L-gas) and regarding the global necessity to reduce carbon footprint which is possible when using natural gas as an alternative for other fossil fuels, adaptations of the Belgian and French Gas Grid and installations are required. Maintaining the use of natural gas avoids an increase of CO2 emissions with respect to the use of other fossil fuels.

By converting the L-gas network to H-gas, the current infrastructures will be maintained, instead of being decommissioned. It will avoid building new energy infrastructures, new transmission and distribution capacities and new heating appliances.

E. Other Benefits

Missing benefits are all benefits of a project which may be not captured by the current application in TYNDP 2020 of the 2nd CBA Methodology.

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.

Other benefits explained [Promoter]

In the last years significant seismic activities in the Groningen area led the Dutch Authorities to reduce the Groningen production from 54 bcm/year in 2013 to 8.1 bcm for gas year 2020/2021.

This has put increased pressure on L/H conversion schedules in Germany, Belgium and France. Reducing L-gas needs and if possible, accelerating conversion projects has become a priority for concerned Member States.

Other benefits include:

- **Removing bottlenecks & Ending Energy isolation**

The L-gas area in France and Belgian is physically a gas island with very limited connections to the neighbouring H-gas network. It is supplied from a single source (the Netherlands), with a single route (2 pipelines) and one single UGS. This has been identified for several years as a weak point for the SoS of France and Belgium. With the project, the L-gas area will merge with the H-gas network, which is deeply interconnected, lifting its isolation.

- **Implementation of the internal energy market**

With this project, the L-gas network will be fully integrated into the H-gas network, bringing this area to the same level of security, diversity and flexibility as the north-western H-gas network.

The L-gas area will be supplied from other sources available in Belgium and France, enabling shippers to optimize their supply portfolio, to the benefit of final customers.

- **Providing other benefits: sustainability**

Maintaining the use of natural gas avoids an increase of CO₂ emissions (e.g. in Belgium, in 2025, after the nuclear phase-out, the production of electricity for heating purposes could reach emissions of 440 kg CO₂/MWh (energy mix cannot avoid fossil fuels) compared to 185 kg CO₂/MWh for the direct use of gas (leaving out the devices efficiency)).

Lastly by intervening into every household and industrial consumer, there is an opportunity to increase the energy efficiency on a large scale, by providing individual advices, installing modern heating devices, or adjusting the heating systems with more effective settings.

F. Useful Links

Fluxys project link:

<https://www.gaschanges.be/en>

GRTgaz project link:

<http://www.grtgaz.com/grands-projets/le-projet-tulipe/presentation/actualites/projet-tulipe.html>

Fluxys Fluxys National Development Plan 2020-2029:

https://www.fluxys.com/-/media/project/fluxys/public/corporate/fluxyscom/documents/fluxys-belgium/corporate/tyndp/tyndp_fluxys_2020_2029_fr.pdf

GRTgaz National Development Plan 2018-2027:

http://www.grtgaz.com/fileadmin/plaquettes/fr/2019/Plan_decennal_2018-2027.pdf