# Project Sheet

Upgrade BE-NL interconnector VanEyck-Maasbracht

| | |
|---|---|
| Project type | transmission |
| Project id | 377 |
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# Key Information

## Cross Border Project
## AC transmission line
## Upgrade

## Under Consideration

### Description

This study envisions an upgrade of the existing interconnector VanEyck-Maasbracht between Belgium and the Netherlands making use of PSTs and/or HTLS technology.The study will determine the appropriate implementation option and timing, taking into account

- The already planned upgrade of  the Zandvliet-Rilland interconnector on the BE-NL border (see project 262)

- The synchronisation with project study to upgrade interconnection DE-NL, also currently under consideration (see project 256)

Project motivation:

A need has been identified to further develop interconnection capacity on the BE-NL border, hereby alleviating VanEyck-Maasbracht as bottleneck. This project effectively increases the degree of interconnectivity between the Belgian and Dutch bidding zone. The possibility of higher market exchanges between these two bidding zones leads to a higher price convergence in more hours of the year and reduces therefore the price differentials.  RES integration implies higher flows in the meshed AC-grid and thus increases the need for cross border transmission capacity. This project satisfies this need in a cost-efficient manner. This project is likely to increase the potential for imbalance netting & reserve sharing due to increased remaining available margins of the cross border transmission capacity. PSTs will also help to balance the flows over the different cross border lines of the Belgian Dutch interconnection. Based on the above, the project directly contributes to the 2030 interconnection criteria.

### Project promoters

ELIA
TENNET-NL

### Countries

Belgium
Netherlands

### National development plan(s)

NDP1, Belgium, 2020-2030, §4.2.3.1,
https://www.elia.be/-/media/project/elia/elia-site/infra-and-projects/investment-plans/federal-

development-plan-2020-2030/fr/20190516_plan-de-developpement-federal_fr.pdf

## Additional information on the project

More information about the project can be found following this link:

- National Development Plan:
https://www.elia.be/-/media/project/elia/elia-site/infra-and-projects/investment-plans/federal-development-plan-2020-2030/nl/20190516_federaal-ontwikkelingsplan_nl.pdf?la=en

## Project sheet backlog

6 Nov. 2020 - Publication as part of the draft TYNDP 2020 package for consultation

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# Project Description & Context

## Project Investments

**Main investment(s): Upgrade of existing interconnection between Van Eyck (BE) and Maasbracht (NL), by adding PST(s) and/or replacing existing conductors by HTLS. The study is to confirm the appropriate implementation option and phasing of this implementation also with respect to evolution of DE-NL interconnectors.**

| Type of element | Total route length (km) | From substation 1 | To substation 2 | Present status | Commissioning year | Progress of the investment | Explanation in case of delay or reclustering |
|---|---|---|---|---|---|---|---|
| AC transmission line | 12 | VanEyck | Maasbracht | Under Consideration | 2030 | Investment on time | |

## Is the project in the reference grid?

No

## System Needs addressed by the project

Project promoter(s) selected up to 4 system needs that are addressed by their project in a predefined list. Available needs ranged from reduction of price differentials between countries, improvement of system flexibility and stability, enabling cost-efficient connection of high volumes of RES, improvement of voltage stability...
As part of the TYNDP 2020, ENTSO-E released a study investigating cross-border system needs in the 2030 and 2040 horizons.

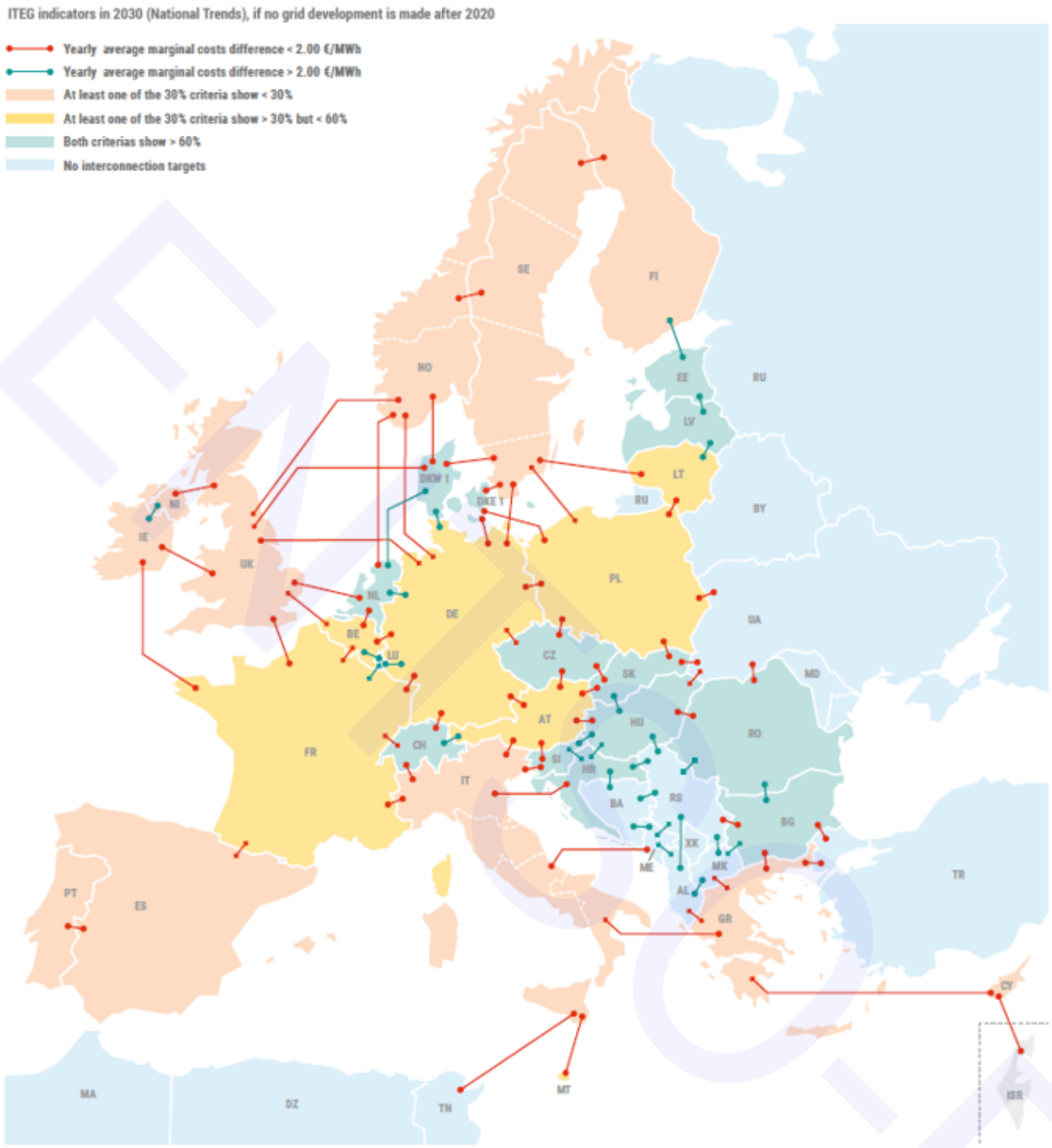
| Need | | How the project addresses each need (explanation provided by the project promoter(s)) |
|---|---|---|
| | Infrastructure to reduce price differentials between EU and/or non-EU countries | This project increases the degree of interconnectivity between the Belgian and Dutch bidding zones. The possibility of higher market exchanges between these two bidding zones leads to a higher price convergence in more hours of the year and reduces therefore the price differentials. |
| | Infrastructure to address system adequacy deficiencies and/or mitigate the risk of power failures. | This project has an important adequacy contribution due to decreasing figures of installed conventionals (bad market conditions) and considering the nuclear phaseout in Belgium. |
| | Infrastructure to facilitate and accommodate future scenarios, cross-border flows | Phase shifting transformers will help to balance the flows over the different cross border lines of the Belgian Dutch border. |

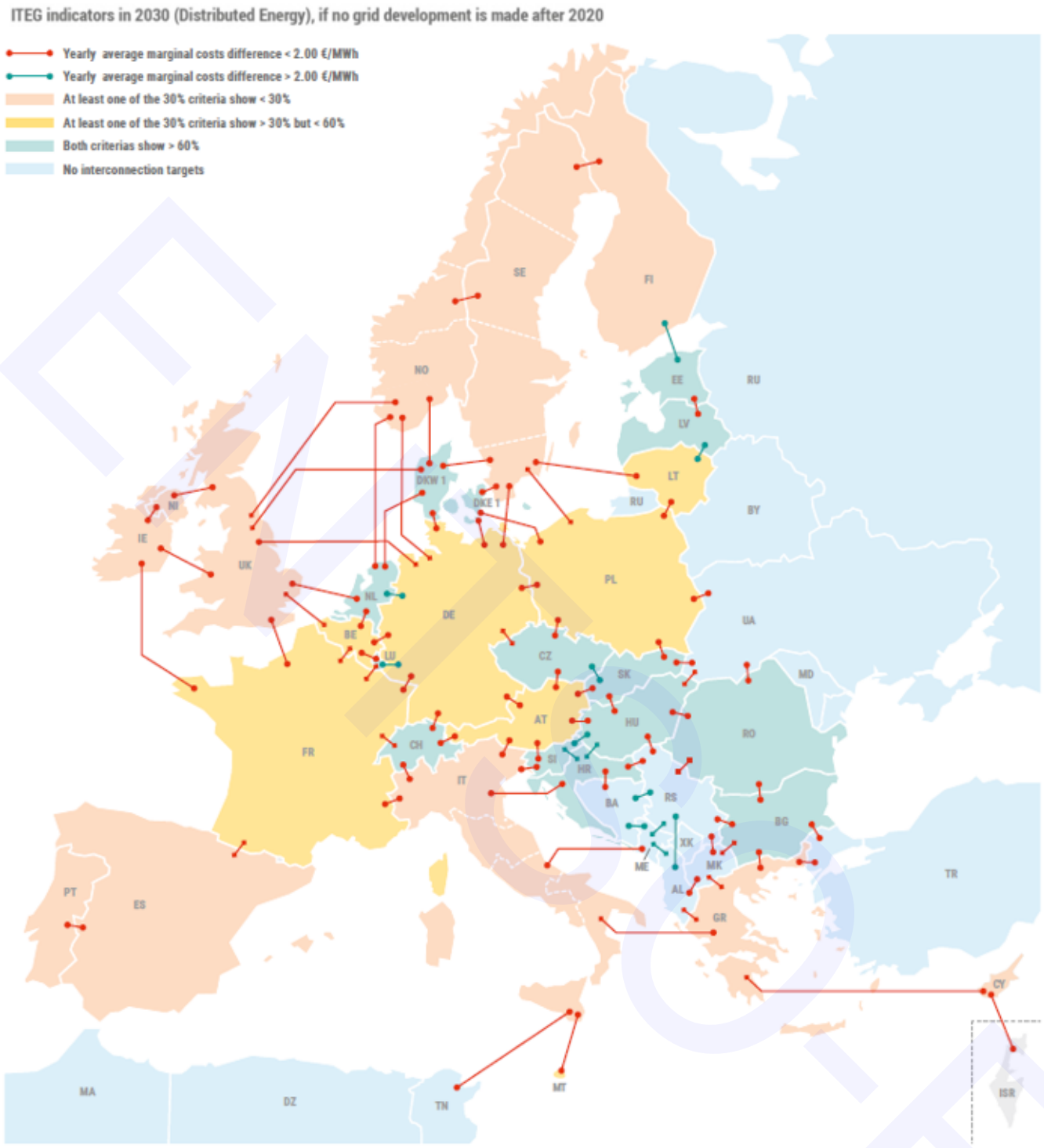
| Need | | How the project addresses each need (explanation provided by the project promoter(s)) |
|---|---|---|
| | or loop flows. | |
| | Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment | RES integration implies higher flows in the meshed AC-grid and thus increases the need for cross border transmission capacity. This project satisfies this need in a cost-efficient manner. |

## Interconnection targets

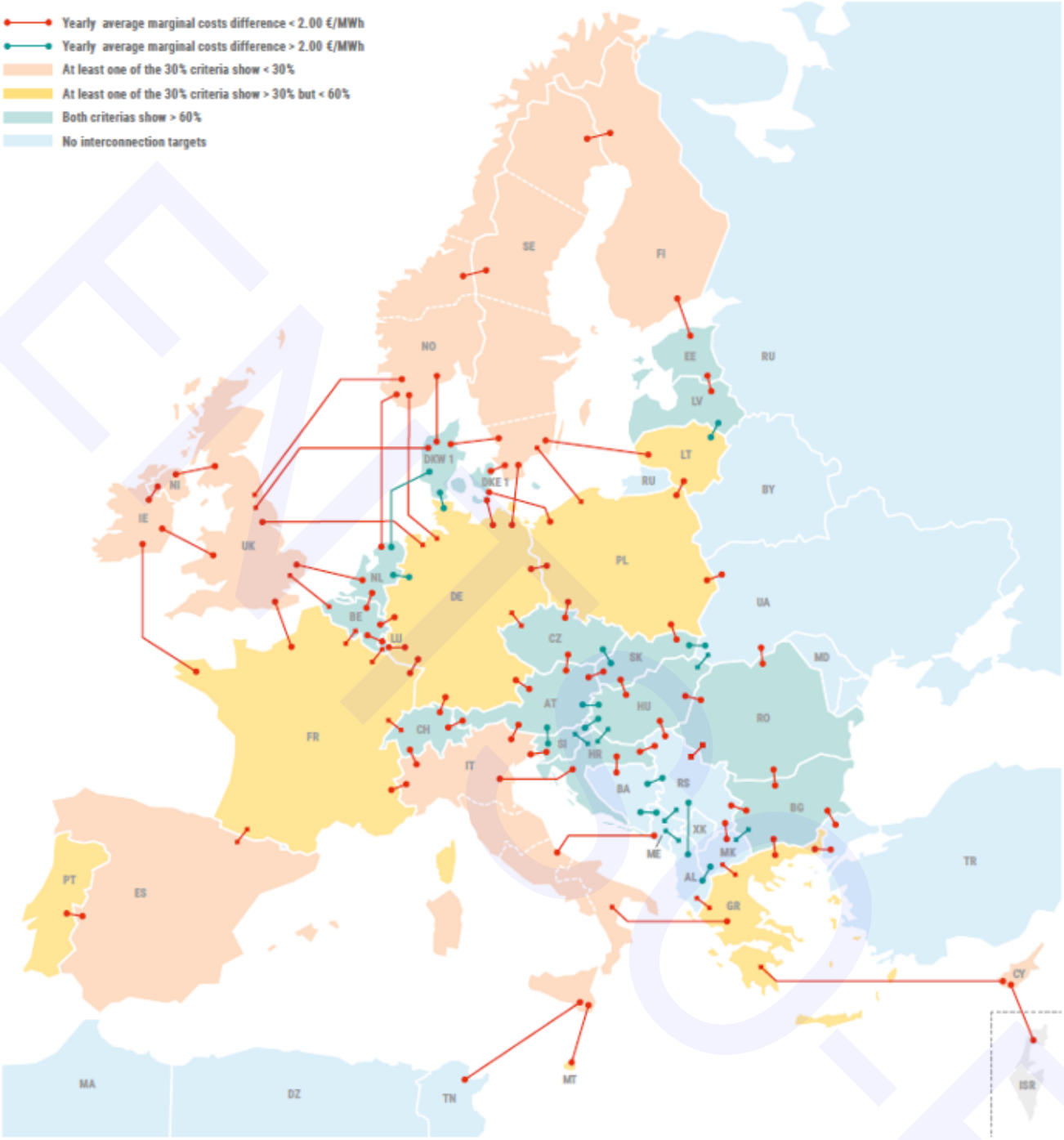
In 2017, the Interconnection Target Expert Group proposed alternative indicators to the 15% interconnection criteria for every country and electrified island with a new methodology developed collaboratively between the European Commission, ENTSO-E, ENTSOG, industry, universities and other experts. The methodology is based on three indicators:
1. Price differential between EU countries, with an objective to reduce it below 2 EUR/MWh
2. Ratio between nominal transmission capacity and installed RES capacity, with a target of past 30%
3. Ratio between nominal transmission capacity and peak load, with a target of past 30%

The following maps show the ITEG methodology applied to the TYNDP 2030 scenarios, with the 2020 grid.


ITEG indicators in 2030 (National Trends), if no grid development is made after 2020
Yearly average marginal costs difference < 2.00 €/MWh
Yearly average marginal costs difference > 2.00 €/MWh
At least one of the 30% criteria show < 30%
At least one of the 30% criteria show > 30% but < 60%
Both criterias show > 60%
No interconnection targets
SE
FI
NO
EE
RU
LV
LT
DKW 1
DKE 1
RU
BY
NI
IE
UK
PL
NL
DE
UA
BE
LU
CZ
SK
MD
AT
HU
RO
FR
CH
SI
HR
IT
BA
RS
BG
XK
ME
MK
AL
TR
PT
ES
GR
CY
MA
DZ
TN
MT
ISR


ITEG indicators in 2030 (Distributed Energy), if no grid development is made after 2020
Yearly average marginal costs difference < 2.00 €/MWh
Yearly average marginal costs difference > 2.00 €/MWh
At least one of the 30% criteria show < 30%
At least one of the 30% criteria show > 30% but < 60%
Both criterias show > 60%
No interconnection targets
SE
FI
NO
EE
RU
LV
LT
DKW 1
DKE 1
RU
BY
NI
IE
UK
PL
NL
DE
UA
BE
LU
CZ
SK
MD
AT
HU
RO
FR
CH
SI
HR
IT
BA
RS
BG
XK
ME
MK
AL
TR
PT
ES
GR
CY
MA
DZ
TN
MT
ISR

ITEG indicators in 2030 (Global Ambition), if no grid development is made after 2020



# Project Assessment

## Transfer capacity increase (National Trends 2025)

| | Border | A B | B A |
|---|---|---|---|
| Transfer capacity increase (in MW) | Belgium - Netherlands | 1000 | 1000 |

## CBA results

ENTSO-E has assessed the benefits delivered by each project in 2025 (scenario National Trends 2025) and in 2030 (three scenarios: National Trends, Distributed Energy and Global Ambition). Indicators B1 to B6 were computed by ENTSO-E, while promoters had the possibility to compute and submit so-called project-level benefits (B7 to B10). The benefits must be understood as benefits for Europe as a whole, not for the promoters of the project.
Results are presented per scenario.

## Central scenario: National Trends

National Trends is the central policy scenario of the TYNDP2020, designed to reflect EU member state's National Energy and Climate Plans (NECP), in line with the requirement to meet current European 2030 energy strategy targets.

| | | | | | |
|---|---|---|---|---|---|
| | | | **Comparison of the COP21 scenarios with NT2030 average result** | | |
| | **NT2025** | **NT2030** | **DE2030 is < or > than NT2030** | **GA2030 is < or > than NT2030** | |

### Increase in socio-economic welfare

| | | | | | | |
|---|---|---|---|---|---|---|
| B1 Annual Socio-Economic Welfare (SEW) increase (M € / year) | max<br>average<br>min | 7<br>6<br>5 | 19<br>17<br>14 | > | < | ENTSO-E assessment |
| B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction | max<br>average<br>min | 0<br>0<br>0 | 3<br>2<br>2 | > | > | ENTSO-E assessment |
| B1_RES Annual Socio-Economic | max<br>average | 12<br>11 | 31<br>29 | < | < | ENTSO-E assessment |

| | | | | | | |
|---|---|---|---|---|---|---|
| Welfare increase resulting from RES integration | min | 9 | 26 | | | |

## Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

| | | | | | | |
|---|---|---|---|---|---|---|
| B4a Nitrogen oxides | average | -30 | 78 | n/a | n/a | ENTSO-E assessment |
| B4b Ammonia | average | -3 | 6 | n/a | n/a | ENTSO-E assessment |
| B4c Sulfur dioxide | average | -60 | 104 | n/a | n/a | ENTSO-E assessment |
| B4d Particular matter 5 | average | -2053 | -7433 | n/a | n/a | ENTSO-E assessment |
| B4e Particulate matter 10 | average | 0 | 11 | n/a | n/a | ENTSO-E assessment |
| B4f Non-methane volatile organic compounds | average | -2056 | -7437 | n/a | n/a | ENTSO-E assessment |

| | | | | | | |
|---|---|---|---|---|---|---|
| B2a Annual CO2 variation from market simulation (ktonnes / year) | max<br>average<br>min | -15<br>-15<br>-17 | -74<br>-85<br>-96 | <<br><br> | <<br><br> | ENTSO-E assessment |
| B2a_€ Annual Societal cost variation resulting from CO2 variation from market simulation monetised (M € / year) | CO2 price 60€/ ton<br>100€/ ton<br>189€/ ton | 1<br>1<br>3 | 3<br>6<br>14 | <<br>><br>> | <<br>><br>> | ENTSO-E assessment |
| B2b Annual CO2 variation due to network losses (ktonnes / year) | average | 40 | 47 | n/a | n/a | ENTSO-E assessment |
| B2b_€ Annual Societal cost variation resulting from | CO2 price 60€/ ton<br>100€/ | -1<br>-3<br>-7 | -2<br>-3<br>-8 | n/a | n/a | ENTSO-E assessment |

| | | | | | | |
|---|---|---|---|---|---|---|
| CO2 variation from network simulation monetised (M € / year) | ton<br>189€/ ton | | | | | |

### Integration of renewable energy sources

| | | | | | | |
|---|---|---|---|---|---|---|
| B3 Annual avoided curtailment (RES integration) (GWh / year) | max<br>average<br>min | 264<br>228<br>187 | 830<br>770<br>670 | < | < | ENTSO-E assessment |
| B3a Connected RES (MW) | - | | | n/a | n/a | ENTSO-E assessment |

### Impact on grid losses

| | | | | | | |
|---|---|---|---|---|---|---|
| B5 Variation of network losses (GWh / year) | average | 112 | 192 | n/a | n/a | ENTSO-E assessment |
| B5_€ Variation of network losses monetised (M€ / year) | average | 3 | 3 | n/a | n/a | ENTSO-E assessment |

### Security of supply

| | | | | | | |
|---|---|---|---|---|---|---|
| B6 Annual reduction in Energy Not Served (MWh / year) | max<br>average<br>min | | 1550 | n/a | n/a | ENTSO-E assessment |
| B6_€ Annual Socio-Economic Welfare increase resulting from reduction in Energy Not Served monetised (M€ / year) | average | n/a | 15.5 | > | n/a | ENTSO-E assessment |

## Scenarios: Distributed Energy & Global Ambition

DE and GA are two scenarios created in line with the COP21 targets to understand the impact on infrastructure needs agains different pathways reducing EU-28 emissions to net-zero by 2050. For these two scenarios, projects were assessed with a subset of CBA parameters.

| | | DE2030 | GA2030 | |
|---|---|---|---|---|

### Increase in socio-economic welfare

| | | | | |
|---|---|---|---|---|
| B1 Annual Socio-Economic Welfare (SEW) increase (M€ / year) | average | 21 | 15 | ENTSO-E assessment |
| B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction | average | 16 | 4 | ENTSO-E assessment |
| B1_RES Annual Socio-Economic Welfare increase resulting from RES integration | average | 12 | 13 | ENTSO-E assessment |

### Reduction of CO2 and GHG emissions

| | | | | |
|---|---|---|---|---|
| B2a Annual CO2 variation from market simulation (ktonnes / year) | average | -298 | -117 | ENTSO-E assessment |
| B2a_€ Annual Societal cost variation resulting from CO2 variation from market simulation monetised (M€ / year) | CO2 price 60€/ ton<br>100€/ ton<br>189€/ ton | 2<br>14<br>40 | 3<br>8<br>18 | ENTSO-E assessment |

### Integration of renewable energy sources

| | | | | |
|---|---|---|---|---|
| B3 Annual avoided curtailment (RES integration) (GWh / year) | average | 254 | 297 | ENTSO-E assessment |
| B3a Connected RES (MW) | - | | | ENTSO-E assessment |

## Non scenario-dependent indicator(s)

| B8.0 Stability (Transient, Voltage and Frequency Stability) | Transient stability | Voltage stability | Frequency stability | |
|---|---|---|---|---|
| BE-NL interconnector: upgrade VanEyck-Maasbracht (AC line high temperature conductor/ conductor replacement (e.g., duplex to triplex)) | - | - | 0 | Qualitative assessment by ENTSO-E based on information on the project technology provided by the project promoter(s).<br>This indicator is not dependent on scenarios or time horizons. |

# Sensitivity Study: Current Trends

'Current Trends' describes a future where the energy transition is slower than planned.

| | | CT2030 | |
|---|---|---|---|

## Increase in socio-economic welfare

| | | | |
|---|---|---|---|
| B1 Annual Socio-Economic Welfare (SEW) increase (M€ / year) | average | 8 | ENTSO-E assessment |
| B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction | average | 2 | ENTSO-E assessment |
| B1_RES Annual Socio-Economic Welfare increase resulting from RES integration | average | 14 | ENTSO-E assessment |

## Reduction of CO2 and GHG emissions

| | | | |
|---|---|---|---|
| B2a Annual CO2 variation from market simulation (ktonnes / year) | average | -74 | ENTSO-E assessment |
| B2a_€ Annual Societal cost variation resulting from CO2 variation from market | CO2 price 60€/ ton<br>100€/ ton<br>189€/ | 2<br>5<br>12 | ENTSO-E assessment |

| | | | |
|---|---|---|---|
| simulation monetised (M€ / year) | ton | | |

### Integration of renewable energy sources

| | | | |
|---|---|---|---|
| B3 Annual avoided curtailment (RES integration) (GWh / year) | average | 258 | ENTSO-E assessment |
| B3a Connected RES (MW) | - | | ENTSO-E assessment |

## Residual impact

Information on the residual impact of the project was provided by the project promoter(s).

## Project Costs

The project costs were provided by the project promoter(s).

| | CAPEX (Meuro) | Uncertainty range (%) | OPEX |
|---|---|---|---|
| 1561. BE-NL interconnector: upgrade VanEyck-Maasbracht | 50 | 25% | 0.1 |
| Total | 50 | | 0.1 |

### Explanation provided by the project promoter on the CAPEX uncertainty range:

1561 Considering project status, significant uncertainties exist regarding CAPEX estimations. These uncertainties are estimated based on both historic experience for similar projects and on present uncertainties regarding choice of final grid solution and related material/ resources costs.