Communication

TYNDP 2018

Improvements of TYNDP 2018

Final version after public consultation and ACER opinion - October 2019

entsoe

Reliable Sustainable Connected

Contents

ENTSO-E Reports 2018

As an improvement to the TYNDP 2018 package, the Insight Reports have been categorised in order to help readers navigate through the document and focus on what readers might find of interest. The category of reports are:

— Executive Report – Contains the key insights of the whole TYNDP package through its two-year cycle.

— Regional Reports – Based on the four projects of common interest (PCI) regions, the reports focus on the regional challenges of the energy transition.

— Communication – These reports communicate how we have interacted with our stakeholders and improved the TYNDP package from 2016 to 2018.

— Technical – These reports give a deeper insight into the technical subjects, including how we use our data, and the technical challenges of energy transition.

We hope this guide is of benefit to all stakeholders.

Main Report

Regional Reports
- North-South Interconnections East
- North-South Interconnections West
- Northern Seas Offshore Grid
- Nordic & Baltics

Communication
- Stakeholder Engagement
- Improvements to TYNDP 2018

Technical
- Data and Expertise
- Technologies for
- Transmission
- Viability of the Energy Mix
- CBA Technical

Adequacy
- Mid-Term Adequacy Forecast

Section 1

Scenarios

1.1
Joint Scenarios

The ENTSOs for gas and electricity have combined their efforts and expertise to develop common scenarios for the first time. These assist with decision making, identifying the needs and the adequacy of future infrastructure investment.

The scenarios form the base of all the studies undertaken in the TYNDP 2018 and thus are one of the most important factors to take into consideration in its development. The coordination of ENTSO-E and ENTSOG in the development of scenarios is an important step towards creating a more comprehensive view of the requirements of the future energy system. We believe that the ENTSOs have been successful in identifying viable pathways for the energy transition in the Electricity and Gas sectors and we will continue to improve our processes and methodologies. Therefore, the interdependence of the two sectors could be taken into account in future analysis.

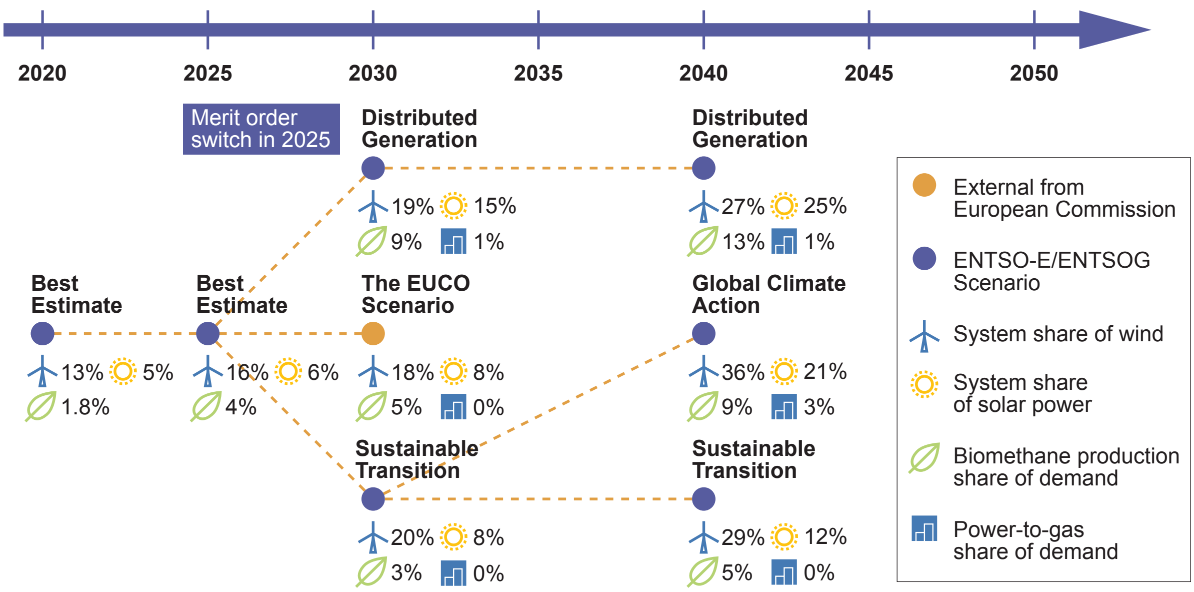
1.2
Scenarios & Time Horizons

In the TYNDP 2016, the scenario package consisted of one 2020 scenario and four 2030 scenarios, which were all branded as 'visions'. In the more recent scenario package used in the TYNDP 2018, the ENTSOs have created a more wide-ranging set of scenarios, following the recommendations from stakeholders. These have been developed using a joint approach between the separate organization's scenario building methodologies.

The results are one scenario each in the 2020 – 2025 timeframe, followed by four scenarios in the 2030 – 2040 timeframe. The naming of the scenarios has also become more indicative of the storylines which they represent. The names are;
— 2020 Best Estimate
— 2025 Best Estimate
— 2030 – 2040 Sustainable Transition
— 2030 – 2040 Distributed Generation
— 2030 EUCO
— 2040 Global Climate Action

More information can be found on the scenario section of the TYNDP 2018 website (https://tyndp.entsoe.eu/).

Figure 1.1 The scenario building framework for TYNDP 2018. Renewable Energy Systems (RES) share of demand for electricity and gas



1.3
Introduction of EUCO Scenario

As part of the scenario building process, the ENTSOs have introduced a scenario from the European Commission. This scenario is called EUCO 2030.
The EUCO scenario shows the impact of EU policies at the time of its formulaton [2014] towards meeting the 2030 decarbonization targets. It is considered a good comparator with the other ENTSO scenarios developed with the industry, and thus the scenario has been implemented in the full range of studies undertaken by ENTSO-E.

Section 2

Pan European Market Modelling Database (PEMMDB)

The PEMMDB forms the basis of all the information which is used to model the scenarios. Each scenario is based on a database for each country which outlines aspects such as installed capacity, hydro conditions, and demand.

In TYNDP 2018 the improvements made were quantitative inputs for electric vehicles, heat pumps, Demand Side Response price bands, among others. Some of the information for scenarios is collected based on the expectations of TSOs and national trends, this is called bottom up collection. The bottom up collection was undertaken for 2020 Best Estimate, 2025 Best Estimate and 2030 Sustainable Transition.

The other scenario PEMMDBs were developed by ENTSO-E based on common methodologies and using the collected information in the bottom up scenarios as a reference point, of the so called ‘top down scenarios’. For example, electric vehicles and heat pumps were forecasted based on the economic growth related to that scenario storyline, and a factor from the World Energy Outlook is used to forecast the increase.

Section 3

Pan European Climate Database (PECD)

The PECD provides an hourly timeseries for Wind and Solar load factors, based on historical data, for each scenario

There have been many improvements to the PECD in comparison to the TYNDP 2016. This includes the introduction of 34 climate years while the TYNDP2016 considered only 14. The climate year were clustered into 9 main climate groups, then further clustered into 3 which formed the basis of most of the TYNDP 2018 studies. This approach allowed for the assessment of the impact of climate years within the time and resource constraints of the TYNDP 2018 timelines.

Other further improvements made to the PECD included the forecast of future technologies used, which included predicted improvements in wind technologies such as increased shaft height and size of turbine blades. The explicit modelling of innovative technologies has been introduced, like batteries and demand-side-Response (DSR), allowing Scenarios to be shaped according to the new development trends in the energy sector worldwide.

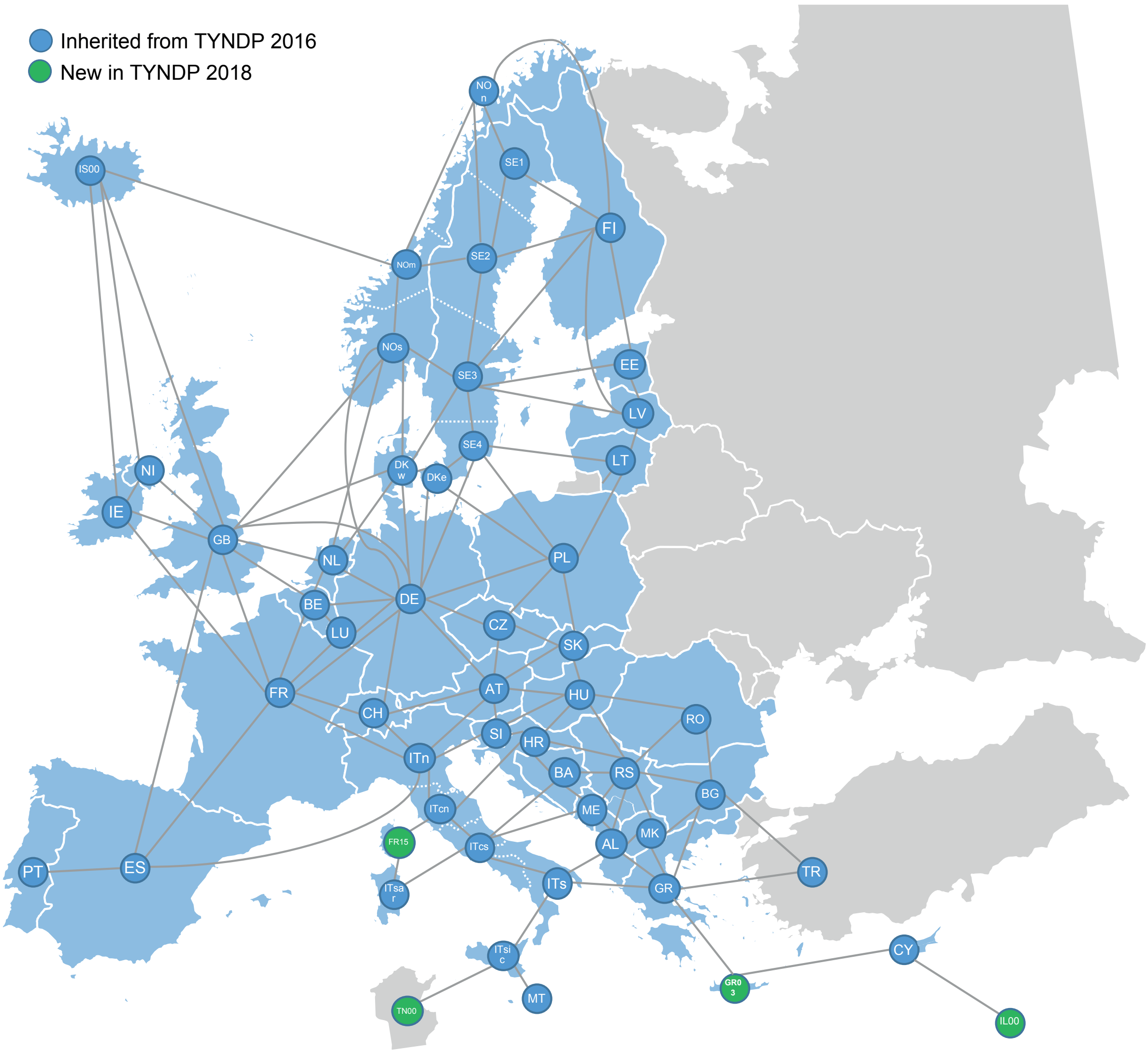
Section 4

Market & Network Studies

The market modelling methodology has been improved in several ways compared to the TYNDP 2016 process.

New market areas have been introduced in TYNDP 2018, like GR03 – Crete (Greece), TN00 – Tunisia, FR15 – Corsica (France) and IS00 – Israel. This allowed ENTSO-E to model the interconnection projects related to these parts of the europe with higher precision. The detailed overview is depicted on the Figure 4.1 below.

Figure 4.1 Market node configuration evolution for TYNDP 2018



Maintenance profiles for each piece of infrastructure have been introduced for the ENTSO-E area used by all market modelling experts, which results in a high level of alignment between market modeling software tool results.

A comprehensive comparison process has been implemented to ensure adequate accuracy and robustness of the results, where each simulation result has been validated between various market modeling software tools.

A new cross border Net Transfer Capability (NTC) calculation methodology has been introduced and used. This allowed limitations to be applied to the cross-border transfer capacity for each border before the NTC variation has been calculated for each project for TYNDP 2018. This is important to avoid network constraints being neglected while modelling each separate transmission project.

The tests have shown, that base case grid contains many overloads which the “NTC calculation method” discarded since it aimed at making the grid congestion free during only 30% of time (stemming from caveat in CBA methodology where delta NTC parameter is linked to such 30% rule).

Following, in the TYNDP18 we largely stuck to the NTC assumptions used in previous MAF/TYNDP products for the sake of consistency.

For the losses variation CBA indicator in TYNDP 2018, monetization has been implemented on an hourly basis using market results with and without the project being assessed, while TYNDP 2016 considered only average values. This has improved the quality of the results and allowed higher precision in definition of losses value for each separate market area.

Section 5

Cost Benefit Assessment (CBA)

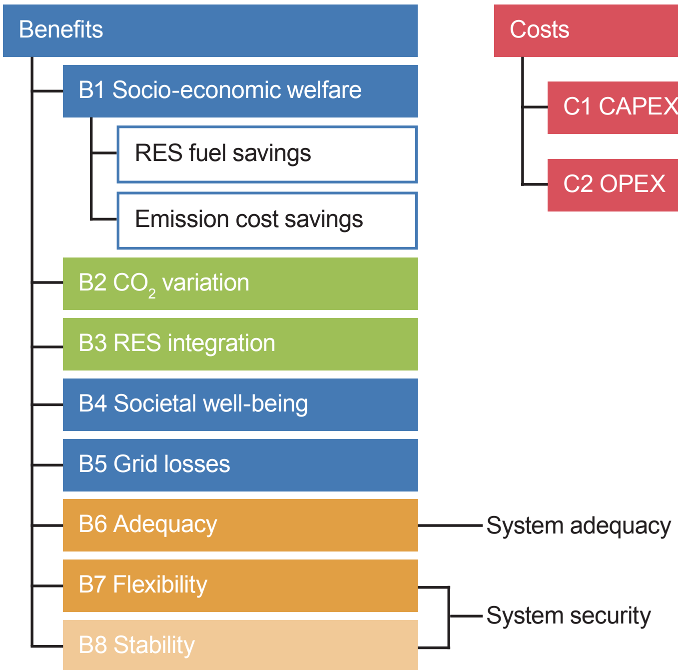
The overall Cost Benefit Assessment (CBA) process has been conducted in a centralized manner in TYNDP 2018. Two central teams dedicated to market studies (MST) and network studies (NST) have been organized to implement the necessary calculations in a harmonized way.

During the CBA process at least three market modeling software tools have been appointed to assess each of the projects submitted to the TYNDP 2018. To avoid distortions in the accuracy of the results the outlying results have been excluded from the computation of the final CBA indicators.

Due to unique use of absolute and median average thresholds for the identification of the outlying CBA market results, the final results were filtered considering the sensitivity of the algorithms of the market modeling software tools while keeping in mind the consistency of the market indicator dimension. This process allowed the ranges of uncertainty in the results to be reduced by up to 90% (when compared to TYNDP 2016 market CBA results as a reference).

Furthermore, additional indicators have been introduced in TYNDP 2018, which allowed the benefits of projects to be highlighted in a more detailed manner. As an example, the Socio-economic welfare calculation has been improved with the computation of two sub-indicators: RES fuel savings and emission cost savings (see Figure 5-1 below). These provide an indication of the source of the socio-economic benefit for that the project and consequently an improved explanation of the overall project benefits.

Figure 5.1 Structure of the project assessment indicators



Section 6

System Needs

For the first time ENTSO-E has done an analysis on the system needs for the 2040 time horizon.

The report aims to address the questions:
— What should the electricity grid look like in 2040 to
  — Create maximum value for Europeans,
  — Ensure continuous access to electricity throughout Europe, and
  — Deliver on the climate agenda?
— What would be the cost of not having the right grid by 2040?

The report is based on the three 2040 scenarios. In particular, very high levels of renewable energy sources (RES) of up to 75% of total demand could be reached. In this situation, European countries will, more than ever, need to rely on each other through cross-border exchanges. This increases the need for extended cross-border transfer capacity, which goes hand in hand with internal reinforcements of national grids. This report and the six Regional Investment Plans it accompanies, present how to complement the power system in 2040 in the most efficient way.

The reports can be found on the TYNDP 2018 website (https://tyndp.entsoe.eu/)

Section 7

Frequency Stability Studies

This year, to enhance our inertia studies, ENTSO-E has undertaken an inertia collection, which consisted of collecting the inertia constants and installed capacity of all generation units in Europe. This allowed us to give much more accurate results when looking at the inertia of various synchronous areas in Europe, based on the future energy scenarios. The results of the simulations can be seen in the European Power System 2040.

Due to the addition of extra market nodes, ENTSO-E is able to run frequency stability studies for all of the synchronous areas as follows:
- Nordics
- Baltics
- GB
- Ireland
- Cyprus
- Sardinia
- Crete
- Central Europe.

The stability studies include calculating Systems Inertia, Energy, RoCoF, Residual Load Ramps and Wind and Solar contribution to demand. This was done for all 2030 and 2040 scenarios and can be done for the 2020 and 2025 scenarios.

Section 8

Project Sheets

The format of the project sheets in light of stakeholder comments and suggestions has been professionally redesigned and improved and can now be viewed online. The project sheets now include extra information which wasn't present/ relevant in the previous versions of the TYNDP. This includes the effect of climate years on a particular project, inclusion of the sequential and normal CBA results, and additional explanation for societal wellbeing.

In addition to the contents last year, the project sheets show the following information

- Project Type (Internal, Generation connection or Interconnection)
- System need addressed by the project
- Explanation for clustering of investments
- Additional CBA indicator
- Comparison of results using different climate years.

This information should give readers deeper insights into each project.

Section 9

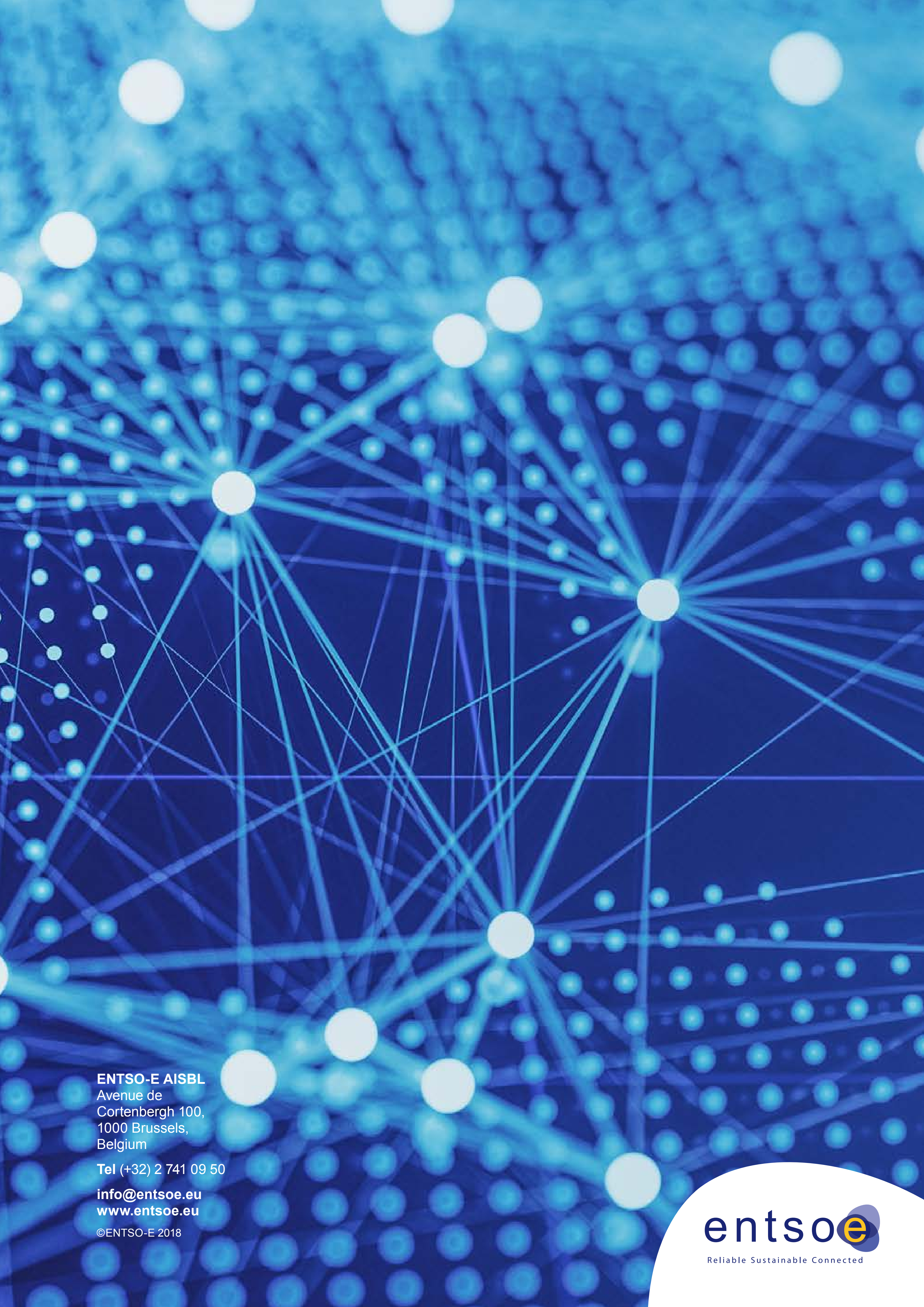
Project Platform

This year ENTSO-E developed a standalone project platform which has been used for the collection of project information.

The platform has been used to collect all the project data, Technical Data, Project Needs and Additional Information. The platform has an integrated mapping function which allows promotors to draw their investments on the map. These map submissions are used for the final TYNDP map as well as the project sheets.

All ENTSO-E calculated results, including the CBA results, are provided to project promoters via the platform as and when they are ready. This has addressed any concerns about equitable treatment of internal ENTSO-E members and 3rd party promotors. The platform included a change request functions which allowed project promoters to state their opinions on the results in the event that they have any reservations.

This was a relevant improvement from the TYNDP 2016 process. This is the first time that ENTSO-E has released this process and will endeavor to improve and smoothen the process in proceeding procedural updates. These updates will utilize feedback received from project promoters.



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