European Network of Transmission System Operators for Electricity

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Recommendations on scenario building and stakeholders involvement

Increasing acceptability of the Ten Years Network Development Plan

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A document prepared by the Long-Term Network Development Stakeholders Group

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Summary

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1. Introduction and Objectives

One of the main objectives of the TYNDP is to identify new flexible infrastructure developments that are able to cope with a range of possible future energy challenges. A crucial factor to ensure TYNDP success is to take into account national network development plans and national energy policies, as well as EU objectives and the uncertainties about the way and the possible delay in which these objectives could be reached.

This necessarily goes through the definition of contrasting scenarios that differ enough from each other to capture a realistic and comprehensive range of possible future pathways. This realistic and comprehensive approach will result in identifying the different future challenges for the grid. The reliability, coherence and accuracy of these scenarios are the cornerstones for their acceptance. It is however, a challenge to ensure that those scenarios reflect the expectations of a broad range of stakeholders, including energy suppliers, system operators, consumers, technology providers and environmental and conservation NGOs. The scenarios do not only need to strike a balance between the different stakeholder views, but also anticipate the impact of national energy and climate policies at the European level and vice-versa.

ENTSO-E has proposed its scenario development process for the TYNDP 2014 with exactly those goals in mind. The work undertaken has set in place a methodology to seek a balanced agreement and ensure the stakeholder inputs that make it suit for its application. Nevertheless, ENTSO-E seeks the input of stakeholders on how to improve it further, especially looking into the new mandates of the TYNDP under the EC Regulation on trans-European energy infrastructure.

This is the motivation behind this self-supporting document drafted by the Long Term Network Development Stakeholders Group (LTND SG) that describes the abovementioned recommendations. The purpose of this work is to improve and complement the ENTSO-E consultation and workshop process on scenarios and not to replace it.

The objectives of this document are:

- Increase the understanding of the way ENTSO-E is building its TYNDP scenarios
- Deliver recommendations on the how to optimally engage with stakeholders early on in the process in order to ensure a balanced input from a broad range of stakeholders, resulting in high quality scenarios and a balanced input to the scenario outcomes
- Deliver recommendations on the optimal way to reflect National/European policies along with the stakeholders' view into the scenario outcomes and
- By the implementation of the above recommendations, the long-term objective is to increase the acceptability of the scenarios used in the TYNDP.

2. Communication with stakeholders

How should stakeholders be involved during the TYNDP building process?

Building the TYNDP requires almost two years of intensive work. When a TYNDP is published, ENTSO-E will have already started preparing the following edition. The building process encompasses various subsequent steps, mainly:

1. The conception of different visions/scenarios for generation and consumption: including how many visions, which matrix of parameters/indicators should visions be based on and in what ways should each of the visions differ from one another,
2. The scenario building process: including generation and consumption data in each vision/scenario)

3. The formation of the reference Network
4. The performance of market studies
5. The performance of grid studies
6. The definition of criteria to select projects and
7. The selection of projects

The authors of the present document recommend that ENTSO-E endeavours to **involve the widest and most representative possible spectrum of stakeholders** in the TYNDP building process. Specific tools such as webinars instead of physical meetings could be used by ENTSO-E so as to involve stakeholders with limited financial and human resources. ENTSO-E could create a wide list of representative stakeholders' organisations and try to ensure their involvement throughout the whole TYNDP building process.

A draft list is proposed underneath.

Sector	Stakeholder	Website
Institutions	- EC - ACER - CEER - NRAs	- http://ec.europa.eu/ - http://www.acer.europa.eu/ - http://www.ceer.eu/
Electricity generation industry	- Eurelectric - Euracoal - Foratom - Eurogas - EPIA - ESTELA - EWEA - EGEC - Ocean Energy Europe - AEBIOM/EUBIA - COGEN	- http://www.eurelectric.org/ - http://www.euracoal.org/pages/home.php?idpage=1 - http://www.foratom.org/ - http://www.eurogas.org/ - http://www.epia.org/ - http://www.estelasolar.eu/ - http://www.ewea.org/ - http://www.egec.org/ - http://www.oceanenergy-europe.eu/ - http://www.aebiom.org/page/3/?cat=16 - http://www.cogeneurope.eu/
Electricity storage industry	- ESHA - EASE - EUROBAT	- http://www.esha.be/ - http://www.ease-storage.eu/ - http://www.eurobat.org/
Electricity consumption sectors	- AVERE (EVs) - IFIEC - BEUC - EHPA (HP) - Euro Heat and Power - SEDC	- www.avere.org - http://www.ifieceurope.org/ - http://www.beuc.org/Content/Default.asp - http://www.ehpa.org/ - http://www.euroheat.org/ - http://sedc-coalition.eu/
Grid equipment industry	- T&D Europe - Europa cable - ORGALIME	- http://www.tdeurope.eu/en/home/ - http://www.europacable.com/ - http://www.orgalime.com/
Distribution system	- CEDEC - EDSO4SG	- http://www.cedec.com/ - http://www.edsoforsmartgrids.eu/

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operators	- GEODE	- http://www.geode-eu.org/
Environmental NGOs	- CAN Europe - WWF - GREENPEACE - RSPB/Birdlife - Friends of the Earth	- http://www.caneurope.org/ - http://www.wwf.eu/ - http://www.greenpeace.org/international/en/ - https://www.rspb.org.uk/ - https://www.foeeurope.org/
OTHER INITIATIVES	- RGI - FOSG - ENTSO-G - E3G - EFET	- http://renewables-grid.eu/news.html - http://www.friendsofthesupergrid.eu/ - http://www.entsog.eu/ - http://www.e3g.org/ - http://www.efet.org/

The authors of this document also suggest that ENTSO-E **asks the same input from stakeholders during workshops, webinars and on-line consultations**. Ensuring stakeholders who are not able to attend the workshops would still be able to contribute to the on-line consultation process.

Workshops and on-line consultations could be organised in parallel with each other, hosting an on-line consultation period during workshops to allow stakeholders to better prepare themselves in advance.

In order to help stakeholders plan their involvement, at the beginning of a TYNDP building process ENTSO-E could **make available a calendar/timeline with planned steps**, including consultations and workshops similar to the ones prepared for each EU Network Code. See recommendation a) “Clarity at the beginning of the TYNDP building process”.

Already today, ENTSO-E publishes documents containing feedback on the comments received from stakeholders on its website. However, **feedback should be better promoted**: ENTSO-E could notify the availability of this feedback to the respondents and to the relevant stakeholders’ organisations identified above. Moreover, feedback should in the future focus more on explaining **how ENTSO-E will take into account the input received**.

What should stakeholders be consulted on?

In the 2014 TYNDP edition ENTSO-E has introduced a longer-than-10-year time horizon. As beyond the year 2020 no binding RES targets exist at the time of writing, national decrees or programmatic documents on RES capacities beyond 2020 are available only in a handful of EU countries. Furthermore, future development and deployment of other technologies such as nuclear, shale gas, Carbon Capture and Storage (CCS) and storage is also quite uncertain. In light of this uncertainty on future national generation mixes, ENTSO-E decided to introduce in the TYNDP 2014 four contrasting visions with different RES and thermal capacity assumptions for the year 2030. They also include different assumptions on technology acceptability (i.e. nuclear), technology deployment (i.e. decentralized storage or electrical vehicles) and energy demand expectations which are all important assumptions for the long-term planning of the grid.

ENTSO-E has consulted stakeholders on the estimations of generation and demand in the scenarios/visions (step 2 above). However, ENTSO-E has not consulted stakeholders on the development of the matrix of parameters/indicators used for building the visions (step 1 above). A certain lack of understanding and disagreement with step 1 on the part of stakeholders has somehow decreased the quality and quantity of input provided on step 2. In particular, stakeholders have experienced a certain lack of inconsistency within the “greenest” scenario/vision (vision 4) leading to the authors of this document recommending that ENTSO-E also **consult its stakeholders on step 1**. The matrix of parameters could be prepared in the

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framework of a collaborative process between ENTSO-E and stakeholders (see chapter 5 for further information regarding this recommendation).

Clarity at the beginning of the TYNDP building process:

Throughout the almost 2-year TYNDP 2014 building process, ENTSO-E has requested input from stakeholders during workshops and via on-line consultations on steps 2, 3, 4 and 5. The authors of this document feel that in the future ENTSO-E could improve interaction with stakeholders.

Notably, ENTSO-E could issue an explanatory document at the beginning of the TYNDP building process containing:

a. A **timeline** of the different TYNDP building steps and of the different consultation periods and workshops on specific building steps

~~a.~~b. An explanation of the **intermediary procedures** between one step and the following one, so that stakeholders understand what ENTSO-E does with their input and how ENTSO-E works internally on the TYNDP

~~a.~~c. An explanation of the **decision-making process** for each building step; clarifying to what extent and when stakeholders will be able to influence (weight of stakeholders' vs. ENTSO-E members' input) what elements and how their input will be used

~~a.~~**d.** An explanation of what data will be shared with stakeholders and **what data will remain confidential and why;** providing a **preliminary set of all public data** referencing their source and justifying their selection. It must be borne in mind that the non-availability of certain data (e.g. the capacity factor of the different generation technologies) limits stakeholders' comprehension of the TYNDP building process, thus also limiting their possibility to provide meaningful input to the process Clarification of what **grid and market studies (steps 4 and 5) exactly are**, what their methodology is and what their key assumptions to be determined (with and without stakeholders' input) are.

~~a.~~e. A **foot**note referring to the CBA methodology document in which the market and network modelling is explained. In the CBA methodology document the description of the market and network studies should be expanded.

Information and feedback at the end of the TYNDP building process:

The TYNDP is a 200 page document which provides "transparency regarding the entire electricity transmission network in the Community" and supports "the decision making process at Regional and European levels"[1]. Due to its importance, the TYNDP must be fully understood by policy makers with varied levels of technical knowledge. Hence, the authors of this document suggest the following:

a) The **limitations** of the TYNDP should be clearly laid out

b) **Assumptions** behind the results should be spelled out and justified

c) A **benchmark with relevant scenarios** (EC Roadmap, IEA WEO…) should be provided

d) The TYNDP executive summary could be **translated** into other EU languages, besides English, to better reach national policy makers and stakeholders. Translation could be made by ENTSO-E TSO members.

[1] ENTSO-E website

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e) Sector-specific concepts could be explained in greater detail or be replaced with simple wording to ensure it is user friendly and can be understood by all stakeholders with varying levels of knowledge.

f) Where possible, the **likelihood of project failure** and the reasons, as well as the **indicative project implementation timeline** and the related uncertainties should be explained.

g) The TYNDP results section of the ENTSO-E **website could be enriched** by extracting and presenting key results and graphs.

3. Scenarios divergence-general operational principles when constructing scenarios:

How to build more diverging scenarios:

Whilst Vision 1 and Vision 3 are constructed using a bottom-up approach, based on inputs from 'national correspondents, Vision 2 and Vision 4 are built using a top-down approach, taking advantage of common strategies, common grid designs and planning for a fully optimized grid.

However in practice, V2 and V4 still derived from the bottom up scenarios (V1 and V3). Thus V4, in particular, should show even more the benefits of an optimised European electricity system by being fully interconnected, demonstrating strong energy efficiency standards and optimizing market coupling. If this scenario, which would save costs and resources, is not considered, it cannot be planned for.

So far in the top down scenarios, the potential of flexibility assets including generation, storage, demand and grids, as well as the estimation of renewables penetration are based primarily on the estimates of current national experts and/or national political situations. However, this does not fully consider the benefits of an optimal interconnection system and integrated Regional or European energy markets.
The potential of flexibility assets and renewable energy resource should be assessed at a regional, if not European level, on the basis of optimisation analyses which are currently TYNDP 2014 only performed for thermal capacities.

How to approach optimization of renewable energy integration:

When optimising the spread of renewable energy capacities in Europe at least the following parameters should be taken into account:

- The cost for a given power plant in a specific location to provide energy and power availability over its lifetime
- The expected revenues of a given power plant in a specific location over its life time
- The grid costs triggered by the integration of the electricity produced by a given power plant in a specific location.2 A sensitivity analysis could be conducted to identify whether minimum amounts of RES production could be curtailed, whether complementary production profiles could decrease the amount of curtailed or stored electricity, whether excess RES production could be absorbed by storage and whether a modification of the demand pattern (demand response) could help absorb the produced RES electricity see section "how to approach optimisation of flexibility assets".

[2] Ideally, not only the costs but also the benefits brought by the given RES power plant to the system should be considered (e.g. avoided CO2 emission, avoided fuel costs), as suggested by the IEA in its recent report "The Power of Transformation" but stakeholders are aware that a balance needs to be found between the scope and resources for the report.

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How to approach optimization of flexibility assets:

Consider Regional or EU optimisation of typical system flexibility assets including flexible generation, demand, storage and grids.

- Evaluate contribution of storage potentials at both distribution and transmission level regarding different time frames – considering daily, weekly and seasonal aspects.
- Consider demand-side management potential in short trading periods (hourly) to adapt demand profiles to generation profiles induced by high levels of variable RES in the system.

Consider aspects of system operation and security of supply by enhancing the network architecture towards a stabilizing size and topology.

- Ancillary services – availability of contributing sources should be monitored; procurement of ancillary services via market-based mechanisms should enable cost efficient provision of the required services.
- Dimension of Reserves- In the case of top-down scenarios, reserves capacity should be designed rather at regional level, reducing the net reserve per country.
- Develop strategies of increased RES contribution to adequacy by considering the development of different RES technologies, with a clear distinction between variable and non-variable technologies.

4. Development of Specific figures

This section aims to provide recommendations for the development of specific figures of key input parameters used in market/grid modelling studies. The table below provides an overview of the influencing factors considered in TYNDP's 2014 scenario narratives, their possible qualitative values and the source of their input parameter figure (columns 2-4). Column 5 aims to provide recommendations for improving the development of each specific value, if needed. Through the involvement of different expert stakeholders in the development of the figures, a more universally acknowledged database of sources and figures could be achieved.

	Influencing factor	**Possible (qualitative) value**	**TYNDP 2014 data source**	**Recommendations**
Demand	Load, Energy efficiency	Incrementally higher among scenarios	Input from LACs[3] min/max values and EU stakeholders survey	Consistency between scenarios and cross checking with other organisations long term scenarios (i.e. EC, IEA)
	Demand response potential	Used as today / Partially used / Fully used		Seek expert stakeholder input from Eurelectric (DSOs), Smart Energy Demand Coalition (SEDC)
	Electric vehicles	No commercial breakthrough of electric plug-in vehicles / Electric plug-in vehicles (with flexible charging) / Electric plug-in vehicles (with flexible charging and generation)		Seek expert stakeholder input from International Council on Clean Transportation (ICCT)

[3] Long-Run System Adequacy Data Correspondents (LACs): National correspondents that deliver data, which are used for the development of the TYNDP

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	Heat pumps	Implemented (although not evenly spread around Europe) / Much more heat pumps implemented (although not evenly spread around Europe)		Seek expert stakeholder input from EHPA
	Economic and financial conditions	Less favourable / Favourable		Cross checking with other organisations long term scenarios (i.e. EC, EUROSTAT)
Generation	Renewables capacities		Input from LACs min/max values and EU stakeholders survey	– Seek expert stakeholder input on renewables distribution from EPIA, EWEA, ESTELA, EURELECTRIC – Regional groups to investigate RES zones, calculate potentials (e.g. LCOE, proximity to consumptions, social/environmental factors) and rank them in order to be considered in the scenarios RES development.
	Back-up generation (gas, nuclear, CCS, large hydro)	Incrementally higher among scenarios	Input from LACs and EU stakeholders survey	Seek additional input from Eurelectric, Eurogas, ESHA.
	Flexibility of generators	Up/Down ramping capabilities	Input from LACs & input from generator operators needed as well	Implement objective criteria for the different generation technologies (including RES) to establish its "technological dispatchability grade"
	Nuclear	National view / Public acceptance	Input on LACs min/max values and EU stakeholders survey	Seek additional input from Eurelectric, Foratom
	CCS	Not commercially implemented / partially implemented / fully implemented	LAC + Workshops	Seek additional input from: – Eurelectric – Bellona CCS Environmental Team – ZEP - Zero Emissions Platform http://www.zeroemissionsplatform.eu/ – CCS Global Institute http://www.globalccsinstitute.com/publicati

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Storage	Storage	As planned today / Decentralized storage (limited amount but higher than other scenarios) / Mainly additional centralized hydro storage (from hourly to seasonal) + some decentralized storage	Input on LACs min/max values and EU stakeholders survey	Seek external stakeholder input from: – EASE – Eurelectric – North Sea P2G Platform www.northseapowertogas.com
Grids	Smart grid solutions	Partially implemented / Fully implemented	Input from LACs & stakeholders survey	Seek external stakeholder input from EDSO
	Load/generation patterns		Input from LACs, workshops Pan European Climate Database	-
Other	Focus on energy policies	National/European	Input from LACs / ENTSO-E	-
	Focus of R&D research schemes	National/European	Input from LACs / ENTSO-E	-
	CO2 prices and primary energy prices	Low CO2 prices and high primary energy prices / High CO2 prices and low primary energy prices	IEA WEO "current policies" and "450ppm" scenarios	Seek external input from Point Carbon, adapt to external estimations.
New	Technology maturity (capex of generation, storage, grid, DSM)			Common technological assumptions per scenario could be included to obtain the figures in each vision (differentiation)
	Ability of network reinforcements to reach EU objectives (2020 and 2030)	A lack in network reinforcement can result in a not feasible dispatching of energy production, TYNDP should quantify this risk and identify possible solutions/additional reinforcements		-

5. Conclusions

The present report, drafted by the Long Term Network Development Stakeholders Group, describes an outlook for stakeholder involvement in the TYNDP development process, with emphasis in the scenario building process.

ENTSO-E should endeavour to involve the widest and most representative possible spectrum of stakeholders during the TYNDP building cycle, aiming to:

– Enrich the soundness of the processes, especially where the scenario approach is used

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- Increase the understanding of the crucial parameters and constraints even at early stages of the TYNDP cycle
- Optimize the overall process by utilizing expertise available in wider groups of stakeholders
- Increase the acceptability of the results of the EU-wide TYNDP
- Enhance the use of the report at the national level

The LTND SG would like to commend ENTSO-E for its initiative to obtain this comprehensive view on the scenario and the overall TYNDP building process, which complements the already well-established consultation approach of the TYNDP. LTND SG is looking forward to enriching the present document on a regular basis (i.e. every second year) based on the experience obtained from the biennial cycle of the TYNDP process.

6. Authors

	Association	Website	Representative's name
1	Friends of the Supergrid	FOSG	David Navidad Mencía
2	Renewables Grid Initiative	RGI	Loukianos Zavolas
3	European Photovoltaic Industry Association	EPIA	Giorgia Concas
4	Climate Action Network Europe	CAN Europe	Daniel Fraile
5	European Wind Energy Association	EWEA	Paul Wilczek
6	International Federation of Industrial Energy Consumers	IFIEC	Peter Claes
7	EURELECTRIC	EURELECTRIC	Michael Zoglauer
8	European Solar Thermal Electricity Association	ESTELA	Marcel Bial
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More information on the Long Term Network Development Stakeholder group can be access at: https://www.entsoe.eu/major-projects/ten-year-network-development-plan/tyndp-2014/long-term-network-development-stakeholder-group/ .

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