TYNDP Scenario building process 2022

Questions and answers - Webinar 3 July 2020

Scenario code: National Trends (NT), Distributed Energy (DE) and Global Ambition (GA)

Category	Question	Answer from ENTSOG and ENTSO-E
Biomass	How did you take into account a limited availability of sustainable biomass for GA?	The use of European biomass in GA is 3% above the one in LT 1.5 Tech.
CBA	How does the TYNDP influence the selection of Projects of Common Interest under TEN-E? And what's the influence of the scenarios on this?	Demand and supply level, repartition and profiles are specific of each scenario. As a result the need to transport energy from one country to the other differs between scenarios. Electricity and gas TYNDPs identify the investment gaps according to these needs and CBAs assess projects cost and ability to fill these gaps. Ultimately the selection of PCI project is up to EC and regional groups.
	Is it correct that a CBA will only be done for the NT Scenario?	In electricity, NT is used as the Reference scenario for the CBA with a lighter analysis done in 2030 on the DE and GA scenarios. The three scenarios are used on equal basis for the gas CBA.
Climate	I am missing consideration of climate change impacts (e.g. less heating demand more cooling demand, worse performance of nuclear). NT scenario comes with higher impacts. Will you include that? Climate change is already changing energy system needs (less heating more cooling demand). How did you take future climate impacts into account?	At this stage global warming impact is not taken into account in the scenario quantification. We invite people to contact us regarding the statement about a higher impact of NT.
	What is the "dunkerflaute" situation?	Dunkelflaute' is a German expression for cold dark doldrums. This is cold spell of 2 weeks with unfavourable conditions for solar PV and wind generation. Under these high energy demand circumstances, the supply of electricity relies on dispatchable power plants.
	Climate change should come into your scenarios via ensemble weather forecast scenarios from maybe the last 5 years and many members in order to have the extremes. Any comment on your plans there? What is about the selection of reference climate years at 2020 scenarios? Is a documentation about the selection available? Are there already inputs for 2022 discussed?	**Gas demand:** gas demand in the scenarios are based on peak demand situations as stated by different regulation rather than a single climatic year. For the highest daily peak demand and the gas demand during a 2 week cold spell, the gas demand is based on the nationally defined temperatures (usually around -14 to -12 °C). **Electricity demand:** The 3 climatic years (1982, 1984 and 2007) used to design the scenarios are the most representative of all parameters and they will be completed by a Dunkelflaute focus in next edition. The possible addition or change of climatic years could be investigated. More information regarding the climate years chosen can be found in at https://eepublicdownloads.blob.core.windows.net/public-cdn-container/clean-documents/tyndp-documents/TYNDP2018/consultation/Technical/DataExpertise.pdf.
	Questions already asked many times : present the data for cold years (1985, 2012) including peak and electricity grid solicitation during these peaks for these years, share of hybrid heat pumps	The market simulation have been run on the years 1982, 1984 and 2007. In the 2022 scenario building process there will be a review of the climate years to be used. The demand hourly profiles for each climatic year between 1982 and 2016 can be downloaded for each scenario at https://www.entsos-tyndp2020-scenarios.eu/download-data/#download The share of each heat pump category (including hybrid ones) can be found in the Visualisation Platform under Final Use Input (https://www.entsos-tyndp2020-scenarios.eu/visualisation-platform-final-use-input/).
	Would open data include all years modelled? What is key are cold years	Published data includes all the modelled years but as yearly aggregate. Figures 8 and 9 of the report presents a standard hourly profile of summer and winter day.
Consumer	Network operators are service providers for the consumers - what are you planning to do to take their needs more into account?	The sector coupling approach develops as part of TYNDP aims to better consider the need of sectors consuming energy. Collaboration with DSOs and district heating operators will help to better factor residential and tertiary needs. The consistency between European TYNDP and national plans also participates to consider national expectations.

	Why is social welfare not taken into account as a key driver?	Social welfare is a too broad concept to be used as a single driver for scenarios which main purpose is infrastructure assessment. Scenarios rather describe the level of comfort and service used by people. Social welfare is use at later stage during the PCI selection process.
Cost	Long term simulations for the next 10 to 20 years should consider also the investment cost. An important approach is the topology of the transport and distribution network and the granularity of data.	As part of the transparency continuous enhancement, the next edition plan to take into account additional cost including those related to distribution level (e.g. HP, EV, RES) as far as made available to ENTSOG and ENTSOE. Specific information regarding cost of network development are provided at TYNDP stage. The scenarios are assessed at bidding zone level (Macro). Going to a micro level of analysis is currently out of the scope of the TYNDP scenario development exercise and performing studies at this level would take exponentially more time. We consider that the split between market participant and non-participant technologies as being more relevant than the location of such technologies on the transmission or distribution grid.
Data	Could you in the future publish stakeholder feedback and how you responded to each?	The final version of the TYNDP Scenario Report 2020 contains a specific chapter on the way ENTSOE and ENTSOG have handled stakeholder feedback. For the 2022 process we intend to provide this information on a more regular basis.
	Can the scenario data be downloaded in excel spreadsheet format? And is there a web-link available? Did ENTSOs make available the datasets of TYNDP 2020? If not yet, when will they be available? Regarding the transparency of data, I noticed that the draft scenarios offered figures per country but now they are aggregated for the EU-28 as a whole. Why's that?	The Scenario website includes a wide set of data to be visualised online and downloaded in Excel format (including country details) at https://www.entsos-tyndp2020-scenarios.eu/download-data/
	What about hydropower? The generation capacity graph misses out the largest installed renewable in Europe. The electricity balancing (example) sub drivers don't mention hydropower? Electricity storage in reservoirs is and will be central to grid adequacy and flexibility planning and operations.	We share the importance of hydro as a significant renewable energy and flexibility source. As the level of development is already high and similar in the different scenarios, it is not identified as a factor differentiating scenarios.
	Do you consider providing a breakdown of the national figures at a local level (instead of a single figure for each country)?	In line with the 3rd Energy Package, TYNDP focuses on cross-border energy flows. National plan can provide more insight on local figures while ensuring consistency with European TYNDPs.
	Are you planning to publish all the data and models under open source licenses? Does the open data licence also apply to the electricity grid data?	All published data are covered by the open source license.
	Why has an interim Annex A not been published? Without this we have no visibility on how many energy transition projects (ETR) are being considered. Will an interim Annex A be published? November 2019 is now out of date and no one has visibility of ETR projects now being considered.	ENTSOG published an Annex A for TYNDP 2020 on the 5th of November 2019, available on the ENTSOG website. This annex provides an overview of all projects submitted for TYNDP, including ETR projects. From May to June 2020, ENTSOG held another submission for additional ETR projects. This additional collection (including new collected ETRs) will be published as part of Draft TYNDP 2020.
	Traceability and transparency are very important for large-scale models as various assumptions influence the end results. Only if all assumptions and data is available model results can be validated.	The number of data published on scenarios increases each edition with already additional data compared to the draft version of the report.
DSO	How do you make sure infrastructure planning is aligned between TSOs and DSOs?	TYNDP is not as such a centralized infrastructure plan, it provides a common framework that investors can use. Coordination between national transmission and distribution operators is ensured at national level.
	Do you envisage better cooperation with DSOs?	Following the last Copenhagen Forum, a cooperation roadmap has been put in place between ENTSOE and DSOs association. A TSO/DSO project is already started to work this out. As part of this project, we have regular TSO/DSO expert exchanges. Scenario building process is part of this process.

	How can we insure that the involvement of DSO in gas can be achieved with the same level as in electricity? Due to the changes in the legislation DSO in electricity already have a defined role?	Even though these is not yet an official European DSO association, ENTSOG and ENTSO-E already exchange with DSO institutions in the scenario building process. A large part of DSOs are active both in electricity and gas, this will help to ensure a certain level of involvement. In any case gas DSOs feedback will be considered as part of the overall feedback received through the stakeholder engagement process.
Environment	How do you consider and reflect in these scenarios the impact of various energy mixes on Natura-2000 sides, protection of species vulnerable to onshore/offshore development, etc?	This assessment is not done for the generation mix, we do not go to a level of granularity where we place resources in specific locations. The environmental impact of transmission projects are evaluated at TYNDP/CBA stage. Regarding the environmental impact of supply and demand assumptions of the scenarios, ENTSOE and ENTSOG welcome any suggestion.
Flexibility	With the aggressive targets, variable renewables will increase balancing requirements. Flexible technologies will be required, not well captured in day-ahead models. How will this be addressed? How will the methodology capture the flexibility value of technologies, in particular in managing uncertainty, variability and short term balancing?	Flexibility technology on the demand-side (VE, batteries, P2X…) can be reflected by ENTSOE models. Nevertheless the impact of using perfect foresight model on the assessment of the flexibility need in a highly renewable mix needs to be further investigated.
	On demand response potential during tight situations, will you besides DSO cooperation also study the possibilities of increased flexibility of large industries connected to high-voltage grids?	DSM is already taken into account in our scenarios. We are looking how to better reflect on the differences between sectors (residential, tertiary and industry).
	Demand side flexibility is taken into account in the investment loop defining the generation and related transmission capacity.	Demand side flexibility is taken into account in the investment loop defining the generation and related transmission capacity.
	Decarbonisation paths look comparable to the 100% RES literature. Jacobson (2016) proposal is managing the related system costs through hydro, which Clack (2018) found highly debatable. What's yours?	We are technology neutral in term of flexibility source. In 2040, DE and GA rely on a mix of gas-fired power generation, nuclear, hydro, batteries and DSM. Next scenarios will assessed flexibility management up to 2050 and will try to provide contrasted pathways with P2X playing certainly a role.
Gas	Saying that the gas infrastructure will dramatically change but only between 2040 and 2050 is a big bet. Why no scenario with a quicker phase out of natural gas?	TYNDP Scenarios primary role is to assess the electricity and gas system. The phase out of any energy carrier is not an objective per se as long as scenarios achieve carbon neutrality in 2050 and meet the predefined carbon budget. In all TNYDP scenarios the market share of natural gas will decrease. Part of it is replaced by renewable gas. Gas supply shows already up to 54% decarbonisation by 2040, so more than half of the change will happen even before 2040, not between 2040 and 2050.
	How do you explain that your 2030 And 2050 gas demand is above that of EUCO and lts scenarios? What do you think will be different to their assumptions? Why is the gas demand so much higher than in the LTS? Is there a problem with the role of ENTSOG in this process?	On the 2030 time horizon DE and GA consider a coal phase out whereas EUCO does not. It is compensated with higher gas demand in industrial sector and power generation. The latest is accentuated by the fact that electricity demand is higher in our Top-down scenarios. On the 2050 time horizon, both scenarios are actually quite comparable to EC LTS 1.5 Tech and Life scenarios as shown in figure 42 in the report. The total gas demand (hydrogen plus methane) of DE is in between 1.5 Life/Tech scenario whereas GA gas demand level is less than 10% higher than the 1.5 Tech scenario.
	Is there no possibility to reduce the gas peak in line with the annual demand? e.g. using gas storages	Gas storage will not reduce peak gas demand in winter. Instead gas storage is part of the gas supply in winter. In the TYNDP scenarios up to one third of gas demand is covered by gas storage.
	Why biomethane is presented as a centralized technology in top down scenario B instead of A?	The table maybe misleading. We expect that the development of RES in scenario A will be such that P2G will become a significant source of gas (hydrogen/methane) when in scenario B most of renewable gas will be biomethane.
	Eurogas published very recently a 2050 scenario, it should be considered for your next report	In the creation of the scenarios for TYNDP 2022 ENTSOG and ENTSO-E will make use of the best available information including third party studies.

GHG Emissions	How do you take into account the proposed more ambitious EU- emission reduction target for 2030?	DE and GA are line with a 55% GHG reduction target in 2030. NT is a bit less ambitious as the Green Deal is posterior to the first NECP definition
	Have you considered using the Climate Action Tracker (CAT) carbon budgets for the EU to be in line with the 1.5 degree target? A 50 Gt is an insufficient emission reduction target according to CAT.	The carbon budget of the 2022 scenarios is still to be defined.
	Current political trajectory and scientific recommendations don't go to 55%, but 65%. Will you take that into account?	The intermediate 2030 target will be defined in parallel to the carbon budget taking into account that scenarios should reflect European and national energy policy (TEN-E regulation).
	Is it fair to account negative emissions after 2050? Should not we stick to the carbon budget before?	In the 2020 edition, scenarios reach carbon neutrality in 2050 which is ambitious when considering Paris Agreement commitment to reach carbon neutrality in the second half of the century. Next edition may be based on another carbon budget but it is necessary to ensure that the reduction of direct GHG emission in Europe does not result in higher global emission and environmental impact.
	Did you consider methane leakage of (decarbonised) gas when calculating the GHG emissions? Are you including methane emissions (scope 1,2,3) in your climate target assessment? If not why not and how would it change your result? We can see few number about the qty of CO2 emissions to be neutralized, what about the qty of other emissions to achieve net-zero emissions target?	Non CO2 emissions (including methane leakage) are taken into account based on the LTS quantification
	Carbon Budget?	A carbon budget is the cumulative emissions of a given geographic area on a given period. It reflects the fact that global warming results from the concentration of GHG in the atmosphere.
	The current EU ambition for 2030 is more than -40% CO2 (see climate law draft). Have you adjusted your scenarios or do you plan on doing so?	The NT scenario based on NECP is in line with the current legal target of reducing GHG emission by 40% in 2030. The DE and GA scenarios achieved a 55% reduction in 2030 in line with the Green Deal ambition
Imports	To what extent does the GA scenario look at imported electricity as part of the imported energy" mix? or does it just focus on gas imports, in which case why?	The GA scenario takes into account import and export with Ukraine, Turkey and Tunisia but no major export project to Europe (e.g. Desertech). The situation may change in the next edition. The main focus in terms of imports refer to gas, as today a large percentage of gas is imported into Europe, whereas this is not the case for electricity.
	It is unrealistic to think it will be possible to produce enough energy in Europe to meet the demand. Do not make a scenario considering this alone rather only together with imports. Don't you think that you'll actually will continue to need both, 'energy autonomy' and imports to quench our energy thirst?	Both the use of low-carbon imports and a European autonomy largely based on renewables represent tremendous challenges with different implication in terms of energy system. For this reason, DE and GA are based on the combination of European renewable energy potential with energy imports. Their shares vary from one scenario to the other in order to illustrate the impact they have on energy infrastructure.
	Blue box on slide 21 references 70% import dependency for gas. Do we continue to import natural gas then decarbonise it? Import H2 instead? Or import more power? Is self-sufficiency possible?	The residual energy imports (compared to present situation) covers abated natural gas, biomethane and hydrogen. Self-sufficiency may be a driver of future scenarios but it has to consider the full scope of economic independence (e.g. technologies, scarce resources, industrial sector...)
Industry	Industry offshoring would move manufacturing to more polluting jurisdictions- which planet does that help? After the Covid crisis, some governments have the objective of relocating the industry. May there be an impact on your demand scenario and jeopardize the achievement of CO2 reduction objectives?	The case of the industrial sector is emblematic of the different equilibrium that may exist between energy, scarce resources and manufactured goods import/export balance. ENTSOE and ENTSOG welcome any feedback regarding the way to handle the topic in the future top-down scenarios.

Mobility	Regarding Driver 3, energy intensity and there "Transport". Is electrified small scale air travel taken in consideration (#Flugtaxi)?	There is a certain degree of electrification in the aviation sector in DE and GA scenarios without specification of the technology and mobility segment.
Model	With electrolysis, hydrogen and seasonal storage, there is a greater requirement for the market modelling to optimise over longer time-frames. How has this been addressed?	In the 2020 edition, P2G was modelled with dedicated RES outside the electricity network. Therefore the requirement in terms of market modelling was minimum. In the 2022 edition, P2G will modelled as part of the electricity network with greater modelling requirement. ENTSOG experience in seasonal gas storage will be helpful in modelling properly hydrogen and seasonal storage. In the next edition the optimisation timeframe will be part of the discussion.
	To assess the feasibility of these scenarios, you already use probabilistic simulations, right? What are the attributes and criteria of probabilistic simulation? Are they different among countries?	Scenarios are built on the basis of storylines resulting from stakeholder engagement process. For the electricity sector, the level of generation capacity and interconnection results from an investment loop ensuring the adequacy in 1984 (the average year). Hourly simulations are then run on climate years 1982, 1984 and 2007. Therefore, the simulations in this edition were deterministic and not probabilistic. The improvement of the adequacy check is part of the methodology to be developed for next edition.
	What kind of models did you use?	The storylines are developed with an in house developed tool (the Ambition Tool) similar to Quintel Energy Transition Model. Electricity demand profiles are developed with the Trapunta tool from Milano Multiphysics. Finally the electricity model is design through the investment loop of Plexos from Energy Exemplar, benchmarked with Antares, an open licence tool developed by RTE. P2X is modelled with PLEXOS. For biomethane, a quantification tool was developed in cooperation with Navigant based on the assumptions of the Gas for Climate study.
NRA	Regardless of the stakeholders' feedback, the most important for the base scenarios is always the NRA (at least for the NT scenario), correct?	The scenario building process shall be consistent with the TEN-E regulation requirement to be in line with European and national energy policies.
Nuclear	For hydrogen production, why is missing the nuclear low-carbon electricity category?	In the 2020 edition, electrolysis was not connected to electricity grid but supplied with dedicated RES. With the integration of electrolysis with the electricity market model, it is likely that part of hydrogen production will come from nuclear (for the scenarios including such technology in the generation mix).
	How do you define nuclear trajectories?	The trajectory for each generation technology derives from data provided by each TSO.
Other	It would be important to illustrate the regrets of missing the different options	In the design of the TYNDP 2022 scenarios we will explicitly vary between the technology options. What has a high level in one scenario will likely have a low level in another. As such the scenarios will show the effect of low levels (or complete lack) of certain technologies
P2X	What is the threshold for your models to decide using P2X rather than using other generation technologies? I assume this transformation is done when there is insufficient transmission capacity?	For the 2020 edition, the annual share of each supply source of methane and hydrogen (P2G, imports, biomethane…) is defined ex-ante at storyline level in order to ensure sufficient differentiation. The potential need to update this approach for next edition is to be further analysed.
	What do you assume as the source of power for P2G? Is it curtailed power, power below a price-threshold or dedicated renewable plants?	For the 2020 edition, P2G was supplied by dedicated RES and limited amount of curtailed RES. In the next edition, electrolysis will be modelled as part of the electricity system. As such the origin of the electricity will depend on the marginal generation. It is to be seen if some restrictions need to be added (e.g. limitation to the hours when the marginal technology is a renewable source) on top of the carbon budget approach.

Process	Will you continue to use online meeting technology post-COVID so those stakeholders who find travel to Brussels difficult / time consuming can have their say more easily, please?	We will certainly maintain online participation.
	When will a first draft methodology be available? Would help stakeholders very much to have that as early as possible.	The publications along the 2022 scenario building process are as follow: Draft storylines (Oct. 20), Final storylines (Jan. 21), Draft scenarios (Jun. 21) and Final scenarios (Dec. 21)
	Will you share the slides so we can send feedback by 17 July?	The slides we have shown during the webinar are available on the event page: https://www.entsog.eu/gas-and-electricity-entsos-workshop-tyndp-scenarios-closing-2020-edition-kicking-2022-cycle-online#downloads
RES	German DSO and TSO have very little access to the wind and solar units, with most of the data being upscaled, not measured by private entities. How can Germany come up to speed, any idea/comment?	We invite people to contact us to further detail their concern.
	Wasn't the GA scenario assuming a lower cost of offshore wind? How come DE scenario has more offshore than in the GA scenario?	Yes and in relative term offshore wind is predominant in GA even if it is true that the total amount of offshore wind in DE is higher due to P2X necessary to produce hydrogen based fuels to replace some of the imports.
Scenario	If the scenarios are not forecasts, how do you address the risk of having stranded assets?	Scenarios are not a forecast (as it will mean that the TSOs have a best estimate of the future up to 2050). Scenarios are to be considered as possible pathways for the energy transition. ENTSOE and ENTSOG aim at contrasted scenarios in order to provide a robust basis for infrastructure assessment (including the risk of stranded asset).
	Would you consider to include a peer review by independent scientists of your 2022 scenarios?	The TYNDP Scenario Report already achieved a high degree of methodology and data transparency compared to equivalent studies. The consultation process as the combination of workshop, bilateral meetings and public consultation already help us to ensure scenario consistency. Putting sector coupling at the core of the scenario building process, we are looking for expertise through the engagement of a wide range of stakeholders representing on one side different sectors and on the other side independent expertise such as JRC.
	Do you plan to design a real Bottom Up scenario based on TSO data?	We will design a bottom-up scenario reflecting national climate and energy policies based on data submitted by TSOs.
	It seems to me that the "bottom up scenario" based on national policies is in fact a top down scenario. What is the "bottom up"-aspect in this scenario?	NT is top-down in the sense that NECPs have to achieve European targets but according the subsidiarity principle, Member States have the ability to define the energy mix. It ensures that the scenario reflect country specific along a bottom-up approach.
	Do you need to include a scenario for slow progress (even if no one will publicly support the narrative) because ENTSOs will need to accommodate a wide range of possible outcomes?	According to Regulation EC 347/2013, scenarios have to reflect European and national policies. Scenarios focus on the nature of the path to carbon neutrality. The impact of a slower progression along the paths can be assessed at CBA level without the need of a specific scenario.
	So far, ENTSOs scenarios are more conservative than References scenarios will there be a more ambitious scenario this time?	DE and GA are more ambitious than current EC Reference scenario. They are comparable with the most ambitious EC scenarios (1.5 Tech/Life) in in terms of GHG reduction, RES development and energy efficiency.
	Bottom up scenario: Were the existing datasets checked whether they also built/integrated the DSO? In some countries this could not be the case, gas and/or electricity.	Bottom-up scenario is based on NECP consulted at national level by Member States. As such they ensure a certain level of TSO/DSO coordination
	When you "add up" the NCEP from the different countries, how do you account for the differences in trade flows? (ex. both Spain and France consider that they are net exporters for the other country)	Only the generation capacity and demand levels of the NECP are considered. The resulting cross-border flows may differ from what is defined in each NECP. Such approach enables MS to analyse the interaction of the national system with the rest of Europe.
	In terms of using the scenario data. If you use the DE scenario supply and demand assumptions for country A can you still use the NT scenario for Country B?	When the scenarios are used in TYNDP and CBA processes, the same scenario is applied for each Member State.

Technology	Could you articulate the risks associated with immature technologies better? Eg what if CCS or H2 don't develop at the speed expected? A storyline with less CCS and more PV and Wind expansion would be necessary for not rely on uncertain and expansive technologies If RES has 80%, it appears you bank on CCS etc. for carbon neutrality? This seems a high risk approach, as those technologies so far have not proven their worth	The consideration of a technology being mature strongly depend on each stakeholder's background. In addition some technology are matured but not commercially developed because of a too low carbon price. Technology maturity is only one challenge of the energy transition, public acceptability of infrastructure and behaviour adaptation are challenges of a similar extent. The publication of cost assumptions is a way to improve visibility on the maturity of each technology.
	Methane Pyrolysis could none the less play a role in Scenario A as it could even be applied to biomethane. During the last 12 months many new technologies and projects for the production of H2 have come to light. Best example plasmalysis from waste water without methane. Do a scenario with lower TRL level?	Technologies for hydrogen production develop rapidly, even if many are at low TRL. Their consideration within TYNDP will increase progressively from one edition to the other.
Transmission	At which step in the process of the TYNDP 2020 the NTC-figures are fixed?	For the TYNDP 2020, the NTC were fixed for the year 2025 based on the MAF process in 2019. For the top-down scenarios, the NTC evolution beyond 2025 is an output of the investment loop in order to have meaningful generation development. This modelling was completed in March 2020 for the Final TYNDP Scenario report 2020.
	What is the difference between the scenario DE compare to GA regarding the development of the electrical transmission system?	The "Electricity flow map" on the visualisation platform provide some insight on the transmission need
	Since NTCs are known for their inaccurate, at times random/political-, allocation decisions, are implicit grid constraints (FBMC) also in use?	As the purpose of grid modelling is only to develop a meaningful generation mix, it is not within scenario building scope given the necessary computation required. Flow-based modelling is used at MAF/ERAA stage and in TYNDP more accurate NTC are calculated on a project by project basis