TYNDP Scenario building process 2022

Questions and answers - Follow-up written feedback received after 3 July 2020 webinar

Category	Author	Stakeholder comment	Answer from ENTSOG and ENTSO-E
CO2 ambition	EREF	It is incomprehensible to ignore a 65% target [in 2030] for the 2 top-down scenarios that are supposed to be compliant with the Green Deal and the Paris Agreement	The Green Deal, as recently proposed by the European Commission, seeks the further strengthen the Paris Agreement by increasing the EU CO2 reduction target in 2030 to at least -55% and the two top-down scenarios for TYNDP 2022 will comply with this target. If this target would change as voted by the European Parliament the scenario assumptions will be adapted accordingly.
	German Watch	Ambition of EU climate targets will not only have to be increased but emission reduction also needs to be sped up in order to limit global warming to 1.5°C. At least one TYNDP 2022 scenario should therefore assess reaching climate neutrality by 2040 instead of 2050.	Both top-down scenarios for TYNDP 2022 will assume carbon neutrality no later than 2050.
	Anonymous	We strongly encourage ENTSOs to develop at least (if not both) scenarios with no overshoot of the EU carbon budget by 2050.	The carbon budget is explicitly identified as a key driver in the scenario development. We aim to limit overshoot of the carbon budget by 2050.
	CAN Europe	Future energy infrastructure planning in Europe needs to be fully aligned with the Paris Agreement. CAN Europe recommends to increase variation of TYNDP 2022 storylines by assessing higher ambition of greenhouse gas emission reduction. In order to reach the 1.5°C target of the Paris Agreement, a trajectory towards net zero emissions in 2040 should be assessed.	Both top-down scenarios for TYNDP 2022 will assume carbon neutrality no later than 2050.
	E3G	It is important to be transparent on the emissions factors and scope you use and make sure it is in line with the objective of global decarbonisation– in particular for natural gas.	ENTSOG and ENTSO-E value transparency in their scenario building process. That is why we will continue to improve this through the release of additional data and especially the emission factors of all fuels being part of the mix.
	E3G	All scenarios should be constraint by EU climate objectives, in particular climate neutrality which requires us to deliver net-zero emissions in 2020. Within that, we suggest you include a higher ambition scenario that reaches net-zero before 2050.	Both top-down scenarios for TYNDP 2022 will assume carbon neutrality no later than 2050. The inclusion of scenarios more ambitious achieving carbon neutrality before the 2050 deadline set by the Green Deal needs to be further investigated, together with the European Commission.

	E3G	Including negative emissions infrastructure/costs: Some pathways have a greater requirement of negative emissions infrastructure/solutions and costs.	In the scenario report for TYNDP 2020 the details of required negative emissions are already laid out (Figure 3 of main report). For the next edition we will continue this practice. We also plan to release more information on our cost assumptions, as we already have done in the 2020 scenario report. An assessment of infrastructure is not part of the scenario report, but is covered in TYNDP.
Environmental CBA	German Watch	Future TYNDP scenarios should firstly include a transparent assessment of the climate benefits and costs that different technologies, energy carriers and infrastructure solutions bring about. In line with the EU's "do no harm" principle the decarbonisation options must proof that they do not counteract climate ambitions.	Defining the most effective climatic scenarios is beyond our remit. Our scenarios are not meant to advise policy makers on the most appropriate way to reach the climate goals. Instead our scenario should be fit for purpose to assess gas and electricity infrastructure under various contrasted pathways. And to be able to show the benefits of projects under these circumstances. That is why we purposefully develop different scenarios which cover the reasonable extremes in terms of transmission network requirements. Climate ambitions are being considered in the scenario building process.
Gas	EREF	Lastly, it is incomprehensible for measures concerning a fossil gas phase-out to only be considered for the time frame 2040-2050. It is irresponsible to lock in fossil gas as an alleged bridge technology as the rapid technology development and cost decrease of renewable technology allows and requires to accelerate the full transition to renewables already today and most certainly well before 2040.	TYNDP Scenarios primary role is to assess the electricity and gas infrastructure. 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. Nevertheless if there are specific plans for phase-out in a certain country, these will be considered. It is expected that the new scenarios will confirm the strong decrease of natural gas before 2040. The upcoming consultation will provide stakeholders to further detail their view on such evolution. In all TNYDP 2020 scenarios the market share of natural gas decreases. Part of it is replaced by renewable gas. The TYNDP 2020 scenario report already highlighted that fossil natural gas will decline substantially in the next 20 years. 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.
	German Watch	Green hydrogen deserves a stronger look than methane and decarbonized hydrogen. Following the EU hydrogen strategy, only hydrogen that is based on renewable electricity can play a long-term role in the EU energy system. This must also be reflected in the assumed amounts of imported hydrogen.	Demand and supply for hydrogen was identified as a main driver and explicitly be considered in the TYNDP 2022 scenarios. We will however consider all available sources of hydrogen in one way or another. In one of the proposed storyline green hydrogen will be the main focus. Whereas in the other we will see relatively more low carbon (blue) hydrogen production and more import. In this way we will explore multiple trajectories as also emphasized by the EU Hydrogen Strategy.

	Anonymous	Therefore, a scenario based on a strong development of low carbon gases should integrate parameters of high cost risk	The consideration of a technology being mature or immature 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 assumption for each technology provide opportunity to stakeholders to make their own risk assessment for each scenario.
	E3G	Disaggregate different types of gases and hydrogen in your figures: they all have different implications in terms of CO2 footprint and infrastructure needs.	This is completely true. That is why in the TYNDP 2020 scenario report we already made an explicit distinction between methane and hydrogen and also for the source (being fossil, decarbonised or renewable). Both in gas supply and gas demand. Datasets are available on the scenario website. For the TYNDP 2022 scenario we will continue to develop and enhance this practice.
Optimized scenarios	CAN Europe	Future TYNDP scenarios should firstly include a transparent assessment of the climate benefits and costs that different technologies, energy carriers and infrastructure solutions bring about. In this context, the variation of the carbon price is a key driver.	The primary role of scenarios is to create a consistent dataset that can be used by the TYNDP process to assess infrastructure projects. Our work with the ILM will provide further evidence on the synergies and insights into competition between infrastructure needed to enable the energy transition to net-zero.
	E3G	TYNDP scenarios should run a cross-sectorial optimisation of infrastructure needs by comparing costs and availability of all options, be it on the generation side, on the demand side (building renovation, appliance efficiency,…) or related infrastructure solutions (e.g. heat networks).	The primary role of scenarios is to create a consistent dataset that can be used by the TYNDP process to assess infrastructure projects. Our work with the ILM will provide further evidence on the synergies and insights into competition between infrastructure needed to enable the energy transition to net-zero.
P2X modelling	Anonymous	From this perspective, we also encourage ENTSOs to consider the possibility for electrolysis directly from the electric power sector, instead of using dedicated resources that would not be connected to the electricity network.	For the TYNDP 2020 scenarios, P2G (electrolysis) was supplied by dedicated RES and in limited amount by curtailed RES. For the next edition we are improving our P2G methodology to better capture the behaviour of electrolysis within the electricity market.

RES development	EREF	As for the energy mix used as a baseline, the role of renewable energies is being underrated; there is not a single scenario envisaging 100% RES. At the same time, scenarios without nuclear should be considered	Both RES technologies and nuclear are identified as main technology drivers in defining our differentiated scenarios. In one of the proposed storyline we assume rapid development of renewable energy, reaching levels close to maximum potential. Whether a 100% RES scenario is feasible within the country specific boundaries we need to consider is yet to be seen. In the other proposed storyline we expect to see more (but not exclusively) low carbon technologies. In this storyline there is still room for nuclear in certain countries.
	German Watch	In this context also a higher degree of electrification, compared to the rates included in the draft TYNDP 2020 scenarios, needs to be envisaged in all scenarios. Also, at least one TYNDP 2022 scenario needs to assess a 100% renewable energy system	In one of the proposed storylines we aim to reach even higher RES share and electrification rates compare to TYNDP 2020. Whether 100% RES share is feasible can only be concluded after we have performed our modelling.
Scenario drivers	German Watch	The learning curves and the competitiveness of renewable energy technologies are important drivers for the pace of their upscaling. These drivers are more relevant for a meaningful variation of TYNDP scenarios than building an artificial cleavage between a purely decentralised “autonomy” scenario and a purely centralised “global economy” scenario. Every scenario should combine decentralised and centralised solutions	We fully acknowledge the importance of renewable technologies as a scenario driver. We will also take this one on board. Furthermore we see all scenario drivers not as a purely all or nothing parameter, but more like a continuous scale. On this scale we choose different positions for each scenario to ensure differentiation. This also applies for the centralised versus decentralised driver.
	German Watch	Changes in regulation and market design could be better integrated: For example, the revision of the EU-ETS, a possible introduction of a quota for renewable gases in certain end-use sectors, and so on.	Market design is an important component of energy system evolution. The scenarios represent different pathways requiring market design evolution to materialize and efficiently operate. At this stage we consider that market design evolution are consequential to the pathway selected by decision-makers rather than input to prospective scenarios.
	German Watch	It is not clear to what extent digitalization and flexibilisation options will be considered appropriately in future TYNDP scenarios	Digitalisation will impact the energy system in many different ways from a wider citizen participation to DSM to data centres consumption and potential excess heat recovery. The DSO/TSO collaboration roadmap should help to better picture both consumers engagement and smart grid solutions.
	German Watch	If TYNDP 2022 scenarios focus on opposing “independency” and “autonomy”, such scenarios might not necessarily help to identify the best pathway towards the Paris Agreement’s 1.5°C target.	It is not the purpose of our scenarios to identify the best pathway to the Paris agreement 1.5°C target. We aim to identify the main uncertainties for the infrastructure development. For this purpose the autonomy versus import dependence is very relevant, as it determines energy transport flows

	German Watch & CAN Europe	Instead of opposing an "autonomy" scenario versus a "globalised" scenario, TYNDP scenarios should run a cross-sectorial optimisation of infrastructure needs by comparing costs and availability of all flexibility and decarbonisation options, be it on the generation side, on the demand side or be it related to infrastructure solutions.	Cost-optimized scenarios would be very dependent on the cost inputs (highly uncertain when looking 30-year ahead) and may not result in a range of scenarios wide enough to serve the purpose of infrastructure assessment. European energy autonomy is perceived by a range of stakeholders as a political objective to be pursued. It requires a different energy system than a scenario with a larger room for energy imports. As such it is a valuable driver for analysing investment needs.
	Anonymous	There should be an alignment on the EU objectives and European Commission Long Term Strategy scenarios by 2050. The global set of scenarios has to be credible and contrasted enough to assess long-term uncertainties in TYNDP analyses.	We do share the twofold objective of the scenarios, ensuring consistency with the European energy and climate policy while providing different pathways in order to form the basis of robust analysis of infrastructure needs. Even though scenarios have similar climate ambition, they can still be very different due to different driving forces.
	Anonymous	At least one scenario should consider a stronger evolution of electricity in the energy mix and in parallel a substantial reduction of gas.	The final TYNDP Scenario Report 2020 shows a differentiated evolution of gas and electricity energy carrier (e.g. direct electrification range between 47% and 54%). Furthermore this contrast in electrification is also part of the proposed storylines. With smart sector integration (E-gas and E-liquid), electricity generation could be a better metric then direct electrification to evaluate the role of electricity in the energy mix. In particular the Distributed Energy storyline assumes high uptake in this respect. Regarding gas, the potential development of a hydrogen economy as foreseen by different European and national strategies will require a better differentiation between hydrogen and methane and their respective evolution.
	Anonymous	Both scenarios should target a low dependency on import while looking at other differentiating factors. To better consider the risk of sunk costs in particular in the gas infrastructure, it is also necessary to feature at least one storyline without the possibility to import "low carbon gases".	TYNDP Scenario Report 2020 already foresees a sharp decrease of energy imports compared to present situation. The expected storyline intending to maximize European RES potential is likely to result in the simultaneous minimization of both low-carbon energy and imports.
	Anonymous	Need of a better articulation between the bottom-up scenario based on so-called national trends, and the top-down scenarios going towards 2050 ambitious targets.	Due to the lead-time between the definition of European energy and climate policies and strategies (e.g. Green Deal, Sector coupling and hydrogen) and national ones, it is likely that the top-down and bottom-up scenarios will differ. We share the value of identifying those differences as part of the TYNDP Scenario Report.

	CAN Europe	Instead of primarily opposing “decentralised” and “global” solutions in the TYNDP 2022 storylines, at least one scenario should analyse how to prepare European energy infrastructure for a 100% renewable energy system in the most efficient way, combining the best out of both “decentralised” and “global” futures.	Our intentions are not to oppose neither drivers nor storylines. Actually, an efficient pathway will certainly combine many features including decentralisation and global interactions. With two top-down scenarios having to describe differentiated pathways for infrastructure assessment purpose, it is necessary to emphasis different drivers. The extent of EU RES maximisation is certainly of the scenario drivers to be explored in the proposed storylines.
	CAN Europe	In previous TYNDP 2020 scenarios, the mobilisation of energy savings potentials and energy efficiency gains did not vary strongly. TYNDP 2022 storylines should assess more ambitious assumptions on energy savings and energy efficiency as these are important parameters for energy infrastructure development.	Energy savings are crucial components of the energy transition. Distributed Energy scenario shows higher energy efficiency than 1.5 Tech/Life scenario of the EC LTS. We need to further analyse the potential benefit of using different level of energy savings in our top-down scenarios.
	CAN Europe	It is not clear to what extent digitalisation will be considered as a cross-cutting driver in future TYNDP scenarios. Storylines should be detailed and transparent enough to identify which consumers under which condition will be engaged in demand response schemes and so-called smart grid solutions and what are the benefits for the entire energy infrastructure.	Digitalisation will impact the energy system in many different ways from a wider citizen participation to DSM to data centres consumption and potential excess heat recovery. The DSO/TSO collaboration roadmap should help to better picture both consumers engagement and smart grid solutions.
Scenario drivers	CAN Europe	TYNDP 2022 scenarios should differentiate the degree of circularity in industrial activity which then impacts its energy demand as well as its resources demand, thus influences its carbon footprint. If TYNDP 2022 scenarios focus on opposing “independency” and “autonomy”, such scenarios might not necessarily help to identify the best pathway towards the Paris Agreement’s 1.5°C target.	We do agree that circularity and its impact on industrial activity and raw material consumption is important driver. As presented during the 3 July webinar, it will certainly be used to differentiate scenarios.
	CAN Europe	Although recycling is an important element in a circular economy approach for transforming and modernising industries, the reduction of raw material demand and the degree of reusing raw materials and products also should be integrated.	We do agree that circularity and its impact on industrial activity and raw material consumption is important driver. As presented during the 3 July webinar, it will certainly be used to differentiate scenarios.

	E3G	We'd recommend simplifying the framing around the four critical determinants for our energy system going forward. The complexity you propose will make it hard to trace back interactions in the model as lots of individually uncertain assumptions will cancel each other out. The four key determinants for the shape of the energy system going forward are: (1) availability of green hydrogen, (2) energy efficiency/DSR in buildings, (3) electricity balancing with and without thermal power generation and (4) energy system design as business as usual versus drastic change.	We assume that the draft storylines will cover different development of the four quoted determinants: - green hydrogen could be consequential of a scenario maximizing European RES in order to decarbonize sectors hard to electrify - high degree of energy efficiency/DSR is especially important for a scenario aiming at covering the European energy demand with European RES only - it could be expected that a scenario relying mostly on wind and power as electricity source will need more demand-side flexibility source than a low-carbon scenario including technologies such as nuclear and power generation with CCS - in both case we do not consider that a business as usual system design will be sufficient to achieve carbon neutrality while we agree that the degree of RES penetration in the electricity mix gives a measure of the expected revolution.
SoS/Adequacy	E3G	Include climatic stress, e.g. impact on performance of key bits of supply or networks as the climate changes (e.g. on hydro, nuclear, grids,..) and geographical changes in heating and cooling needs.	We agree on the value of analysing these risks. Currently the impact of climatic stress in demand is explicitly considered and analysed. Additionally, some climatic stress conditions concerning supply or also covered, like synchronised temperature, wind and solar timeseries to capture Dunkelflaute events. Please also keep in mind that further assessments will be provided by the next steps of the TYNDP (infrastructure needs and project assessment). The extension such analysis to other climatic events like floods exceed the scope of our scenario building. As these are more related to security of supply analysis.
	E3G	Include demand side interventions among possible responses to new supply side risks from climatic change which would be more prevalent in some of your low ambition scenarios: precipitation changes affecting power plant energy production (hydropower, thermal power); disruption to energy distribution networks due to lightning, high wind speeds and flooding; and changes in bioenergy crop yields.	The level of Demand side intervention will certainly differ between scenarios. The top-down scenarios are likely to be of similar ambition while their exposure of climatic risk will differ. As stated above, we do not yet the most appropriate process to detail such risks.

Technologies	EREF	The first proposals overall heavily rely on unproven technologies such as hydrogen and CCS. Whilst those technologies might have the potential to play an important role for some applications or – later – for negative emissions, where they are needed when emissions cannot be avoided, it is important to include scenarios without them, only based on renewable energy and energy efficiency.	Each scenario, including one purely based on RES and energy efficiency, will face technical challenges. Many technologies underlying hydrogen and CCS development are already mature (e.g. hydrogen network across French, Belgium and Dutch borders or Enhanced Oil Recovery in the US). Scenarios will rely on a wide range of technologies but at different degrees. We intend to identify the nature of the challenges (technology, public acceptance, way of life...) that each scenario will face.
	Anonymous	It would be relevant to include at least in one top-down scenario the risk that EU cannot rely on imports of low carbon gases nor CCUS and has to manage a more significant drop in final gas demand.	Each scenario, including one purely based on RES and energy efficiency, will face technical challenges. Many technologies underlying hydrogen and CCS development are already mature (e.g. hydrogen network across French, Belgium and Dutch borders or Enhanced Oil Recovery in the US). Scenarios will rely on a wide range of technologies but at different degrees. We intend to identify the nature of the challenges (technology, public acceptance, way of life...) that each scenario will face.
	Anonymous	It would be relevant to consider the possibility to maintain nuclear generation at its 2030 level (or increase where possible) in EU countries that are open to this climate neutral technology.	New nuclear units (partly compensating capacity decommissioning) are likely to be part of the scenario storyline using low carbon technologies and imports to complement European RES. The level of development of nuclear is still to be defined. In any case the Bottom-up scenario based on national energy and climate policy will take into account the latest country specific outlooks.
	CAN Europe	The policy framework beyond the NECPs as a driver could be better integrated in the top-down scenarios, e.g. in view of potentially more national governments pursuing dedicated phase-out policies to end the use of fossil fuels in the buildings sector.	Scenarios are expected to be coherent with NECP in terms of phase-out policies. Doing so they will distinguish the end of commercialisation of a technology and the disappearance from the stock.
	CAN Europe	The impact of novel technologies in transport could be included more in detail, e.g. in view of efficiency gains or long-term electrification of parts of aviation and which energy infrastructure needs are caused by a potential market introduction of liquid synthetic fuels as a substitute for fossil kerosene.	The TYNDP 2020 Scenario Report already includes some degree of electrification of the aviation and the synthesis of e-liquids. The next edition will provide the opportunity to provide additional details.

	E3G	Critical assumptions with high uncertainties around cost or deployment rate/potential should be highlighted and individual stress tests performed, currently these would include for example CCS location, potential and cost, hydrogen potential and infrastructure cost, energy efficiency deployment rate.	The TYNDP Scenario building process needs to strike the right balance between the number of scenarios to capture stakeholder expectations, the level of details required to assess infrastructures and the 2-year timeline in order not to endanger TYNDP and PCI processes. As a result the critical assumptions are reflected through 2 top-down scenarios combining differently the key parameters. In the scenario report we plan to be as transparent as possible on the assumptions we have considered (and the challenges/risks associated with them).
Transparency	E3G	Greater transparency would aid buy-in, this should include: • Publication of all input data (incl. sources) and ideally an open source model • Publication of network utilisation rates • Academic peer review of the model • Publish all consultation response and your responses.	ENTSOG and ENTSO-E value transparency in their scenario building process. Data publication is improving on continuous basis as illustrated the wide set of new data release with the final version of the TYNDP Scenario Report 2020. For the 2022 Scenario Building process, ENTSOG and ENTSO-E will release Questions and Answers after each consultation phase (including webinar).
	E3G	Benchmarking: input assumptions should be drawn from a wide range of sources, including scientifically verified sources.	Benchmark of our figures has always been important in TYNDP scenario development. This was also highlighted in the final scenario report for TYNDP 2020 where we benchmark key topics to EC LTS scenarios. And benchmarking will remain an important topic for TYDNP 2022 scenario development. We have continuous bilateral engagement with stakeholders to obtain best available information for identifying input parameters. Even if potential evolution of parameters is beyond the scope of scientifically verified sources. For this reason, stakeholders are invited to provide their views on the parameters in consultations as well.