Annex 4 – Demand

Question 1: Biomass range

Feedback (Germanwatch):

It seems that in both scenarios the relevance of biomass is very strong, maybe overly strong.

Response:

The draft scenarios from TYNDP were designed with a level of biomass which does not exceed the levels observed in the Impact Assessment from the European Commission (link). Distributed Energy was comparable to the CPRICE scenario, whereas Global Ambition was lower that the Impact Assessment. In the public consultation several stakeholders commented that the biomass utilization should be lower. In response the level in Distributed Energy was reduced. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment.

Feedback (WindEurope):

"We have reasonable concerns regarding the massive role of bioenergy. The scenarios are assuming that there will be an ever-increasing availability of bioenergy, starting from 2030 on, which could not materialize.

The extensive use of biomass in sectors like the buildings sector creates additional environmental problems such as the difficulties to control pollutants emissions and their relevant contribution of poor air quality levels not complying neither with EU nor WHO limits, something inconsistent with the European ambition to move towards a zero pollution environment. Other solutions like biomethane are still under R&D and are yet not competitive and could imply extra-GHG emissions due to methane leakages. Biofuel's production conflicts with other uses such as food production and the achievement of some UN SDGs and may increase LULUCF emissions in the EU or outside the EU due to carbon leakage phenomena.

Therefore, we suggest not underestimating the risk of the limited potential of bioenergy production, availability in international markets and restrictions of use."

Response:

The draft scenarios from TYNDP were designed with a level of biomass which does not exceed the levels observed in the Impact Assessment from the European Commission (link). Distributed Energy was comparable to the CPRICE scenario, whereas Global Ambition was lower that the Impact Assessment. In the public consultation several stakeholders commented that the biomass utilization should be lower. In response the level in Distributed Energy was reduced. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment.

De demand for biofuel has also been reduced, especially in Distributed Energy. In part because of increased market share for electric transportation.

Both Distributed Energy and Global Ambition assume a reduction in direct use of biomass in the residential and tertiary sectors. More information on the final demand of biomass is included in the updated main report.

Feedback (Enel SpA):

"We have reasonable concerns regarding the massive role of bioenergy in both the Distributed Energy and Global Ambition scenarios from TYNDP 2022 draft Scenarios. The ENTSOs scenarios are assuming that there will be an ever-increasing availability of bioenergy, starting from 2030 on, which could not materialize.

The use of renewable energy such as biomass and, biofuels (despite the limited availability due to sustainability considerations) could offer a complementary solution to decarbonize sectors such as aviation. The extensive use of biomass in sectors like the buildings sector creates additional environmental problems such as the difficulties to control pollutants emissions and their relevant contribution of poor air quality levels not complying neither with EU or WHO limits, something inconsistent with the European ambition to move towards a zero pollution environment. Other solutions like biomethane are still under R&D and are yet not competitive, and could imply extra-GHG emissions due to methane leakages. Biofuels production, particularly those of 1st generation, conflict with other uses such as food production (the "food vs fuels dilemma") and the achievement of some UN SDGs, and may increase LULUCF emissions in the EU or outside the EU due to carbon leakage phenomena.

Therefore we suggest not underestimating the risk of limited potential of bioenergies production, availability in international markets and restrictions of use."

Response:

The draft scenarios from TYNDP were designed with a level of biomass which does not exceed the levels observed in the Impact Assessment from the European Commission (link). Distributed Energy was comparable to the CPRICE scenario, whereas Global Ambition was lower that the Impact Assessment. In the public consultation several stakeholders commented that the biomass utilization should be lower. In response the level in Distributed Energy was reduced. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment.

The demand for biofuel has also been reduced, especially in Distributed Energy. In part because of increased market share for electric transportation.

Both Distributed Energy and Global Ambition assume a reduction in direct use of biomass in the residential and tertiary sectors. More information on the final demand of biomass is included in the updated main report.

Feedback (CAN Europe):

See our response to question 16 on the consistency with regards to the LULUCF potential and the increase in bioenergy use in the Distributed Energy scenario compared to its previous version.

Response:

The draft scenarios from TYNDP were designed with a level of biomass which does not exceed the levels observed in the Impact Assessment from the European Commission (link). Distributed Energy was comparable to the CPRICE scenario, whereas Global Ambition was lower that the Impact Assessment. In the public consultation several stakeholders commented that the biomass utilization should be lower. In response the level in Distributed Energy was reduced. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment.

LULUCF figures for the TYNDP scenarios were taken from the Impact Assessment of the European Commission. The use of biomass for energy purposes in the TYNDP 2022 scenarios are also benchmarked against the same Impact Assessment. As shown in the main report both TYNDP 2022 scenarios are below the Impact Assessment in terms of biomass consumption. As a result, the use of LULUCF from the Impact assessment could be regarded as conservative.

Feedback (Oeko):

After a reduction of biomass usage from the draft to the final version of the DE scenario in TYNDP 2020, it was increased again significantly for TYNDP 2022. We do not comprehend your statement "The biomass supply levels are quite similar to the assumptions in the Final TYNDP 2020 scenarios". It must be assumed that there might be inconsistencies in the scenarios due to the also very high LULUCF assumptions. See question 16.

Response:

The draft scenarios from TYNDP were designed with a level of biomass which does not exceed the levels observed in the Impact Assessment from the European Commission (link). Distributed Energy was comparable to the CPRICE scenario, whereas Global Ambition was lower that the Impact Assessment. In the public consultation several stakeholders commented that the biomass utilization should be lower. In response the level in Distributed Energy was reduced. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment.

LULUCF figures for the TYNDP scenarios were taken from the Impact Assessment of the European Commission. The use of biomass for energy purposes in the TYNDP 2022 scenarios are also benchmarked against the same Impact Assessment. As show in the main report both TYNDP 2022 scenarios are below the Impact Assessment in terms of biomass consumption. As a result, the use of LULUCF from the Impact assessment could be regarded as conservative.

Feedback (Agora Energiewende):

"Biomass on the one side can be seen as sustainable, as long CO2 emissions from biomass are balanced by growing biomass absorbing the same amount of CO2. On the other hand, the incineration of biomass, including process emissions, emits similar volumes CO2 as oil.

Therefore, it's important to remain prudent on the use of biomass. Agora Energiewende suggests using the JRC scenarios (ENS Low or ENS_Med_BAU) with a sustainable potential of around 2000 and 1800TWh/yr reduced by 1st generation bioenergy and stemwood. See also: https://data.jrc.ec.europa.eu/dataset/74ed5a04-7d74-4807-9eab-b94774309d9f . The biomass figures seem therefore overestimated (p.26)."

Response:

Thank you for the suggested study. We have also used this one as a reference in the updated scenario report. In response to the public consultation we have reduced the level of biomass in Distributed Energy was reduced. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment (link). Furthermore both scenarios are well below the potentials in the JRC study you recommended.

Feedback (Eurelectric):

"Eurelectric notes a significant increasing share of biomass (especially of biomethane) in both scenarios in the primary energy supply (point 4.2.1), which is not clearly explained in the point 4.2.2 (especially which countries consider this usage in their NEPC or how they reached this scenario).

Eurelectric has reasonable concerns regarding the relevant role of biomass – especially the role of biomethane) in both the DE and GA scenarios from TYNDP 2022 draft Scenarios which is not sufficiently justified in the report. Hence, Eurelectric recommends providing more information explaining the figures for biomass/biomethane in the coming decades but also on the technology required to scale it up and the expected costs making the outcome feasible at the referred time horizons."

Response:

The draft scenarios from TYNDP were designed with a level of biomass which does not exceed the levels observed in the Impact Assessment from the European Commission (link). Distributed Energy was comparable to the CPRICE scenario, whereas Global Ambition was lower that the Impact Assessment. In the public consultation several stakeholders commented that the biomass utilization should be lower. In response the level in Distributed Energy was reduced. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment. And also below the potentials stated by JRC (link).

More information on the biomethane assumptions can be found in the Scenario Building Guidelines report annex IX.

Feedback (EDF):

Assumption seems ambitious but in line with other studies, quite a bit high still as uncertainties about the real environmental impact and biodiversity issues are growing. EDF recommends to provide more information explaining the figures for biomass/biomethane in the years explored but also on the technology required to scale it up.

Response:

The biomass section in the updated main scenario report has been expanded to further clarify the scenario assumptions and data sources. More information on the biomethane assumptions can be found in the Scenario Building Guidelines report annex IX.

Feedback (GD4S):

The assumption on biomethane and synthetic methane (through methanation) seems very cautious according to the last studies made for instance by the IEA (2020). We believe a sensitivity analysis could be completed with more ambitious targets for 2050 (1,200 – 1,400 TWh of biomethane).

Response:

In the updated scenarios the production of biomethane was increased in certain countries to better reflect national potentials and ambitions in these countries. As a result the biomethane production on a EU-27 level is also increased. Furthermore, the updated COP21 scenarios now also assume an uptake of synthetic methane in 2040 and 2050.

Feedback (Ørsted):

"Natural gas supply is replaced by biogas and H2 towards 2050, but it can be argued that assuming ~ 1PWh of biomethane supply in 2050 may seem overly ambitious. That is compared to today's production of 26 TWh of biomethane and 167 TWH of biogas.

While Appendix IX (section C) in the scenario building guidelines report provides useful assumptions on availability of bio feedstocks, the question remains if cost, technology and regulatory developments will allow it to scale in the amounts required."

Response:

The achievement of carbon neutrality is by nature a tremendous challenge whatever the pathway Europe will select. They are not only related to the use of immature technologies from today's point of view. RES development acceptance, less energy intensive way of living, CAPEX intensive mature technologies represent similar challenges by level if not by nature. The TYNDP 2022 scenarios are designed to capture and reflect the uncertainties regarding all these developments. Furthermore, the scenarios also show that no technologies can be excluded if net-zero carbon emissions is to be achieved.

Feedback (Engie):

"While TYNDP and EC scenarios end up in 2050 at the same level of biomass utilization for EU27, they seem to differ at the beginning (TYNDP accounting for less biomass than the EC Impact Assessment) and in 2030 (TYNDP is more ambitious than EC). In particular, if we look at 2030 the low assumption from TYNDP is higher than the highest assumption from the European Commission (ALLBNK, which is by the way already discarded as an option as it goes beyond the 55% climate target for 2030).

One of the explanatory drivers of this difference between EC and TYNDP scenarios seems to be the potential for biomethane in the medium term, that appears to be underestimated in the EC scenarios for 2030.

We agree that biomethane will have a key role to play to decarbonize gas usages already in 2030 (almost 400 TWh in 2030 and around 900 TWh in 2050 in the TYNDP DE scenario). At the same time we believe that in order to unlock such potential, a specific incentivizing framework should be introduced such as ex ante targets or quotas on biomethane. We regret that the Fit for 55 package, as it stands now, falls short of proposing robust incentivizing targets. Moreover, it ought to be borne in mind that for biomethane to develop and provide all of the positive effects it can generate, there needs to be a robust market design that allows the market to fully take off. In this context the role of guarantees of origin and their harmonized use across Europe (for instance as a valid tool in the ETS system) is of particular importance."

Response:

Thank you for this comment. We agree with your observation that proper incentives and market design are needed to support certain consumer behavior or technology investment. This not only applies to biomethane, but also for a lot of other technology options. Our approach does not make specific assumptions on what the market design looks like, or which policy measures will be put in place. Instead the scenario reflects quantitative ranges for the respective technologies, while assuming that conditions for development will be favorable or not.

Feedback (Edison S.p.A.):

In general, the use of biomass is consistent with the storyline report, however at country level the estimate could be too high. For example, in the case of Italy, the scenarios GA and DE foresee a supply of 72 and 97 TWh in 2050 for the biomethane. These figures underestimate the maximum production potential that should be closer to 200 TWh (cf. "Consorzio biogas-potenziale biometano-marzo 2017", p 17, considering both inputs on Biomethane from Olive Mill Wastewaters (OMW) and Agricultural Biomethane).

Response:

Biomethane production in Italy (and some other countries) was increased to better reflect national potentials and ambitions. Specific details can be found on the Visualization Platform.

Feedback (BDEW):

"Both scenarios foresee a strongly increasing biomass supply (see chapter 4.2.2 of the draft scenario report), with the DE scenario achieving around 10 per cent higher values than the GA scenario. In both scenarios, the increase in biomass used for biomethane production represents the major driving force of this development.

The scenarios are in line with the respective assumptions made in the Storyline Report. Yet, the level of biomass production appears very ambitious, notably in the DE scenario. Besides, the differentiation between the fields of utilisation of biomass (figure 18 in chap-ter 4.2.2) is not clear: How to distinguish

use for biomethane from use for electricity since electricity is also produced from biomethane? And what is meant by "direct use" of bio-mass? BDEW asks for more explanation on these aspects."

Response:

In response to the public consultation we have reduced the level of biomass in Distributed Energy. As a result both Distributed Energy and Global Ambition are now below the Impact Assessment (link). The biomass section in the updated main scenario report has been expanded to further clarify the scenario assumptions and data sources.

Question 2: BEV & FCEV range

Feedback (WindEurope):

"While the range forecasted for the market share of passenger electric vehicles in the TYNDP 2022 scenario has good values for 2050 (75-95% of the market share of EVs in passenger car fleet by 2050), the 2030 figures are too low, posing a large gap to bridge. What is particularly concerning is that the share of BEVs in GA seems to be around the same level (~15%) as of today's BEV share in total car sales. Perhaps one of the scenarios should have a stronger uptake already in 2030. This is far below the European Commission's Regulation proposal on CO2 standards for light vehicles, which points to 100% zero-emission new vehicles by 2035.

Furthermore, ~50% of heavy trucks in 2050 are still internal combustion engines, while the FCEV share in the passenger cars segment stands at ~20% in 2050. This both stands in contrast not only to carbon-neutrality and fails to reflect rapid developments in vehicle electrification but also with the plans anticipated by main EU truck manufacturers on medium-range vehicles.

The IEA's Net Zero by 2050 roadmap indicated that heavy trucks would have a 30% share of PHEVs, BEVs, and FCEV in sales by 2030 and 99% by 2050 (dominantly battery electric). For cars this figure would increase from 64% in 2030 to 100% in 2050.

We do not agree with the rather aggressive assumptions taken on FCEV. For passenger cars, there will be very little room for fuel-cell vehicles in the long term, given that the cost reductions for electric vehicles make it uneconomical to move towards a capillary distribution of hydrogen for private consumers. This is reassured by the most relevant scenario exercises, which foresee certainly less than 10% FCEV in the private fleet. Both scenarios, and in particular the GA scenario, move oddly in an opposite direction. A high share of FCEV in the passenger car fleet, in particular referring to the Global Ambition scenario, limits the potential of decarbonization and energy efficiency in the transport sector. Hydrogen vehicles are between 2.5-3.5 times less efficient than BEVs so they require more than double or even triple of RES power for the same final work. Only, for in segments such as heavy-duty /freight transport (requires longer driver range and or continuous operation) FCEV or hydrogen-based solutions powered by RES (e.g. synthetic fuels) could become a complementary alternative to battery electric vehicles solutions."

Response:

Based on feedback of several stakeholders we have increased the EV shares for passenger cars in Distributed Energy for 2030. As a result the growth trajectory of the scenario improved. And the two COP21 scenarios show more differentiation compared to the draft. Furthermore, the 2050 BEV share for heavy trucks was also increased in Distributed Energy, to further differentiate scenario scenarios.

We support your observation that FCEV technology is in particular promising for heavy goods transport. This is also reflected in the TYNDP 2022 scenarios, where market shares are higher for trucks than for passenger vehicles. In both COP 21 scenario BEV covers the lion's share of the passenger car fleet in 2050. However FCEV offer benefits though ease of use for refilling and longer ranges. This is captured in the Global Ambition scenario, where FCEV share is a bit higher for passenger cars.

Both scenarios show some residual market share for internal combustion engines, in particular for heavy goods transport. The category that was shown in the draft report not only consist of conventional (petrol/diesel) vehicles, but also included hybrid and methane vehicles. The updated scenario report provides more detail on these different sub-categories. Fuel for these types of vehicles is also decarbonized by 2050, as is shown in the supply section of the report.

Feedback (Enel SpA):

"We do not agree with the aggressive assumptions taken on FCEV. For passenger cars, there will be very little room for fuel-cell vehicles in the long-term, given that the cost reductions for electric vehicles makes uneconomical to move towards a capillary distribution of hydrogen for private consumers. This is reassured by the most relevant scenario exercises, which foresee certainly less than 10% FCEV in the private fleet. Both scenarios, and in particular the GA scenario, moves oddly in an opposite direction. In the case of heavy trucks, FCEV values seem as well overestimated, as the cost decrease in batteries expected by most analyst will make short and medium-distance road freight transport feasible to be electrified without range concerns, and a lower cost compared to FCEV.

A high share of FCEV in passenger car fleet, in particular referring to Global Ambition scenario, limits the potential of electrification in terms of decarbonization and energy efficiency in the transport sector. Hydrogen vehicles are between 2,5-3,5 times less efficient then BEVs so they require more than the double, or even triple of RES power for the same final work. . In the truck segment, approximately half of EU's total truck activity (in tonnes.km), featured by trips of less than 300 km, could be covered already today by electric trucks[Transport & Environment (2020). Unlocking Electric Trucking in the EU: recharging in cities] and the range and availability of electric truck vehicles continues to expand thanks to new models coming to the market and the commitments taken by the industry[CEO alliance 2021 HD truck Charging Final Report]. In the long haul trip (defined as trips above 400km and accounting for 4% of the trips and 26% of the activity1) the future for battery electric solutions look promising with the breakeven in terms of total cost ownership (TCO) between a diesel heavy truck (>16 ton) and a BEV one estimated for 2027 whereas not before 2035 for the same ICE heavy truck when compared to a fuel cell truck.

Moreover, it would be interesting to have a sense as well on technologies for public road transport, mainly buses, as the most promising technology nowadays to decarbonize this segment is e-mobility, with already a significant adoption."

Response:

Based on your and other feedback we have increased the BEV shares for heavy trucks in Distributed Energy for 2050. We support your observation that FCEV technology is in particular promising for heavy goods transport. This is also reflected in the TYNDP 2022 scenarios, where market shares are higher for trucks than for passenger vehicles. In both COP 21 scenario BEV covers the lion's share of the passenger car fleet in 2050. However FCEV offer benefits though ease of use for refilling and longer ranges. This is captured in the Global Ambition scenario, where FCEV share is a bit higher for passenger cars.

Feedback (Agora Energiewende):

Our H2 insights study implies that nearly all passenger cars will be BEV, and 80% of the distances for heavy trucks can be covered by BEVs, which are more efficient: https://static.agora-energiewende.de/fileadmin/Projekte/2021/2021_11_H2_Insights/A-EW_245_H2_Insights_WEB_V2.pdf (p. 30). Therefore fuel cells for passenger cars and heavy trucks seem overestimated.

Response:

Distributed Energy explores a pathway where BEV share of passenger cars is close to 100 present in 2050. To ensure sufficient scenario differentiation, BEV share in Global Ambition is a bit lower, but still cover the majority share for passenger cars. In addition the market share of FCEV is a bit higher, to reflect benefits though ease of use for refilling and longer ranges.

We acknowledge that the possibilities regarding BEVs for heavy good transport were not fully reflected at draft scenario level. Based on your and other feedback we have increased the BEV shares for heavy trucks in Distributed Energy for 2050.

Feedback (Eurelectric):

"Eurelectric notes a significant increasing share for the development of Fuel Cell Electric Vehicles (FECVs) by 2050 in both scenarios for passenger cars and heavy duty.

We do not agree with this assumption on FECVs. First of all, Eurelectric believes that a high share of FCEV in passenger car fleet, in particular referring to Global Ambition scenario, limits the potential of decarbonization and energy efficiency in the transport sector.

Moreover, given the discontinuation of some early FCEV models in the passenger car segment, Eurelectric does not expect a high FCEV scenario to be realistic in 2030 to say the least. At the same time, several truck manufacturers have already addressed to focus only on BEV. The development is limited by the lower efficiency of FECV and the expected progress in technology and cost vs. EV.

This element has been also confirmed by several automotive CEOs when describing their company's plans for the coming decade. Additionally, a 'path dependency' effect will affect the adaptation of Fuel Cells for Passenger cars as opposed to Hybrid/Battery Electric vehicles. It is foreseen that EV Charging stations will be plentiful by 2030 so that the economics of then competing against such a network with Fuel Cells requiring Hydrogen will be increasingly difficult. For instance, customers of EV can expect to charge easily their passenger vehicles at home.

FCEV would have relevance in the heavy-duty segment in case the FCEV can actually respond to technical and cost challenges set on them by EV. In particular, it seems unlikely that battery systems will be economic in powering trucks given the high weight of battery required for long distance heavy trucks. In these cases, the higher power density afforded by FCEV and Hydrogen will be much more feasible if the practical challenges of this technology could be fixed to make it operational."

Response:

First of all we believe that FCEV technology do not limit the potential for decarbonization but rather facilitates it. The (hydrogen) fuel for this technology can and will be decarbonized over the years, as is also reflected in the scenarios. In this regard FCEV are not different from BEV, as further decarbonization of electricity supply is also needed.

Distributed Energy explores a pathway where BEV share of passenger cars is close to 100 present in 2050. To ensure sufficient scenario differentiation, BEV share in Global Ambition is a bit lower, but still cover the majority share for passenger cars. In addition the market share of FCEV is a bit higher, to reflect benefits though ease of use for refilling and longer ranges.

We support your observation that FCEV technology is in particular promising for heavy goods transport. This is also reflected in the TYNDP 2022 scenarios, where market shares are higher for trucks than for passenger vehicles. We acknowledge however that the possibilities regarding BEVs for heavy good transport were not fully reflected at draft scenario level. Based on your and other feedback we have increased the BEV shares for heavy trucks in Distributed Energy for 2050.

Feedback (EDF):

"A scenario with a stronger penetration of electric vehicle for passenger cars and heavy trucks should be considered. For example, for France, DE, scenario with the highest market share of EV, forecasts 82% of EV in 2050 for passenger cars whereas the freshly released reference scenario of RTE forecasts 94% of EV in 2050. Likewise, The many journeys made by heavy trucks are lower than at 300km (60% in France), therefore a scenario with a higher penetration of electricity could be considered.

Moreover, while there is a consensus on the development of electric vehicles, the market share of EVs in GA in 2050 remains low to the detriment of hybrid vehicles. It is surprising that for France, in GA in 2050, EVs represent only 29% of the fleet while hybrid vehicles 45%. A high share of FCEV in passenger car fleet, in particular referring to limits the potential of decarbonization and energy efficiency in the transport sector. Moreover, given the discontinuation of some early FCEV models in the passenger car segment, EDF does not expect a high FCEV scenario to be realistic in 2050. Even if it is essential to make contrasting scenarios, the share of EV in the fleet should be revised upwards and to higher levels than those of hybrid in GA."

Response:

Based on your comments we have increased the French EV share for passenger cars in Global Ambition at the expense of PHEVs and FCEVs. We also have increased the BEV shares for heavy trucks in Distributed Energy for 2050.

Feedback (GD4S):

More details about the construction of the assumptions would be welcome, especially concerning the level of EV in passenger cars. Sensitivity on the level and the consumption and its impact on the grid should be provided.

Response:

The updated scenario report provides more details on the market shares of the different vehicle technologies. The use of sensitivity analyses is beyond the scope of the joint scenario building process. The gas CBA methodology however includes sensitivity for some of the parameters. Impact on the grid is also not part of the scenario building exercise but will be part of the TYNDP.

Feedback (Ørsted):

Orsted notes a surprisingly low share for electric vehicles. For example, the FCEV share in the passenger cars segment stands at less than 20% in both scenarios in 2030. These forecasts might be overly pessimistic, given that they do not reflect rapid developments in vehicle electrification. Already today (ie in September 2021), 15% of vehicle sales were BEV. This share is set to continue going up. The vast majority of automakers has already committed to BEVs and phase-out selling ICEs. A BEV passenger cars future is also reflected in market valuations of public companies. Moreover, regulation and policy is supporting this trend. The proposed CO2 standard on vans and cars, as part of the Fit-for-55, would see a phase-out of non-zero emission cars by 2035. Followingly, the below 20% numbers for 2030 are unjustifiably low.

With regards to heavy trucks, ~50% of these are still internal combustion engine in GA in 2050. This stands in contrast to carbon-neutrality."

Response:

We like to point out that the market shares presented in the draft scenario report are regarding total fleet rather than only the new sales in given year. For Distributed Energy we increased the market share for passenger BEV in 2030 a bit to ensure a more plausible growth trajectory. The resulting market share is above the Impact Assessment scenarios from the European commission.

Global Ambition indeed shows a substantial market share for ICEs for heavy trucks in 2050. The category that was shown in the draft report not only consist of conventional (petrol/diesel) vehicles, but also included hybrid and methane vehicles. The updated scenario report provides more detail on these different sub-categories. Fuel for these types of vehicles is also decarbonized by 2050, as is shown in the supply section of the report.

Feedback (Eurogas):

It is quite difficult to have a precise picture of the dedicated strategy for each transport segment. More details are therefore welcomed. The role of fuel cell seems very high which would need an extensive hydrogen distribution network either with pipes or trucks or trains. For densely populated areas transporting H2 with trucks can be restricted. If – on the other hand – the distribution grid is converted to hydrogen to serve filling stations for mobility – all other customers will convert too which will

increase the hydrogen consumption. For heavy trucks, the share of gas/methane vehicles seems very low. The advantages in terms of decarbonisation of all type of gas/LNG solutions in mobility should not be underestimated.

Response:

The TYNDP 2022 scenarios explore different pathways, also for hydrogen. Hydrogen applications are foreseen not only for the mobility sector, but also for industry, power generation and heating in the built environment. It is clear that the uptake of hydrogen in these sectors will require specific hydrogen infrastructure. This applies to both the transmission as well as the distribution level.

The updated scenario report provides more detail on these different mobility technologies. Hybrid and methane vehicles are now presented in separate categories for further transparency.

Feedback (currENT Europe):

"While the range forecasted for the market share of passenger electric vehicles in the TYNDP 2022 scenario has good values for 2050 (75-95% of the market share of EVs in passenger car fleet by 2050), the 2030 figures are too low, posing a large gap to bridge. Perhaps one of the scenarios should have a stronger uptake already in 2030.

Furthermore, ~50% of heavy trucks in 2050 are still powered by internal combustion engines, while the FCEV share in the passenger cars segment stands at ~20 % in 2050. This both stands in contrast to carbon-neutrality and fails to reflect rapid developments in vehicle electrification.

The IEA's Net Zero by 2050 roadmap indicated that heavy trucks would have a 30% share of PHEVs, BEVs, and FCEV in sales by 2030 and 99% by 2050 (dominantly battery electric). For cars, this figure would increase from 64% in 2030 to 100% in 2050."

Response:

We like to point out that the market shares presented in the draft scenario report are regarding total fleet rather than only the new sales in given year. For Distributed Energy we increased the market share for passenger BEV in 2030 a bit to ensure a more plausible growth trajectory. Based on your and other feedback we have increased the BEV shares for heavy trucks in Distributed Energy for 2050.

Global Ambition indeed shows a substantial market share for ICEs for heavy trucks in 2050. The category that was shown in the draft report not only consist of conventional (petrol/diesel) vehicles, but also included hybrid and methane vehicles. The updated scenario report provides more detail on these different sub-categories. Fuel for these types of vehicles is also decarbonized by 2050, as is shown in the supply section of the report.

Feedback (Engie):

"Yes, assumptions are consistent with Storyline report. However, it is difficult to have a good picture of the dedicated strategy for each transport segment. Thanks to the visualization tool, it is possible to look for each country but no view at EU level.

However, the place of fuel cell in GA seems unrealistic in terms of costs for passenger cars as it will induce to develop an hydrogen distribution network. For heavy trucks, share of methane/e-gas vehicles seems rather low in some EU Countries despite a high potential of gas for heavy trucks (e.g. 22% for France in GA compared to 74% for Negawatt 2022 scenario)."

Response:

Thank you for your comment. We like to point out that the TYNDP 2022 scenarios explore different pathways for infrastructure assessment. The TYNDP 2022 scenarios are designed to be fit for purpose for infrastructure assessment. Not only for electricity and methane, but also for hydrogen. Existing natural gas infrastructure can in the future be converted for hydrogen transport. Not only at the transmission level, but also for the local distribution grids. The latter would also enable the application of hydrogen in for example mobility or residential and tertiary heating. This is also reflected in the scenarios.

Feedback (Edison S.p.A.):

Edison appreciates the splitting between "passenger cars" and "heavy trucks". For the passenger cars one could expect a quasi-complete electrification, regarding heavy transportation, the decarbonisation process would be more difficult, and it will be necessary to consider the use of gas as the main vector in the medium to long term.

Response:

Thank you for your comment

Feedback (BDEW):

The scenarios are in line with the respective assumptions made in the Storyline Report. In view of the current uptake of electric vehicle deployment across Europe the figures fore-seen for 2030 appear achievable. It is difficult to evaluate the 2050 EV figures as well as the figures for fuel cell electrical vehicles for 2030 and 2050.

Response:

Thank you for your comment

Question 3: Heat pump range

Feedback (Germanwatch):

No, the share of heat pumps is not significantly higher in DE scenario than in GA scenario. In both scenarios, gas based heating systems continue to play a major role (albeit then running on renewalbe or decarbonized methane and/or hydrogen).

Response:

The EU-27 market shares for heat pump technologies have been added in the demand chapter of the updated scenario report. This new section illustrated how Distributed Energy focusses more on all electric heat pumps, whereas Global Ambition has more hybrid heat pumps. Differentiation between the scenarios may differ a lot from one country to another. Country specific data can be found on the Visualisation Platform.

Feedback (WindEurope):

The use of hybrid heat pumps could lead to a significant lock-in effect due to sustained investments in distribution gas networks, potentially increasing the related burden of costs for consumers. Hybrid heat pumps have lower efficiencies than electric heat pumps and higher emissions, thus substantially decreasing energy savings and reducing the penetration of renewable energy sourcing in buildings. The combination of a lowered share of electric heat pumps and an increasing one of hybrid heat pumps is detrimental to cost-effective decarbonisation.

Response:

ENTSOG and ENTSO-E remain technology and energy carrier neutral while building the TYNDP scenarios. That is why Distributed Energy and Global Ambition explore different future pathways based on storylines. This also applies to heat pump market shares. Whereas Distributed Energy has a stronger focus on all-electric, Global ambition tends more towards hybrid. These storylines are the result of a public consultation.

hybrid heat pump run on electricity for most of the year, but use the (exiting) gas infrastructure for peak. Furthermore, hybrid heat pumps do not require deep renovation in order to operate efficiently, which brings overall costs down. As a result, hybrid heat pumps can enable the decarbonization of older less insulated buildings, or regions where electricity infrastructure capacity is limited. Emission reduction is ensured by the decarbonization of both gas and electricity supply.

Feedback (Enel SpA):

"The projected improvement of costs and efficiency of heat pumps should be considered in the scenarios, leading to higher market shares. According to IEA and IRENA, while heat pumps are a mature technology, their efficiency is expected to increase by 2030 by 30-50% for heating and 20-40% for cooling. Looking at 2050 improvements range between 40-60% for heating and 30-50% for cooling. Flexible demand of heat pumps supports the integration of variable RES through peak load reduction and leads to load shifting during peaks of solar production.

In the buildings sector, energy efficiency gains should be achieved thanks to the increased electrification of the sector via Heat Pumps from deep renovation of existing buildings and new buildings. The adoption in the Global Ambition scenario of low carbon technologies, such as methane and hydrogen with no specified ways of production, could limit the decarbonization potential of such sector. The use of hybrid heat pumps could lead to a significant lock-in effect due to sustained investments in distribution gas networks, potentially increasing the related burden of costs for consumers. Hybrid heat pumps haver lower efficiencies than electric heat pumps and higher emissions,

thus substantially decreasing energy savings and reducing the penetration of renewable energy sourcing in buildings. In the Global Ambition scenario, the combination of a lowered share of electric heat pumps and an increasing one of hybrid heat pumps is detrimental to a cost-effective decarbonization."

Response:

ENTSOG and ENTSO-E remain technology and energy carrier neutral while building the TYNDP scenarios. That is why Distributed Energy and Global Ambition explore different future pathways based on storylines. This also applies to heat pump market shares. Whereas Distributed Energy has a stronger focus on all-electric, Global ambition tends more towards hybrid. These storylines are the result of a public consultation. In the quantification of demand for heat pumps we use the efficiency gains stemming from PRIMES.

hybrid heat pump run on electricity for most of the year, but use the (exiting) gas infrastructure for peak. Furthermore, hybrid heat pumps do not require deep renovation in order to operate efficiently, which brings overall costs down. As a result, hybrid heat pumps can enable the decarbonization of older less insulated buildings, or regions where electricity infrastructure capacity is limited. Emission reduction is ensured by the decarbonization of both gas and electricity supply.

Feedback (EU DSO Entity):

"Questions 21, 23, 24 and 28 collective proposal: the sources mentioned in these questions will be mostly connected to the DSO network. Which means that knowledge, forecasts, opinions, proposal of solutions and data from the DSO area are the key factor here.

At the DSO level, the technologies development effects, mentioned in these questions, will be the applicable."

Response:

The cooperation of DSOs is something we have attempted to address in the 2022 scenario building process. Indeed, as outlined in the bilateral meetings table, the scenario building team met with a group of experts from the DSO networks on multiple occasions, starting at the very beginning of the process. For future editions of the TYNDP scenarios we aim to further extend our cooperation with DSOs

Feedback (CAN Europe):

"We did not find any data indicating the EU27 market shares of electric and hybrid heat pumps in the TYNDP 2022 Draft Scenario Report, in the TYNDP 2022 Scenario Building Guidelines or in the downloadable datasets. As a consequence, it was not possible to compare to what extent the shares suggested in the Distributed Energy scenario and in the Global Ambition scenario are consistent with the assumptions made in the TYNDP 2022 Storyline Report.

Given that there is a huge variety of technologically and economically viable alternatives to gas boilers as flexibility option for heating, CAN Europe earlier questioned the relatively high market share suggested in the TYNDP 2022 Storyline Report. A continued dependency on (fossil) gas and its

infrastructure might tend to make a fast decarbonisation more difficult and costly. CAN Europe recommends the Heat Roadmap Europe 4 as a reference for the potential of renewable heat sources and district heat networks. In our PAC scenario, we assume that the heat delivered by heat pumps in the residential sector reaches 417 TWh in 2030 and 544 TWh in 2050. This amount includes the ambient and geothermal heat captured by heat pumps and the electricity input for heat pump operation. In the tertiary sector, 157 TWh are supplied in 2030 and 319 TWh in 2050."

Response:

The EU-27 level aggregate market shares have been added into the updated scenario report for further transparency. More details can be found in the demand chapter. The Heat Roadmap you recommended was part of the discussion with Euroheat and Power when establishing the scenario assumptions.

Feedback (Oeko):

It was not possible to compare storylines and scenarios regarding heat pumps, as the information given for heat pumps in the scenario report where not sufficient.

Response:

Market shares for different heat pump technologies are available per country on the visualization platform. The EU-27 level aggregate has been added into the updated scenario report for further transparency.

Feedback (Agora Energiewende):

In the building sector, mainly heat pumps, district heating and solar thermal will be applied. Biomass and biogas play a limited role, e.g. for limited application in residential heating and district heating (around 250TWh biogas in 2050 in Agora Energiewende's future of fossil gas study, https://static.agora-energiewende.de/fileadmin/Projekte/2021/2021_07_EU_GEXIT/AgoraEW_Phasing_out_fossil_gas_in_the_EU_Interim_Results_20211028.pdf). The methane demand in the residential and tertiary sector in 2050 (450/500TWh) seems overestimated (p.19).

Response:

Thank you for your comment. In both COP21 scenarios for TYNDP assume heat pumps and district heating together cover the majority of the market share in residential and tertiary heating in 2050. This is also illustrated in the updated scenario report. More information can be found in the demand chapter.

Feedback (Eurelectric):

"Eurelectric notes that DE scenario provides a very ambitious development for electric heat pump while GA rather gives a strong emphasis for the development of hybrid heat pump (twice the figures forecasted in DE scenario in terms of market shares).

In this regard, Eurelectric would rather support DE scenario, compatible with a higher degree of electrification, because it gives a predominant role for proven efficient paths to efficient Cooling and Heating solutions through electric heat pumps, which is overall aligned with Eurelectric scenarios and the objective of carbon neutrality by 2050.

A key element for discussing the shares of electric and of hybrid heat pumps is related to the impact that each technology could have on the demand figures, esp. during stress events (contribution to peak load). As pointed out in the scenario report, one should pay attention that technologies having an impact during stress events or cold snaps could have in turn implications on security of supply and on the cost for consumers, making assumptions on hybrid heat pumps a key parameter for scenario design.

Another important element to consider in the analysis is the overall cost linked to the installation of heat pumps such as the renovation cost of the building. Energy efficiency goes hand in hand with an efficient heating system to avoid energy losses. Installing heat pumps in building with poor energy performance would have a detrimental impact on the energy system costs (cf. impact on demands, both for peak figures and for yearly figures)."

Response:

Thank you for your comments. We are glad that you like the Distributed Energy scenario. We recognize your observation all-electric and hybrid heat pumps have a different impact on energy infrastructure, also with regard to peak load. That is also the main reason for the differentiation between Distributed Energy and Global Ambition in this regard.

Furthermore we also recognize your observation that electric heat pumps generally require deep building renovation in order to operate efficiently. This also has an effect on the overall costs of the installation.

Feedback (EDF):

For France, the penetration of electric heating (heat pumps…) is lower than 50% in DE and GA in 2050 whereas the RTE's reference scenario makes the assumption of 70% of electric heating in 2050. A scenario with a higher penetration of electric heating in residential should be envisaged.

Response:

The country specific assumptions for TYNDP 2022 scenarios have been consulted with the national gas and electricity TSO's. For France the market share of fully electric heating is indeed close to 50%. Additionally, hybrid heat pumps also run on electricity for most of the year. When this is also considered, the market share is close to 60 percent in Global Ambition.

Feedback (Environmental Action Germany):

"We did not find any data indicating the EU27 market shares of electric and hybrid heat pumps in the TYNDP 2022 Draft Scenario Report, in the TYNDP 2022 Scenario Building Guidelines or in the downloadable datasets. As a consequence, it was not possible to compare to what extent the shares suggested in the Distributed Energy scenario and in the Global Ambition scenario are consistent with the assumptions made in the TYNDP 2022 Storyline Report.

Given that there is a huge variety of technologically and economically viable alternatives to gas boilers as flexibility option for heating, DUH questioned the relatively high market share suggested in the TYNDP 2022 Storyline Report. A continued dependency on (fossil) gas and its infrastructure might tend to make a fast decarbonisation more difficult and costly."

Response:

The EU-27 market shares for heat pump technologies have been added in the demand chapter of the updated scenario report. This new section illustrated how Distributed Energy focusses more on all electric heat pumps, whereas Global Ambition has more hybrid heat pumps. Differentiation between the scenarios may differ a lot from one country to another. Country specific data can be found on the Visualisation Platform.

Both Distributed Energy and Global Ambition assume a sharp decrease in market share of gas boilers. In addition the gas supply is also decarbonized, as is illustrated in the supply section of the report. As a result, net zero emissions can be achieved not later than 2050.

Feedback (GD4S):

The two scenarios are not contrasted enough as regards the heating sector and the feasibility of such a level of electrification. Extended sensitivity analysis should be conducted to avoid any lock-in effects to a single technology or overinvestment in one element of the value chain when a system approach would have determined better alternatives. Therefore, we would welcome the detailed analysis of the impact of heat pumps on the energy system and the contribution of hybrid system.

Response:

The EU-27 market shares for heat pump technologies have been added in the demand chapter of the updated scenario report. This new section illustrated how Distributed Energy focusses more on all electric heat pumps, whereas Global Ambition has more hybrid heat pumps. Differentiation between the scenarios may differ a lot from one country to another. Country specific data can be found on the Visualisation Platform.

The use of sensitivity analyses is beyond the scope of the joint scenario building process. The gas CBA methodology however includes sensitivity for some of the parameters.

Feedback (Ørsted):

Ørsted notes that DE scenario provides a very ambitious development for electric heat pump while GA rather gives a strong emphasis for the development of hybrid heat pump (twice the figures forecasted in DE scenario in terms of market shares). Ørsted believes that electric heat pumps are the most efficient way to decarbonize heating and support the approach in the DE scenario.

Response:

Thank you for your comment. ENTSOG and ENTSO-E remain technology and energy carrier neutral while building the TYNDP scenarios. That is why Distributed Energy and Global Ambition explore different future pathways based on storylines. Whereas Distributed Energy has a stronger focus on all-electric, Global ambition tends more towards hybrid.

Feedback (Eurogas):

"The development of full electric heat pumps reflects too optimistic assumptions in both COP21 compliant scenarios. Such an excessive ambition on heat pumps could lead to a technology lock-in and to a further increase of the peak of the electric system, not granting security of supply in a power system dominated by RES with low levels of dispatchable generation. As previously mentioned by Eurogas, E-Cube and EWI published a report analysing in depth the difficulties to manage peak power demand in North-West Europe with very high penetration of electric heat pumps. Frontier economics published a report for the German heating market with the result, that on cold days for unrenovated buildings the efficiency of a electric heat pump levels with a hydrogen boiler due to seasonality and lower efficiency in cold temperature. H2 heat pumps of fuel cells even have a higher efficiency. The dark windless cold spell on the week of the 11.2.2021 shows, that most of the electricity production had to come from conventional production as wind and sun were very low. This is not unusual and has to be taken into account in any efficiency calculation. Unrenovated homes cool out fast if it stays cold several days. If electric heat pumps are installed in these homes the direct heater kicks in with addition 1:1 electricity consumption. An assumption, that these additional loads could be delivered through demand response or batteries, has to be simulated in a real life environment with the given design temperature of the EN ….. in the regions.

Furthermore, the impact of hybrid heat pumps does not adequately reflect the potential of technology. The assumption of max 40% reconversion of gas boilers to hybrid heat pumps in 2050 could be already retained for the 2030 horizon instead.

In addition, gas/H2 heat pumps are not taken into account, even though they are suitable to be installed in a non-renovated building, or in areas with a weak electric grid. This technology can achieve an energy efficiency of 150-170%. Lower heating costs makes this technology a cost effective investment with short payback times.

Acknowledging the difficulties to enforce deep renovations on the existing building stock, sensibility analysis should be done taking into account that the assumed building renovation may not happen to the foreseen level (for technical reasons, lack of funding…). Furthermore, there is no reason why heating insulated buildings with renewable or low carbon gases in highly efficient appliances should be phased until 2050 out if it is a climate neutral as electricity heat pumps.

According to the EC study in 2019 (Comprehensive study of building energy renovation activities and the uptake of nearly zero-energy buildings in the EU). It is estimated that today's buildings will make up at least 75% of the 2050 building stock. Even if renovation picks up the question remains how fast and how deep. For a deep renovation the owners have to spend considerable funds and for many buildings a really low level of consumption can´t be reach because of the substance of the building or e.g. the building is under heritage control. Insulation of roofs is fairly easy, insulation of basements and

the foundation is nearly unpayable. Another very interesting observation in the report was that "Naturally "low-hanging fruit renovations" (typically light renovations) with most favourable cost-benefit ratios will be realised first. Hence, future renovations will have a tendency to feature less attractive cost-benefit ratios. This might potentially further slow-down the renovation process. Within an unchanged market and policy environment, it will get increasingly hard to even keep the current too slow speed." If this proves correct it is of the utmost importance to bring and kind of renewable and low carbon energy to the homes . To install a heat pump in an unrenovated home is inefficient, and comes at a very high cost to the customers and in the end also to the electricity grid operator. Unrenovated homes would always need a hybrid heat pump to get through the winter."

Response:

We recognize your observation all-electric and hybrid heat pumps have a different impact on energy infrastructure, also with regard to peak load. That is also the main reason for the differentiation between Distributed Energy and Global Ambition in this regard. We do recognize the mentioned benefits of hybrid heat pumps. Hybrid heat pump run on electricity for most of the year, but use the (existing) gas infrastructure for peak. Furthermore, hybrid heat pumps do not require deep renovation in order to operate efficiently, which brings overall costs down. As a result, hybrid heat pumps can enable the decarbonization of older less insulated buildings, or regions where electricity infrastructure capacity is limited. These aspects are explored in Global Ambition in particular. Moreover, both scenarios see a role of renewable gases in residential and tertiary heating in 2050. This also illustrated in the updated scenario report. Please refer to the demand chapter for more information.

Hybrid heat pumps running on hydrogen are considered in the scenarios, with highest market shares in Global Ambition. Gas heat pumps ere currently not modelled, but this can be reconsidered for upcoming editions.

Feedback (Engie):

"This question is difficult to answer as the figures about final energy demand (fig. 3 and 4 of the Draft Scenario Report) do not really show the impact of heat pumps.

Furthermore electricity demand in the residential sector (fig. 5) do not exhibit significant differences between the Distributed Energy and the Global Ambition scenarios, which appears counterintuitive (one would expect a more pronounced difference in the DE and GA scenarios). Since there are only two extreme scenarios in this TYNDP, we believe that those should be more differentiated, so that diverging realizations of the scenarios assumptions can be adequately taken into account in the assessment of EU infrastructure needs.

More in general we believe that the development of full electric heat pumps reflects too optimistic assumptions in both COP21 compliant scenarios, especially if energy performance of buildings is not properly accounted for. Such excessive ambition on heat pumps could lead to a technology lock-in and could lead to a further increase of the peak of the electric system, which may be detrimental for security of supply in a power system dominated by RES with low levels of dispatchable generation (see also answers to Q.22 and 23).

On the other hand we believe that the impact of hybrid heat pumps in the COP21 compliant scenarios is not adequately reflecting the potential of this technology and its contribution to the energy

transition. In particular, looking at the model assumptions, the choice to limit to max 40% of existing gas boiler reconversion to this particular solution in 2050 seems challengeable due to the strong benefits of hybrid heating both for power and gas systems. The assumption of max 40% reconversion of gas boilers to hybrid heat pumps could be already retained for the 2030 horizon instead. This sensitivity may be tested in order to measure the impact at peak demand and extreme historical weather conditions on the electricity and gas systems, as well as in a second stage provide a coherent assessment of cost assumptions."

Response:

The EU-27 level aggregate market shares have been added into the updated scenario report for further transparency. This also illustrated the differentiation between the scenarios regarding residential and tertiary heating technologies. More details can be found in the demand chapter.

Indeed residential electricity demand is quite similar in both scenarios, even though the technology market shares are rather different. It should be noted however that hybrid heat pumps also use electricity for most of the year. This means that consumption on a yearly based may be not that different from a all-electric heat pump. However on a hourly bases the difference is quite substantial, in particular in cold periods when a hybrid heat pump uses gas. We also would like to point out that electricity is also used for lighting, appliances and cooking, for which scenario differentiation is limited.

The market shares for both all-electric and hybrid heat pumps have been consulted with national gas and electricity TSO's, in order to capture country specifics. Technology potential for hybrid heat pumps may depend of several factors, including climate, coverage of gas distribution grids, age of building stock, etc. As a result the share of differs a lot from one country to another. In countries with a lot of potential for hybrid heat pumps, the market share in 2050 is a lot higher than 40% of current gas boilers.

Feedback (Edison S.p.A.):

"We appreciated the definition of "Assumptions for Heat Pumps (HPs) modelling" at page 44 of the Scenario Building Guidelines".

The relevance of the use of hybrid pumps should be considered for the medium term. The range of the hybrid pump in the long term will probably decrease coming along with a stronger electrification."

Response:

Thank you for your comment. Hybrid heat pumps do not require deep renovation in order to operate efficiently, which brings overall costs down. As a result, hybrid heat pumps can enable the decarbonization of older less insulated buildings, or regions where electricity infrastructure capacity is limited. We believe these benefits remain also relevant in the longer term. Furthermore, in the longer-term hybrid heat pumps can benefit from the decarbonization of gas supply though biomethane and hydrogen. That is why Global Ambition in particular sees an increase of hybrid heat pumps until 2050.

Feedback (BDEW):

In the draft scenario report it remains unclear which numbers of heat pumps (electric heat pumps and hybrid heat pumps) have been foreseen in the two scenarios.

Response:

Market shares for different heat pump technologies are available per country on the visualization platform. The EU-27 level aggregate has been added into the updated scenario report for further transparency.

Question 4: District heating range

Feedback (Germanwatch):

No, the share of district heating is not significantly higher in DE scenario than in GA scenario. In both scenarios, gas based heating systems continue to play a major role (albeit then running on renewable or decarbonized methane and/or hydrogen).

Response:

Decarbonization of the residential and tertiary sectors is a tremendous challenge that require all available technology options. The role of gas for heating in the built environment will in 2050 clearly be lower than today. However (hybrid) gas-based technologies still have a role to play. For example to enable the decarbonization of older less insulated buildings, or regions where electricity infrastructure capacity is limited.

ENTSOG and ENTSO-E have put great effort in developing differentiated scenarios for a large number of variables. Varying every variable in just two scenarios is very difficult. For some topics, for example district heating, the variation between the is limited. For future editions we seek to further improve the scenario building methodologies.

Feedback (CAN Europe):

We did not find any data indicating the EU27 market shares of district heating in the TYNDP 2022 Draft Scenario Report, in the TYNDP 2022 Scenario Building Guidelines or in the downloadable datasets. As a consequence, it was not possible to compare to what extent the shares suggested in the Distributed Energy scenario and in the Global Ambition scenario are consistent with the assumptions made in the TYNDP 2022 Storyline Report.

Response:

The EU-27 level aggregate has been added into the updated scenario report for further transparency.

Feedback (Oeko):

Again (as for question 21) not enough information and data were given in the scenario report to answer this question.

Response:

Market shares for different heat pump technologies are available per country on the visualization platform. The EU-27 level aggregate has been added into the updated scenario report for further transparency.

Feedback (Eurelectric):

"Eurelectric notes an overall increase of the market shares for district heating in both scenarios. However, DE Scenario has a stronger focus on this technology compare to GA Scenario.

In Eurelectric study "Decarbonisation Pathways", district heating is part of the "alternatives". Thus, the market share of district heating is maximum 20% in the case of residential buildings and 10% for commercial buildings. District heating is an efficient way of flexible utilisation of different sources of waste and ambient heat through heat pumps. District heating also enables utilisation of excess renewable electricity through power-to-heat installations, when combined with heat accumulators. District heating should solely be based on renewable and recovery energy by 2050 alongside a fossil fuel phase-out.

As mentioned in the previous question, another important element to consider is the overall cost linked to the installation of heat pumps such as the renovation cost of the building. Energy efficiency goes hand in hand with an efficient heating system to avoid energy losses."

Response:

Thank you for your comment. We recognize your observation that electric heat pumps generally require deep building renovation in order to operate efficiently. This also has an effect on the overall costs of the installation.

Feedback (Environmental Action Germany):

We did not find any data indicating the EU27 market shares of district heating in the TYNDP 2022 Draft Scenario Report, in the TYNDP 2022 Scenario Building Guidelines or in the downloadable datasets. As a consequence, it was not possible to compare to what extent the shares suggested in the Distributed Energy scenario and in the Global Ambition scenario are consistent with the assumptions made in the TYNDP 2022 Storyline Report.

Response:

The EU-27 level aggregate has been added into the updated scenario report for further transparency.

Feedback (GD4S):

The assumption on the development potential of new District Heating should be carefully assessed in a sector coupling way, in order to optimise investments and end-user billing.

Response:

In order to capture district heating specifics, ENTSO-E and ENTSOG have initiated a cooperation with some district heating stakeholders in order to provide some first insights on how electricity, gas and heat networks can be smartly combined. To this end the electricity load of district heating heat pumps were used as an input to electricity modelling. More information on our approach can be found in the Scenario Building Guidelines Annex I. For future editions of the TYNDP scenarios we aim to further refine our methodologies.

Feedback (Eurogas):

"At the current stage, district heating is mostly produced with CHP connected to distribution grids. We were not able to understand how district heating will be produced in the future. The chapters are cross referencing but we are missing the information how many plants will deliver how much district heating with which technology. In the storyline report it is mentioned, that this will be defined in the scenario, but we could not find it.

Depending on the country district heating is produced with natural gas, biomethane, biomass, coal. Large heat pumps are very rare and their location is concentrating in Scandinavia along the cost. This very specific situation can´t be extrapolated into the other countries. Secondly the immense importance of the local production of electricity seems to be considered as unimportant. Heat pumps need electricity especially in winter where renewable sources are fluctuating. If a large geothermal reservoir exists in a city this is an excellent source, but this cannot be the baseline assumption. Secondly air driven heat pumps lose their efficiency in cold temperatures which makes it even worse. We definitely would ask the drafting team to go into a deeper discussion with more district heating operators to understand what is feasible. If heat pump are the planned variant they will need a full back up production with hydrogen/Biomethane for security of supply reasons. It is unclear whether this infrastructure, capacity and gas volumes are included in the planning.

Ultimately it is unclear on which assumption the calculation is building in regards of temperature levels in the district heating grids. Many systems today run on high temperatures to deliver the heat at the right temperatures and capacity to the end users. These systems cannot be easily changed, as all connected customers have to be fully renovated before."

Response:

We agree on the observation that district heating cannot be implemented everywhere, and that viability is region specific. As a result the market share of district heating also varies per country. More information can be found on the Visualization Platform. In this edition of the TYNDP scenarios we made a first attempt to capture the district heating specifics in order to provide some first insights on how electricity, gas and heat networks can be smartly combined. To this end ENTSO-E and ENTSOG have initiated a cooperation with some district heating stakeholders More information on our approach can be found in the Scenario Building Guidelines Annex I. For future editions of the TYNDP scenarios we aim to further refine our methodologies.

Feedback (BDEW):

The minimum share value of 15 % for district heating is too low. Germany has currently a share of destrict heating in the amount of 14 % at the residential buildings sector. This share needs to be increased by 2030 / 2050 to reach the climat targets. A realistic range for 2050 is between 25 and 35 %.

Response:

The referenced minimum for 2050 is specifically related to the tertiary sector in the Global Ambition scenario. The district heating share in the residential sector is substantially higher in both scenarios. As a result the overall market share of district heating in Germany is much higher than today's level.