Elia Group

Brussel, 1 December 2021

Onze referentie: -
Uw referentie: TASK FORCE SCENARIOS - Belgian Electricity Scenario Report
Onderwerp: Public consultation - BBL input

Dear Expert,

Thanks for giving us the opportunity to provide input in the scenario building process of Elia. Please find below our input.

Question 1 - The link with the European framework

I would rely on the national reports, the EU Member State have to submit to the European Commission:

- The National Energy and Climate Action plans: https://ec.europa.eu/info/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en#final-necps
- The National Long-Term Strategies: https://ec.europa.eu/info/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-long-term-strategies_en#strategies

But these reports are already input for the TYNDP.

I also would have an eye on the Energy Technology Systems Analysis Program of the International Energy Agency, as Belgium and all its neighbouring countries are part of this collaboration.

Bond Beter Leefmilieu Vlaanderen vzw
Tweekerkenstraat 47, B-1000 Brussel
+32 2 282 17 20 · info@bblv.be
BTW BE 0416 114 756
BANK BE34 8939 4407 4490 · BIC VDSPBE91

Concerning the deep decarbonisation of the industry, I can recommend the proceedings of the Industrial Efficiency conference - especially its dedicated panel (link to this panel of the 2020 edition). (Access to the papers of the 2020 edition might be limited - the previous editions should be open for everyone).

There are also interesting contributions in the Summer Studies on Energy Efficiency of the eceee, especially on buildings, transport, ICT and behaviour. Yet, it might be more challenging to find relevant contributions in the many papers presented.

I finally would recommend seeking collaboration with the European Energy Reseach Alliance - more in particular the Joint Programme Energy Systems Integration. This would foster knowledge exchange between in-house experts and academics who could examine particular aspects more into depth.

Question 2 - Proposed storylines

I find the proposed set of scenarios interesting. Yet, I wonder whether they grasp the full variety of potential trends of our energy system.

I observe a significant interdependence between the four axes: the level of energy imports of the EU, the level of flexibility of the electricity demand and the degree of decentralisation of the electricity generation all are directly proportional while all three are inversely proportional to the level of electrification.

I also miss the level of sector integration as a determining parameter. I find the proposed too electricity focused, while the way we organise the heating sector has significant implications on how we can / should organise the electricity sector.

Hence, I'd like to propose a different set of scenarios, based on two major trends (of which I hope that they are sufficiently independent):

- **The level of electrification**: this is one of the major choices our society has to make in organising the electricity system - Elia's vision 2050 provides very valuable insights in that respect
- **The level of (de)centralising components of the energy system:** the more decentralised, the more end-consumer focused the energy system will be, both for producing energy and offering flexibility - the less decentralised, the more large scale / capacity energy systems focused the energy system will be.

From the combination of both, four scenarios can be developed. Below, a narrative for each of these is proposed.

	Low level of electrification	High level of electrification
Centralised energy system	The electricity grids are characterised by a **high degree of interconnection**, allowing an easy flow of electrons in Europe. Aside from power grids, the **natural gas** system remains a **backbone** for supplying Europe with green molecules. **Large capacity renewable electricity installations** have a significant share in the renewable electricity production, such as **offshore wind farms**. Flexibility is offered by (electric) storage, demand response and a limited number of **dispatchable thermal power plants** of large capacity, supplied by green molecules They only provide electricity, no heat. A large share of the **natural gas grids** is **repurposed** to green molecules. A large share of the **heating** in the densely populated areas is still **gas-based.** Locally, **some district heating grids** are deployed. **Heat pumps** are the main source of heat in less densely populated areas.	The electricity grids are characterised by a **very high degree of interconnection**, allowing an easy flow of electrons in Europe. **Natural gas grids** are **limited** to supply hard to electrify sectors with green molecules only. **Large capacity renewable electricity installations** have a significant share in the renewable electricity production, such as **offshore wind farms**. Flexibility is offered by (electric) storage, demand response and multiple **dispatchable thermal power plants** of moderate capacity, many of which are configured as **cogeneration** units, They are fed with biogas to the extent possible, the use of hydrogen (or derivatives) is limited. They feed heat in **district heating grids**, which have a lion's share in densely populated areas, replacing gas grids. Their main source of heat is waste heat from the industry and waste incinerators, (deep) geothermal sources, and large capacity heat pumps. Additional flexibility is provided by heat storage. **Heat pumps** are the main source of heat in the less densely populated areas.
Decentral-ised energy system	The **level of interconnection** of the electricity grids has **increased moderately** compared to the current level. Aside from power grids, the **natural gas** system remains a **backbone** for supplying Europe with green molecules. **Decentralised renewable electricity installations**, such as roof-top PV and wind onshore provide the bulk of the renewable electricity supply. Flexibility is offered by (electric) **storage and demand response**. In addition, a limited number of **dispatchable thermal power plants** of large capacity, supplied by green molecules provide the additional flexibility. The **end-consumer** is **actively involved** in energy production, including wind offshore, and flexibility via energy communities. Many local natural grids are replaced by **small district heating grids**, The majority of these district heating grids are owned by local cooperatives. **Small capacity green gas fuelled cogeneration unit**s provide heat to these grids, aside from locally available renewable heat sources. In parts with a limited renewable heat potential, heating is still (green) gas based via **repurposed gas grids**. **Heat pumps** are the main source of heat in less densely populated areas.	The electricity grids are characterised by a **high degree of interconnection**, allowing an easy flow of electrons in Europe. **Natural gas grids** are **limited** to supply hard to electrify sectors with green molecules only. **Decentralised renewable electricity installations**, such as roof-top PV and wind onshore provide the bulk of the renewable electricity supply. Flexibility is predominately offered by (electric) **storage and demand response**. The **end-consumer** is **actively involved** in energy production, including wind offshore, and flexibility via energy communities. Where there is a high potential of (deep) geothermal energy, (locally sourced) biomass and biogas, **many small district heating grids** have replaced natural gas grids, The majority of these district heating grids are owned by local cooperatives. **Heat pumps** are the main source of heat in the other areas.

Based on this narrative, one can see following similarities between the scenarios, you have defined, and those, I propose:

	Low level of electrification	**High level of electrification**
Centralised energy system	• Global import	• ~ Large scale RES
Decentral-ised energy system	• (no analogue defined)	• e-Prosumers • Flex +

Only for the scenario with a low level of electrification and based on a high level of decentralisation, no analogue was defined by Elia. Hence, I recommend adding such a scenario to the narratives.

As a source of information, I recommend relying on the Comprehensive Assessments on Heating and Cooling, which EU Member States have to submit to the European Commission by the end of 2020, in line with Art. 14 of the Energy Efficiency Directive; see: https://ec.europa.eu/energy/topics/energy-efficiency/heating-and-cooling_en#comprehensive-assessments.

In future, these assessments will make part of the National Energy and Climate Action plans, as stipulated in the recast Energy Efficiency and Renewable Energy Directives.

The development of the scenarios, as proposed above, might require the involvement of Fluxys and the distribution grid operators. It might be challenging to achieve a consensus with these stakeholders, but it would increase the broad acceptance and relevance of the proposed scenarios.

Question 3 - Storylines to scenarios

I propose alternative scenarios to what you propose. Each of the scenarios, I propose, stands on its own merits and needs its proper development.

The way heat is provided to the end-consumers is one of the main differentiators between the scenarios, which I proposed. The development of the scenarios would also partially need to start from there.

Question 4 and 5 - Photovoltaic - Onshore and Offshore Wind

I consider the range provided by these trajectories as reasonable.

I'd prefer to see a higher maximum. I'd increase the potential of wind onshore to 16 GW, 80% of its theoretical potential. I'd increase the potential of solar PV to 60 GW, 60% of its theoretical potential. It does not make much sense increasing the maximum potential of

solar PV to 80% of its theoretical potential, in my point of view, as an appropriate equilibrium between solar and wind production should be maintained.

Question 6 - Underlying assumptions of electricity demand

The proposed drivers can be linked to the differentiators I propose as basis for the scenarios:

- One can expect a lower behavioural change when the focus is on centralised energy systems; vice versa, one can expect a higher behavioural change when the focus is on the end-consumer in a system based on decentralised energy systems.
- The electrification is a main driver for the fuel switching behaviour.

The ranges, especially on heat sources, should be reviewed based on the narrative I propose.

I have no comments on the proposed minima and maxima.

I am also wondering what development of the climate you intend to include in your scenarios. I'd recommend including the cold winters of the 80's. We have observed very cold winters in North-America in the last few years, spurred by a weakened jet stream. It is possible that, one winter, the disturbed jet stream directs polar air to Europe. This would lead to a high electricity demand, especially in view of the increase of electric heating in all scenarios. This possibility should be assessed from my point of view.

Question 7 - Demand Side Response

The flexibility of heating and cooling should be reviewed in view of the narrative I propose.

I have no other comments on the proposed ranges, minima and maxima.

Question 8 - Storage

Energy can also be stored as warm water, even for several months. This should be incorporated in the scenarios.

I have no other comments on the proposed ranges, minima and maxima.

Question 9 - Electrolysers

I have no other comments on the proposed ranges, minima and maxima.

Question 10 - Dispatchable Generation

I support the assumption to add only carbon-free dispatchable generation from 2030 onwards. A fast decarbonisation of the electricity supply is a prerequisite for the decarbonisation of the entire economy.

In the scenarios, I propose, various modes of carbon-free dispatchable generation are assumed. This should include fuel cells and hydrogen-fuelled internal combustion engines.

Yet, I am wondering whether hydrogen will be the fuel of the future, especially in the Global Market / Centralised-Low electrification scenario. If hydrogen is sourced from distant regions, there is a high likelihood that synthetic methane will be generated from it to optimise the logistic chain. In this case, synthetic methane would replace fossil methane.

BBL is looking forward to collaborating closely with Elia in developing relevant energy system scenarios and in developing narratives to gain public acceptance for sustainable scenarios for our common energy future.

Sincerely Yours,

Erwin Cornelis

Policy expert energy at BBL