100TWh comments on Elia's methodology

SUMMARY

100TWh does not agree with Elia's methodology. Our security of supply may not be evaluated using statistical simulations based on unrealistic assumptions, including optimistic interconnections and exchanges with our neighbouring countries.

We need a much stronger analysis to evaluate the production means we need to secure the electricity supply that our society deserves (economy, industry, citizens), building enough redundancy to reduce the risks of power shortages.

100TWh therefore wants to promote its alternative methodology, based on a deterministic approach. With this methodology and with more realistic assumptions, it is obvious that Belgium needs to build 4 GW new nuclear to produce 131,4 TWh of low-carbon electricity in 2034.

SCOPE

100TWh, the citizen movement for a sustainable energy mix, is very enthusiast to contribute to this public consultation.

We fully support the "*voluntary initiative taken by Elia in order to elaborate a robust study and to collect the valuable input from market parties, both on input data and the methodology*", even if we regret this has only been announced on the Elia's website.

100TWh criticises the unrealistic assumptions in the evolution of the technologies to produce electricity in the period 2024-2034.

Among others, we disagree with the assumptions for solar PV and onshore wind turbines. In the last 20 years, Belgium has only been able to install 6 GW PV's and 3 GW onshore wind turbines. So it seems for us unrealistic to jump to 17,5 GW PV's and 6,5 GW onshore wind in a period of 10 years. It is too optimistic, considering the opposition of a growing part of the population, even if today undemocratic processes are promoted at European and national level, which we blame.

Furthermore, if we agree that the energy mix foreseen by Elia in 2034 will be able to raise the total yearly production of electricity from 87 TWh in 2024 to 131,4 TWh (document A – page 19), this doesn't ensure that there will be enough electricity at every moment from 2024 to 2034. If we consider the Elia's own derating factors, which measure the adequacy of the RES in situation of scarcity, the benefit of renewables to ensure our electricity supply is very limited (see annex table 1),

Another problem is the inevitable increase of our gas production to reach 131,4 TWh with only 2 nuclear reactors. This implies that Belgium will never sufficiently reduce its CO_2 emissions to contribute its share to the EC Fit-for-55 plan.

Next, 100TWh doesn't accept the evaluation of Demand Side Response. We wonder how those load-shedding contracts will be developed. In particular how much time industries will agree to be disconnected from the grid? We are very astonished by the Elia's figure of 25% of companies that are ready to cut their electricity supply on demand ! This is by far too simplistic and need a much finer evaluation !

Finally, 100TWh doesn't agree to consider imports as a reliable source of supply. Every European country is obliged to reduce its pilotable electricity sources, like in Belgium, and in case of common electricity shortages, they will give the priority to their own consumers. Furthermore, if we apply the Belgian derating factors for their energy mix, we see that they will get in big trouble, especially the countries that have decided to suppress their pilotable sources (see annex table 2).

But most fundamentally, 100TWh fully disagrees with the Elia's methodology !

Elia's methodology is based on Monte-Carlo simulations, as it is described in the document "20221028_APPENDIX_ADEQUACY" (called document B). Even if "such an approach is compliant with the ERAA methodology" (document B – page 2).

100TWh reminds that a blackout could cost billions euros per hour to our economy and could cost a lot of human lives. Hence our security of supply cannot solely be based on statistical results. The risk of having a blackout due to a situation that has not been simulated is too high to rely only on this kind of methodology.

That's why a deterministic approach is utmost necessary. 100 TWh recalls that this combination of approaches is used when it come to the evaluation of the safety of nuclear plants ! Moreover, the deterministic approach is the one on which nuclear licensing is based.

100TWh therefore wants to promote an alternative methodology, based on a deterministic approach, founded on 4 assumptions :

1. Belgium must ensure enough domestic productions, without optimistically relying on the neighbours (who may have their own production problems, as clearly demonstrated today – lessons should be learned !).

2. Each energy source must be available 80% of the time to be included in our electricity mix. This means that intermittent sources must be packaged with other means allowing them to deliver 80% of the time. The only available solutions therefore are gas and storage. Also a full cost approach needs to be used, so that the cost of intermittency is taken by the intermittent sources.

3. For energy sources that are not 80% available, the derating factors used by ELIA in the previous studies (Oct 2021 and March 2022 - to service the Energy Minister nuclear phase-out plan) must be considered. For Belgium in 2022, the derated RES capacity is 665 MW, and its reliable production counts for 5.8 TWh (see table 1).

4. To limit our CO_2 emissions, fossil fuel based solutions must be excluded, even the use of gas.

With the 100TWh methodology and with more realistic assumptions, it is obvious that Belgium needs to build 4 GW new nuclear to produce 131,4 TWh in 2034

Using the figures of 2034 from Elia in our assumptions (electricity storage, RES capacities, thermal capacities), the acceptable electricity mix appears to be :

1. Reliable RES = 3,5 GW, that can produce 7,6 TWh per year [1]
2. Derated RES = 1,6 GW (of the 30 GW installed) producing 13,7 TWh (see table 1)
3. Thermal capacities = 75,7 TWh [2]

With this electricity mix, Belgium only reach 100 TWh per year !

Instead of installing 30 GW of expensive RES, our organisation finds that this amount of energy could also be reached, and with less CO2 emission, should we keep the set of thermal units available in 2022. In this scenario, the thermal electricity capacity of 11,2 GW (composed of 4.9 GW nuclear + 5.8 gas + 0,5 other), can produce 88,3 TWh. If we add 7,6 TWh reliable RES and 5,8 TWh derated RES, we get 102 TWh.

But most fundamentally, the 100TWh methodology shows that to reach 131,4 TWh, while limiting our CO2 emissions, Belgium needs to add 31,4 TWh nuclear, which means that we need to install 4 GW new nuclear.

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[1] RES capacity foreseen in 2034 in the chapter 2.5 “Storage and demand response” (document A – page 28): 5,8 GWh (Coo) + 3,448 x 4 GWh (Large scale batteries) + 0,6 x 2 GWh (Small scale home batteries) = 20,8 GWh.
If we assume a daily load/discharge cycle for each storage capacity : the yearly storage capacity would be multiplied by 365. The yearly energy would thus be 365 x 20,8 GWh = 7,6 TWh
Renewable capacity needed to produce this energy (mean load factor of 25%) = 7600 / (8760 x 0,25) = 3,5 GW.

[2] Considering the Elia projections in 2034 for thermal electricity : 2.1 GW (nuclear) + 7.1 (gas) + 0,5 (other) = 9,6 GW.
The thermal electricity produced is then : 9,6 * 8.760 * 90% = 75,7 TWh

ANNEXE 1.
FACTS AND FIGURES EXTRACTED FROM ELIA'S DOCUMENTS

1. TABLE 1. DERATED CAPACITIES IN BELGIUM

		2022			2034		
	derating factor	installed (MW)	derated (MW)	energy (TWh)	installed (MW)	derated (MW)	energy (TWh)
PV	1%	6.400	64	0,6	17.500	175	1,5
wind offshore	13%	2.254	293	2,6	5.760	749	6,6
wind onshore	9%	2.787	251	2,2	6.500	585	5,1
hydro	41%	140	57	0,5	140	57	0,5
			665	**5,8**		1566	**13,7**

2. TABLE 2. ENERGY MIX IN NEIGHBOURING COUNTRIES

Electricity production	**derating**	**Germany**			**Spain**		
		2022	**2034**	**diff**	**2022**	**2034**	**diff**
consumption (TWh)		580	830	+ 43%	250	285,7	+ 14%
RES capacity (GW)		108	496	+ 359%	48	140	+ 192%
Solar PV	1%	66	303	+ 359%	18	81	+ 350%
wind offshore	13%	9	30	+ 233%	0	3	n/a
wind onshore	9%	42	155	+ 269%	30	56	+ 87%
derated RES (TWh)		49,1	182,9	+ 133,8	25,2	54,7	+ 29,4
thermal capacity (GW)		27	0	- 100%	7,1	0	- 100%
thermal electricity (TWh)		189,2	0,0	-189,2	49,8	0,0	-49,8
export (+) / import (-) (TWh)		580,0	524,5	**- 37%**	250,0	229,7	**- 20%**