Commission voor de Regulering van de Elektriciteit en het Gas

CREG

Note

(Z)2050
16 January 2020

Reaction to the consultation organised by DG Energy (European Commission) on Belgium's market reform plan

Carried out pursuant to article 23, §2, second paragraph, of the Law of 29 April 1999 on the organisation of the electricity market

Non-confidential

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INTRODUCTION

1. As stipulated in article 20(3)-(8) of the Regulation (EU)2019/943, Member states facing identified adequacy concerns shall develop and publish an implementation plan with a timeline for adopting measures to eliminate any identified regulatory distortions and market failures.

2. On 21 November 2019, Belgium submitted its implementation plan to the Commission for review. By organising a consultation, the European Commission is seeking stakeholders' views on the market reform plan proposed by the Belgium.

3. In the present note, the Commission for Electricity and Gas Regulation (CREG), which is the national regulatory authority in Belgium, gives its views on the implementation plan for Belgium in response to the consultation organised by the European Commission.

1. ADEQUACY ASSESSMENT

4. In chapter 3 of the implementation plan, the adequacy concerns for Belgium occurring from 2025 are highlighted. These adequacy concerns are mainly based on the results of the adequacy and flexibility study for the period 2020-2030, made by Elia in June 2019.

5. CREG believes that only a base case scenario should be considered for assessing the adequacy concern of Belgium. The base case scenario is in line with the reasoning for using a central reference scenario as stipulated in articles 23 and 24 of the Regulation (EU)2019/943. The High Impact – Low Probability scenario (HiLo-scenario) should not be considered to evaluate the adequacy concerns for Belgium, because this scenario considers a decreased nuclear availability in France for all years considered in the adequacy assessment, which leads to an overestimation of the capacity needs for Belgium. These high impact- low probability events should be integrated by taking into account the probability of such extreme event happening. Article 24(1) of the Regulation (EU)2019/943 outlines that national resource adequacy assessments may take into account additional sensitivities . National resource adequacy assessments may :

a) Make assumptions taking into account the particularities of national demand and supply;

b) Use tools and consistent recent data that are complementary to those used by the ENTSO for Electricity for the European resource adequacy assessment.

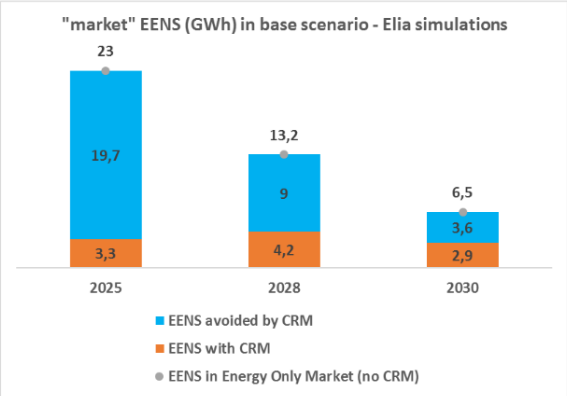
CREG considers that a national adequacy assessment should not modify assumptions for neighboring countries (such as the availability of nuclear capacity in France). Therefore, CREG considers that the HiLo-scenario is not in line with chapter four of the Regulation (EU)2019/943 (see also advice of CREG on a proposal of Royal Decree made by Elia concerning the methodology for calculation of the capacity and the parameters for the auctions in the capacity remuneration mechanism[1]).

6. The results of the adequacy assessment are focusing on the number of LoLE[2]-hours and the need of capacity to meet the reliability criterion, but don't mention the fact that the severity of the adequacy

[1] Advice (A)2030 available in Dutch and French on the CREG website : (https://www.creg.be/nl/publicaties/advies-a2030 or https://www.creg.be/fr/publications/avis-a2030)

[2] Loss of Load Expectation

concern is decreasing in the years after 2025. The table below shows the decreasing values for EENS[3] with and without a CRM for 2025, 2028 and 2030. This figure highlights the reduction of the severity of the problem after 2025. The CREG regrets that the adequacy assessment of Elia nor the chapter on adequacy concern in the implementation plan mention this fact.



7. The CREG already expressed some major comments on this study[4]. In the next paragraphs we want to recapitulate the most important points of the comments of CREG, complemented with some further insights which will be described more extensively.

8. As this study of Elia is being used to demonstrate the adequacy concerns for Belgium in the framework of the notification of a new capacity remuneration mechanism to be implemented in Belgium, CREG beliefs that this study should be as much as possible in line with the chapter 4 of the Regulation (EU)2019/943. Although a national resource adequacy assessment, as outlined in article 24 of the Regulation (EU)2019/943, is actually not feasible as certain methodologies still have to be defined, the adequacy study should have been more extensively consulted upon. Only a consultation of basic input data was organized by Elia, which was considered by the CREG as insufficient[5]. No consultation on the scenarios or methodology has been conducted. Within the framework of the Belgian legislation such consultation was not mandatory, but if this adequacy study is being used as support to justify the implementation of a CRM, which will have a major impact on the electricity market, such an extensive consultation is absolutely necessary. In the implementation plan, it is mentioned that the methodology is similar to the one used to determine the volume needed for strategic reserves. The CREG notes that the word “similar” is used and not “identical”. Moreover a consultation of a methodology in the framework of strategic reserves, which only has an effect for one year, cannot substitute a consultation for a long term adequacy assessment, which in case of the implementation of a CRM could result in costs to be supported over the lifetime of contract of 15 years.

9. The study of Elia is simulating the electricity system for each of 34 climate years or 33 historic winter periods (from 1982 till 2015). For analysing the resource adequacy, each of these historic climate years has the same weight. Two historic extremely cold winter periods, 1984-85 and 1986-87, are having a major impact on the results, expressed in LoLE and EENS. One could wonder if, within the current context of climate change and global warming, it is justified to give an equal weight to every historic winter, including these 2 extreme winter periods. As temperature in Belgium, but even more in France, has an impact on electricity consumption, and consequently on the occurrence of eventual adequacy concerns, CREG believes that an expert opinion on this issue is absolutely necessary. A

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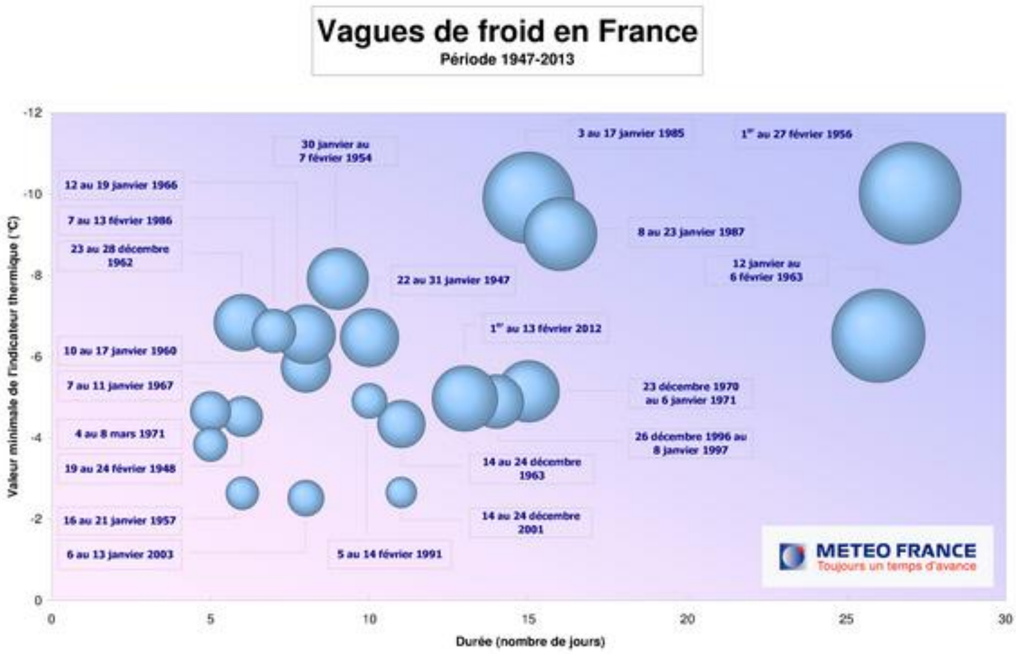
[3] Expected Energy Not Served

[4] See Study(F)1957: Analysis by the CREG of the Elia study ‘Adequacy and flexibility study for Belgium 2020-2030’, 11 July 2019, https://www.creg.be/sites/default/files/assets/Publications/Studies/F1957EN.pdf

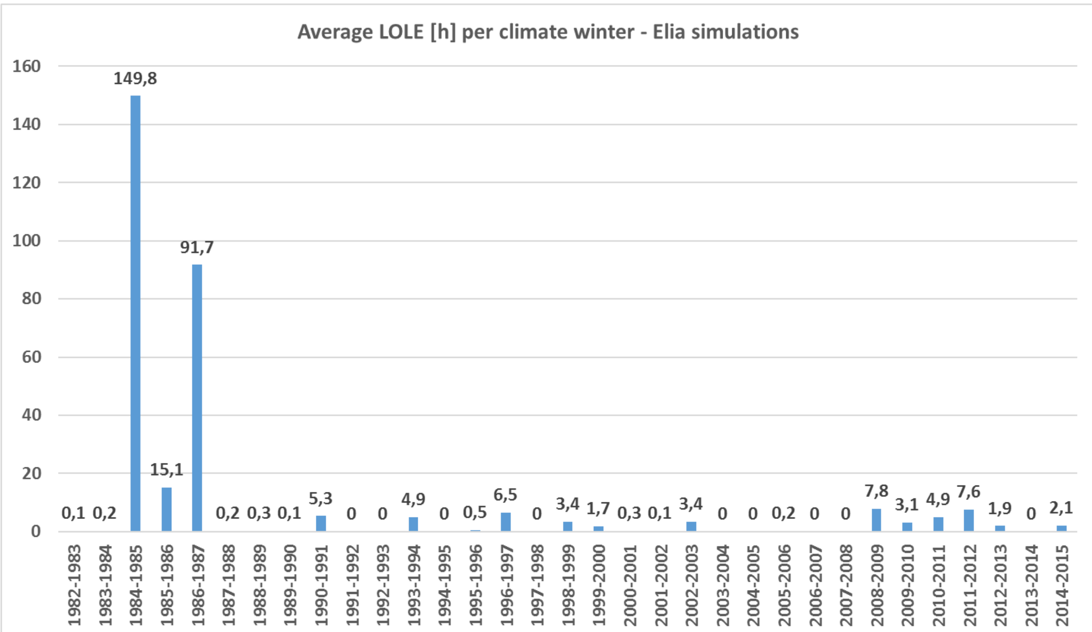
[5] See Note (Z)1901 : available in Dutch and French on CREG website : https://www.creg.be/nl/publicaties/nota-z1901 or https://www.creg.be/fr/publications/note-z1901

statistical overview of the cold spells in France shows that severe cold spells didn't occur since 1987 (see figure below).



La surface des sphères symbolise l'intensité globale des vagues de froid, les sphères les plus grandes correspondant aux vagues de froid les plus sévères

By analysing detailed results for 2025 from the adequacy assessment of Elia (results which were not made public), one can observe that 78% of the LoLE hours, used to calculate an average LoLE to match the reliability criterion, result from these severe winter periods of '85 and '87. Similar observation can be made for 2028 and 2030. The graph below gives the distribution of the LoLE hours for the 2025-simulation in the base case.



A similar pattern can be observed for the HiLO-scenario and for the other modelled years (2028 and 2030). For EENS values the effect of the severe winter periods is even more important. The two tables below are summarizing these results.

Distribution of LoLE hours for 330 simulations (10 simulations per winterperiod)							
	Average LoLE	Sum of LoLE hours	LoLE hours in 84-85	LoLE hours in 86-87	LoLE% in 84-85	LoLE% in 86-87	Total % LoLE hours in winter periods 84-85 and 86-87
Base25	9.4	3112	1498	917	48%	29%	78%
Base28	6.0	1972	936	699	47%	35%	83%
Base30	6.0	1989	584	464	29%	23%	53%
HiLO25	10.5	3457	1503	857	43%	25%	68%
HilO28	6.9	2262	990	783	44%	35%	78%
HiLO30	6.2	2041	655	527	32%	26%	58%

Distribution of EENS for 330 simulations (10 simulations per winterperiod)							
	Average EENS (GWh)	Sum of EENS (GWh)	EENS in 84-85 (GWh)	EENS in 86-87 (GWh)	EENS% in 84-85	EENS% in 86-87	Total % EENS in winter periods 84-85 and 86-87
Base25	23.4	7709	4518	2340	59%	30%	89%
Base28	13.3	4384	2189	1827	50%	42%	92%
Base30	6.5	2143	795	863	37%	40%	77%
HiLO25	21.3	7042	3736	2028	53%	29%	82%
HilO28	14.0	4612	2130	2013	46%	44%	90%
HiLO30	6.4	2107	772	882	37%	42%	79%

It is obvious that taking into account a lower probability of occurrence for these extreme winters would have a significant impact on the average LoLE-results, and by consequence on the adequacy concern for Belgium. The choice of using 34 climate years instead of for example 20 or 10 years is clearly very impacting for the adequacy assessment results. The CREG has calculated this impact for the base case scenario, based on the data she received from Elia:

For 2025:

- If the winter 1984-1985 and 1986-1987 are excluded, the average LoLE decreases from 9.4 hours to 2.2 hours
- If only the last 20 years are considered, the average LoLE is 2,2 hours
- If only the last 10 years are considered, the average LoLE is 2.8 hours

⇨ These LoLE-results are all below 3 hours.

For 2028:

- If the winter 1984-1985 and 1986-1987 are excluded, the average LoLE decreases from 5.9 hours to 1.1 hours
- If only the last 20 years are considered, the average LoLE is 1,1 hours
- If only the last 10 years are considered, the average LoLE is 1.1 hours

⇨ These LoLE-results are all below 3 hours.

For 2030:

- If the winter 1984-1985 and 1986-1987 are excluded, the average LoLE decreases from 6.0 hours to 3.0 hours

- If only the last 20 years are considered, the average LoLE is 2,9 hours
- If only the last 10 years are considered, the average LoLE is 2.6 hours

⇨ These LoLE-results are all at or below 3 hours.

For this reason, the CREG insists on the fact that the climate years should be taken into account on a scientific based approach, taking into account the effect of climate changes.

10. The adequacy assessment should include an economic assessment of the likelihood of retirement, mothballing and new-build of generation assets. This economic assessment is of a major importance, as this should show whether or not, the markets will be able to anticipate or to solve an eventual adequacy concern, before introducing a capacity mechanism, which inevitably will create some market distortion. The CREG believes that the revenues for all types of capacities are underestimated due to some flaws in the methodology. Some major comments on this economic assessment, which were explained in its study (F)1957 (pages 16-31), are briefly listed :

- The inframarginal rents simulated by Elia are heavily underestimating the inframarginal rents based on the current forward prices for 2020;
- The revenues used are the median revenues (P50) of all simulations. Due to the highly skewed revenue distribution, the P50-revenues for capacity used by Elia are strongly underestimating the true economic value of that capacity. Moreover, CREG believes that using median revenues for the economic assessment and using average values for assessing the LoLE-reliability criterion is not consistent.
- No scarcity pricing mechanism was modelled in the adequacy assessment, which could increase the profitability of existing generation units in Belgium (see also Chapter 2 on Proposed measures).
- The economic viability assessment of CHP (combined heat and power units) has been conducted in a very conservative manner (no revenues for heat were considered, support schemes were not taken into account and its generation is only driven by heat demand, which reduces its availability, while CREG considers that at moments with an adequacy concerns (with power prices spiking up to 3,000 €/MWh or higher) CHP availability will no longer be driven by solely the heat demand and should thus contribute more.
- The economic viability check should not only be conducted for capacity in Belgium, but also for other countries as these countries will also face the high prices in case of an adequacy concern in Belgium

CREG considers that the current economic assessment, leads to an overestimation of the non-viable capacity in the Energy only market. This assessment needs to be improved.

11. Due to the use of median revenues, the impact of the removal of price caps (an obligatory measure imposed by the Regulation (EU)2019/943) is minimized. The potential of demand response, with prices spiking up to a multiple of the current price cap of 3,000 €/MWh, is underestimated in the adequacy assessment.

12. CREG considers that the assessment of security of supply should be simulated in a realistic way. This implies that simulations should focus on real time LoLE rather than day ahead market LoLE. The grid operator must take all possible measures to avoid involuntary disconnection in real time, including the use of balancing reserves that are not required for balancing. All available balancing reserves in Belgium and abroad should be taken into consideration.

13. The adequacy assessment made by Elia indicates that Belgium still has available import capacity during periods of scarcity. During these periods, other countries will often quote the same high prices

as Belgium. Market reaction to such high prices will not only happen in Belgium, but also in these other countries. This market reaction will contribute to solve an eventual adequacy concern.

14. Also, the winter reserves in Germany should be taken into consideration. In fact, the German regulator anticipates an increase of winter reserves from 6.6 GW to 10.6 GW by 2022-2023. These reserves are primarily used to stabilise the domestic electricity grid when there is a lot of wind production in the north that needs to be transported to the south. During periods of high wind, no capacity shortfalls are expected. So during periods of low wind, these capacities are largely available. These capacities can thus be used to address adequacy issues, considering that adequacy issues generally arise when wind generation is limited.

15. As already stated previously, CREG believes that the adequacy assessment is overestimating the adequacy concern and a complementary analysis should be conducted, taking into account the CREG-comments.

EOM adequacy assessment methodology

16. To implement a market wide capacity mechanism, Belgium has to show there is an adequacy concern in the EOM[6] that cannot be solved through market measures, nor with strategic reserves. This adequacy concern should be expressed in LoLE and EENS (not in GW).

17. We will show that based on the current proposals by EntsoE and based on the European legislation, it is difficult to understand why the EOM would not be able to provide the necessary capacity to meet the reliability criteria in Belgium. Also, we will show the importance to adhere to the hierarchy set out in Regulation 2019/943 where the adequacy concern should first be assessed with a strategic reserve, which was not properly done in the Elia adequacy assessment.

18. The reasoning is as follows.

1. EntsoE proposes to calculate the LoLE-target as follows: LoLE-target = CoNE[7] / VoLL[8].
2. EntsoE proposes the CoNE to be the gross cost of new capacity (€/MW), namely the investment cost to build a new MW of capacity plus the cost to keep this capacity available. It does not take any revenues into account (CoNE is the so-called “gross CoNE”).
3. EntsoE proposes the VoLL to represent the most likely cost of an adequacy outage, during which the different categories of consumers may be affected in different proportions.
4. The system defence plan has to be economically efficient (art 11.6.b of Regulation 2017/2196), implying that the consumers that will be first disconnected when there is an adequacy concern need to have a VoLL as low as possible. In this document, the VoLL of these disconnected consumers is referred to as VoLL_low. It is this VoLL that represents most likely the cost of an adequacy outage and thus LoLE-target = CoNE / VoLL_low. According to the Belgian defense plan, affected consumers will most likely be households in rural areas[9].

[6] Energy Only Market

[7] Cost of New Entry

[8] Value of Loss of Load

[9] The Belgian Minister of Energy approved on 19.12.2019 the system defence plan proposed by the Belgian TSO Elia according to the European NC E&R. The system defence plan includes the manual demand disconnection procedure in line with article 22 of the European NC E&R. The manual demand disconnection procedure affects only distribution grids with a connection of less than 30 kV to the transmission grids in primarily rural areas. Industrial and power plants are excluded in the manual disconnection procedure as well as the Brussels capital region, capital cities of the provinces and city centres of at least 50.000 inhabitants. Consequently, the manual disconnection procedure affects almost exclusively household (Since it is technically not feasible to selectively disconnect consumers on distribution grids, small services (e.g. bakeries) and small enterprises in the concerned primarily rural area are also disconnected while – of course- high priority consumers like hospitals are excluded

5. When there is an adequacy issue, the market price will go to the market price cap. According to European legislation, this market price cap cannot impede entrance of demand response to the market which implies that the price should be able to go as high as the highest VoLL of price-elastic consumers. In this document, this VoLL will be referred to as VoLL_high.

19. Based on these five points, the expected revenues on the EOM of new capacity will be more than sufficient to attract new capacity:

a) The necessary annual revenue for new capacity is by definition equal to CoNE, expressed in €/MW. This CoNE equals LoLE * VoLL_low
b) The expected market revenue of any available capacity during scarcity hours is the number of hours of scarcity (LoLE) multiplied with the market price during scarcity (= market price cap), which is VoLL_high, leading to an expected market revenue during scarcity hours is LoLE * VoLL_high

From (a) and (b) follows that the expected market revenue (= LoLE * VoLL_high) is (much) higher than the necessary revenue to attract new capacity (= LoLE * VoLL_low), since VoLL_high is (much) higher than VoLL_low[10]. Therefore, revenues that are needed to attract new capacity (= LoLE * VoLL_low) will be supplied by the market because this market has a price of VoLL_high during LoLE-hours.

On top of that, one can assume that the new capacity will also earn revenues outside scarcity hours. This implies that the expected revenue from the market is LoLE*VoLL_high + revenuesWhenNoScarcity, which is even higher.

EOM+SR[11] adequacy assessment

20. In addition, in the setting of an EOM with strategic reserves (EOM+SR), it is important to understand the impact of out-of-market capacity on the profitability of in-the-market capacity. The reason is that –by definition- out-of-market capacity such as strategic reserves can prevent LoLE-hours (LoLE in real time, in this document referred to as “LoLE_realtime”), without impacting market prices. As a result, the LoLE in real time, which is the only relevant LoLE when considering adequacy, will be lower than the number of hours the market cannot supply all demand (“market LoLE”, in this document referred to as “LoLE_market”).

21. This effect can be illustrated with a simple example. Assume there is a strategic reserve of 1 GW. The day ahead market cannot clear for 2 hours, with a curtailment of respectively 1 GW and 2 GW. So, the “LoLE_market” is 2 hours, during which the market price equals the market price cap (which is VoLL_high). In real time, the strategic reserves are activated, leading to only one hour with load shedding of 1 GW. The “LoLE_realtime” is only 1 hour. So, when there is out-of-market-capacity available, such as strategic reserves, the LoLE on the market (“LoLE_market”) is higher than the LoLE in real time (“LoLE_realtime”). The LoLE_realtime is the only relevant parameter to assess whether the reliability standard is met.

(though hospitals are not typically located in less than 30 kV rural areas)). Therefore, the approved manual disconnection procedure follows the requirement of art. 11 (6) by minimising the VoLL of manual demand disconnection and excluding the consumers with the highest VoLL e.g. industrial and power plants. In this sense is the Belgian manual demand disconnection plan is developed in order to minimise the overall costs of involuntary disconnection in order to guarantee system stability as well as adequacy.

[10] This regardless whether there are high volumes of demand response available or not.

[11] Strategic Reserve

22. Therefore, the minimal expected market revenues of new capacity should be calculated as LoLE_market * VoLL_high. The necessary level for attracting new capacity to the market should be calculated as LoLE_realtime * VoLL_low. Both LoLE_market and VoLL_high are higher than LoLE_realtime and VoLL_low, respectively. This implies that the minimal expected market revenues of new capacity are more than sufficient for attracting new capacity.

23. Nevertheless, the Elia adequacy assessment concludes that the EOM cannot meet the reliability standard. To arrive to this conclusion, Elia ignores the important issues described above regarding the difference between LoLE in real time and LoLE on the market, and regarding the role of VoLL when disconnecting clients and when setting the market price cap. Also, the view by Elia that market parties would rely on the median value of spot prices, is showing a lack of understanding price formation on the forward market and the importance of these forward prices (instead of spot prices).

Elia simulation results with strategic reserves

24. First, Elia does not provide any details on LoLE and EENS in real time. It only gives statistics on the "market LoLE" and the "market EENS" (see the table on page 138 of the Elia adequacy assessment).

25. Second, and this is mandatory in a resource adequacy assessment in the framework of Regulation 2019/943 but is lacking in the Elia adequacy assessment, Belgium has to show that a strategic reserve cannot solve the adequacy concerns. With strategic reserves, at least the existing capacity that is unprofitable in the Elia simulation is then taken up in the strategic reserve to prevent forced load shedding. According to the Elia simulation, this unprofitable existing capacity is 1,7 GW in 2025 and 1,4 GW for 2028.

26. Based on the detailed results that CREG recently received from Elia, the CREG could calculate the impact of the strategic reserves on the number of hours with LoLE, which is significant:

- For 2025: with strategic reserves, the average LoLE decreases from 9,4 hour to 5,6 hour
- For 2028: with strategic reserves, the average LoLE decreases from 6,0 hour to 3,6 hour (with 1,8 GW it decreases to 3 hours)

27. These results show a significant decrease of LoLE hours due to strategic reserves and even almost no adequacy issue in 2028, even when all other assumptions and methodology choices Elia made would be acceptable (which is not the case from CREG's point of view), and if one accepts the LoLE-target of 3 hours.

28. In the sections above, we also describe into more details the impact of the choice of the climate years, running from 1982 to 2015, including two very severe cold spells in 1985 and 1987.

29. Without taking into account strategic reserves, these two climate winters (1984-1985 and 1986-1987) cause 78% of all LoLE hours for 2025. If strategic reserves are taken into account, the part of these two winters increases to 90% of all LoLE hours.

30. Elia does not correct the probability of the occurrence of such winters. Well-known findings of climate science show that the probability of severe winters such as in 1985 and 1987 have significantly dropped. If we would only take the last 20 climate winters and we take strategic reserves into account, the average LoLE for 2025 is only 0,36 hours, well below the 3 hours LoLE-target.

31. Similar results are obtained for 2028: the part of the two severe winters in the number of LoLE hours increases from 83% to 91% of all LoLE hours. If we would only take the last 20 climate winters and we take strategic reserves into account, the average LoLE for 2025 is only 0,28 hours, well below the 3 hours LoLE-target.

Reliability standard

32. The adequacy assessment by Elia is performed with a LoLE target of maximum 3 hours on average per year.

33. It is important to recall the legal framework: all contracts that will be signed in the Belgian CRM will have to be compliant to chapter IV of Regulation 2019/943. According to this chapter, EntsoE has to propose a methodology to calculate the VoLL and CoNE and to obtain the reliability criteria, which should be expressed in LoLE and VoLL. Acer will have to approve or amend these methodologies, which is foreseen in June 2020. This implies that contracts signed in the Belgian CRM will have to be compliant with the reliability target that is set based on the European methodologies. Based on the proposal by EntsoE and the apparent consensus during the preparation works with EntsoE, the EC and Acer/NRAs, it is expected that the LoLE target will be calculated as CoNE / VoLL.

34. Elia suggested a CoNE of at least 75.000 €/MW; other estimations are around 60.000 €/MW but can go as high as 100.000 €/MW or higher. The VoLL should be the likely cost of a forced disconnection, where mostly households are impacted. Given the VoLL estimations of households by the federal Planning Bureau (2300 €/MWh) and Acer (5500 €/MWh), this would lead to a LoLE-target that is most probable more than double the current LoLE-target.

35. It is true that the LoLE-target used by Elia is currently the legal target, but since the contracts signed under the CRM will have to be compliant with Regulation 2019/943, this should already be taken in to account when doing an adequacy assessment in order to get approval for a market-wide capacity mechanism and change the conclusion that the energy-only-market fails to meet the reliability standard (and hence the need for an implementation plan).

36. With regard to the implementation plan, it is important to note that a future LoLE-target will probably be much higher and that average “market LoLE” hours simulated by Elia are close to 6 hours for 2028 and 2030. With strategic reserves taken into account, they fall below 6 hours for 2025 (and close to 3 hours for 2028). By taken into account the insights of climate science and the lower probability of having severe winters, they will decrease even further. This will probably lead to the conclusion that the energy-only-market can meet the reliability standard, when this standard is compliant with Regulation 2019/943.

2. PROPOSED MEASURES

37. During the previous years, a continuous effort has been made to improve market functioning (balancing, transfert of energy, …). Nevertheless, additional measures could be taken to further improve market functioning.

38. In chapter 5 of the implementation plan, an overview of different measures is listed, but there is no quantification of their individual are global effect on the eventual adequacy concern. It is not clear to which degree these measures were taken into account in the adequacy assessment made by Elia.

Article 21(1) of Regulation (EU)2019/943 states clearly that introducing a capacity mechanism should only be considered when the measures of the implementation plan would not be sufficient to solve an eventual adequacy concern. In order to enable the European Commission to issue an opinion on the implementation plan, the effects of these measures on adequacy concerns for the Member State should be quantified in the implementation plan.

A major comment from CREG concerns the way scarcity pricing is treated in the implementation plan. This is further commented in the next section.

2.1. SCARCITY PRICING MECHANISM

39. One of the measure to be considered is the introduction of shortage pricing function. It will be shown below that several statements made in the Implementation Plan on this issue are misleading, and in particular:

1. "*For instance, an ERCOT-like scarcity mechanism building on real-time situations and prices relies essentially on back-propagating flexibility price signals.*"
2. The alpha component "*already exhibits quite some characteristics of a scarcity price mechanism*"
3. The Belgian implementation plan does not foresees, on the basis of the information at our disposal, the implementation of a shortage pricing function, as it may be interpreted from the table page 35

2.1.1. The shortage pricing function ("*ERCOT-like scarcity mechanism*") improves the adequacy of the system

40. The statement made in the implementation plan seems to indicate that a shortage pricing function has nothing to do with adequacy, and only improve flexibility conditions. Of course CREG agree that the implementation of a shortage pricing function will improve the conditions for flexibility in Belgium. But the CREG is also convinced that the implementation of an "*ERCOT-like scarcity mechanism*" targets the adequacy of the Belgian system and the investment signal.

The objective pursued by CREG with the work done on shortage pricing was, from the beginning, the improvement of the investment conditions in the Belgium system, and therefore the adequacy of the system.

41. A first study on shortage pricing was performed by the Center for Operations Research and Econometrics (CORE) of the Université Catholique de Louvain (UCL) in 2015-2016. The text below is

extracted from the note made by CREG (Z)160512-CDC-1527 in May 2016 on "Scarcity pricing applied to Belgium" accompanying the study. In this note, the objective and the trigger of the works on scarcity pricing are clearly indicated, together with the first conclusions of the study.

"*Renewables are characterised by important investment cost, low fixed cost and variable cost close to zero. The massive introduction of large amount of renewable energy has led to overcapacity and has* ***exacerbated the missing money problem*** *reflecting the difficulties of remunerating the marginal generation unit in an energy only market with a marginal pricing principle.*

This introduction contributed to the lowering of the average electricity price to levels that may put at risk the profitability of new large scale generation units (mainly CCGT) in pure energy only markets even in the absence of excess generation capacity…

This study was launched at the time when Belgium experienced a lack of generation capacity *(several nuclear units, totalling a capacity of up to 4000 MW, were out of the market for several reasons) and* ***where some CCGT were announced to be mothballed****.*

A replacement/alternative to nuclear should indeed preferably come from the market, not from support schemes or even from open tenders ***for the remuneration (of investment and fixed costs) of alternative solutions."***

Further in the text it is indicated that: "*ORDC (ie. the shortage pricing function) may be seen as an* ***alternative to CRMs****, ...*"

In the study results, it can be found that "*The main conclusions of the study are…that the addition of a scarcity adder for the remuneration of flexibility (in the 7 min timeframe and 60 min timeframe) is able to not only remunerate operating costs* ***but also to remunerate investment costs of new CCGT units****."*

Finally, it is stipulated in the Conclusions that "***The proposed adder provides a long term price signal enough to invest*** *in new CCGT units* ***or a transition towards a new energy system****.*" So the link with investment decisions required for the energy transition in Belgium and adequacy was clearly made by CREG from the beginning.

42. It is more difficult to comment on the exact goals pursued by ERCOT when implementing the ORDC mechanism. But more can be found on the link between a scarcity pricing mechanism, better price and adequacy in the literature. The text below is extracted from the note (Z)1986 of September 2019 published by CREG accompanying the publication of the third study made by the CORE. And in order to explain the benefits of a scarcity pricing mechanism, it is interesting to refer here the view of an academic not directly involved in the development of this kind of mechanism who has produced several papers on Capacity Remuneration Markets (CRMs), Peter Cramton[12]. Bold characters below are from CREG.

"*In broadest terms, regulators seek a market design that provides reliable electricity at least cost to consumers. This can be broken down into two key objectives: The first is short-run efficiency: making the best use of existing resources. (…)* ***The second objective is long-run efficiency: ensuring the market provides the proper incentives for efficient long-run investment****. This has proven to be the most challenging objective. In the simplest theory, efficient long-run investment is induced from the right spot prices. But this is complicated by the reliability requirement. Reliability requires a reserve to satisfy demand when supply and demand uncertainty would otherwise lead to shortage. In other industries, reliability is not an issue. Prices rise and fall to assure supply and demand balance, but in current electricity markets there is typically insufficient demand that responds to price, and consumers are unable to express a preference for reliability. Thus, there is a need in current markets for the regulator*

[12] Electricity market design, Peter Cramton, Oxford Review of Economic Policy, Volume 33, Number 4, 2017, pp. 589–612; https://academic.oup.com/oxrep/article/33/4/589/4587939

to determine how this preference for reliability is expressed. As we will see, one approach to reliability is to rely solely on spot prices but to include administrative scarcity prices at times when reserves are scarce. ***The preference for reliability is imbedded in the scarcity prices. Setting higher scarcity prices enhances reliability in providing stronger investment incentives****.* ***An alternative approach is to more directly coordinate investment with a capacity market, although this is best done as an addition to, not a substitute for, administrative scarcity pricing, since it is the scarcity price that motivates capacity to perform when needed.***"

The link between reliability, reserves and adequacy is clearly established here. The need for the implementation of a shortage pricing function before considering a capacity remuneration mechanism – as in the new Regulation (EU)2019/943 – is also clearly indicated in Cramton's text.

43. Further in the same paper of Peter Cramton, it is indicated that "In Texas[13], the high scarcity pricing motivates the forward contracting that limits risk and induces investment. The scarcity price is the key instrument for resource adequacy. One reason this may work well in Texas is substantial industrial load that makes the market for forward contracts more liquid." So the link of an ORDC mechanism with adequacy is clearly established for Texas.

44. On the importance of an adequate price signal, where the preference for reliability of consumers is better reflected, for ensuring generation adequacy, CREG also refer to Paul Joskow who has produced several papers in the past on the question of "Reliability and competitive electricity markets" with Jean Tirole and more recently a paper[14] on "Challenges for Wholesale Electricity Markets with Intermittent Renewable Generation at Scale: The U.S. Experience"

In that paper Paul Joskow highlights the new context linked to the increased penetration of renewables and the importance of an improved price signal for ensuring generation adequacy in the current context of renewable integration (again, bold characters are from CREG): "*High penetration of intermittent generation with zero marginal operating costs creates challenges for wholesale market designs. And it is both intermittence and zero marginal operating cost that are important. To oversimplify, wholesale markets as they are now structured in the U.S. perform two related resource allocation functions --- short run and long run. First, they provide for the efficient real-time operation of existing generating capacity, clear supply and demand at efficient wholesale prices that represent the marginal cost of supply at any moment, and do so while maintaining the reliability of the system.* ***Second, market prices and price expectations are supposed to provide efficient long run profit expectations and incentives to support efficient decentralized investments in new generating capacity and efficient retirements of existing generating capacity****. Wholesale market designs in the U.S. that evolved since the late 1990s now do a reasonably good job supporting the first set of short run resource allocation tasks under most states of nature. However, they have been challenged in providing adequate financial incentives to support efficient entry (investment) and exit decisions consistent with reliability criteria established by system operators.* ***That is, the short run price signals do not lead to long run price expectations that adequately incent efficient investment and retirement decisions****. The disconnect emerges primarily as a result of energy and ancillary price formation during tight supply and other stressed conditions. Prices under these conditions do not rise high enough to reflect the scarcity value of the generation due to price caps, limited demand-side participation in the wholesale market, and out-of market actions by system operators during network security emergencies.*"

In the same paper Paul Joskow it can also be find that: "***Note that scarcity pricing is not a departure from the basic principle of short run marginal cost pricing****. Rather, movements* ***along the appropriate***

[13] where the ORDC mechanism under consideration for Belgium is implemented

[14] Challenges for Wholesale Electricity Markets with Intermittent Renewable Generation at Scale: The U.S. Experience; Paul L. Joskow, January 2019, MIT, https://economics.mit.edu/files/16650

demand curve when capacity constraints are binding reflect consumer valuations of sudden reductions in available generating capacity (reliability) and represent consumers' short run marginal opportunity cost of having more or less generating capacity*. While there may be few hours when capacity constraints are binding, energy prices would likely go to very high levels as demand is price-rationed and yield substantial revenue for all generators which would allow them* ***to recover their capital costs in a long run equilibrium*****"**.

45. In Section 6 of the note (Z)1986 of September 2019 it can be found that "Detailed numerical analyses of the Belgian market have demonstrated the potential of scarcity pricing **to overturn the financial viability of flexible technologies in Belgium, and also to create a strong investment signal for mobilizing demand response**."

All these elements allow to conclude that the implementation of a shortage pricing function will also, like in Texas, improve investment conditions in Belgium and therefore the system adequacy.

2.1.2. The alpha component has no impact on adequacy

46. The Belgian Implementation plan indicates that the alpha component "already exhibits quite some characteristics of a scarcity price mechanism".

47. CREG considers that the primary objective of the alpha component is to incentivise BRPs to minimise the volume of their imbalances. As clearly indicated in the Implementation plan, the alpha component, applied to BRPs only, will not affect BSPs. High system imbalances, as correctly indicated in the Implementation plan, does not necessarily reflect adequacy concerns.

48. To the contrary, the primary objective of a shortage pricing function, with a real time market for reserves in the current proposal, is to better remunerate market players (BSPs) providing reserves resources to the system when they are necessary by providing a non-zero signal when the real time volume of available reserves in the Belgian system is scarce ("pay for performance attribute of the proposed mechanism"). The mechanism proposed by CREG will positively affect BSPs, and therefore investment conditions in the Belgian system. And by taking into account consumer preference for reliability in the price signal, investment conditions will improve.

2.1.3. Implementation of a shortage pricing function in Belgium

49. The table on page 35 seems to indicate that Belgium is going to implement a shortage pricing function.

The CREG has not yet received a request for the implementation of a shortage pricing function from the Belgian Administration in the context of the Implementation plan and has put financial incentives on Elia to achieve the development done so far (the publication of the adders on Elia webpage) towards a possible implementation of a shortage pricing function.

3. CONCLUSION

In this note the CREG reacted to the public consultation on the Implementation plan of Belgium. The main comments are related to the adequacy assessment and to the treatment of scarcity pricing.

On the issue of adequacy assessment, CREG is referring to a number of official CREG documents. The main point of the adequacy assessment are :

- The base case scenario should be the reference scenario instead of the HiLo-scenario.
- The adequacy concern for Belgium after 2025 is, according to the simulations of Elia, decreasing.
- The adequacy concern is overestimated due to :
  - selection of historic climate years
  - underestimation of market revenues
  - no simulation of adequacy with strategic reserves

Concerning the proposed measures :

- No quantification of the impact on adequacy concern is made of the proposed measures
- Scarcity Pricing is one of the measures that should be implemented before 2025

For the Commission for Electricity and Gas Regulation (CREG):

Andreas TIREZ
Director

Koen LOCQUET
Acting President of the Board of Directors

ANNEX 1

Study (F)1957 of 11 July 2019 : Analysis by the CREG of the Elia study ‘Adequacy and flexiblility study for Belgium 2020-2030’

ANNEX 2

Note (Z)1986 on the implementation of a scarcity pricing mechanism in Belgium