Explanatory note for the public consultation on the scenarios, sensitivities and data for the CRM parameter calculation for auctions 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4.

April 2024

Table of contents

Introduction

In the framework of the Capacity Remuneration Mechanism ('CRM'), Elia is provided with several tasks described in the Electricity Law[1] and the Royal Decree Methodology on the determination of volume and parameters[2].

Elia is requested to establish a CRM calibration report on volumes and parameters for the Y-1 auction with delivery period 2026-27 (2026-27/Y-1), the Y-2 auction with delivery period 2027-28 (2027-28/Y-2) and for the Y-4 auction with delivery period 2029-30 (2029-30/Y-4) and to publish it by the 1st of December 2024 at the latest. The CRM calibration report will be based on the intermediate values and reference scenario that will be selected by the Minister by the 30th of September 2024.

It is important to note that the law relating to the introduction of a Y-2 auction and the Royal Decree related to the different publication dates are currently being debated in Parliament (Parliamentary Paper 55K3937). However, in view of the discussions held in the *Comité de Suivi CRM*, Elia has been asked to take the necessary steps to prepare a Y-2 auction. It is clear that in the absence of legal confirmation, the Y-2 auction will not be pursued.

For the Minister to select the input data and assumptions which are part of the reference scenario, market parties are invited to be part of a public consultation on the data, scenario and sensitivities for this 5th CRM calibration report on volumes and parameters for delivery periods 2026-27, 2027-2028 and 2029-30.

This explanatory note gives stakeholders more context and guidance on the submitted consultation document, which is an Excel-file with the input data and scenarios for delivery periods 2026-27, 2027-2028 and 2029-30. It also foresees some additional qualitative information, which is not quantified in the Excel. The documents submitted to public consultation have been established in collaboration with the DG Energy from the FPS Economy and in concertation with the CREG, as stated in the Royal Decree Methodology.

Unless explicitly stated otherwise, all prices are expressed in €2023.

This explanatory note consists in 3 main sections:

- The legal and regulatory framework (§1)
- The scenario and sensitivities (§2)
- The other parameters which have to consulted (§3)

Should there be any remark or additional suggestion on this document, this can obviously be provided as part of the consultation contribution.

[1] https://www.ejustice.just.fgov.be/eli/loi/1999/04/29/1999011160/justel
[2] http://www.ejustice.just.fgov.be/eli/arrete/2021/04/28/2021041351/justel

Note that the slide deck presented during the Working Group Adequacy of the 12th April 2024[3] can also be considered as reference for the public consultation.

In order to ease the reading the following acronyms will be used.

For the auctions related to the 4th CRM calibration report:
- 2025-26/Y-1 refers to the Y-1 calibration for the DP 2025-26;
- 2028-29/Y-4 refers to the Y-4 calibration for the DP 2028-29.

For the auctions related to the 5th CRM calibration report:
- 2026-27/Y-1 refers to the Y-1 calibration for the DP 2026-27;
- 2027-28/Y-2 refers to the Y-2 calibration for the DP 2027-28;
- 2029-30/Y-4 refers to the Y-4 calibration for the DP 2029-30.

The public consultation will take place from the 12th of April 2024 to the 13th of May included. The public consultation report and Elia's recommendation are planned to be presented during the Working Group Adequacy of the 14th of June 2024.

[3] https://www.elia.be/en/users-group/adequacy-working-group/20240412-meeting

1 Legal and regulatory framework

This public consultation takes place according to the Royal Decree on volume and parameters[4].

Article 3 presents the objective of the public consultation in the framework of the reference scenario selection process.

Royal Decree Reference	
Art. 3. § 1er. Le gestionnaire de réseau effectue, en collaboration avec la Direction générale de l'Energie et en concertation avec la commission, une sélection d'un ou de plusieurs scénarios et sensibilités selon les étapes décrites à l'article 4, §§ 2 à 4 inclus. § 2. A partir de l'évaluation européenne, visée à l'article 23 du Règlement (UE) 2019/943, et / ou de l'évaluation nationale visée à l'article 24 du Règlement (UE) 2019/943, les plus récemment disponibles au moment de la sélection, un ou plusieurs scénarios et sensibilités sont sélectionnés. Cette sélection comprend au moins le scénario de référence central européen visé à l'article 23, 1er alinéa, 5, b) du Règlement (UE) 2019/943. Tant que lesdites évaluations ne sont pas encore disponibles, une sélection est effectuée à partir d'autres études disponibles. § 3. Les données et hypothèses à partir desquelles lesdits scénarios et sensibilités ont été établis, sont mises à jour sur la base des informations pertinentes les plus récentes. § 4. En outre, d'autres sensibilités qui peuvent avoir un impact sur la sécurité d'approvisionnement de la Belgique, peuvent être définies, y inclus des	**Art. 3.** § 1. De netbeheerder maakt, in samenwerking met de Algemene Directie Energie en in overleg met de commissie, een selectie van één of meerdere scenario's en gevoeligheden volgens de stappen beschreven in artikel 4, §§ 2 tot en met 4. § 2. Uit de op het ogenblik van de selectie meest recent beschikbare Europese beoordeling bedoeld in artikel 23 van Verordening (EU) 2019/943 en/of de nationale beoordeling bedoeld in artikel 24 van Verordening (EU) 2019/943, worden één of meerdere scenario's en gevoeligheden geselecteerd. Deze selectie omvat minstens het Europese centrale referentiescenario bedoeld in artikel 23, lid 1, 5, b) van Verordening (EU) 2019/943. Tot zolang deze beoordelingen nog niet beschikbaar zijn, wordt een selectie gemaakt uit andere beschikbare studies. § 3. De gegevens en hypothesen waaruit deze scenario's en gevoeligheden zijn opgebouwd worden geactualiseerd op basis van de meest recente relevante informatie. § 4. Daarnaast kunnen andere gevoeligheden gedefinieerd worden die een impact kunnen hebben op de bevoorradingszekerheid in België, met

[4] http://www.ejustice.just.fgov.be/eli/arrete/2021/04/28/2021041351/justel

évènements en dehors de la zone de réglage belge.	inbegrip van gebeurtenissen buiten de Belgische regelzone.
§ 5. Les scénarios et sensibilités sélectionnés, en ce compris les données et hypothèses à partir desquelles ils ont été établis, sont soumis à une consultation publique telle que visée à l'article 5.	§ 5. De geselecteerde scenario's en gevoeligheden, inclusief de gegevens en hypothesen waaruit ze zijn opgebouwd, worden onderworpen aan een openbare raadpleging bedoeld in artikel 5.
§ 6. Sur la base du rapport de consultation, et en particulier des informations ayant trait à l'article 5, § 2, 1° et 2°, la commission rédige une proposition pour le Ministre de l'ensemble des données et hypothèses à retenir, qui constituent ensemble une proposition de scénario de référence. La Direction générale de l'Energie formule un avis sur cette proposition.	§ 6. Op basis van het consultatierapport en in het bijzonder de informatie die betrekking heeft op artikel 5, § 2, 1° en 2° maakt de commissie een voorstel op voor de Minister van de te weerhouden set van gegevens en hypotheses, die samen een voorstel van referentiescenario vormen. De Algemene Directie Energie formuleert een advies op dit voorstel.
§ 7. Compte tenu de la proposition de la commission, des recommandations du gestionnaire du réseau et de l'avis de la Direction générale de l'Energie, le Ministre décide, par arrêté délibéré en Conseil des ministres depuis la décision prise en 2021, au plus tard le 15 septembre de l'année précédant les enchères, de l'ensemble des données et des hypothèses qui doit être sélectionné comme scénario de référence. Le Ministre peut déroger à la proposition de la commission moyennant motivation adéquate.	§ 7. Rekening houdend met het voorstel van de commissie, de aanbevelingen van de netbeheerder en het advies van de Algemene Directie Energie, beslist de Minister, bij besluit vastgesteld na overleg in ministerraad vanaf de beslissing genomen in 2021, ten laatste op 15 september van het jaar voorafgaand aan de veiling welke set van gegevens en hypotheses moet worden geselecteerd als het referentiescenario. De Minister kan hierbij afwijken van het voorstel van de commissie mits passende motivatie

Article 5 sets the requirements of the public consultation and the data that need to be submitted to public consultation.

Royal Decree Reference	
Art. 5. § 1er. Le gestionnaire de réseau organise une ou plusieurs consultations publiques conformément à l'article 7undecies, § 3, alinéa 3, de la loi du 29 avril 1999 durant une période de minimum un mois. Le gestionnaire du réseau informe les acteurs de marché de la tenue de cette (ces) consultation(s). § 2. Au moins les sujets suivants sont soumis à une consultation publique : 1° la mise à jour des données et des hypothèses du scénario ou des scénarios, ainsi que des sensibilités, telles que visées à l'article 3, § 3 ; 2° la pertinence des sensibilités visées à l'article 3, §4, en ce compris les données et hypothèses à partir desquelles elles ont été établies ; 3° le type de capacité supplémentaire visé à l'article 6, § 1er ; 4° les sources publiques des scénarios pour les années postérieures à l'année de livraison à partir desquelles les données d'entrée sont utilisées pour le calcul des rentes inframarginales annuelles visées à l'article 10, §6 ; 5° la liste réduite des technologies existantes qui seront raisonnablement disponibles et qui sont éligibles pour la détermination du prix maximal intermédiaire visé à l'article 18, §1er.	**Art. 5.** § 1. De netbeheerder organiseert een of meerdere openbare raadpleging(en) met het oog op de opmaak van zijn verslag en zijn voorstel bedoeld in artikel 7undecies, § 3, derde lid van de wet van 29 april 1999, gedurende een periode van ten minste één maand. De netbeheerder informeert de marktdeelnemers over het houden van deze raadpleging(en). § 2. De volgende onderwerpen worden ten minste aan openbare raadpleging onderworpen: 1° de actualisatie van de gegevens en hypothesen van het scenario of de scenario's en de gevoeligheden zoals bedoeld in artikel 3, § 3; 2° de relevantie van de gevoeligheden bedoeld in artikel 3, § 4, inclusief de gegevens en hypothesen waaruit ze zijn opgebouwd; 3° het type bijkomende capaciteit bedoeld in artikel 6, § 1; 4° de publieke bronnen van de scenario's voor de jaren na het leveringsjaar waaruit de invoergegevens gebruikt worden voor de berekening van de jaarlijkse inframarginale inkomsten, bedoeld in artikel 10, § 6; 5° de beperkte lijst van bestaande technologieën die redelijkerwijs beschikbaar zullen zijn, en die in aanmerking komen voor de bepaling van de intermediaire maximumprijs, bedoeld in artikel 18, §1.

2 Scenario and sensitivities

This chapter describes the data and assumptions related to the scenarios and sensitivities that have to be submitted to public consultation according to article 5 of the Royal Decree. The overall process should lead the Minister to select a reference scenario that will be used as basis for the CRM calibration report for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4.

This chapter contains two main parts: the main data and assumptions regarding the scenario (Article 5, §2, 1°) on §2.1 and the sensitivities that could be integrated in the reference scenario (Article 5, §2, 2°) on §2.2.

Note that when a sensitivity is proposed regarding one of the data and assumptions presented in §2.1, a black box with the reference to the associated sensitivity included.

2.1 Data and assumptions for the scenario

This section presents all the data and assumptions included in the scenario. The European Resource Adequacy Assessment 2023 (ERAA 2023)[5] is taken as reference, as it is the latest published European Resource Adequacy Assessment by ENTSO-E.

The data for Belgium is based on the Adequacy and Flexibility study 2024-34 published in June 2023[6] and is updated according to the most recent available information. The sources of the updates are mentioned in each sub-section (§2.1.1. to §2.1.4).

Regarding the flow-based parameters (see §2.1.5), Elia proposes to keep the same model and assumptions as implemented in the Adequacy and Flexibility study 2024-34.

The data for all other countries is based on ERAA 2023 and is updated based on the most recent national/regional adequacy studies and known ambitions, as described in §2.1.6.

The methodology applied is compliant with the ERAA methodology, as applied in the Adequacy and Flexibility study 2024-34. In particular, the study will apply the 200 synthetic years from the forward-looking climate database developed by Météo France (see §2.1.7).

Finally, the proposed economic parameters presented in §2.1.8 are based on latest available information and aim to integrate the uncertainties due to the current geopolitical context.

[5] https://www.entsoe.eu/outlooks/eraa/
[6] https://issuu.com/eliagroup/docs/adequacy_flexibility_study_for_belgium_2024-203?fr=sOTBhNDYxOTUwMTY

2.1.1 Generation & Storage

First, the Belgian generation and storage capacities are presented. This sub-section also includes the forced outage rates. The data is in line with the data considered for the Adequacy and Flexibility study 2024-34, in line with article 3, §2 of the Royal Decree, and has been updated according to the most recent available information sources.

2.1.1.1 Generation & Storage summary

A summary of the generation and storage installed capacities for the 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 is presented in the Excel file (section 1.1).

Table 1 presents the installed capacities for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 for each technology. A comprehensive explanation of the updates compared to 2025-26/Y-1 and 2028-29/Y-4 is performed in the following subsections.

Generation type	Generation capacity [MW]		
	2026-27/Y-1	2027-28/Y-2	2029-30/Y-4
Individually modelled non renewable thermal generation	**9,149**	**9,149**	**9,149**
Nuclear	2,056	2,056	2,056
Gas - CCGT	5,748	5,748	5,748
Gas - OCGT	294	294	294
Gas - CHP	910	910	910
Oil	140	140	140
Gas - CL	305	305	305
Profiled thermal non renewable generation	**1,505**	**1,511**	**1,525**
Renewable generation	**20,308**	**21,842**	**25,607**
Wind	6,519	6,849	8,209
Onshore	4,258	4,588	5,248
Offshore	2,261	2,261	2,961
Photovoltaics	12,723	13,923	16,323
Hydro RoR	140	143	148
Biomass	610	611	611
individually modelled	68	68	68
profiled	542	543	543
Waste	316	316	316
individually modelled	286	286	286
profiled	30	30	30
Storage	**2,436**	**3,154**	**3,344**
Pumped storage	1,305	1,305	1,305
Large and small scale Batteries	1,131	1,849	2,039

Table 1 : Generation & storage summary

Note that additional capacity could be added to the reference scenario based on the pre-selected capacity types to make the reference scenario selected by the Minister adequate for Belgium (see section 3.1), as mentioned in article 5 §1.

2.1.1.2 Individually modelled thermal generation

Section 1.2 of the Excel file details all individually modelled thermal generation facilities available for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4. The Excel document describes for each unit, its name, owner, fuel type, derating factor type, used fuel and the associated net generation capacity. Furthermore, the availability of each unit for the delivery periods of 2026-27, 2027-28 and 2029-30 is specified.

Nuclear

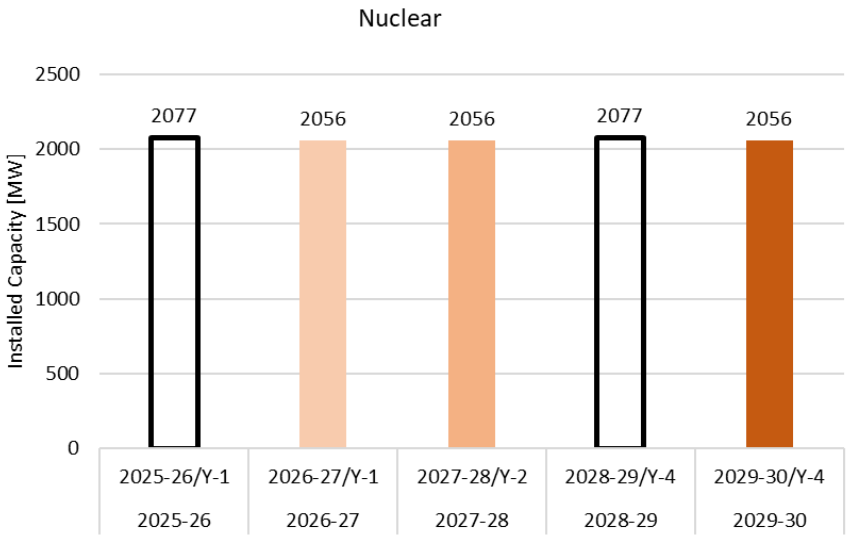

Figure 1 : Evolution of nuclear installed capacity

Compared to 2025-26/Y-1 and 2028-29/Y-4, the update of the nominal power is taken into account for Tihange 3, from 1038 MW to 1030 MW, and for Doel 4, from 1039 MW to 1026 MW[7].

Moreover, the nuclear units are assumed to be only available during winter months for calendar years 2026 and 2027, as stated in information published on NordPool.

Note that a sensitivity is foreseen on the forced outage rate considered for the Belgian nuclear units (see §2.2.6).

[7] https://umm.nordpoolgroup.com/#/messages?publicationDate=all&eventDate=all&units=22WDOELX40000793&units=22WTIHANG000242R

Gas

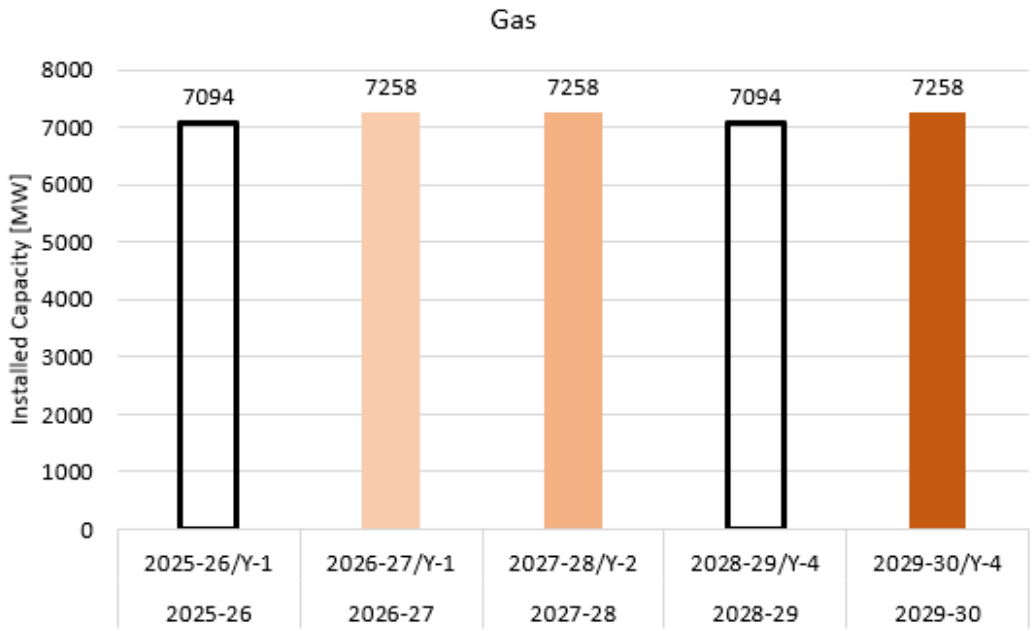

Figure 2 : Evolution of gas installed capacity

Compared to 2025-26/Y-1 and 2028-29/Y-4, the following elements are taken into account:

- Sappi Lanaken (43 MW), Fluxys Zeebrugge (40MW) and Zwijndrecht Lanxess ST (15 MW) are considered as decommissioned for all delivery periods (Art. 4 bis)[8].
- Vilvoorde GT (255 MW) is considered as available as from the 1st of November 2025, meaning it is part of the scenarios, following the information published on NordPool[9]. Vilvoorde GT (255 MW) is considered as available as from the 1st of November 2025, meaning it is part of the scenarios, following the information published on NordPool[10].
- The nominal capacity of Saint-Ghislain is updated from 378 MW to 385 MW[11]

[8] https://economie.fgov.be/fr/themes/energie/securite-dapprovisionnement/electricite/mecanismes-de-capacite/reserve-strategique/notifications-de-mise-larret
[9] https://umm.nordpoolgroup.com/#/messages/937ab00f-4cd1-4aca-9c2d-0ef05594fd28/2
[10] https://umm.nordpoolgroup.com/#/messages/937ab00f-4cd1-4aca-9c2d-0ef05594fd28/2
[11] https://umm.nordpoolgroup.com/#/messages?publicationDate=all&eventDate=all&units=22WSAINT-000221B&areas=10YBE----------2

Note that this list also integrates the two CCGT contracted for 15 years in the framework of 2025-26/Y-4[12], including the results of the CRM re-run[13].

Oil

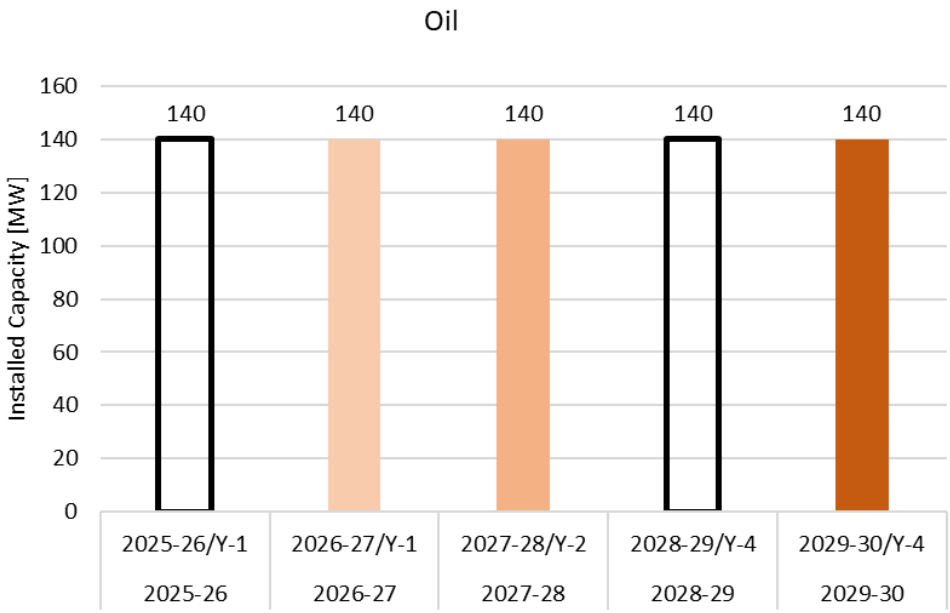

Figure 3 : Evolution of oil installed capacity

No change in the installed capacity of oil powered units is foreseen.

Note that a sensitivity is foreseen on Belgian turbojet units due to the CO2 threshold (see §2.2.7).

2.1.1.3 Storage

The installed capacities and reservoir volumes for storage in 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 are presented in the Excel (section 1.3).

Pumped-storage

Pumped-storage technology in Belgium exists at two different sites, namely Coo and Platte-Taille. Coo has a turbining capacity of 1161 MW and a storage capacity of 5100 MWh, which is available for economical dispatch, after reserving 500 MWh for black-start services. It also takes into account the reservoir extension of Coo 1-3. Platte-Taille has a turbining capacity of 144 MW and a reservoir volume of 700 MWh.

[12] https://www.elia.be/fr/donnees-de-reseau/adequation/resultats-de-l-enchere-crm
[13] https://www.elia.be/fr/actualites/communiques-de-presse/2022/04/20220414_rerun-crm

Large-scale batteries

The installed capacity for large-scale batteries is equal to the sum of the existing capacity and the volume contracted in past CRM auctions: 2025-26/Y-4 and 2027-28/Y-4. Additional capacity is not included in the base scenario, however, large-scale batteries can be added in the scenario in the calibration process, following the preselected capacity types, as described in §3.1.

Figure 4 shows the updated installed capacity and energy content for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 for large-scale batteries.

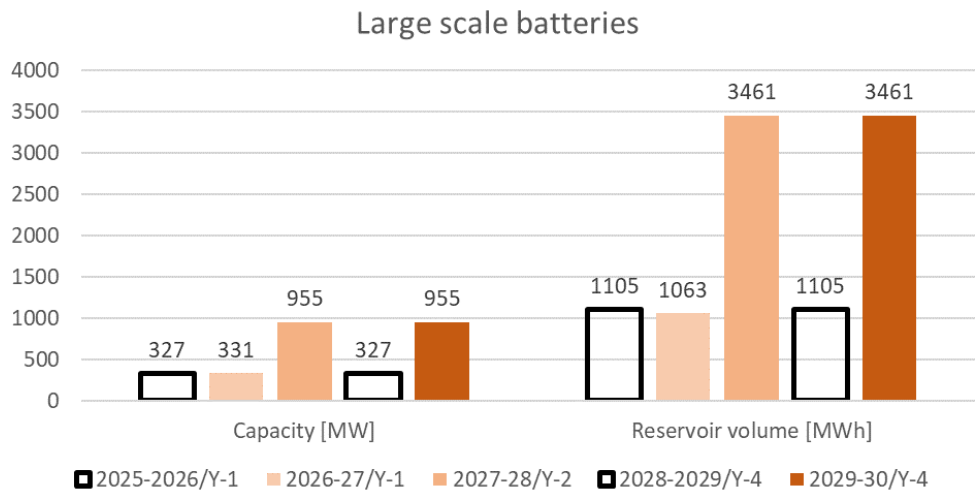

Figure 4: Evolution of the installed capacity and reservoir volume for large-scale batteries

The energy content of large-scale batteries is based on information available on existing and known projects.

Small-scale batteries

The capacity of small-scale storage is based on historic data from Fluvius and VEKA for Flanders. The installation of small-scale batteries is mostly driven by the installation of solar panels. For later years, an additional capacity equivalent to 0.3% of the total installed existing photovoltaic capacity is considered to be installed (compared to 0.2% in the latest Adequacy and Flexibility study). Note that EVs (V2G included) are integrated in the demand and are therefore not included in the small-scale batteries. An energy content of 2 hours is assumed for small-scale batteries.

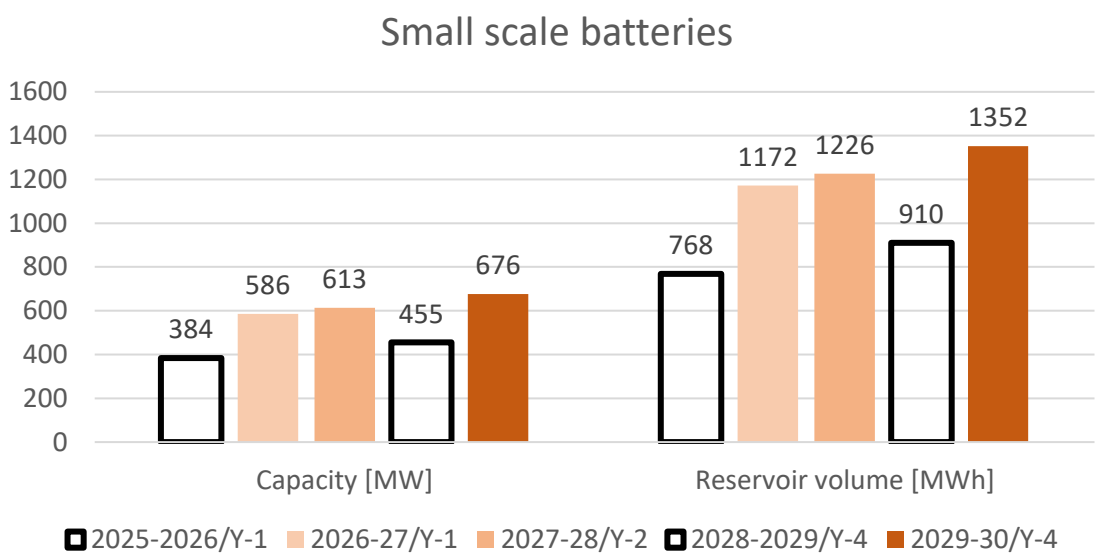

Figure 5: Evolution of the installed capacity for small-scale batteries

In line with the Adequacy and Flexibility study 2024-34, small-scale batteries are considered either in-the-market or out-of-market. Out-of-market batteries are considered to react to local signal such as solar production whereas in-the-market batteries are considered to react to market signals and are thus dispatched by the market. The division between small-scale batteries in-the-market and out-of-market is based on the proportions from the Adequacy and Flexibility study 2024-34. A larger proportion of small-scale batteries are expected to be in the market in later years. The proportions of the different categories are given in section 1.3 of the Assumptions Workbook.

2.1.1.4 Renewable and profiled non-renewable

Section 1.4 of the Excel file details the renewable energy and profiled thermal production without daily schedule units.

Onshore wind

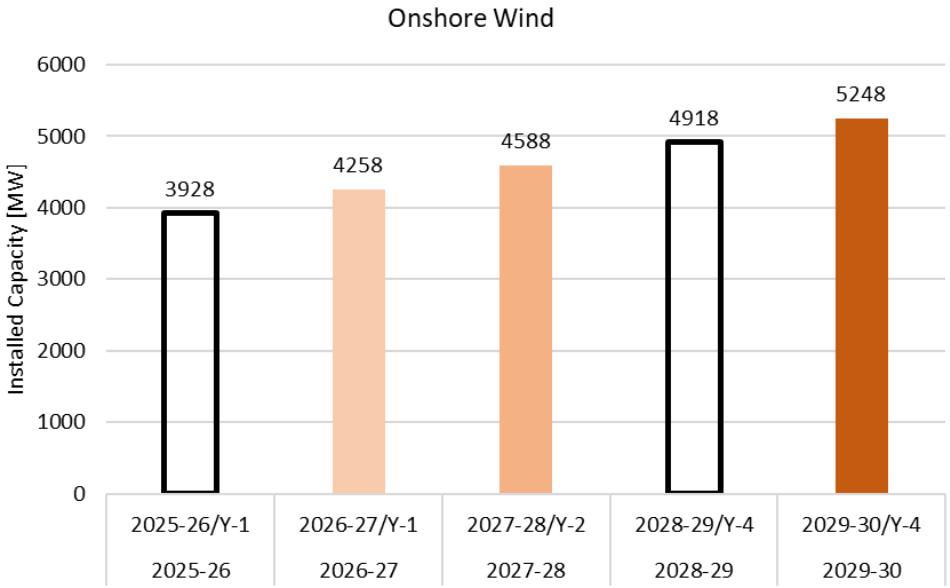

Figure 6 : Evolution of the onshore wind installed capacity

Regarding onshore wind, the installed capacity for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 follows the same trajectory than the one defined for the Adequacy and Flexibility study 2024-34. The same trajectory is maintained as the realized installed capacity aligns with the expected installed capacity, signifying a continued trend. Note that the current installed capacity is based on the numbers from SPW[14], Energie Commune[15] and VWEA[16].

[14] https://zealous-nobel-aa39f4.netlify.app/
[15] https://energiecommune.be/documentation/eolien/
[16] https://wind.ode.be/nl/cijfers

Offshore wind

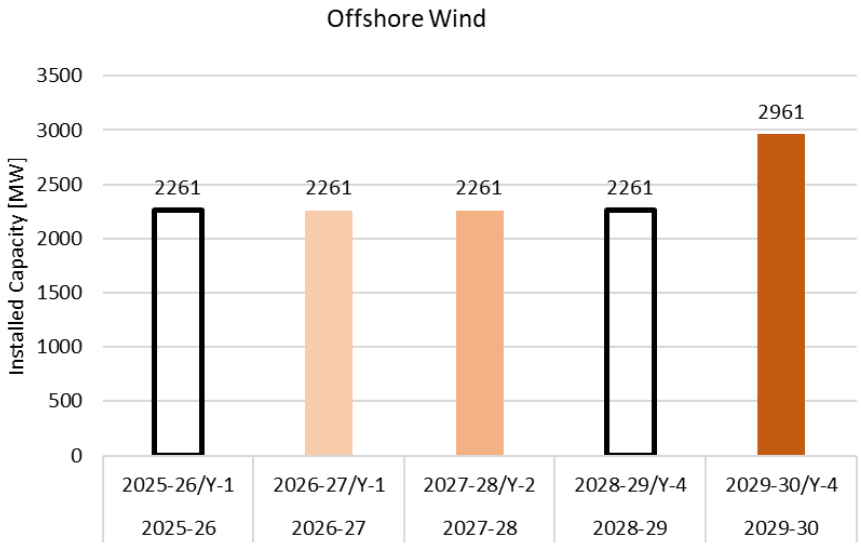

Figure 7 : Evolution of the offshore wind installed capacity

Regarding offshore wind, the installed capacity for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 follows the same trajectory as the one defined for the Adequacy and Flexibility study 2024-34. The generation capacity is set to 2261 MW. This value is based on the latest information regarding installed capacity and to the fact that the first phase of PEZ (700 MW) is expected for Q1-Q2 2028 according to latest public information[17].

[17] https://economie.fgov.be/fr/themes/energie/sources-denergie/energies-renouvelables/exploitation-en-mer-du-nord/energie-eolienne-belge

Photovoltaics

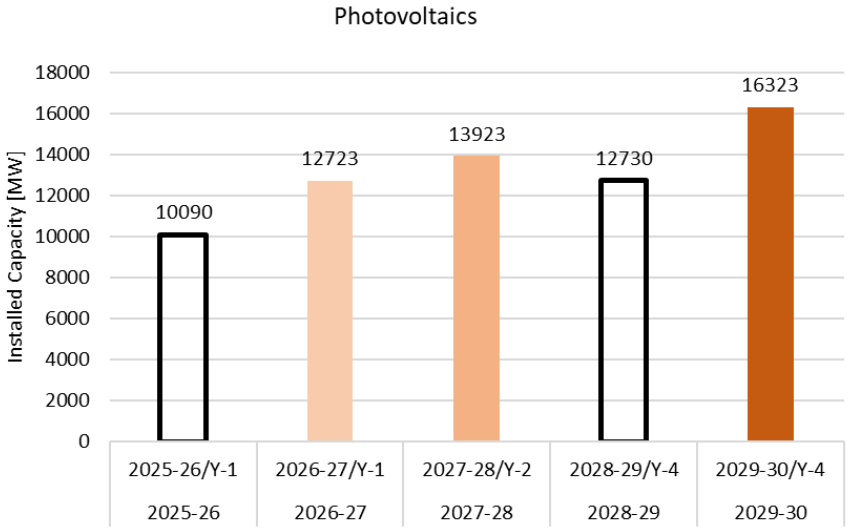

Figure 8 : Evolution of the photovoltaics installed capacity

Regarding photovoltaics, the installed capacity for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 integrates the latest available data on current installed capacity per region. The installed capacities for 2023 were taken from VEKA[18] for Flanders, Energie Commune[19] for Wallonia and Brugel[20] for Brussels. Elia considers an average installation rate calculated over the past three years, equal to 1200 MW/year. This installation rate has been significantly increased compared to the Adequacy and Flexibility study 2024-34 (880 MW/year).

[18] https://emis.vito.be/nl/artikel/vlaanderen-kreeg-er-2023-een-recordaantal-zonnepanelen-bij#:~:text=In%202023%20is%20er%20een,nu%206.071%20MW%20in%20Vlaanderen.
[19] https://energiecommune.be/statistique/observatoire-photovoltaique/
[20] https://app.powerbi.com/view?r=eyJrIjoiNDkyNWIyNDgtNWNkNi00MWY2LTgxY2QtZTZlZWI2MDM1YmRhIiwidCI6ImMwYjg2YzA3LWRhZGUtNDkyMC1hYzEzLWIwZWNhZDNiMmM5NSIsImMiOjh9

Hydro run-of-river

The trajectory for the run-of-river capacity is unchanged.

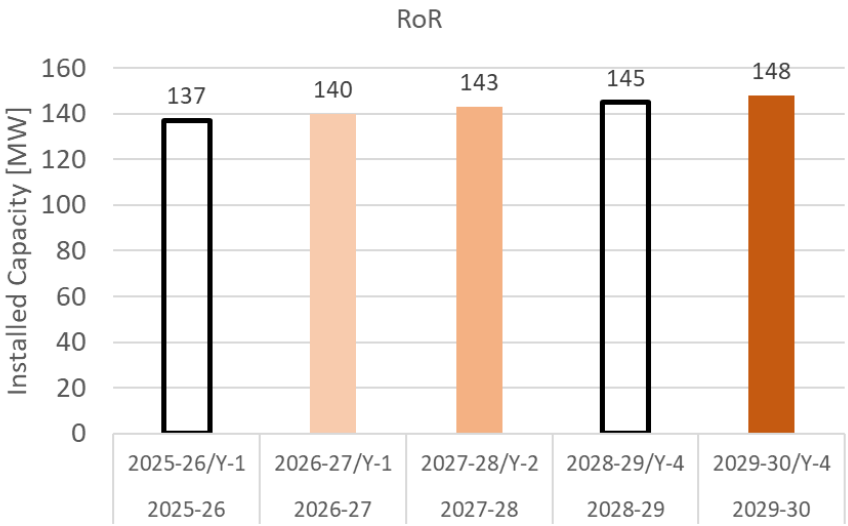

Figure 9 : Evolution of the run-of-river installed capacity

Profiled thermal without daily schedule units

The profiled thermal without daily schedule units (gas CHP, biomass and waste) installed capacity is based on the latest information from Elia's internal database which gathers the latest information from the DSOs.

This database is updated regularly by the DSO's meaning that capacities, technologies, or installation dates can be updated. The evolution of the profiled thermal non-renewable generation, biomass and waste are respectively shown in Figure 10, Figure 11 and Figure 12.

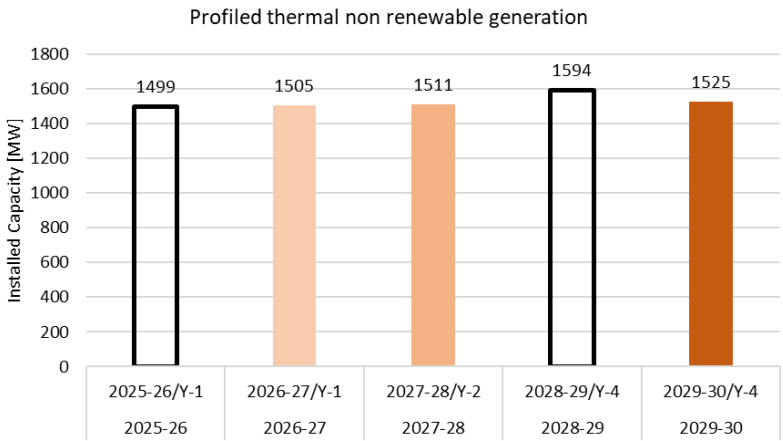

Figure 10 : Evolution of the profiled thermal non-renewable generation installed capacity

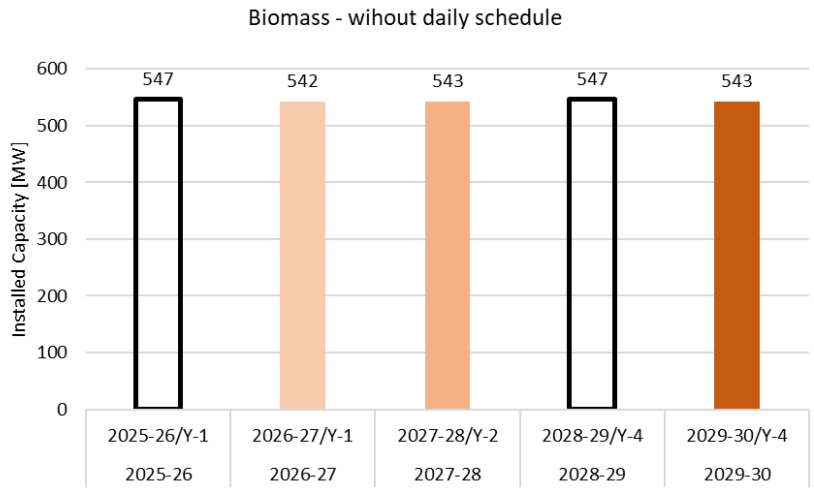

Figure 11 : Evolution of the biomass installed capacity

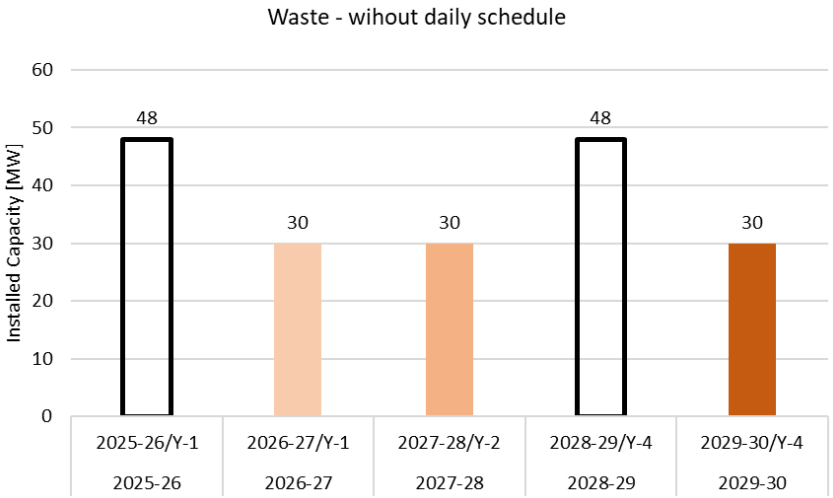

Figure 12 : Evolution of the waste installed capacity

2.1.1.5 Forced outage rates

The forced outage (FO) rates are presented in the Excel (section 1.5) and were calculated in the context of the Adequacy and Flexibility study 2024-34. The forced outage rates are presented in Figure 13.

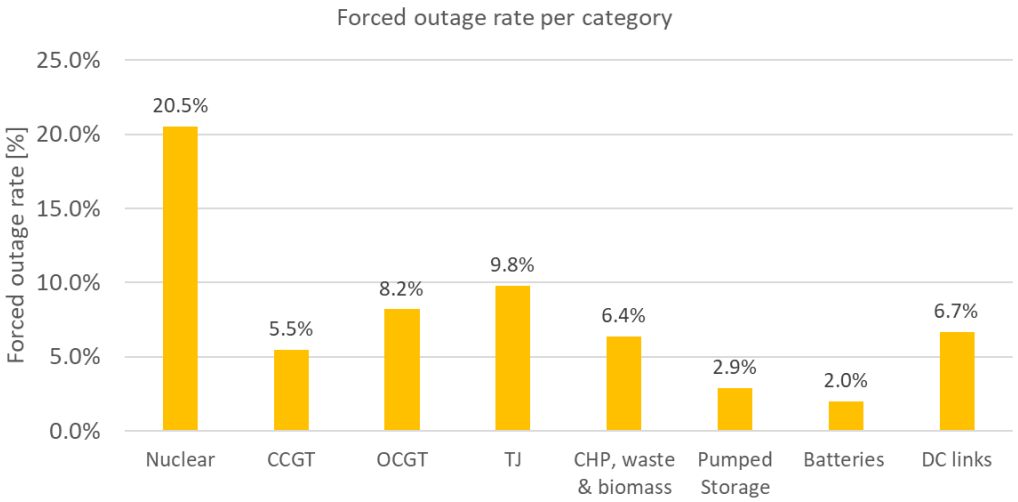

Figure 13: Forced outage per category

Note that a sensitivity is foreseen on the forced outage rate considered for the Belgian nuclear units (see §2.2.6).

2.1.2 Electricity consumption

As was done in the past years, Climact is currently updating the trajectories for the total electricity consumption. As visible on Figure 14 there are several components of the total electricity consumption which will be updated. The update of the proposed trajectories along with all the different components will be presented in the WG Adequacy of August.

2.1.2.1 Additional electrification from industry

Elia is currently working to improve its hypotheses on the volume and timing of the electrification in close collaboration with its customers and will update its assumptions regarding additional electrification from industry based on this. These updated assumptions will be included in the work of Climact and presented during the WG Adequacy of August.

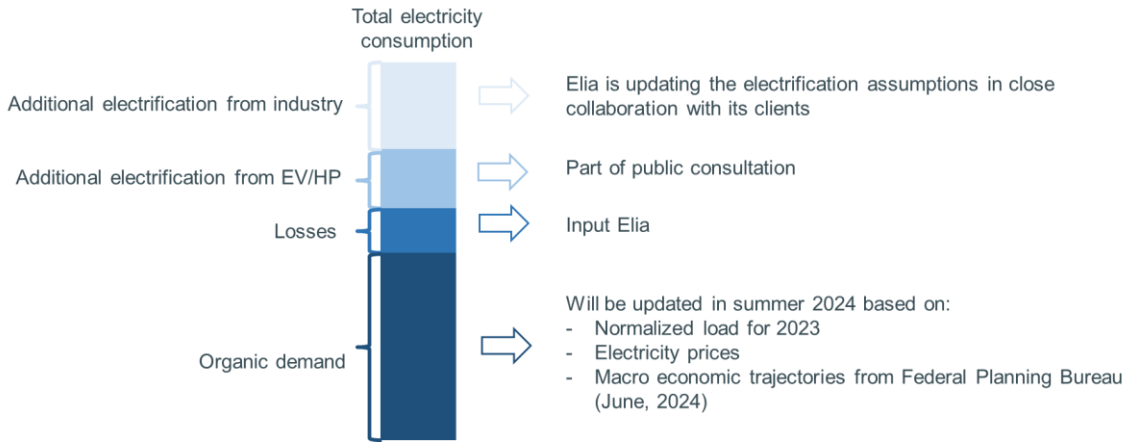

Figure 14: Update of the load components

2.1.2.2 Additional electrification from Electric Vehicles (EV) and Heat Pumps (HP)

For EV and HP, Elia updated the proposed trajectories based on the numbers for 2023 from ATTB and Febiac[21] respectively. The numbers for 2023 represent a minor increase compared to what was foreseen in Adequacy and Flexibility study 2024-34.

Electric Vehicles	2025-26/Y-1	2026-27/Y-1	2027-28/Y-2	2028-29/Y-4	2029-30/Y-4
Passengers Cars BEV [thousand]	400	650	893	1,170	1,469
Passengers Cars PHEV [thousand]	430	460	450	400	373
LDV freight BEV [thousand]	28	43	63	90	123
LDV freight PHEV [thousand]	10	15	19	24	28
HDV freight BEV [thousand]	0	0	0	1	2
Busses BEV [thousand]	2	3	3	4	4

Heat Pumps	2025-26/Y-1	2026-27/Y-1	2027-28/Y-2	2028-29/Y-4	2029-30/Y-4
Residential HP [thousand]	815	934	1,016	1,061	1,194
Tertiary HP [thousand]	70	88	103	114	136

Table 2: Updated EV and HP assumptions

2.1.2.3 Losses

Elia provides the estimated losses as an input to Climact. These will be presented in the WG Adequacy of August.

2.1.2.4 Organic demand

The organic demand is updated based on the normalized load for 2023 and will integrate the latest macro-economic trajectories per sector that will be published by the Federal Planning Bureau in June 2024. In addition, new price estimates for electricity will be used to update the price elasticity.

Climact will integrate all the load components and present the proposed new total load trajectories in the WG Adequacy of August. Since no results are available yet, no values for the total electricity consumption can be shared yet.

2.1.3 Demand-Side Response

Elia considers 3 main categories of demand-side response (DSR): DSR from existing usages, end-user flexibility (electric mobility, heating and residential batteries) and DSR volumes from newly electrified industry or new usages.

[21] https://www.febiac.be/sites/default/files/media/file/2024-01/Bilan%202023%20NL.pdf

2.1.3.1 DSR from existing usages

The capacity of this type of flexibility applicable in the reference scenarios of last year's calibration was calculated by E-Cube based on historical volumes. An update of this study using the same methodology will be performed this year. The results will be presented during the WG Adequacy of August. Elia considers several categories of DSR from existing usages according to the amount of hours of flexibility that can be provided per day (1h, 2h, 4h, 8h or no limit). Elia proposes to use the same proportions as used in the Adequacy and Flexibility study 2024-34. Additional DSR from existing usages could also be added during the calibration of the reference scenario if the reliability criteria for Belgium is not reached.

For information, it should be noted that 1843 MW of DSR from existing usages was considered in previous scenarios selected by the Minister.

2.1.3.2 End-user flexibility

End-user flexibility refers to the flexibility associated to electric mobility, heat pumps and residential batteries. Residential batteries are already integrated in the storage volume (see §2.1.1.3).

The flexibility assumptions from these assets were determined by Delta-EE in the context of the Adequacy and Flexibility study 2024-34. Elia proposes to keep using the same methodology and refers to the Adequacy and Flexibility study 2024-34 for details regarding the methodology.

2.1.3.3 DSR volumes from newly electrified industry or new usages

This is the flexibility associated with the electrification assumptions from industrial heat pumps, e-boilers, steel, CCS or datacenters. As mentioned in paragraph 2.1.2, Elia is currently working on updated capacity assumptions regarding these technologies. Elia considers a certain percentage of each of these technologies to be flexible, as shown in Table 3. Elia proposes to keep using the same flexibility percentages as were established in the context of the Adequacy and Flexibility study 2024-34. The flexibility associated with the electrification coming from these technologies limits its impact on the adequacy need.

Additional DSR from industry electrification (shedding capacity)	% of the additional electrification by industry		
	2026-27/Y-1	2027-28/Y-2	2029-30/Y-4
P2H - HP		80	
P2H - eBoiler		100	
DRI-EAF (Steel)		75	
CCS		0	
Data centers		50	

Table 3 : Additional DSR from industry electrification

2.1.4 Reserve capacity needs

This subsection is dedicated to the reserve capacity needs on FCR and FRR to deal with unexpected variations in demand and generation (including forced outages of large generation units or transmission assets). The reserve capacity applied for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 is presented in the Excel file (section 3).

The reserve capacity needs impact the volume to be procured in each CRM auction. This estimation is required by article 11, §2, 2° of the Royal Decree. The reserve capacity needs are added to the average load during simulated scarcity hours. This volume includes the capacity assumed to be delivered by Belgian generation and storage units and by the Belgian demand as well as the volumes delivered through cross-border reserve capacity. This ensures that the full reserve capacity needs can be activated, also during scarcity periods.

The necessary total reserve capacity needs are defined as the sum of the FCR[22] reserve capacity and the total FRR[23] reserve capacity.

- The FCR capacity is expected to slightly increase in the next years. The expected value for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 is 97 MW. Currently, the capacity is determined on regional level by ENTSO-E based on a deterministic methodology and is foreseen to be replaced by a probabilistic approach as from 2025. The reserve capacity needs are allocated to Belgium based on the share of generation and demand of Elia's LFC[24] block compared to the total generation and demand in the synchronous zone of Continental Europe. These projections are based on an estimation of the future FCR needs with the new probabilistic methodology together with projections on the future share of Belgian generation and consumption in the synchronous zone.

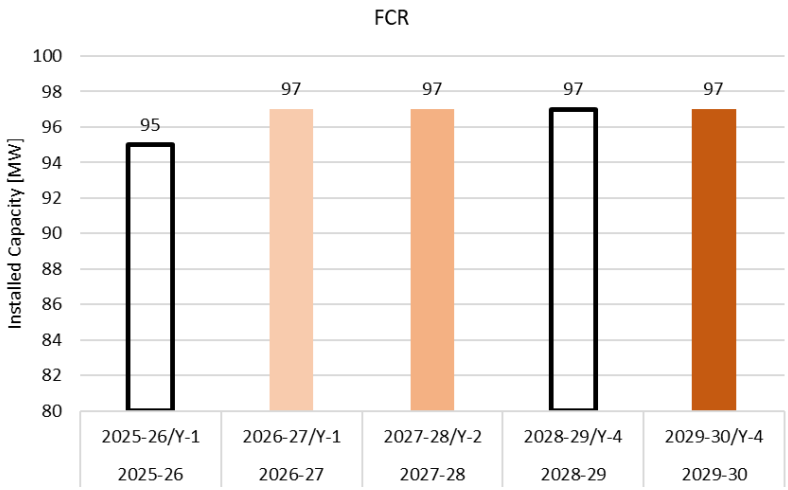

Figure 15 : Evolution of the FCR capacity

- The upward FRR capacity (aFRR + mFRR) during scarcity periods is expected to be 1030 MW for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4. While the FRR capacity is determined on a day-ahead basis by means of Elia's dynamic dimensioning method taking into account prediction error risks and forced outage risks, it is expected that the reserve capacity needs during scarcity periods are

[22] FCR: Frequency Containment Reserves
[23] FRR: Frequency Restoration Reserves
[24] LFC : Load Frequency Control

determined by the deterministic incident (in this case the outage of the largest nuclear generation unit, Tihange 3). Note that this capacity has slightly reduced and was previously determined by Doel 4, i.e. 1039 MW. This is explained by the fact that renewable generation prediction risks are typically low during scarcity risk periods (characterized with low renewable generation).

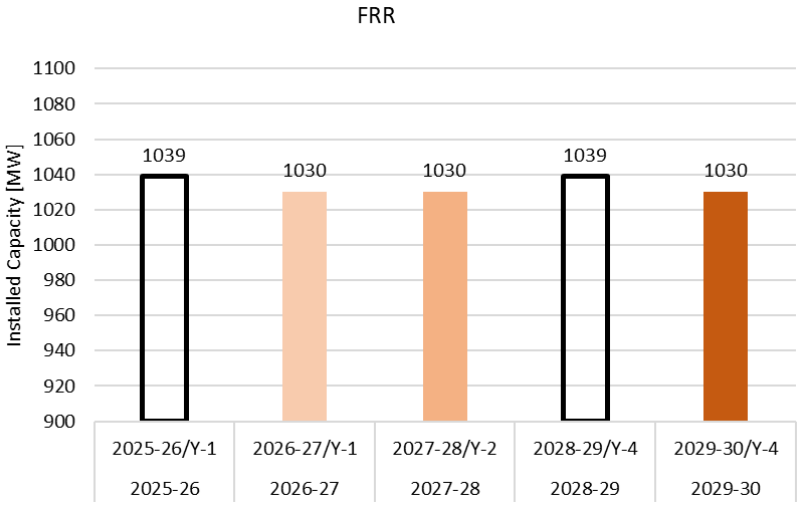

Figure 16 : Evolution of the FRR capacity

Based on the above-mentioned assumptions, the balancing need volume 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 is assumed to be equal to 1127 MW.

2.1.5 Cross-border market capacities

The CRM calibration will use the same flow-based modelling than the one used for the Adequacy and Flexibility study 2024-34. The parameters of this model are presented in the Excel file (section 4). The flow-based domain creation process is described in the Adequacy and Flexibility study 2024-34.

The presented domain will be complemented with the NTC values taken from the European Resource Adequacy Assessment 2023 (ERAA23) of ENTSO-E for the borders which are not included in the flow-based region.

Figure 17 gives an overview of the main parameters required to generate the flow-based domains on different targets years. For this study, in line with the foreseen market operations, Core is modelled as a flow-based region. The flows outside Core are subject to NTC constraints, and the interaction between the flow-based region and flows over external borders to countries beyond Core are modelled using advanced hybrid coupling (AHC). For 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4, only cross-border CNECs will be considered using the grid model from the TYNDP 2022.

When creating flow-based domains for this study, the assumption is taken that no grid maintenance is planned throughout Europe in the winter period. In other words, while the impact of single contingencies is taken into account through the CNEC definition process, it is assumed that prior to a contingency, the European transmission grid is always fully available and operational. While for winter months, with a focus on the representation of scarcity events, this optimistic assumption is retained; for summer months assuming the absence of any grid maintenance is deemed unrealistic. As a proxy for this reduced availability of the transmission grids, the domains generated for the summer months assume a fixed RAM of 70% applied to the fully available transmission grid.

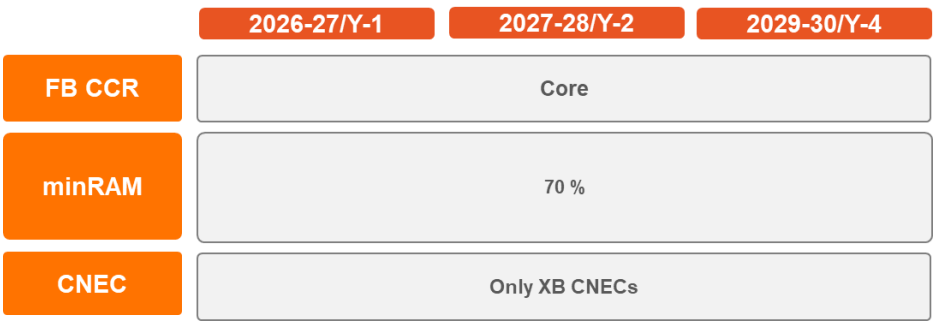

Figure 17: Overview of assumptions for the Core flow-based domain creation

A sensitivity is foreseen for whether 70% should be the fixed or the minRam (see §2.2.5).

2.1.6 Other countries data

The same data as presented from §2.1.1 to §2.1.4 are also necessary for other countries. In the framework of the CRM calibration, the same perimeter as used for the Adequacy and Flexibility study 2024-34 will be taken into account and is represented on Figure 18. It includes **twenty-eight countries**.

- Austria (AT)
- Belgium (BE)
- Bulgaria (BG)
- Switzerland (CH)
- the Czech Republic (CZ)
- Germany (DE)
- Denmark (DK)
- Estonia (EE)
- Spain (ES)
- Finland (FI)
- France (FR)
- United Kingdom (GB and NI)
- Greece (GR)
- Croatia (HR)
- Hungary (HU)
- the Republic of Ireland (IE)
- Italy (IT)
- Lithuania (LT)
- Luxembourg (LU)
- Latvia (LV)
- the Netherlands (NL)
- Norway (NO)
- Poland (PL)
- Portugal (PT)
- Romania (RO)
- Sweden (SE)
- Slovenia (SI)
- Slovakia (SK)

Due to the specific market situation in Italy, Denmark, Norway and Sweden, these countries are modelled using multiple market nodes. This type of specific modelling is in line with the current market zones' definition, and is identical to the approach used in other studies, e.g. at ENTSO-E.

Figure 18: EU simulation area

The most recent European dataset available is the ERAA 23 data. The years for which data are provided are the following: 2025, 2028, 2030 and 2033. Note that the target

years from ERAA data refers to beginning of the year. Therefore, the data used in CRM for delivery period X refers to ERAA data for year X+1. When needed, a linear interpolation was used to obtain specific data on a particular year which was not included in the study.

In the CRM calibration, the ERAA23 dataset is used as an initial dataset but updated with the latest public information available for neighboring countries. The updates made compared to the ERAA23 data can be consulted in the Excel file (section 5).

2.1.6.1 Overview of the updates for neighboring countries

Table 4, Table 5 and Table 6 present the main updates proposed respectively for 2026-27/Y-1, 2027-28/Y-2, and 2029-30/Y-4, initially based on ERAA23 data. It takes into account updates for the total yearly consumption as well as some technologies, including nuclear, coal/lignite, gas, wind onshore, wind offshore and solar.

2026-27/Y-1	France	Germany	Netherlands	United Kingdom	Spain	Italy	Poland	Denmark
Demand [TWh]	480	590	134	294	260	335	173	46
Onshore Wind [GW]	26	86	8	21	36	15	12	6
Offshore Wind [GW]	3	13	6	28	0	5	4	4
Solar [GW]	27	132	47	23	40	53	22	8
Coal [GW]	1	19	3	0	0	0	24	1
Nuclear [GW]	62,9	0,0	0,5	3,6	7,1	0,0	0,0	0,0
Gas [GW]	7,2	32,8	13,6	41,9	24,5	42,6	5,8	1,2

Table 4: Updates for neighboring countries based on latest available information for 2026-27/Y-1.

2027-28/Y-2	France	Germany	Netherlands	United Kingdom	Spain	Italy	Poland	Denmark
Demand [TWh]	490	610	139	300	264	340	177	49
Onshore Wind [GW]	27	93	8	23	37	16	12	7
Offshore Wind [GW]	3	18	8	30	0	6	6	4
Solar [GW]	32	152	51	25	46	60	23	11
Coal [GW]	1	14	3	0	0	0	23	1
Nuclear [GW]	62,9	0,0	0,5	3,6	6,1	0,0	0,0	0,0
Gas [GW]	7,2	32,8	13,6	42,1	24,5	42,6	5,8	1,2

Table 5 : Updates for neighboring countries based on latest available information for 2027-28/Y-2.

2029-30/Y-4	France	Germany	Netherlands	United Kingdom	Spain	Italy	Poland	Denmark
Demand [TWh]	509	652	156	325	269	351	185	55
Onshore Wind [GW]	30	107	9	27	44	19	14	7
Offshore Wind [GW]	4	26	15	45	3	10	6	5
Solar [GW]	42	194	59	31	59	75	27	18
Coal [GW]	1	0	0	0	0	0	22	0
Nuclear [GW]	62,9	0,0	0,5	1,2	5,1	0,0	0,0	0,0
Gas [GW]	7,2	25,7	12,7	37,7	24,5	42,6	5,8	0,8

Table 6: Updates for neighboring countries based on latest available information for 2029-30/Y-4.

2.1.6.2 Sources for France

ERAA 2023 data is used as main source for France for the different delivery periods.

The Bilan prévisionnel 2023-2035 published on 20th of September 2023 by RTE[25] is used:

- to validate the assumptions regarding solar and wind offshore;
- to align the assumptions regarding the availability of Cordemais. Cordemais is considered as a coal unit for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4 as the full transition to biomass is not expected before 2030[26];
- to update the demand and the onshore capacity which is computed using the current installation rate of this study.

EDF nuclear power plant open data hub[27] is used for the nuclear capacity.

The availability of the French nuclear fleet is a key parameter that impacts Belgium's adequacy (given the strong correlation between both countries in simulated scarcity situations). The availability of French nuclear follows either:

- the forecast of the French producer as published in REMIT for 2026-27/Y-1, calibrated to an estimated yearly generation output of 365 TWh[28];
- the maintenance profiles used in the ERAA 2023 as a basis for 2027-28/Y-2 and 2029-30/Y-4.

In addition, forced outages are drawn and added to the unavailability.

For 2025-26/Y-1, Flamanville 3 was considered unavailable during the winter period. For 2026-27/Y-1, Elia will take into account the latest information available on REMIT. EDF currently foresee an electricity generation of 14TWh until the first outage that should take place mainly in 2026 and last multiple months[29]. As the first outage to replace the nuclear pressure vessel cover is expected to last from 4,5 to 9,5 months, as mentioned in the Bilan prévisionnel, the availability of Flamanville 3 will be closely monitored to assess its availability for winter 2026-27.

---

[25] https://www.rte-france.com/analyses-tendances-et-prospectives/les-bilans-previsionnels
[26] https://assets.rte-france.com/prod/public/2023-10/2023-10-16-chapitre3-production-stockage-electricite.pdf
[27] https://opendata.edf.fr/explore/dataset/centrales-de-production-nucleaire-edf/table/?disjunctive.centrale&disjunctive.tranche&disjunctive.sub_sector&sort=-tri
[28] https://www.edf.fr/sites/groupe/files/epresspack/6873/CP-Estimation-de-production-nucleaire-21.12.2023.pdf
[29] https://www.edf.fr/groupe-edf/ambition-neutralite-co2-pour-edf-a-l-horizon-2050/optimisation-et-trading/listes-des-indisponibilites-et-des-messages/liste-des-messages?code=edf-2024-00097

Note that different sensitivities are foreseen on French nuclear availability as well as on the availability of Cordemais (see §2.2.1 and §0)

2.1.6.3 Sources for Germany

ERAA 2023 data is used as main source for Germany for all parameters and for all delivery periods. No updates from other sources are applied on the dataset.

2.1.6.4 Sources for Netherlands

ERAA 2023 data is used as main source for Netherlands for all parameters and for all delivery periods. No updates from other sources are applied on the dataset.

However, some adaptations might be done after the publication of the Monitoring Leveringszekerheid by Tennet.

2.1.6.5 Sources for Great-Britain

The "Future Energy Scenarios" (FES 23 - CT) published by National Grid in 2023[30] is used for all the data except for nuclear capacity.

The "Point d'actualité sur le projet Hinkley Point C" published on the 23rd of January 2024 by EDF[31] is used to determine the nuclear capacity.

Note that different 2 sensitivities are foreseen on the nuclear capacity in Great-Britain linked to the availability of Hinkley Point C and the possible extension of the AGR units (see §2.2.2 and 2.2.3).

[30] https://www.nationalgrideso.com/future-energy/future-energy-scenarios-fes [30]
[31] https://www.edf.fr/groupe-edf/espaces-dedies/journalistes/tous-les-communiques-de-presse/point-dactualite-sur-le-projet-hinkley-point-c [31]

2.1.6.6 Sources for other main countries

For other countries, the sources of the updates per country are listed in Table 7.

Country	Main sources used to update ERAA 23 data
	➢ The “Adequacy and Flexibility study 2024-34” published by Elia in June 2023 (Adflex23)[32] is used for the onshore capacity, as it follows the same trend as ERAA23 with a higher granularity. ➢ The “Plan Integrated National Energy and Climate 2023-2030” (NECP)[33] is used for the offshore wind capacity.
	➢ The “Development plan for the national electricity grid (Piano di sviluppo 2023 della rete elletrica nazionale)” published in 2023 by Terna (TERNA23)[34] is used for all data.
	➢ The “Adequacy and Flexibility study 2024-34” published by Elia in June 2023[35] is used to determine the offshore and solar capacity, as it better follows the latest available information.
	➢ The “Analyseforudsætninger til Energinet published on the 13th of October 2023[36] is used to update the demand and the offshore capacity.

Table 7 : Sources used to update ERAA 23 data

2.1.7 Methodology and Climatic years

The methodology applied will take into account the latest European methodologies approved in 2020, as applied in the Adequacy and Flexibility study 2024-34 published in June 2023.

Regarding climatic years, Elia will use the ‘forward looking’ climate database developed by Météo-France and also used by RTE in its adequacy assessment. Such methodology

[32] https://www.elia.be/en/electricity-market-and-system/adequacy/adequacy-studies
[33] https://commission.europa.eu/publications/spain-draft-updated-necp-2021-2030_en
[34] https://www.terna.it/en/electric-system/grid/national-electricity-transmission-grid-development-plan
[35] https://www.elia.be/en/electricity-market-and-system/adequacy/adequacy-studies
[36] https://energinet.dk/analyse-og-forskning/analyseforudsaetninger/analyseforudsaetninger-2023/

was already extensively presented (several sources are available detailed the methodology used by Météo-France) in the Adequacy and Flexibility study 2024-34.

2.1.8 Economic parameters

The last point of this section is dedicated to data and assumptions for the scenario's economic parameters which are necessary to calculate the market revenues. Those are required to determine the missing money of technologies in order to calibrate the price parameters of the demand curve and to determine the intermediate price cap.

The methodology used to compute the prices is the following. Prices are based on futures when available. Those are sales of fuel or CO_2 units which are contracted in this year, but for which actual delivery will happen in a determined future year. This is used as a proxy for future prices. The sources used to consult the future prices are displayed in Table 8.

Data	Sources
Gas	EEX TTF Natural Gas [37]
Coal	Coal (api2) CIF ARA (argus-McCloskey)[38]
Oil	Crude oil futures[39]
CO_2	EEX EUA futures[40]

Table 8: sources for future prices per fuel

For years where futures are not available, an interpolation between the last available future and the World Energy Outlook 2023[41] value for 2030 is applied. Prices from the WEO announced pledges scenario are used.

[37] https://www.eex.com/en/market-data/natural-gas/futures#%7B%22snippetpicker%22%3A%22292%22%7D
[38] https://www.cmegroup.com/markets/energy/coal/coal-api-2-cif-ara-argus-mccloskey.quotes.html#venue=globex
[39] https://www.cmegroup.com/markets/energy/crude-oil/light-sweet-crude.contractSpecs.html
[40] https://www.eex.com/en/market-data/environmentals/futures
[41] https://iea.blob.core.windows.net/assets/86ede39e-4436-42d7-ba2a-edf61467e070/WorldEnergyOutlook2023.pdf

The prices include the fuel cost for oil, gas, and coal, expressed in December €2023/MWh, and the CO_2 cost expressed in December €2023/tCO_2. The inflation rates to index prices are taken from the Federal Planning Bureau[42].

The figures below show the proposed fuel prices per fuel and per auction. The prices for the delivery periods of last year's calibration exercise are given in €2022.

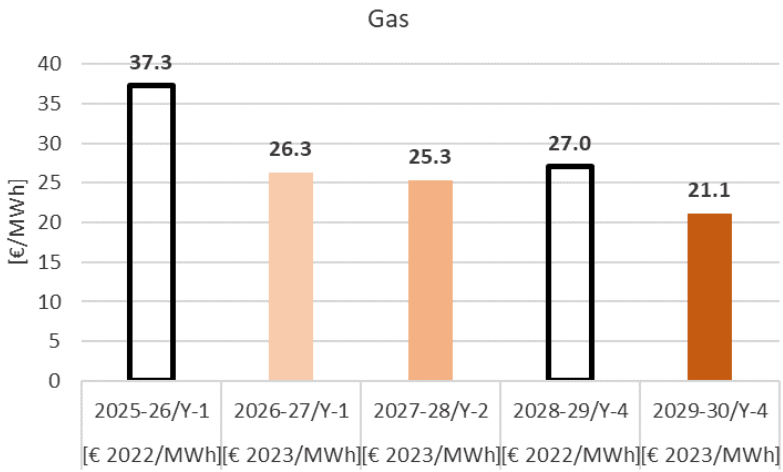

Figure 19: comparison of gas prices

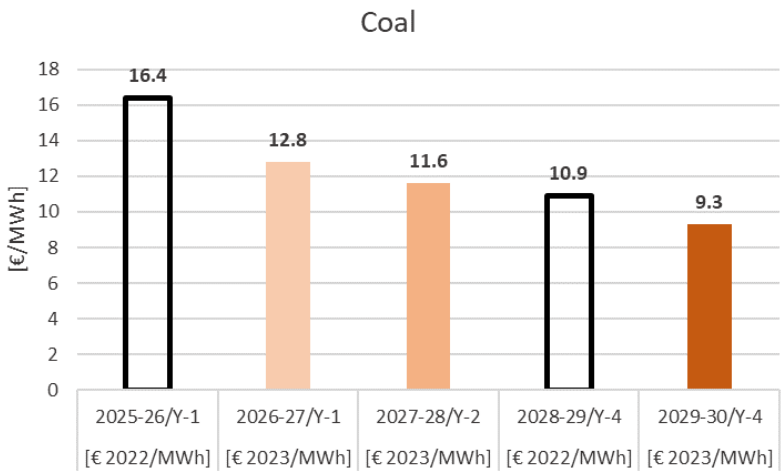

Figure 20: comparison of coal prices

[42] https://www.plan.be/publications/publication-2458-nl-economische_begroting_2024_economische_vooruitzichten_2025_2029_van_februari_2024#:~:text=Bij%20ongewijzigd%20beleid%20neemt%20het,2023%20tot%20117%25%20in%202029

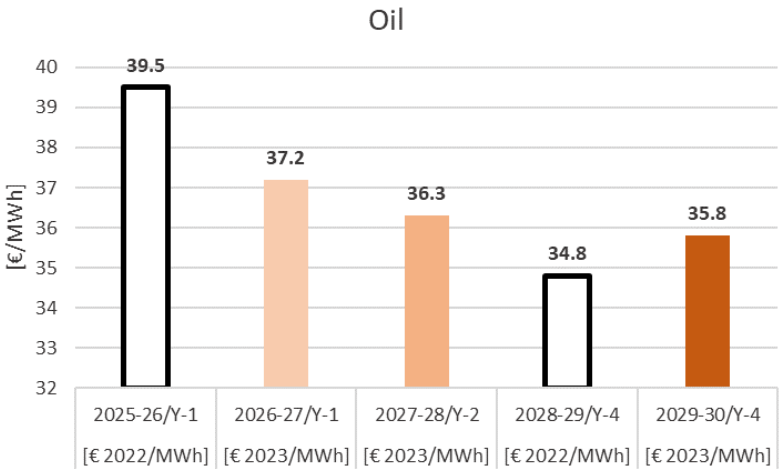

Figure 21: comparison of oil prices

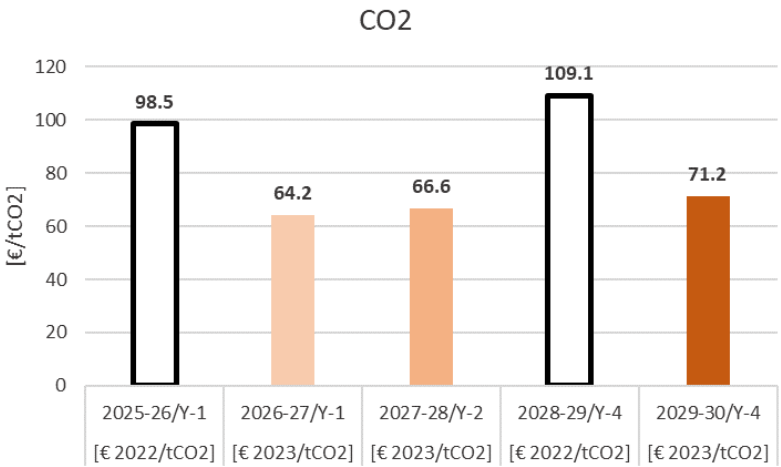

Figure 22: comparison of CO2 prices

2.2 Sensitivities that could be integrated in the reference scenario

This section presents the sensitivities that could be integrated in the reference scenario, according to article 3, §4. The purpose of the sensitivities is to take into account additional assumptions that can have an impact on the Belgian security of supply. Stakeholders are also free to propose additional quantified sensitivities.

The sensitivities have been selected by Elia in collaboration with FPS and in concertation with the CREG. These sensitivities, the associated assumptions and data modification and their purpose are then submitted to public consultation. Elia will then provide a public consultation report integrating the feedback from the stakeholders and recommendations.

Based on this report, CREG will propose to the Minister a set of data and assumptions that constitutes a reference scenario on which FPS transmits an advice. Finally, the Minister decides which sensitivities should be applied in order to establish the reference scenario by September 2024.

The sensitivities menu is presented in the Excel, section 7. This explanatory note further explains the purpose, the source and the impact of each proposed sensitivity. The Figure 23 presents the different sensitivities proposed for 2026-27/Y-1, 2027-28/Y-2, and 2029-30/Y-4. Furthermore, the application is specified for each of the delivery periods.

Any feedback on the proposed sensitivities or additional proposals for sensitivities (ideally including sources) are more than welcome and will be dealt with carefully by Elia.

Sensitivity	Description	Applicable for 2026-27/Y-1	Applicable for 2027-28/Y-2	Applicable for 2029-30/Y-4
French nuclear availability 1	2026-27/Y-1 : Lower availability during winter compared to **REMIT** Calculated as the difference with the **average** EDF forecast on the **winter** only 2027-28/Y-2 & 2029-30/Y-4 : Lower availability by **2 units** on average during winter compared to **ERAA**	Yes	Yes	Yes
French nuclear availability 2	2026-27/Y-1 : Lower availability during winter compared to **REMIT.** Calculated as the difference with the **minimum** EDF forecast on the **winter** only 2027-28/Y-2 & 2029-30/Y-4 : Lower availability by 4 **units** on **average** during winter compared to **ERAA**	Yes	Yes	Yes
French nuclear availability 3	2026-27/Y-1 : Lower availability during winter compared to **REMIT.** Calculated as the difference with the **minimum** EDF forecast on the **whole year** 2027-28/Y-2 & 2029-30/Y-4 : Lower availability by **6 units** on average during winter compared to **ERAA**	Yes	Yes	Yes
French nuclear availability 4	2026-27/Y-1 : / 2027-28/Y-2 & 2029-30/Y-4 : Lower availability by **8 units** on average during winter compared to **ERAA**	Yes	Yes	Yes
Nuclear capacity Great-Britain 1	Earlier availability of Hickley Point C	No	No	Yes
Nuclear capacity Great-Britain 2	Extension of AGR nuclear plants by 2 years	No	Yes	Yes
Cordemais unavailability	The coal unit Cordemais is not switched to biomass and is closed in 2026.	Yes	Yes	Yes
FB CEP rules	Non achievements of the CEP rules to reflect the uncertainty on capacity calculation. Fixed RAM 70% instead of 70% minRAM	Yes	Yes	Yes
Nuclear forced outage rate in Belgium	Better Belgian nuclear availability in winter due to the extensive LTO works performed in summer. FO rate of 10 % instead of 20,5 %	Yes	Yes	Yes
TJ closure	Closure of turbojets due to CO2 threshold -140 MW	Yes	Yes	Yes

Figure 23: Sensitivities menu

2.2.1 French nuclear availability

As demonstrated in the Adequacy and Flexibility study 2024-34 (Figure 4-14), the availability of French nuclear units can have a strong impact on the Security of Supply of Belgium. Therefore, for the three auctions, 4 different sensitivities associated to the French nuclear availability are proposed.

The reasoning behind these sensitivities are historical observations complemented with recent observations on the unavailability of the French nuclear fleet:

- The French nuclear fleet is going through major overhauls to extend the lifetime of its ageing fleet beyond 40 years. The maintenance schedule foresees a substantial number of "decennial visits" over the next 5 years, in particular for the 900 MW nuclear power plants[43].

- In addition, found corrosion defects in some welding greatly impacted the availability of all nuclear reactors in the previous years and might still impact them in the future as inspections are still being performed and could lead to possible additional maintenances/works, as recently observed on Blayais 4 unit.

- The nuclear fleet is very vulnerable to generic issues given the same technological conception used in the reactors. A similar situation was already experienced during winter 2016-17.

- RTE proposes a nuclear generation of 350 TWh from 2026 onwards for the next 'Bilan Prévisionnel'[44], while the historical generation was above 400 TWh. Note that the yearly generation expected for Flamanville 3 is expected by RTE to reach 10 TWh. RTE also run a low sensitivity (330 TWh) as well as some stress tests on the nuclear units to assess the simultaneous unavailability of 12 nuclear units (280 TWh).

- The EDF generation forecasts for the coming years do not match with the sum of unit availability reported on REMIT. Therefore, a reduction of the unit availability reported on REMIT is required.

These sensitivities propose unavailability of the nuclear units in France in addition to the considered maintenance profiles. For 2026-27/Y-1, the maintenance profile published according to REMIT is considered as base. For 2027-28/Y-2 and 2029-30/Y-4, the maintenance profile provided by RTE in the context of ERAA 2023 is considered as base.

[43] https://assets.rte-france.com/prod/public/2023-10/2023-10-16-chapitre3-production-stockage-electricite.pdf
[44] https://assets.rte-france.com/prod/public/2023-10/2023-10-16-chapitre3-production-stockage-electricite.pdf

Determination of the nuclear unavailability for 2026-27/Y-1

The French nuclear unavailability sensitivities for 2026-27/Y-1 are calculated using a combination of the REMIT data and the yearly EDF generation forecast, as developed in the Adequacy and Flexibility study 2024-34. While the REMIT data provides a reference profile, it tends to be overly optimistic[45]. The latest EDF generation forecast for 2026 is 335-365 TWh[46]. Note that this generation forecast does not consider Flamanville 3, the production of Flamanville 3 will be added based on the latest REMIT information.

To obtain an availability profile matching with a certain amount of generation for a given year, the REMIT profile is scaled by considering an additional number of unavailable unit(s). The additional unavailable capacity is obtained by comparing the forecast production based on the REMIT data with the EDF forecast or assumption, and deducing the corresponding capacity, expressed as a number of equivalent units. Figure 24 provides an overview of this calculation. For the sensitivities labeled "French nuclear unavailability" 1, 2, and 3, the three scenarios of EDF generation forecast (high, average, and low) adapted to only consider the winter months, which are critical for ensuring adequacy, are considered. In the last sensitivity, the scenario with the lowest availability published by EDF is considered and the same methodology is applied to the entire year.

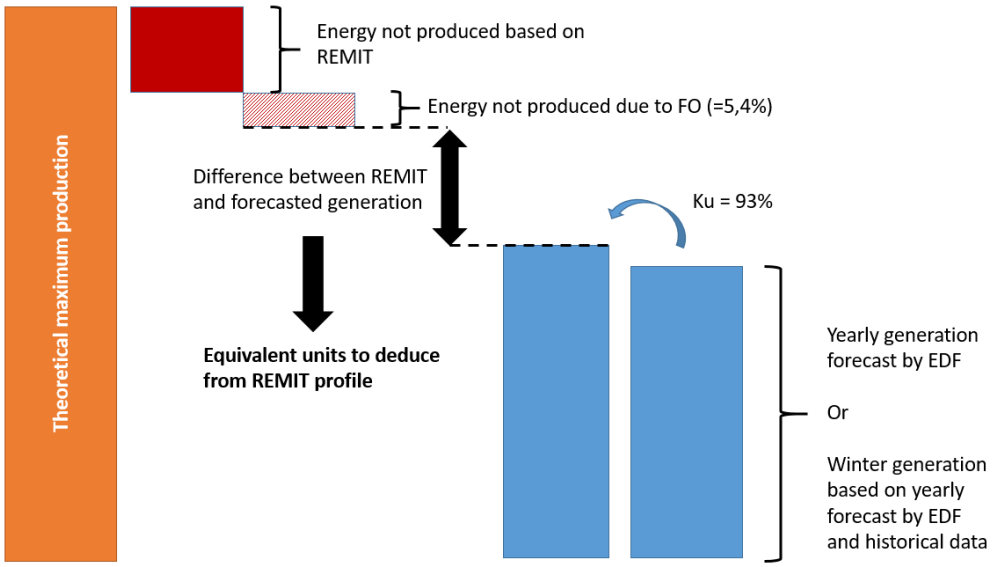

Figure 24 : Description of the methodology to determine the number of unavailable nuclear units

[45] https://assets.rte-france.com/prod/public/2022-10/Analyse-passage-hiver-2022-2023-actualisation-18octobre.pdf

[46] https://www.edf.fr/groupe-edf/espaces-dedies/journalistes/tous-les-communiques-de-presse/estimation-de-production-nucleaire-en-france-en-2026#:~:text=L%27estimation%20de%20production%20nucl%C3%A9aire,365%20TWh%20pour%202025%20() .

Determination of the nuclear unavailability for auction 2027-28/Y-2 and 2029-30/Y-4

Regarding the sensitivities associated with 2027-28/Y-2 and 2029-30/Y-4, a different approach is taken due to the unavailability of EDF's yearly generation forecast. These sensitivities take into account a higher unavailability of nuclear units, resulting in a reduction of 2, 4, 6, or 8 units compared to the availability profiles used under the ERAA 2023 framework.

2.2.2 Nuclear capacity Great-Britain 1

EDF operates 4 nuclear AGR power plants in Great-Britain. Two of these units are currently planned to be shut-down by 2026 and the two remaining by 2028. EDF recently announced a possible extension for these AGR plants[47]. No specific timings or extension periods were communicated as of yet and the extensions needs to be approved by the nuclear regulator in Great-Britain.

Since the extension is still uncertain but would significatively impact the generation capacity in Great-Britain, Elia proposes to include a sensitivity regarding the extension of the AGR units. Since no specific timings have been communicated, Elia proposes to consider a 2-year extension for each of the units. If more information becomes available, the sensitivity could be updated accordingly. EDF also considers a possible extension of the Sizewell B reactor by a further 20 years. However, this does not affect 2026-27/Y-1, 2027-28/Y-2 or 2029-30/Y-4 since the current closure date is 2035.

2.2.3 Nuclear capacity Great-Britain 2

The Hinkley Point C nuclear power plant currently under construction by EDF is expected to be available as from 2030. However, EDF also considers an optimistic and a pessimistic scenario where the unit would be available 1 year earlier and 1 year later respectively[48].

A sensitivity could therefore be considered to take into account the optimistic scenario of EDF where the unit would already be available in 2029. The pessimistic scenario would not affect any of the delivery periods relevant for this year's calibration exercise and is therefore not considered.

[47] https://www.edfenergy.com/media-centre/investment-boost-maintain-uk-nuclear-output-current-levels-until-least-2026
[48] https://www.edf.fr/groupe-edf/espaces-dedies/journalistes/tous-les-communiques-de-presse/point-dactualite-sur-le-projet-hinkley-point-c

2.2.4 Cordemais unavailability

This sensitivity is considered as the future of the Cordemais unit is still uncertain. The project “Ecocombust” aims the transition of the coal unit Cordemains to biomass. This scenario was supported by Emmanuel Macron[49]. Therefore, the unit of Cordemais is considered as available. But the final resolution of this project is still uncertain[50] and could result to the closure of the unit. The situation could be clarified before the selection by the Minister of the scenario.

In this sensitivity, Elia assumes that the Cordemais unit will be closed in 2026, rendering it unavailable for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4. This would result in 1,2 GW not available in the French electricity market.

2.2.5 Flow-based CEP rules

Several reasons can be put forward to justify the addition of sensitivity on the applied flow-based domains in the context of this study.

Firstly, in exceptional circumstances, the minRAM factor can be set below the targeted legal threshold by a TSO if required to maintain operational security (See CEP article 16.3[51]). This type of events cannot be excluded and a minRAM 70% can therefore not be guaranteed at every hour and on every CNEC. The complexity and uncertainties linked to the forecasting of remedial actions (RA) are one of the main factors justifying that such operational security exceptions could occur during the period covered by this study. Such exceptional circumstances might arise during near scarcity periods. For instance, such a situation was observed during the cold wave that hit Central Europe in 2020, leading to a reduction in crossborder capacities by Tennet NL.

The need for sensitivity could be further justified in order to capture the potential delay in meeting the 70% minRAM target. Any country that would be facing unforeseen difficulties to meet the legal target, could still legally request a derogation after 2025.

Furthermore, the current legislation does not exclude the inclusion of grid elements internal to a bidding zone in the CNE list, if it is demonstrated with a Cost Benefit Analysis (CBA) that adding the internal grid element is a more economically efficient solution in comparison to – amongst others – a bidding zone reconfiguration. Given that the flow-based domains calculated in this study only consider cross-border CNECs, decreasing the available margin on those cross-border CNECs can be considered as a proxy to the inclusion of internal constraints into the market coupling.

---

[49] https://www.elysee.fr/emmanuel-macron/2023/09/24/20h-linterview-du-president-emmanuel-macron-sur-tf1-et-france-2

[50] https://www.ouest-france.fr/economie/energie/info-ouest-france-conversion-verte-de-la-centrale-a-charbon-a-cordemais-la-prefecture-dit-oui-09eeaa38-d708-11ee-a613-258427ffa9f5

[51] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R0943&from=EN#d1e2713-54-1

If a country is facing systemic difficulties to meet the CEP requirements, a bidding zone split could constitute a solution forward. It can be expected that such a bidding zone split will neither be decided upon nor be applied overnight. As an example, the split of the German-Austrian bidding zone took about 2 years to implement, starting November 2016 when ACER issued a legally binding decision for the German-Austrian border, followed by the German and Austrian regulatory authorities (BNetzA and E-Control) agreement on May 2017 and finally with the split between Germany and Austria taking effect on 1 October 2018[52]. The impact of such a bidding zone split would be difficult to estimate: while it might have a mitigating impact on initial flows affecting the flow-based domain, in general splitting bidding zones will lead to additional constraints to the market coupling, as former internal grid elements might then become cross-border elements.

Finally, as mentioned earlier, in determining the flow-based domains for winter periods, the optimistic assumption is taken in this study that the transmission grid is always fully available. While covering the potential impact of any single contingency taking place, prior to such a contingency, a European transmission grid without planned outages and without forced outages that cannot be quickly repaired is assumed.

The abovementioned arguments justify the consideration of a sensitivity fixed RAM 70% instead of a minRAM 70%.

2.2.6 Forced outage rate of Belgian nuclear units

This sensitivity is justified by considering that potential defects would be detected by the needed LTO-works and dealt with during the foreseen summer planned outages, leading to a better availability during winter months. Considering these elements and in line with the LowNuFO sensitivity from the Adequacy and Flexibility study 2024-34, a forced outage rate of 10% for the Belgian Nuclear units could be considered.

However, Elia would like to stress that the LTO works that will be performed over the course of several years entail many risks that could cause additional unavailabilities. LTO works in the past already lead to additional unavailability on Tihange 1[53]. As indicated before, Elia still considers the 20.5% forced outage rate calculated on all nuclear units in the context of the Adequacy and Flexibility study 2024-34 as the best value to consider to ensure the security of supply in Belgium.

2.2.7 Uncertainty on Belgian Turbojet units related to the CO_2 thresholds

In this sensitivity, it is assumed that all turbojets in Belgium will close due to the CO_2 thresholds. This sensitivity would results in 140 MW not being available in the Belgian electricity market. This sensitivity is proposed for all auctions.

[52] https://eepublicdownloads.entsoe.eu/clean-documents/news/bz-review/2018-03_First_Edition_of_the_Bidding_Zone_Review.pdf
[53] https://afcn.fgov.be/fr/actualites/lafcn-donne-son-feu-vert-au-redemarrage-de-tihange-1-0

3 Other parameters

This chapter describes the additional parameters that have to be submitted to public consultation according to article 5, §2, 3° to 5° of the Royal Decree, but that are not fixed by the Minister. This includes the sources of scenarios for periods after the delivery periods in order to calculate the market revenues accordingly, the preselected capacity types to be added to the reference scenario in order to reach the security of supply criteria and the intermediate price cap parameters.

3.1 Preselected capacity types

This section details the parameters included in the scope of this public consultation towards the preselected capacity types that shall apply in 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4

Once the reference scenario is defined by the Minister, it does not mean that this scenario meets the legal security of supply criteria, as defined in article 7undecies, §3 of the electricity law. Indeed, the scenario choice takes into account data and assumptions from the latest European or National Resource and Adequacy Assessment updated with the most up-to-date available information and might take into account some sensitivities in or out of the Belgian market zone that can have an impact on the Belgian security of supply. The next step in the methodology is therefore to calibrate the scenario to the security of supply criteria in order to reach the right volume to be procured for each CRM auction.

The proposed preselected capacity types are presented in the Excel file (section 8). Five categories are mentioned: semi-baseload, peakers 1, peakers 2, batteries and demand-side response. Each category is associated with a typical technology available on the Belgian energy market.

- **Volume**
  For the first four categories, incremental capacity of the reference technology (new CCGT, new OCGT, new IC engine and new large-scale batteries) is added step by step. It should be noted that neither new CCGT nor new OCGT are considered for both Y-1 and Y-2 auctions.
  For demand-side response, incremental capacity is added to each of the categories already defined for the Belgian market zone (see §2.1.3.1) proportionally to each demand-side response category size.

- **Marginal Price**
  For the first three categories, the marginal price will be calculated based on the parameters associated with a new entrant of each technology.
  For demand-side response, the marginal price is defined based on a weighted average of the existing demand-side response categories.
  No marginal price is associated to large-scale batteries.

Note that the information presented also includes CAPEX [€2023/kW], FOM [€2023/kW] and economic lifetime [years]. Entras recently published a study on the cost of capacity in which the FOM and VOM costs for existing and new capacities were estimated[54]. Entras is still in the works of finalizing a similar study on the CAPEX cost for new capacities. The results of this study are not available as of yet. Elia therefore proposes to use the FOM costs from the Entras study and use CAPEX costs from the Adequacy and Flexibility study 2024-34 updated for inflation. The cost assumptions for the preselected capacity types are presented in section 8 of the Assumptions Workbook. Elia proposes to update the CAPEX cost assumptions based on the results of the Entras study once it becomes available and to align with the Intermediate Values which will be selected by the Minister.

As long as the security of supply criteria is not reached, additional capacity from one of these categories is added step by step. The step size will be in line with the European Resource and Adequacy Assessment methodology and shall not exceed 100 MW. For each step, capacity will be iteratively added based on an economic optimization loop.

At the end of this process, the security of supply criteria are reached and a mix of capacities from the different categories will be selected based on the defined economical loop.

Royal Decree Reference	
Art. 6. §1er. Le gestionnaire du réseau s'assure que le scénario de référence tel que déterminé selon l'article 3, §7, répond aux critères pour la sécurité d'approvisionnement requis par l'article 7undecies, §3, de la loi du 29 avril 1999 en ajoutant, si nécessaire, une capacité supplémentaire à la zone de réglage belge : 1° provenant des types de capacité présélectionnés selon l'article 10 et proposés par le gestionnaire de réseau dans la consultation publique visée à l'article 5 et ensuite choisis par le gestionnaire de réseau en collaboration avec la Direction générale de l'Energie et en concertation avec la commission ; 2° d'une manière itérative sur la base d'une boucle d'optimisation économique avec l'incrément comme utilisé dans	**Art. 6**. §1. De netbeheerder verzekert zich ervan dat het referentiescenario zoals bepaald volgens artikel 3 §7 beantwoordt aan de criteria voor de bevoorradingszekerheid die worden geëist door artikel 7undecies, § 3, van de wet van 29 april 1999 door, indien nodig, aan de Belgische regelzone bijkomende capaciteit toe te voegen: 1° afkomstig van de volgens artikel 10 voorgeselecteerde types van capaciteit die voorgesteld worden door de netbeheerder ter openbare raadpleging bedoeld in artikel 5 en daarna door de netbeheerder in samenwerking met de Algemene Directie Energie en in overleg met de commissie gekozen worden; 2° op een iteratieve manier op basis van een economische optimalisatielus op basis van incrementele stappen zoals

[54] https://www.elia.be/-/media/project/elia/elia-site/users-group/ug/wg-adequacy/2024/20240202_esid-23-022_d1_technologies_v113_final_en.pdf

l'évaluation de l'adéquation des ressources à l'échelle européenne ou nationale visée aux articles 23 et 24 du Règlement (UE) 2019/943 et de maximum 100 MW.	gebruikt in de Europese of nationale beoordeling van de toereikendheid van de elektriciteitsvoorziening, bedoeld in de artikelen 23 en 24 van Verordening (EU) 2019/943 en van maximaal 100 MW.

3.2 Scenario used for post-delivery periods

This section details the parameters included in the scope of this public consultation towards the scenarios for the periods after 2030 that are used to calculate the market revenues for the technology with a lifetime longer than one year. It is also worth noting that a linear interpolation will be taken for 2028 as no simulation will be realized on this year.

Indeed, point B of the demand curve is calibrated at the net-CONE, which is equal to the missing money of the technology with the lowest missing money. Three parameters are required to determinate it: the gross-CONE, the market revenues, and the ancillary services revenues (defined in §3.3.3). Just as the gross-CONE takes into account the costs of the entire lifetime for the reference of each technology, market revenues must also be determined on this period. This requires more than the delivery period scenario to have a correct estimation. This is the reason why additional existing scenario from public available sources are taken into account. If a scenario is not available for one of the years of each reference technology lifetime, an interpolation is made between the values of the years for which a public scenario is available.

The proposed post-delivery period scenarios are presented in the Excel file (section 9).They are also mapped on Figure 25, Figure 26, and Figure 27. For the period from 2030 to 2034 included, the results are taken from the Adequacy and Flexibility 2024-34. For later years, it is proposed to take the last year of the same study as a proxy in order to keep consistency with the other time horizons and to use recent data. For each of these time horizons, scenarios as close as possible to the reference scenarios of 2026-27/Y-1, 2027-28/Y-2, and 2029-30/Y-4 defined by the Minister will be selected.

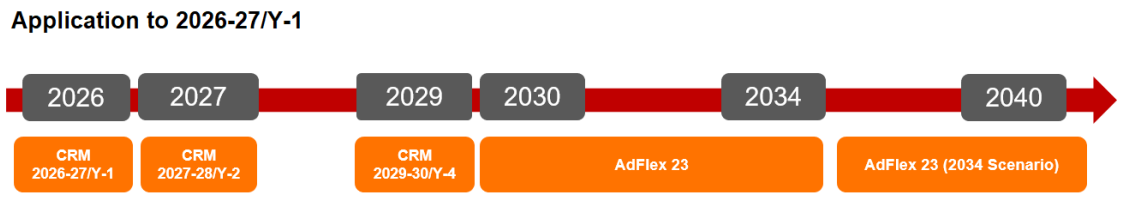

Figure 25: Selection of the scenarios and sources post-delivery period for the market revenues calculation for 2026-27/Y-1.

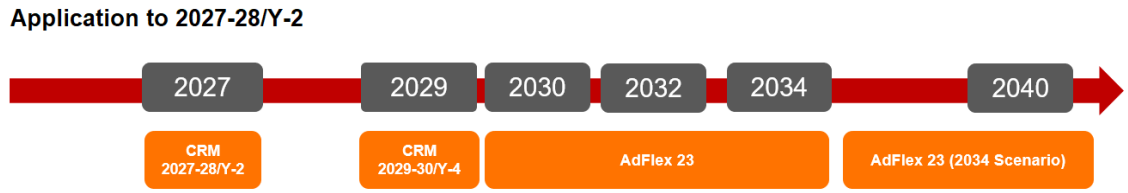

Figure 26: Selection of the scenarios and sources post-delivery period for the market revenues calculation for 2027-28/Y-2.

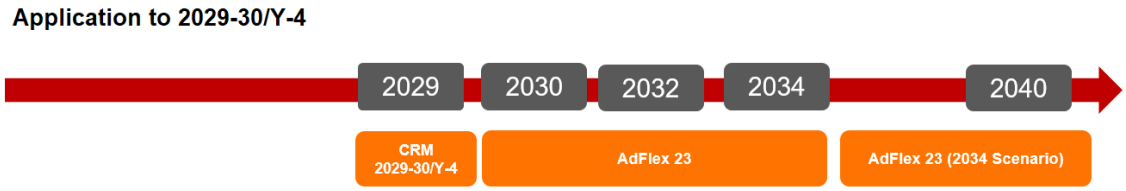

Figure 27: Selection of the scenarios and sources post-delivery period for the market revenues calculation for 2029-30/Y-4.

Royal Decree Reference	
Art. 10. §6. (…) Si le scénario de référence n'est pas disponible pour une année sur la durée de vie de la référence pour chaque technologie, une interpolation est réalisée entre les valeurs des années pour lesquelles le scénario de référence existe, éventuellement corrigé par des données disponibles complémentaires.	Art. 10. §6. (…) Indien het referentiescenario niet beschikbaar is voor een jaar uit de levensduur van de referentie voor elke technologie, wordt een interpolatie uitgevoerd tussen de waarden van de jaren waarvoor het referentiescenario bestaat, eventueel bijgestuurd door bijkomende beschikbare gegevens.

3.3 Intermediate Price Cap parameters

In this section, the parameters are described that are included in the scope of this public consultation towards the calibration of the intermediate price cap that shall apply in 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4, respectively.

3.3.1 Shortlist of technologies

In accordance with art. 5, §2, 5° of the Royal Decree on the volume methodology (cf. section 1), this public consultation includes a shortlist of existing technologies reasonably considered available during the delivery periods 2025-26, 2026-27 and 2029-30 and deemed relevant for the calibration of the intermediate price cap. The shortlist is presented in the Excel file (section 10.1).

Based on the expert study delivered by Entras (2023)[55] a shortlist is established that is considered to represent a list of technologies likely to include the technology with the highest missing-money across the whole set of existing technologies reasonably expected to be available during the delivery periods 2025-2026, 2026-2027 and 2029-2030. Therefore, this shortlist serves as a basis towards the calibration of the intermediate price cap.

Royal Decree Reference	
Art. 18. §1er. Le gestionnaire du réseau détermine, sur la base de l'étude visée à l'article 17, après la consultation publique visée à l'article 5, une liste réduite de technologies existantes qui seront raisonnablement disponibles et qui seront considérées pour la détermination du prix maximal intermédiaire.	**Art. 18.** §1. De netbeheerder stelt op basis van de studie bedoeld in artikel 17, na de openbare raadpleging bedoeld in artikel 5, een beperkte lijst op van bestaande technologieën die redelijkerwijs beschikbaar zullen zijn en die in aanmerking genomen zullen worden voor de bepaling van de intermediaire maximumprijs.

[55] Conform art. 17, §1 of the Royal Decree, ELIA has initiated a study – in concertation with the CREG – by an independent expert to determine the cost components associated to the technologies deemed relevant towards the calibration of the intermediate price cap. The resulting expert study by Entras titled "Cost of Capacity for Calibration of the Belgian CRM" was made available in the framework of the public consultation of the regulatory framework in February 2024 and is available at the Elia website.

3.3.2 Cost components

In addition to a shortlist of technologies and beyond the legal requirements regarding the scope of the public consultation for the calibration of the intermediate price cap (i.e. the above mentioned shortlist of technologies), like for the set of parameters for 2026-27/Y-1, 2027-28/Y-2 and 2029-30/Y-4, this public consultation also consults on various cost components relevant for the calibration of the intermediate price cap. In particular, yearly fixed operation and maintenance (FO&M) costs, the activation cost for an availability test and the variable operation and maintenance (VO&M) costs are consulted upon.

*The **yearly fixed operation and maintenance (FO&M) costs*** (cf. art. 18, §2, 1° and 2° of the Royal Decree) have been assessed from the expert study realized by Entras (2023). They are presented per technology included in the shortlist in the Excel file (section 10.1) and include the components that are mentioned in section 3.3 ("FOM and VOM cost model") of the Entras study. Note that the cost categorization might still change in order to be aligned with developments of the Royal Decree Methodology.

In accordance with the Royal Decree (art. 18, §2, 6°), the ***activation cost for an availability test*** is to be considered only for technologies with a high short-run marginal cost. Indeed because of the high short-run marginal cost these technologies are unlikely to be activated. As this makes it harder to monitor their availability in the market they are more likely candidates for availability tests. A CRM candidate offering such a CMU is therefore more likely to also include a provision for such an availability test in its bid. Among the technologies included in the shortlist, the activation cost is deemed relevant only for the *Demand Side Response* technology, considered to be characterized by a high short-run marginal cost.

The activation cost – presented in the Excel file (section 10.2) – is therefore to be associated to the *Demand Side Response* technology and is derived from the historical data published on the Elia website regarding contracted volumes and prices for Strategic Demand Reserves (SDR)[56]. Considering the average activation price for SDR for winter period 2015-2016 [57] for a 4-hour activation (associated with a derating factor X, expressed in %), and assuming one availability test of 15 minutes per year, the activation cost is calculated as follows:

$$\frac{0{,}9€}{kWh} * 0{,}25h * \frac{1}{X}$$

Lastly, the Entras study also includes the **variable operation and maintenance (VO&M) costs** (cf. art. 18, §2, 3° of the Royal Decree). Similar to the FO&M costs, they are presented per technology in the Excel file (section 10.2).

[56] https://www.elia.be/en/suppliers/supplier/energy-purchases/strategic-reserve-volume-and-prices. Originally this analysis yielded a value of 0,74 €/kWh, expressed in €2015. Seeing as this explanatory note is written in €2023 the result is indexed accordingly.
[57] Winter 2015-2016 is still the most recent winter period in which SDR was contracted.

3.3.3 Net revenues from the provision of balancing services

Finally, in terms of assessment of net balancing revenues, Elia refers to the study that was realized in collaboration with Compass Lexecon and presented in WG Adequacy in 2023[58]. The intention is to update this study this year by actualizing the numbers and potentially integrate some additional methodological refinements. Nevertheless, this update will still be based on the legal framework applicable for the assessment of net revenues from balancing services (cf. art. 19, §3 of the Royal Decree) meaning that net balancing revenues are defined:

- On a technology basis;
- Based on historical data (over the last 36 months);
- Derived from the reservation costs for the procurement of balancing services;
- This assessment takes into account the costs linked to the participation of balancing services, including the opportunity costs.

[58] https://www.elia.be/en/users-group/adequacy-working-group/20231013-meeting