Reaction on Elia consultation

On the scenarios for the 10-year Federal Development Plans Electricity and hydrogen

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1 Introduction

This reaction has been written by COGEN Vlaanderen in reaction to Elia's public consultation on the **scenario's for the 10-year Federal Development Plans of electricity and hydrogen networks**[1]. All of the following remarks are non-confidential.

[1] https://www.elia.be/en/public-consultation/20250718_public-consultation-on-scenarios-for-10y-federal-investment-plans-electricity-h2

2 Remarks by COGEN Vlaanderen

2.1 CHP capacity and evolution

Question formulated by Elia in the main document of the consultation report:

Elements and assumptions to which we want to draw attention and especially welcome feedback on:

*- **CHP capacity:** The proposed evolution of CHP capacity assumes a gradual decommissioning capacity towards 2050 related to the electrification of industry. Do you have specific reasons and/or sources which could justify different assumptions (or confirm the proposed one)?*

In the consultation report Elia proposes to:

- keep the 1 400 MWe of estimated large-scale CHP's constant until 2050 in all scenarios
- assume an increase from 1.5 GWe in 2025 to 1.6 GWe in 2030, followed by a decommissioning of 1/3 of the capacity by 2050

Feedback COGEN Vlaanderen:

Remark 1 As already mentioned in previous reactions, COGEN Vlaanderen currently expects a decline of CHP capacity in Belgium as a result of the current implemented policies (combination of European, Federal and Regional elements) and its resulting driving forces. Therefore, assuming an incline of the operational capacity between 2025 and 2030 does not align with our observations and expectations. Furthermore, the current proposal to assume no additional decommissioning of decentralised CHP installations until 2030 "*due to the fact that these capacities can participate to CRM auctions or for some still get certain form of subsides*", will most likely result in an overestimation of CHP capacity within that timeframe. Illustrations of several driving forces, such as how cogeneration is currently treated in the CRM versus large scale electricity production (e.g. CCGT), are given below this textbox.

Between 2022 and 2023 a decline of approximately 70 MW_e of the operational installed capacity has been observed in Flanders (from 2 815 to 2 744 MW_e). Our estimation for Belgium is illustrated in Figure 1. It should be noted that these numbers encompass all CHP installations, irrespective of their seize (from 0,75 kW_e to hundreds of MW_e), their fuel usage (biogas, biomass, hydrogen gas, natural gas, syngas, waste, etc.), the underlying technology (ICE, gas turbine, steam turbine, fuel cell, etc.), the economic sector of the end users, the voltage level to which it is connected, etc.

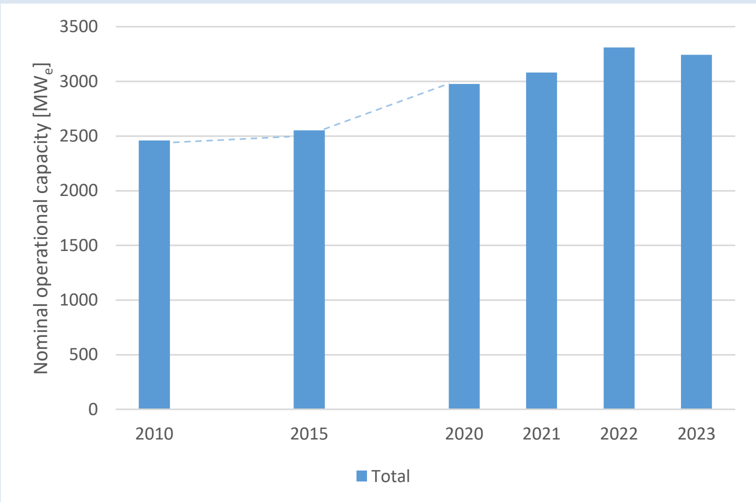


Figure 1 - Evolution of the operational nominal electrical capacity of CHP installations in Belgium in the period 2010-2023. Sources : analysis by COGEN Vlaanderen of the 'WKK-inventaris' as received from VEKA (Flandres) ; Service public de Wallonie – Bilan énergétique de la Wallonie 2016, 2018 and 2022 (Wallonia) ; BRUGEL – 'Les installations de production d'électricité verte' (Brussels)

At this moment in time, COGEN Vlaanderen does not have quantitative numbers of the expected future decline. This expectation is based on current implemented policies (European, Federal and Regional combined), its resulting driving forces, as well as the feedback we receive on our yearly survey of the cogeneration sector (WKK-barometer 2024).

However (as it is clear from all the developed demand simulations performed by Elia) energy vectors other than electricity will remain an important energy source, even in 2050, independent of the scenario's, as illustrated in figure 2-3 on page 23 of the main consultation document. Therefore, should the efficient use of these energy sources (i.e. cogeneration) regain increased attention and support, the estimated evolution of CHP capacity could remain constant or even increase.

The challenge of the energy and climate transition in Belgium is strongly focused on optimising CO_2 accounting per region (each having their own regional contribution goals to the national Effort Sharing Regulation (ESR) target)**, per individual sector and per individual company** (each of which can either belong to ETS 1, ETS 2 or solely under the responsibility of the regions (contribution to ESR)). Although it is an understandable reflex to divide a complex issue into manageable challenges and then solve each of them separately, this is **potentially leading to suboptimal solutions for society as-a-whole**.

Cogeneration, being at the intersection of different policy levels and economic sectors (electricity, industry, agriculture/horticulture, residential) is currently being challenged by this approach, such as the separation of the competencies for Security-of-Supply (Federal level), Energy-Efficiency (Regional level) and the fact that emissions of large-scale electricity production in power-only plants are part of the ETS 1 (European level).

Illustration 1 - The current approach of tackling the challenges coupled to the energy transition of the Belgian regions and its economic sectors strongly focuses on the desired electrification, while the energetically (and exergetically) efficient use of the current and future primary energy resources remains underlit.

In the current endeavour towards the desired energy and climate neutrality of the Belgian society, much attention is given to electrification, which is undeniably needed. From the perspective of Greenhouse Gas (GHG) accounting, this reasoning is understandable, as it lowers the direct emissions of the Regions (Effort Sharing Regulation (ESR)) and its companies (either under ETS1, ETS2 or solely under the responsibility of Belgium and its Regions (ESR)). Any GHG emissions resulting from the production of electricity are therefore pushed towards the electricity sector which also has to be compliant to the targeted GHG emission cap (mostly belonging to ETS 1 with a European cap). In addition, the GHG Protocol catalogues onsite emissions from cogeneration under Scope 1, while grid electricity is catalogued under Scope 2. Companies have the ability to cover the indirect emissions coupled to the consumed electricity (Scope 2) by the use of Guarantees of Origin (GoO), which are currently valid for a period of one year. As such, the electricity consumed in the winter months can (for example) be turned ‘green’ by using GoO’s coupled to solar electricity produced in the summer months, independent of the marginal electricity unit that was needed to cover the demand at the time of consumption.

This strategy results in the remaining question of being able to buy cheap electricity delivered on site at low costs. In this respect cogeneration is able to give answers (see Annex 1 for the societal advantages of decentralised cogeneration plants), but is currently strongly challenged by the fact that they increase the direct emissions on site (when using non-renewable fuels), compared to for example fuel- or electricity-based heat-only alternatives such as gas boilers and e-boilers.

In order to fully exploit synergies such as the use of residual heat from electricity production (~cogeneration), dialogue and cooperation between the federal level, the regions, the relevant authorities/actors as well as the different economic sectors is important. In this respect, the current initiative and cooperation between transmission system operators Elia and Fluxys is a step in the right direction, though it is important to further strengthen this dialogue and cooperation between the federal level and the different regions (and their competences).

Illustration 2 - The CRM, being a Federal instrument implemented in order to guarantee Security-of-Supply, currently contains different elements which have a negative influence on cogeneration and in favour of large-scale electricity-only plants (i.e. CCGT). Therefore the current proposal to assume no additional decommissioning of CHP installations until 2030 "*due to the fact that these capacities can participate to CRM auctions or for some still get certain form of subsides*", will most likely result in an overestimation of CHP capacity within that timeframe.

These topic has already been mentioned in previous consultation by Elia and the CREG. We refer to Annex 2 and our previous consultation reactions for more information on the different elements identified by COGEN Vlaanderen, and which should be addressed within this context in order to stimulate the use of the waste heat linked to electricity production (i.e. cogeneration).

Illustration 3 – The promotion of rational energy use of fossil fuels by means of Flemish '*warmte-krachtcertificaten'* was discontinued with the phasing out of certificate support for new or significantly modified fossil fuel cogeneration installations with a start date from 1 January 2023 onwards. New or significantly modified cogeneration installations with a start date from 1 January 2023 are therefore no longer eligible to receive heat and power certificates for the primary energy savings achieved. Flemish investment support for micro-CHP was also discontinued for installations operating on fossil fuels. Investments in new fossil fuel CHP installations are therefore becoming rare within the current policy context, which means that the assumption of growth in installed capacity is not supported.

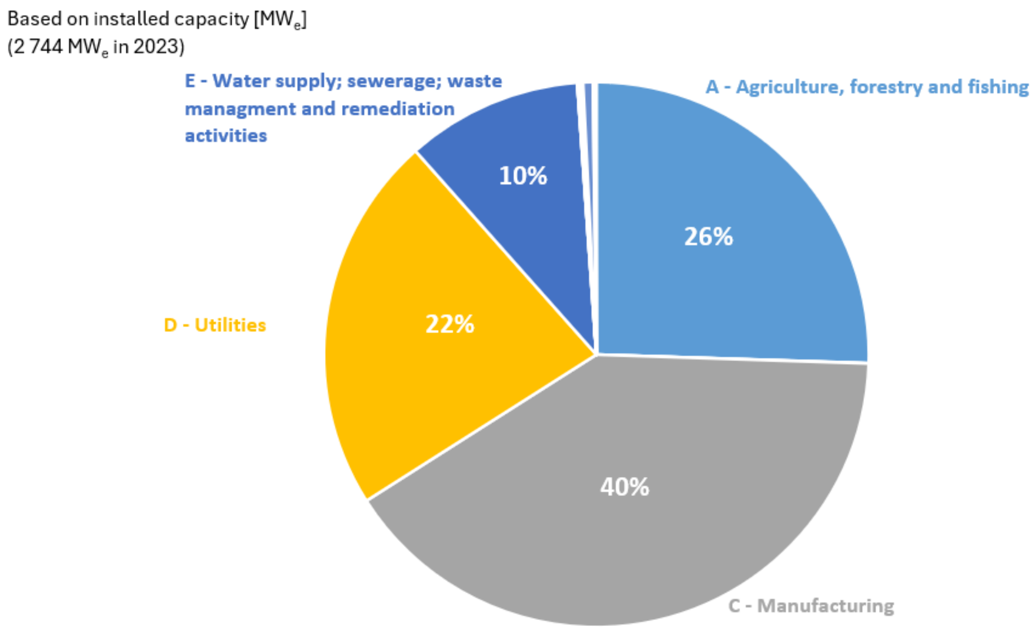
2.2 Coherency in the CHP-related assumptions between the demand and supply side of each projected scenario

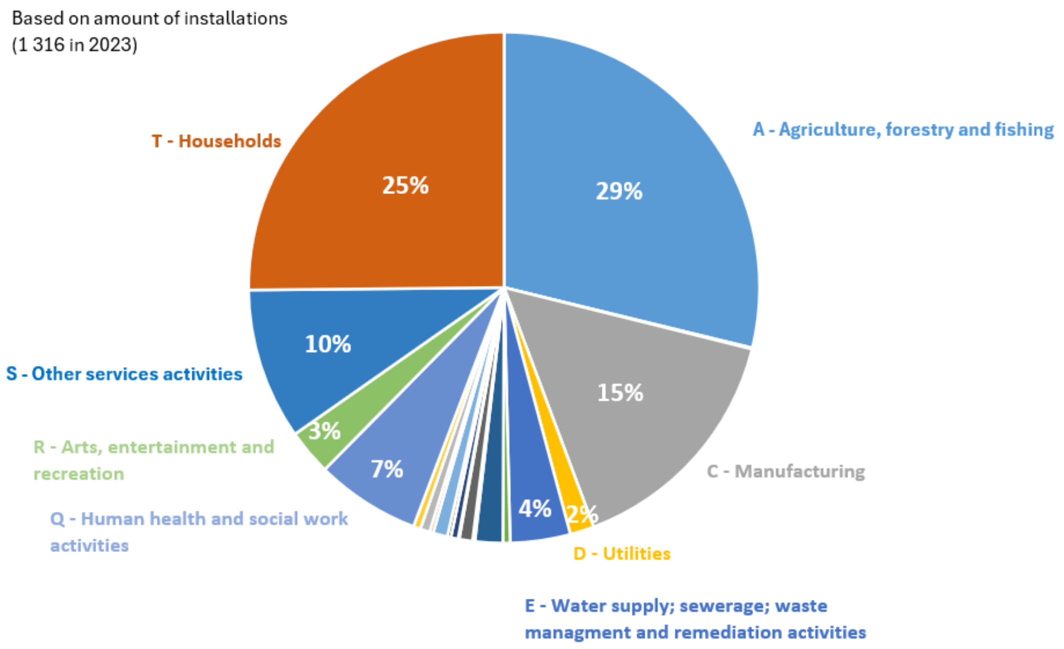
Remark 2 As cogeneration installations transform energy sources in both electricity and useful heat, these installations are typically located in the vicinity of an end-user for the produced heat (directly on site of the end-user, or indirectly through a district heating network). Therefore, it is important that the assumed parameters to simulate the final energy demand (chapter 2 of the consultation report) are consistent with those made for CHP on the electricity supply side of each scenario (chapter 3 of the consultation report).

As such, assumptions made regarding the electrification of heat production impacts the capacity of operational CHP's in Belgium. An end-user may choose to decommission a CHP installation and fully replace the heat production by one or more power-to-heat technologies, or the end-user may place the technologies side-by-side offering flexibility (and market opportunities) to switch between technologies. Consequently the electricity, heat and CO_2 (when combusting carbon-based fuels) production profile of a CHP installation will be impacted when the end-user invests in power-to-heat technologies which are placed next to the CHP, for example giving the end-user the possibility to consume electricity from the grid when prices are low.

COGEN Vlaanderen is available to Elia to provide Elia with more insights into cogeneration where possible. For example, underneath this text box an overview is given related to the distribution of cogeneration plants in Flanders, based on information available to COGEN Vlaanderen.

Illustrations of the characteristics of cogeneration units in Flanders: distribution over the different economic sectors, based on NACE-code coupled to the CHP-installation. Top figure: distribution based on the total electrical capacity of CHP installations in Flanders, operational in 2023 (2 744 MW_e and 4 376 MW_{th}). Bottom figure: distribution based on the total number of CHP installations in Flanders, operational in 2023 (1 316 installations). Source: analysis of COGEN Vlaanderen based on data received from VEKA.





2.3 Efficiency of a CHP installations

Remark 3 In chapter 2 of the main report Elia mentions the efficiency of CHP, such as in table 2 on page 54. In order to avoid misconceptions, the thermal efficiency of CHP should always be mentioned as a combination of thermal and electrical efficiency. After all, the input power of the energy source is divided between the electricity and the heat vector(s). The electrical efficiency is strongly dependent on the underlying technology (fuel cell, gas turbine, ICE, ORC, steam turbine, CCGT, etc.) as well as the seize of the installation, with the total energy efficiency (~ electrical + heat) varying between 85% and 100% (when condensating technologies are being applied).

COGEN Vlaanderen developed a ‘Cogeneration Feasibility Tool’ (link). In this document, reference values are given for the electrical efficiency of CHP units based on ICE or turbine technology as a function of their nominal electrical capacity. These figures are based on a market survey conducted by COGEN Vlaanderen among its members.

2.4 Biomass and waste capacity

Question formulated by Elia in the main document of the consultation report:

Elements and assumptions to which we want to draw attention and especially welcome feedback on:

- ***Biomass and waste capacity:*** *The proposed assumptions for biomass and waste capacity consider the existing capacity to be kept constant during the entire study* *horizon. Do you have specific reasons and/or sources which could justify different assumptions (or confirm the proposed one)?*

In the consultation report Elia proposes the proposed trajectories for biomass and waste-fired set forward in Elia's latest adequacy and flexibility study. These trajectories contain as of 2025

- 589 MW of biomass as of 2025, and
- 316 MW of waste as of 2025

These capacities are assumed to be kept constant during the entire study horizon

Feedback COGEN Vlaanderen

Remark 4: As previously mentioned during the public consultation on the most recent Adequacy and Flexibility study, there are currently several trends in (Flemish) energy policy that would rather imply a decline:

- Flemish certificate support: The removal of several representative project categories for new or significantly modified ('*ingrijpende wijziging*') biomass cogeneration installations with a start date from 1 January 2023.
- Circular economy: By evolving towards a more circular economy, historical waste streams or more and more being turned into feedstocks, hereby reducing the volumes being energetically valorised (principle of Ladder of Lansink).
- VEKP: During the previous term of office, Flemish policy shifted towards the use of (biomass) waste for heat production rather than electricity production, which can be interpreted as a prioritisation of the energetic use of (biomass) waste to cover ESR emissions, despite the more energy/exergy-efficient use of cogeneration (see Annex 1).
- Biomethane: The emergence of biomethane projects, since the rational use of biomethane through cogeneration is not yet being encouraged at the Flemish level. Reports indicate that some new biomethanisation projects are replacing biogas CHP plants for which the business case has become less financially attractive, partly due to the phasing out of certificate support.

More information can be found in chapters 2.2 and 2.3 of our previous reaction (link) on the Elia consultation considering the Adequacy & Flexibility Study 2026-2036.

2.5 Biomethane

Remark 5 The reported Belgian biomethane potentials in the main document mentions the values of 3,2 TWh/year in 2030 and 6 TWh/year as of 2040, referring to the Gas for Climate study of 2022 available on the website of the European Biogas Association (link). However, during Workshop 3 the same reference was depicted on the presented slides and mentioned a potential of 15 TWh/year in 2050 (slide 42). As the reported source only mentions 2030 and 2050 potentials, it is unclear how the 2040 value mentioned in Elia's report was obtained.

Table 2.
Comparison of Gas for Climate biomethane potential estimates for Belgium in 2050 with country-level estimates (units: TWh[46])

Gas for Climate		Valbiom[47]	
Anaerobic digestion		**Anaerobic digestion**	
Agricultural residues	1.089	Straw	1.926
Animal manure	5.207	Animal manure	3.995
Biowaste	0.438	Green waste	0.540
Industrial wastewater	2.796	Industry waste and co-products	1.866
Permanent grassland		Permanent grassland	2.310
Roadside verge grass	0.121		
Sequential cropping	3.887	Sequential cropping	2.541
Sewage sludge	0.202	Sewage sludge	0.591
		Energy crops	0.341
	13.7 TWh		**14.1 TWh**

45 1 bcm is equivalent to around 10.61 TWh or 38.3 PJ on a lower heating value basis.
46 Note that the potentials were calculated on a higher heating value basis and have been converted to a lower heating value basis using a factor of 0.9 for consistency with the Gas for Climate potentials.
47 https://greengasplatform.be/green-gas-platform-fr.html

Source

2.6 Other

Remark 6 In chapter 2.9.1.4, the first paragraph should be amended as follows, as the availability of a sufficiently large and cheap heat source influences the choice whether a heat pump or an e-boiler would be chosen:

'The emissions of this sector are due to the combustion of fuels for heat production and mechanical work. Thus, electrification of heat and agriculture machineries appears as a decarbonizing solution. Heat pumps and e-boilers are considered for heat, depending on the availability of a cheap heat source, and electric motors for machineries. The efficiencies of these technologies are summarised in the table below.'

Annex 1 – Cogeneration and its advantages

Cogeneration, also known as Combined Heat and Power (CHP) occupies a unique position within the entire energy system:

1. Cogeneration links different energy vectors and their infrastructure, such as fuel (natural gas, biogas, biomass, biomethane, liquid fuels, hydrogen gas, e-fuels, waste, etc.), electricity, heat and CO_2 (from the combustion of carbon-based energy carriers).
2. Cogeneration allows primary and secondary energy carriers to be used energy-efficiently through the combined generation of electricity and heat.
3. Doing so, cogeneration contributes to a more sustainable society with less (or none, when combined with capture) CO_2 emissions from carbon-based energy carriers, as well as the maximal utilisation of scarce, costly, renewable fuels. See Figure 2 for an illustration of the primary energy savings realised by cogeneration installations.
4. Cogeneration plants can provide flexibility for both the electricity and heating sectors, which is crucial in an energy landscape characterised by an ever-increasing presence of intermittent electricity production such as wind and solar energy.
5. Due to its controllability, a cogeneration plant can be operated in a grid-supporting manner by producing (or not producing) at the right moments. For example, a CHP unit can produce electricity during periods of increased electricity demand (e.g. on colder days, as recently confirmed in Fluvius' Time-of-Use study[2]), which can then be used to power a local heat pump. Conversely, a CHP unit can be modulated downwards or shut down to take electricity from the grid at times when there is sufficient renewable electricity generation from wind and solar power. The grid-supporting effect of cogeneration in the roll-out of heat pumps is also confirmed in the literature[3] as well as by Fluvius[4].
6. Cogeneration provides local energy generation and thus avoids grid losses.

In short, cogeneration makes it possible to provide flexibility and security of supply, while maximising the use of valuable, scarce energy sources (natural gas, biogas, biomass, biomethane, waste, liquid fuels, hydrogen gas, e-fuels, waste, or others), supporting the electricity grid and helping to reduce grid losses and investment costs.

[2] '*Verslag – Onderzoek naar Time-of-Use tarieven en injectie*' (Fluvius, 1 december 2023 (link))

[3] '*Impact of Heat Pump and Cogeneration Integration on Power Distribution Grids Based on Transition Scenarios for Heating in Urban Areas*' (Feseveldt *et al.*, Sustainability, maart 2023 (link))

[4] Fluvius Ontwerp investeringsplan 2026-2035 (link):
'Een belangrijk aandachtspunt is de bijdrage van de WKK's (warmtekrachtkoppelingen) aan het energiesysteem, vooral tijdens de winterpiek. Door deze flexibele elektriciteitsproductie kan het distributienet ontlast worden zonder bijkomende investeringen'

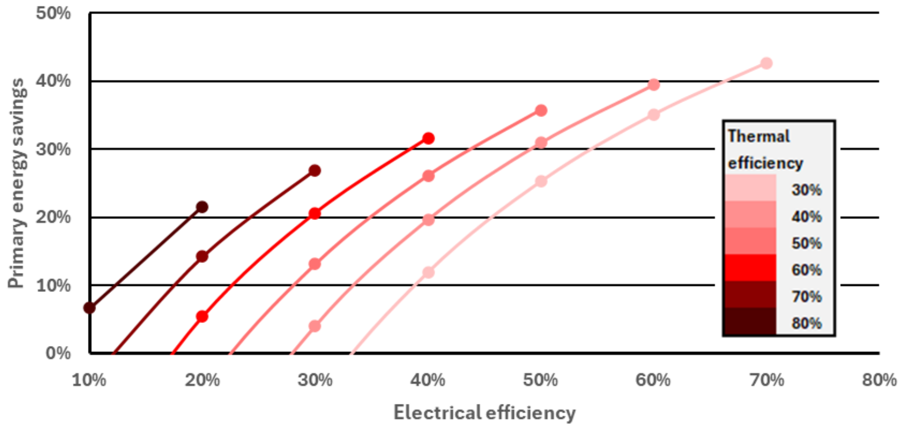


Figure 2 - Illustration of the relative primary energy savings achieved through cogeneration in relation to its electrical and thermal efficiency, compared to the separate production of the same amount of electricity and heat from the same fuel. The calculation illustrated in this figure is based on the production of electricity and hot water, using natural gas as a fuel, in a facility connected to a connection voltage between 0,45 and 12 kV, with 50% of the electricity produced being consumed locally. The calculation methodology follows Annex III of the Delegated Directive on Energy Efficiency (EU/2023/1791).

Annex 2 – CRM

A2.1 Eligible investment costs

COGEN Vlaanderen would like to reiterate its call to allow investments in the recovery of heat from electricity generation for the conversion into usable heat (heat exchangers, steam boilers, hot water boilers, etc.) to be included in the logic of “eligible costs” within the framework of the CRM. In contrast, investments aimed at completely destroying residual heat (~ usable heat) in cooling towers of large conventional power stations are taken into account.

We believe that these investments can be limited to elements located upstream of the measurement point for useful heat supplied. This measurement point is also necessary to allocate CO_2 emissions in the CRM between electricity generated (kWh_e) and heat supplied (kWh_{th}). The measurement point is also required for ETS reporting and recognition of ‘high-efficiency cogeneration’ under the new European Energy Efficiency Directive (EED).

Investments aimed at improving cogeneration management in line with market signals, for example through investments in a sufficiently large thermal storage tank, should also be taken into consideration. These investments make it possible to decouple daily electricity production from end-user heat demand, or to keep cogeneration available for the electricity market, in addition to investments that contribute to the electrification of the heat vector. Without such investments combined with multi-year support from the CRM, cogeneration plants may not have sufficient future prospects to make replacement investments and may therefore disappear from the Belgian electricity market.

A2.2 ‘Existing capacity’ versus ‘new capacity’

As highlighted by COGEN Vlaanderen during the CREG's PRD2743 public consultation[5], this comment concerns the logic introduced in the CRM with regard to multi-year contracts, which treats new capacity differently from existing capacity. The Royal Decree of 4 June 2021 defines ‘Existing Capacity’ as *“5° "bestaande capaciteit": capaciteit die op het ogenblik van de indiening van het prekwalificatiedossier reeds in staat was om elektriciteit te injecteren of de afname ervan op de markt of na de meter te beperken;”*. 'New Capacity' is defined as *“12° "nieuwe capaciteit": elke capaciteit die extra capaciteit aan het elektriciteitsnet aanbiedt, met inbegrip van bestaande capaciteit die de uitgaven doen bedoeld in artikel 3, § 2 die als gevolg hebben dat er extra capaciteit wordt aangeboden”*.

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[5] *‘Ontwerpvoorstel van koninklijk besluit tot wijziging van het koninklijk besluit van 4 juni 2021 tot vaststelling van de investeringsdrempels, de criteria voor het in aanmerking komen van investeringskosten, en de procedure van klassering van de capaciteiten in het kader van het capaciteitsvergoedingsmechanisme’* ((PRD)2743, 23 February 2024, link)

COGEN Vlaanderen fears that this definition, at least for cogeneration installations, could create ambiguities. In many cases, existing installations will, after reaching their “technical lifespan” (10 to 15 years), face significant investments to replace the “drive component” (piston engine, gas turbine, steam turbine, etc.). Other important components, such as the alternator, transformers or connection installations, often remain perfectly usable, unless the transposition of the European network code “Requirements for Generators” (federal or regional technical regulation, Synergrid C10/11) requires that these components also be replaced (or significantly modified).

In cases where the drive component needs to be replaced, whether or not this is related to the main electrical components, we believe it is important to be able to invoke the logic of the New Capacity for these investments and thus be able to compete for an 8-year or 15-year contract, with no limitation on the aid period (up to five years). The replacement of an existing cogeneration plant with a plant that is better suited to the heat user's vision for the future (reduction in capacity due to electrification or changes in industrial processes, or increase in capacity due to the addition of industrial activities) should also be eligible for multi-year contracts as New Capacity.

We would like to point out here that cogeneration installations with an electrical capacity of less than 5 MW_e are not subject to the notification requirement in the event of temporary or permanent shutdown, in accordance with Article 4bis of the 1999 Electricity Act. The distinction linked to this information requirement does not therefore seem immediately applicable.