Main hypotheses related to marginal costs taken into account for calculation of inframarginal rents in the framework of the Intermediate Price Cap (IPC) derogation

15 May 2021

1 Introduction

A derogation process to the Intermediate Price Cap (IPC) is foreseen towards the first Y-4 auction that will be organized in October 2021 in the context of the Belgian CRM. This process is described in article 21 of the Royal Decree establishing the parameters with which the volume of capacity to be provided is determined, including their calculation methods, and the other parameters necessary for the organization of the auctions, as well as the method for and the conditions for granting an individual derogation from the application of the Intermediate Price Cap(s) under the capacity remuneration mechanism[1] (hereafter referred to as "the Royal Decree on Methodology").

This document is published by Elia in the framework of this IPC derogation process, fulfilling the requirement as described in article 21, §1 of the Royal Decree on Methodology. The said article prescribes to restate the hypotheses taken in the reference scenario used for the calibration of the parameters for the auction organized in October 2021 related to the marginal costs taken into account for the calculation of yearly inframarginal rents.

These hypotheses related to the marginal costs of the technologies for which a derating factor is determined in accordance with article 13, §1 of the Royal Decree on Methodology are presented below.

All the information presented below has already been published by Elia[2] and was publicly consulted upon in the framework of the determination of the reference scenario, which was eventually defined according to the Ministerial Decree of April 30 2021.

2 Hypotheses

2.1 Thermal technologies

For thermal technologies, the hypotheses related to the calculation of marginal costs are derived from the equation below and are presented in the subsequent tables:

$$\begin{aligned}\text{Marginal cost [€/MWh]} &= \frac{\text{Fuel price [€/GJ] x 3.6 [GJ/MWh]}}{\text{efficiency [\%]}} \\ &+ \frac{\text{CO}_2\text{ emission factor [tons/GJ]} \; x \; 3.6 \text{ [GJ/MWh]}}{\text{efficiency [\%]}} x \; \text{CO}_2\text{price [€/tons]} \\ &+ \text{Variable O\&M cost [€/MWh]}\end{aligned}$$

The table below is based on the economic parameters from the W.E.O.2019[3] (in order to use the same data source as for the reference scenario selected by the Minister and as for the calibration report published by Elia which led to a decision by the Minister on various parameters linked to this Y-4 Auction) and on technical parameters as described in the MAF2019 dataset[4], the Fichtner study[5], the Afry review[6] and a study by the Joint Research Centre of the European Commission[7].

The efficiency highlighted per technology in the table is provided as a range given that it can vary according to the age of the units considered for that technology. Moreover, a range is provided instead of a value in order not to differentiate on a unit based aspect given that is considered as confidential information.

---

[1] http://www.ejustice.just.fgov.be/eli/arrete/2021/04/28/2021041351/justel#LNK0007

[2] https://www.elia.be/-/media/project/elia/elia-site/public-consultations/2020/20200505_crm_publication-consultation-input-data_dy-2025_y-4_auction_en.xlsx

[3] https://www.iea.org/reports/world-energy-outlook-2019

[4] https://www.entsoe.eu/outlooks/midterm/

[5] https://www.Elia.be/-/media/project/Elia/Elia-site/public-consultations/2020/20200505_fichtner-report-cost-of-capacity-crm_en.pdf

[6] https://www.Elia.be/-/media/project/Elia/Elia-site/ug/crm/2020/20201027_afry_peer-review-of-annual-fixed-costs-for-belgian-crm_en.pdf?la=en

[7] http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_48648

Derating Factor	Technology	Hypotheses related to marginal costs						
		Fuel price (€/GJ)	C02 price (€/tCO2)	CO2 emission factor (kg/net.GJ)	Efficiency rate (min-max,in %)		Variable Operation & Maintenance Costs (€/MWh)	
90%	New open gas cycle tubrine	6,4	27	57	39	44	1,6	11
90%	Existing open gas cycle turbine	6,4	27	57	35	38	1,6	11
91%	New combined cycled gas turbine	6,4	27	57	58	62	1,6	4
91%	Existing combined cycle gas turbine	6,4	27	57	45	58	1,6	4
96%	Turbojet	11,7	27	78	20	35	1,1	3,3
93%	CHP gas	6,4	27	57	35	58	1,6	11

For CHP, the methodology as developed in §3.3.4.3 of the Fichtner study is applied to calculate the marginal cost of the technology. In Elia's CRM calibration report, it was assumed to consider the reference from the Fichtner study leading to the lowest marginal costs. The same assumption is considered in this overview. The assumptions related to the "Credit for CHP" methodology are presented in the second table below.

Boiler efficiency	Utilization factor (%)	Heat generated (MWhth/MWhe)
99	85	1600

For biomass and waste incineration units, the marginal costs are in line with the marginal costs obtained for CHP gas, as explained above.

2.2 Weather dependent technologies and thermal technologies without daily schedule

For the weather dependent technologies (onshore wind, offshore wind, solar and hydro run-of-river) and thermal technologies without daily schedule, no marginal cost is calculated as those technologies are modelled through given profiles (based on historical or forecasted data) in the simulation performed. Those technologies are therefore considered to have a marginal cost equal to zero for the modelling.

2.3 Energy-limited technologies

For energy-limited technologies, as developed in "Category I: SLA" (small-scale storage) and "Category III: Energy-limited technologies with daily schedule" (large-scale storage and pumped-storage plants) from the Ministerial Decree from the 30th of April 2021[8], no marginal cost(s) is (are)

[8] www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=fr&la=F&cn=2021043002&table_name=loi

considered but some assumptions are considered in the model as presented on the table below. All parameters except round-trip efficiency have been submitted to public consultation.

Energy-limited technology	Round-trip efficiency (%)	Forced-outage rate (%)	Installed Capacity (MW)	Reservoir Volume (MWh)	Estimated availability duration (h)
Small-scale storage	**90**	**NA**	**413**	**1239**	**3**
Large-scale storage	**90**	**NA**	**406**	**406**	**1**
Pumped-Storage Hydro	**75**	**4,2**	**1395**	**5700**[9]	**4**

2.4 Market Response

The last category is market response, which is considered in the "Category I: SLA" of the CRM calibration report. Market response is taken into account on the supply side and is modelled in a stepwise approach with an associated volume and marginal cost, as for individually modelled thermal technologies. It is assumed that the marginal cost, corresponding to the activation cost, is higher than the strike price considered in the framework of the first CRM auction.

[9] Available storage for economical dispatch.