Feedback on the Strike Price

Objectives of the Strike Price

According to Elia’s design note on the “Calibration Methodology of the Strike Price”, it appears that the strike price should take into account consideration and objectives of the CRM, namely :

1. Technology neutrality and openness;
2. Limitation of the CRM overall cost;
3. **Windfall profits avoidance;**
4. Insurance of a functioning reliability option principle; and
5. Keeping the complexity of the CRM under control.

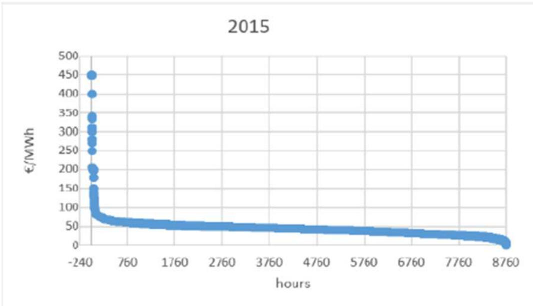
While the CRM and its parameters are designed in accordance with those general objectives and considerations, “Windfall profits avoidance” should be considered as the ultimate goal of the strike price. As a matter of fact, Ireland did design a CRM based on reliability options to tackle potential issues linked to windfall profits which could arise in a traditional capacity auction (cf. UK mechanism). The risk of windfall profits appears when a capacity holder benefits from both a capacity payment and price peaks on the EOM. To correctly calibrate the payback obligation to the risk of windfall profits, first price peaks should be identified/defined. Then, one should have a look to the energy mix and the marginal costs of these technologies in order to identify the maximum price one is willing to pay for such a mix. Strike price should then be calibrated to ensure a sufficient security of supply at an acceptable cost.

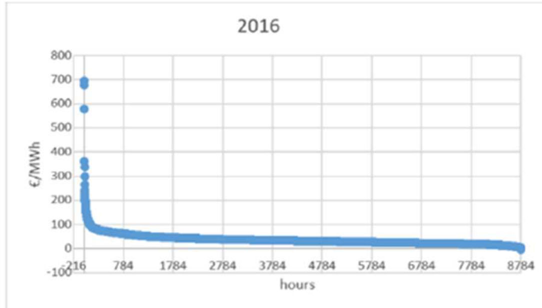
Setting the strike price

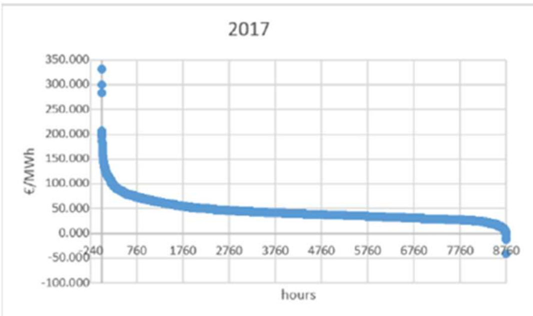
Identification of price peaks

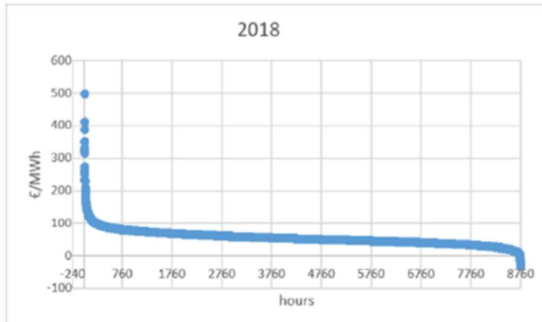
Since the strike price should optimally be set at a level to avoid double remuneration whenever price peaks occur, the first step is to identify when and how often those peaks do occur.

For this purpose, Elia performed an initial analysis on the price levels historically observed (see illustration here after).









Those graphs illustrate that over the past years the highest price levels recorded have been between 300 and 800 €/MWh. More precisely, it can be observed that prices above 300 €/MWh are relatively rarely recorded. Indeed, according to the same Elia analysis, this price level occurred during:

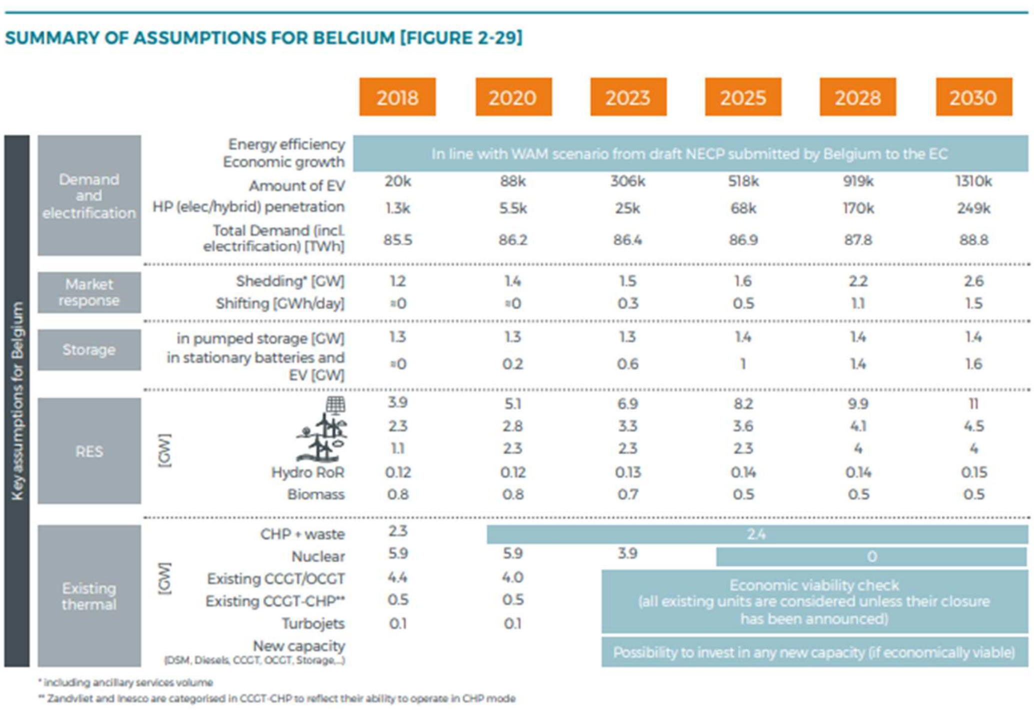
- 14 hours in 2015
- 6 hours in 2016
- 2 hours in 2017
- 9 hours in 2018

Based on those facts, it can be concluded that prices around 300-400 €/MWh do not happen too often and not for a long period of time. Hence it could be an acceptable level for price peaks in the energy market.

Analysis of the technologies' marginal costs

This second part of the analysis aims at analysing the Belgian energy mix and the activation price of such technology on the energy market. In terms of data we used capacity data from Elia (Adequacy and Flexibility study for 2020-2030, as well as generation units data). What regards the operational costs (activation costs) of the different technologies, we based ourselves on an International Energy Agency (IEA) about the projected cost of producing electricity. Work hypotheses are detailed below.

	OPEX (EUR/MWh)[1]	Installed capacity in 2020 (GW)	% of total capacity[2]
CCGT	89	3.0	22%
OCGT	120	1.0[3]	12%
Solar PV - Residential rooftop	22	5.1	10%
Solar PV - Commercial rooftop	22		
Onshore wind	27	2.8	13%
Offshore wind	54	2.3	4%



SUMMARY OF ASSUMPTIONS FOR BELGIUM [FIGURE 2-29]

Key assumptions for Belgium		2018	2020	2023	2025	2028	2030
Demand and electrification	Energy efficiency Economic growth	In line with WAM scenario from draft NECP submitted by Belgium to the EC					
	Amount of EV	20k	88k	306k	518k	919k	1310k
	HP (elec/hybrid) penetration	1.3k	5.5k	25k	68k	170k	249k
	Total Demand (incl. electrification) [TWh]	85.5	86.2	86.4	86.9	87.8	88.8
Market response	Shedding* [GW]	1.2	1.4	1.5	1.6	2.2	2.6
	Shifting [GWh/day]	≈0	≈0	0.3	0.5	1.1	1.5
Storage	in pumped storage [GW]	1.3	1.3	1.3	1.4	1.4	1.4
	in stationary batteries and EV [GW]	≈0	0.2	0.6	1	1.4	1.6
RES [GW]		3.9	5.1	6.9	8.2	9.9	11
		2.3	2.8	3.3	3.6	4.1	4.5
		1.1	2.3	2.3	2.3	4	4
	Hydro RoR	0.12	0.12	0.13	0.14	0.14	0.15
	Biomass	0.8	0.8	0.7	0.5	0.5	0.5
Existing thermal [GW]	CHP + waste	2.3	2.4				
	Nuclear	5.9	5.9	3.9	0		
	Existing CCGT/OCGT	4.4	4.0	Economic viability check (all existing units are considered unless their closure has been announced)			
	Existing CCGT-CHP**	0.5	0.5				
	Turbojets	0.1	0.1				
	New capacity (DSM, Diesels, CCGT, OCGT, Storage,...)			Possibility to invest in any new capacity (if economically viable)			

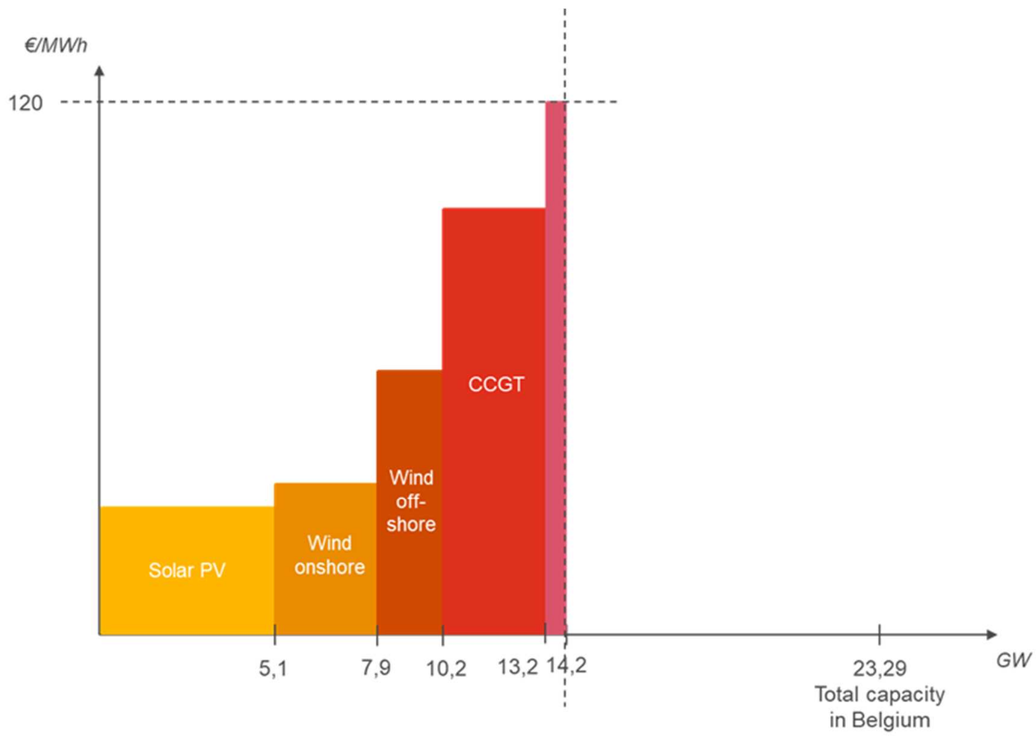
* including ancillary services volume

** Zandvliet and Inesco are categorised in CCGT-CHP to reflect their ability to operate in CHP mode

[1] Source: IEA, "Projected Costs of Generating Electricity", 2015, p.91. Please note that amounts were given in USD/MWh for 2015. The average conversion rate USD/EUR (1.11) of 2015 has been used. Then amounts have been inflated based on indexes available (+/-2.84%/year) on Statbel.

[2] Assuming total capacity in Belgium of 23,29 GW (according to FEBEG, 2018 via https://www.febeg.be/fr/statistiques-electricite)

[3] The capacity volume of CCGT technology has been extracted from Elia's public data on the generation park in Belgium.



In its design notes Elia analyzed the different transactions on the day-ahead market. Actually they assessed the capacity that is offered at a certain price. Their approach is that a certain level of capacity should be ensured. This level is then reported on the price axis to determine the applicable strike price. We believe that looking at the supply is not entirely relevant for the topic. Instead we believe we should first look at the demand. Indeed, it is essential to consider the level of demand to be met in the market.

In this perspective, we attempted on a very high level to reproduce the merit order curve of all Belgian capacities. The idea behind it is to identify at which price level the energy mix can be considered as neutral in the sense that all reasonable and relevant technologies are present in the market. We stress the fact that technology neutrality should not be understood as price neutrality. The strike price should not support all technologies (even the most expensive ones) in order to be neutral. Neutrality should be viewed as ensuring all types of technologies to be present in the market but not at any cost (ability to implicitly reject the most expensive ones).

As a consequence, the graph above illustrates the ability to satisfy a certain demand of capacity (**61% of total capacity in Belgium**) for a level of price above 120 €/MWh. This result is even underestimated as it does not include other renewable technologies that are also known for having relatively low activation cost (hydro for example).

Whenever looking at price peaks (see above), a strike price around 300 €/MWh seems to be adequate to fulfill the overall objective of avoiding/limiting the windfall profits. Based on Elia's methodology, this would capture approximately 80% of DAM market participation (see below).

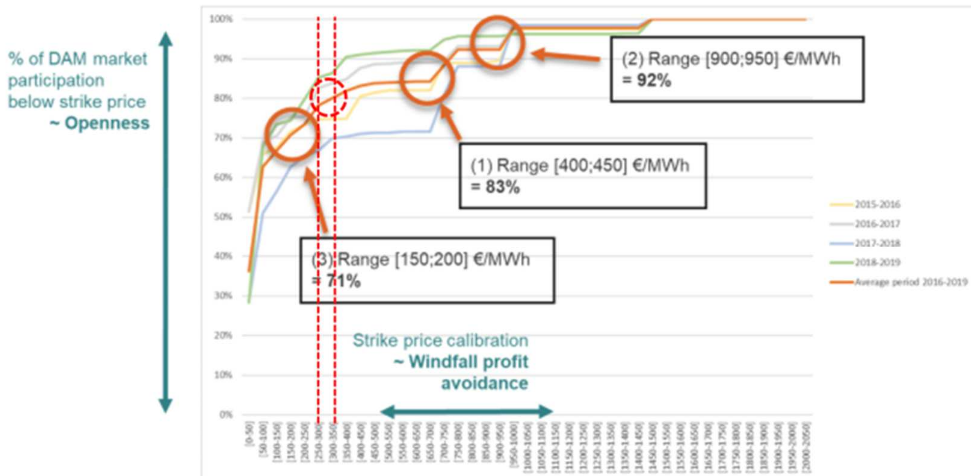


Figure 16: Example of Calibration curve of the last 4 Winters and Average

Consideration of a second strike price

Finally, with the aforementioned argumentation on the strike price level that should be set at +/- 300 €/MWh, most of the demand will be satisfied by capacity supply at a reasonable price. However, to fulfill the demand while paying attention to the overall cost of the mechanism, it might be appropriate to define a second strike price to capture the “virtuous” technology of demand-side management present in the remaining supply curve. Indeed, only in this case, it is acceptable to raise the strike price in order to capture this technology. Yet, raising the strike price to this level would mean creating an opportunity for windfall profits for all technologies present below this level.

Based on the information found regarding the DSR price in Ireland (see below), this second strike price should be much higher than the first one to capture part of the remaining DSR. Based on the table below which represents the results of our high level market analysis on the DSR activation price, the second strike price should be above 1.000 €/MWh.

RESOURCE_NAME	Cost/MW @ 1 hour shutdown (EUR/MW)	Cost / MW@ max down time (EUR/MW)	Incremental Cost Bid (EUR/MW)	Quantity (MW)	Cumulative MW
DSU_401610	21.14	- 42.69	- 42.75	9.00	9.00
DSU_401400	279.06	279.06	279.06	23.00	32.00
DSU_401490	332.37	321.68	311.00	19.00	51.00
DSU_401590	339.52	234.78	147.49	20.08	71.08
DSU_401850	411.41	362.39	313.37	15.30	86.38
DSU_401620	420.51	354.11	313.37	14.00	100.38
DSU_401330 combined	437.24	408.62	350.00	22.41	122.79
DSU_401800	452.49	382.93	313.37	10.78	133.57
DSU_401530	478.23	404.12	330.00	33.69	167.26
DSU_401270	486.14	411.91	337.68	99.00	266.26
DSU_501380	1,193.00	771.40	307.40	20.00	286.26
DSU_501330	1,521.29	971.84	371.20	18.35	304.60
DSU_401660	2,190.00	1,290.00	390.00	5.00	309.60
DSU_401390	2,602.73	348.94	330.00	11.00	320.60

This proposition thus entails the presence of two different strike prices. Indeed, if we only consider having a single strike price, a low strike price would de facto exclude a “virtuous” technology like the DSR. On the opposite side, a high strike price would allow technologies with a lower SRMC to benefit from windfall profits.

As a conclusion, based on the considerations to think about when defining a strike price (see beginning of this presentation), setting up two different strike prices appears to be the optimal solution to favor both technology openness and neutrality (in the sense that no technology is de facto excluded) and the avoidance of windfall profits. Defining only one strike price would implicitly lead to a less optimal outcome with regard to these two objectives.