K4K Food4Thought:

RD 446/2023 and the reform of the PVPC

Royal Decree 446/2023, of 13 June 2023, changes the calculation of the energy component of the Voluntary Price for the Small Consumer ("PVPC"), linked to the regulated tariff. Spain has spent years with the energy component of the PVPC indexed directly to the results from the day-ahead and intraday wholesale spot markets. But beginning next year, the role of the wholesale market will be diluted by the use of futures contracts, specifically monthly, quarterly and annual products. In 2024, 75% of the weight will come from the spot market with the rest from the forward markets. The 75% will fall to 60% in 2025 and will remain at 45% from 2026.

The calculation of futures prices is somewhat complex since it will be determined as a weighted value of different prices that have to be recalculated every month. We already know the weighting of each future contract in the basket of future products with the monthly contract contributing 10%, the quarterly contract 36% and the annual contract 54%.

But what will be the prices of each contract used to calculate the price of the basket of futures? Well, for year Y, the price of the annual contract will be calculated as the arithmetic mean of the reference prices of the annual baseload futures contract as published by the electricity futures market, OMIP, in the six months prior to the start of the year. So the average of prices between 1 July and 31 December of year Y-1 will be used as the annual contract price applied to year Y. For quarter Q of year Y, it will be similar except that one uses the average of the prices for contract Q in the three months prior to the start of quarter Q. So one would use prices between 1 October to 31 December of year Y to define the price for the first quarter of year Y, 1 January to 31 March for the second quarter of year Y, etc. And for each month M, the relevant monthly price will be the arithmetic mean of the prices of that monthly contract M during the month prior to the start of month M. The prices from 1 to 31 December in year Y-1 will be used to define the price for January of year Y, the prices from 1 to 31 January of year Y for February of year Y, etc.

The PVPC will still be subject to hourly price variations since the spot market's hourly curve will continue to serve as a reference. The new methodology simply applies a shift upwards or downwards (Tah) which is the same in all hours of the day. RD 446/2023 introduces this complex formula for calculating Tah which fortunately can be simplified quite a bit:

$$Tah = [(A - 1) * Pmah + B * (Ft)] * FCh \quad (1)$$

If we assume that the energy correction factor (FCh) is equal to 1, believe me it's a reasonable assumption for this illustration, we get:

$$Tah = (A - 1) * Pmah + B * (Ft) \quad (2)$$

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"A" is the weight given to the spot market results and "B" to the basket of futures, Pmah is the arithmetic average price of the hourly prices on that day, and Ft is the average price of the basket of futures for the relevant month. And, since A+B=1, we can simplify further and say:

Tah = B * (Ft - Pmah) 3

To each hourly price (Pmh), we have to add B multiplied by the difference between the price of the futures basket (Ft) and the arithmetic average price of the 24 hours of that same day (Pmah = $(\sum_{h=1}^{24} \mathrm{Pmh})/24$). Since most of the time Pmh is almost identical to the day-ahead price, we will be able to calculate the daily adjustment Tah for tomorrow once the day-ahead market closes.

To arrive at the final PVPC, the costs of providing ancillary services and other administrative costs will have to be added. But since these are already applied to today's PVPC, they do not imply a change in the methodology and we will ignore them from now on.

Although I have tried to simplify the methodology, it is remains convoluted. So the real question is will the change be worth it? Will this new PVPC provide us with "better" prices? The answer is it depends.

The regulatory impact analysis ("RIA") prepared by the Ministry for Ecological Transition and Demographic Challenge ("MITECO") and published on October 5, 2022 summarises the results of a backcast using market results between January 2018 and June 2022. This examined what would have happened to the energy component of the PVPC if the new methodology had been in place during this period. It must be said that this study did not exactly replicate the RD 446/2023, since an additional change was introduced in the futures price history to be used: six months instead of three months for the annual contract, three months instead of 15 days for the quarterly contract, and one month instead of 5 days for the monthly contract. But it's a starting point.

The answer was that the cost of energy does not change much. The RIA says "In relation to the impact on prices, during the period analysed, the price would be reduced by €2.5/MWh on average. However, this differential is positive in some years and negative in others." What is interesting is the saving of €23.9/MWh, or -20.7%, for 2021 for having contracted forward before the price rise due to the war in Ukraine. We'll get back to this in a minute.

The regulator, the National Commission for Markets and Competition ("CNMC"), attempted the same in its report published on December 16, 2022. Their conclusions are even less favourable as they believe that the new methodology will negatively impact the shape of the hourly price curve. The CNMC states "the monthly billing of consumers covered by the PVPC... does not represent a relevant gain in price stability" and "the energy cost formula... can lead to inefficient behaviour, especially in the future, on days with high penetration of renewables where prices are close to zero in the spot market and it is convenient to provide signals to the demand side to increase its consumption in those hours".

So far, so obvious. Let's review two key topics. **First key topic: the difference between futures and the resulting prices in the spot market.** Remember that 2020 was the year of COVID-19, when demand plummeted, and gas and electricity prices were very low. It would have been very logical to buy futures in 2020 to cover the demand in 2021 since the price of electricity could only go up. But what if we have a period of high prices when prices are about to drop, as has happened between 2022

and 2023? We would end up paying more than if we had stayed indexed to the spot price.

The MITECO and CNMC studies did not have the data to replicate the results for the entire year 2022 nor any of 2023. We can. Table 1 below confirms that the difference between the basket of futures and spot prices in 2022 was not significant, but the futures for 2023 is well above spot prices; hence little difference between PVPC and spot prices in 2022 but a significant surcharge relative to spot price so far in 2023. If the new PVPC were applied today, it would perpetuate the nightmare of the 2022 energy crisis!

Table 1: Applying the new methodology [1]

Year	Day-ahead price (€/MWh) *a*	Futures (Ft) (€/MWh) *b*	PVPC energy component (€/MWh) *c*	Difference (%) *d=(c/a)-1*
2018	57.29	53.13	55.00	-4.0%
2019	47.68	57.90	53.30	11.8%
2020	33.96	47.93	41.64	22.6%
2021	111.93	60.60	83.70	-25.2%
2022	167.52	156.77	161.61	-3.5%
2023 [2]	87.57	178.27	137.45	57.0%

[1]: Using A=45% and B=55% as the CNMC does in its report.

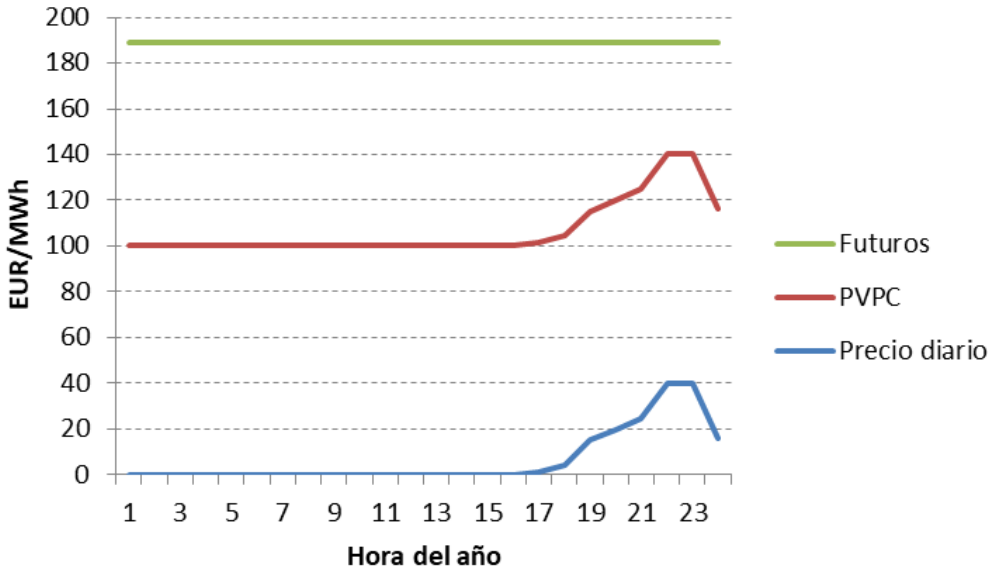
[2]: Data up to 20 June 2023.

Source: BOE (RD446/2023), OMIP, ENTSO-E, K4K calcs.

Second key issue: impact of the daily adjustment on the incentive to modify hourly consumption. In 2023, apart from a significant drop in the price of natural gas, we have also experienced periods of very low hourly prices due to a combination of high renewables generation and low demand. We can see the perverse impact of the new methodology using 1 January 2023 as an example. On that day the average day-ahead price was €6.70/MWh with the first 13 hours registering an hourly price of zero. But the futures price would have been €188.92/MWh. So the energy component of the new PVPC for the first hour of the day would be €100.22/MWh (=0 + 55% * (188.92-6.70)). As can be seen in Table 2 below, the absolute difference between hourly prices remains the same between the daily market and the new PVPC, but the incentive to adjust our consumption is, arguably, not as appealing.

Table 2: Applying the new methodology on 1 January 2023

Hour	Day-ahead price (€/MWh)	Futures (Ft) (€/MWh)	PVPC energy component (€/MWh)
1	0.00	188.92	100.22
2	0.00	188.92	100.22
3	0.00	188.92	100.22
4	0.00	188.92	100.22
5	0.00	188.92	100.22
6	0.00	188.92	100.22
7	0.00	188.92	100.22
8	0.00	188.92	100.22
9	0.00	188.92	100.22
10	0.00	188.92	100.22
11	0.00	188.92	100.22
12	0.00	188.92	100.22
13	0.00	188.92	100.22
14	0.10	188.92	100.32
15	0.10	188.92	100.32
16	0.01	188.92	100.23
17	1.00	188.92	101.22
18	4.16	188.92	104.38
19	15.10	188.92	115.32
20	19.51	188.92	119.73
21	24.61	188.92	124.83
22	40.07	188.92	140.29
23	40.07	188.92	140.29
24	16.00	188.92	116.22



Note: Using A=45% and B=55% as the CNMC does in its report.

Source: BOE (RD446/2023), OMIP, ENTSO-E, K4K calcs.

Furthermore, interventions such as the “Iberian Exception” designed to reduce the spot prices will not have the same mitigating impact on the tariff since the weight of futures (previously determined) could be greater than any potential reduction in the spot price.

To summarise, with the current PVPC, we are exposed to current spot market prices. With the new PVPC, we will continue to be exposed to historical prices, whether good or bad, and today's spot prices will matter less. Subjecting PVPC purchases to a prescribed formula may make political sense but not necessarily economic sense. But, given the complexity of implementing dynamic buying strategies, it is likely that this change will be accepted, codified and half-forgotten by all but the electricity retail companies, especially the retailers of last resort (Comercializadoras de Referencia or “COR” in Spanish) who will have to take into account the change in the calculation of their margins: the cost of energy sales will no longer be recovered at the spot price but as a basket of spot and futures.

And this until another wave of negative publicity breaks when the PVPC is extremely high relative to the spot, we get negative PVPC prices, or/and distortions in the behaviour of consumers tied to the PVPC. In other words, sooner or later, politicians will need to rethink this.

Mr Kim Keats

Madrid, 21 June 2023.