Residential Electricity Pricing Offer

Jonathan Dumas
Uliège

Residential Electricity Pricing Offer

Goals

Understand how an energy supplier builds and prices a residential electricity offer.

Building and pricing two competitive offers:
- one with energy directly bought to the producer
- one with energy bought on the market with a Guarantee of Origin (GO)

Try to find out if your energy supplier is really the one you want to.

Residential energy supplier

Quiz

What do you think of the evolution of the electricity and gas bills over the last decade?

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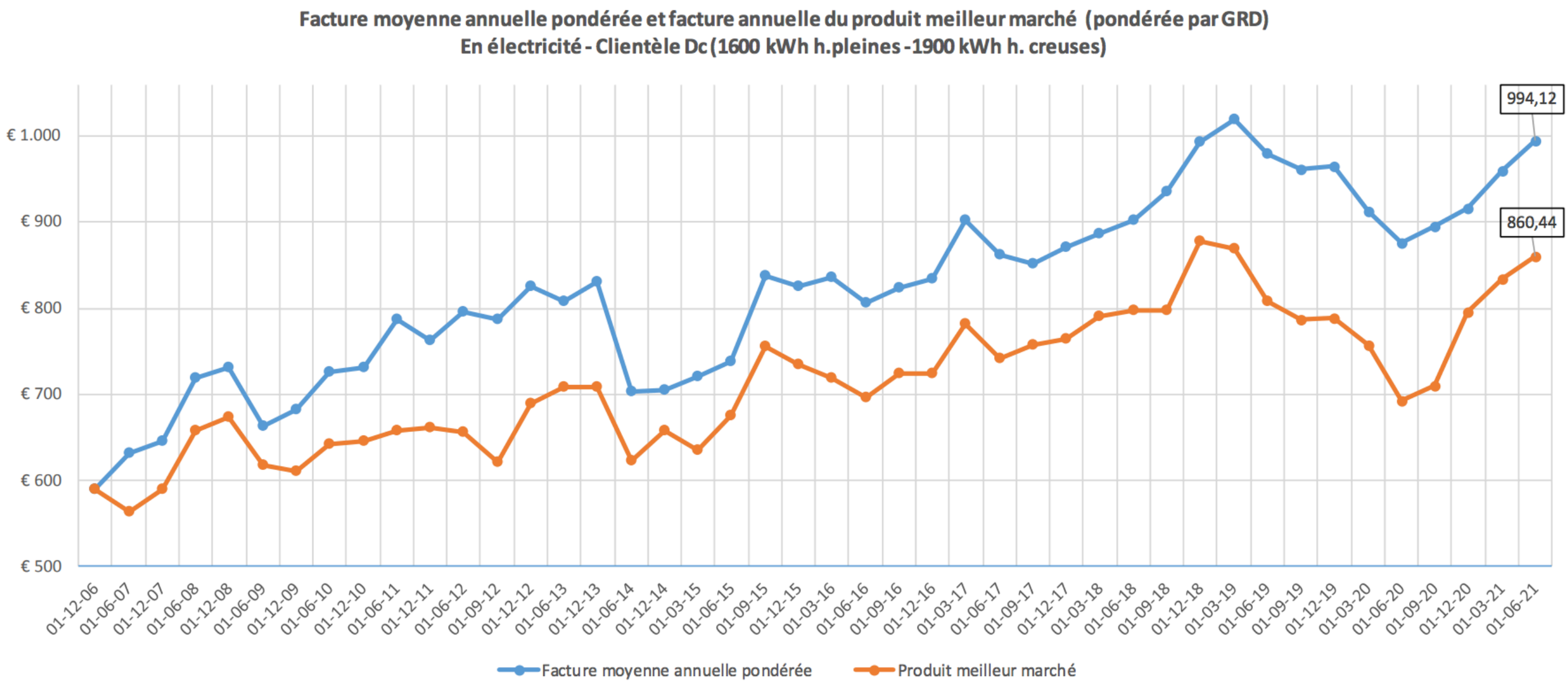
Evolution of the Wallon yearly electricity bill 2006-2021



Source: Rapport concernant l'analyse des prix de l'électricité et du gaz naturel en Wallonie (clients résidentiels) sur la période de janvier 2007 à juin 2021 lien

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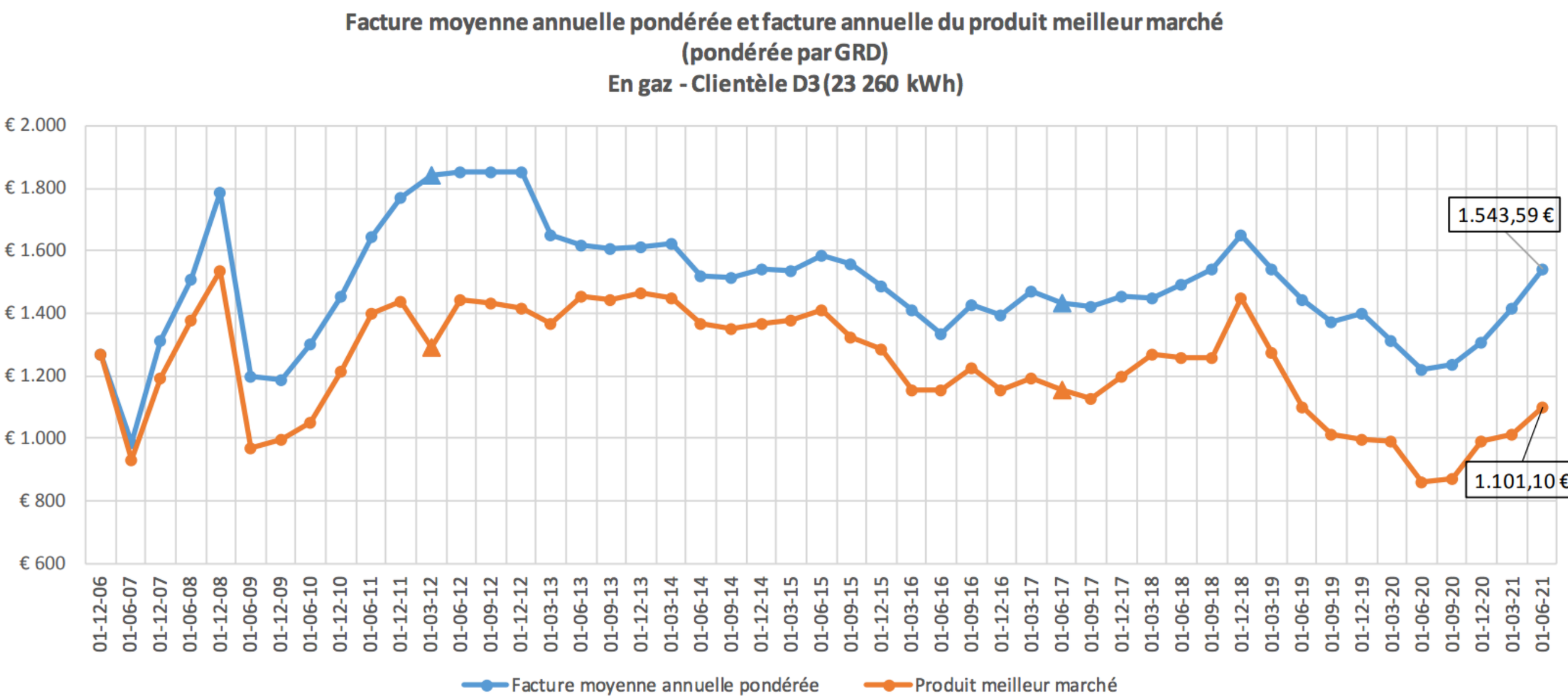
Evolution of the Wallon yearly gas bill 2006-2021



Source: Rapport concernant l'analyse des prix de l'électricité et du gaz naturel en Wallonie (clients résidentiels) sur la période de janvier 2007 à juin 2021 lien

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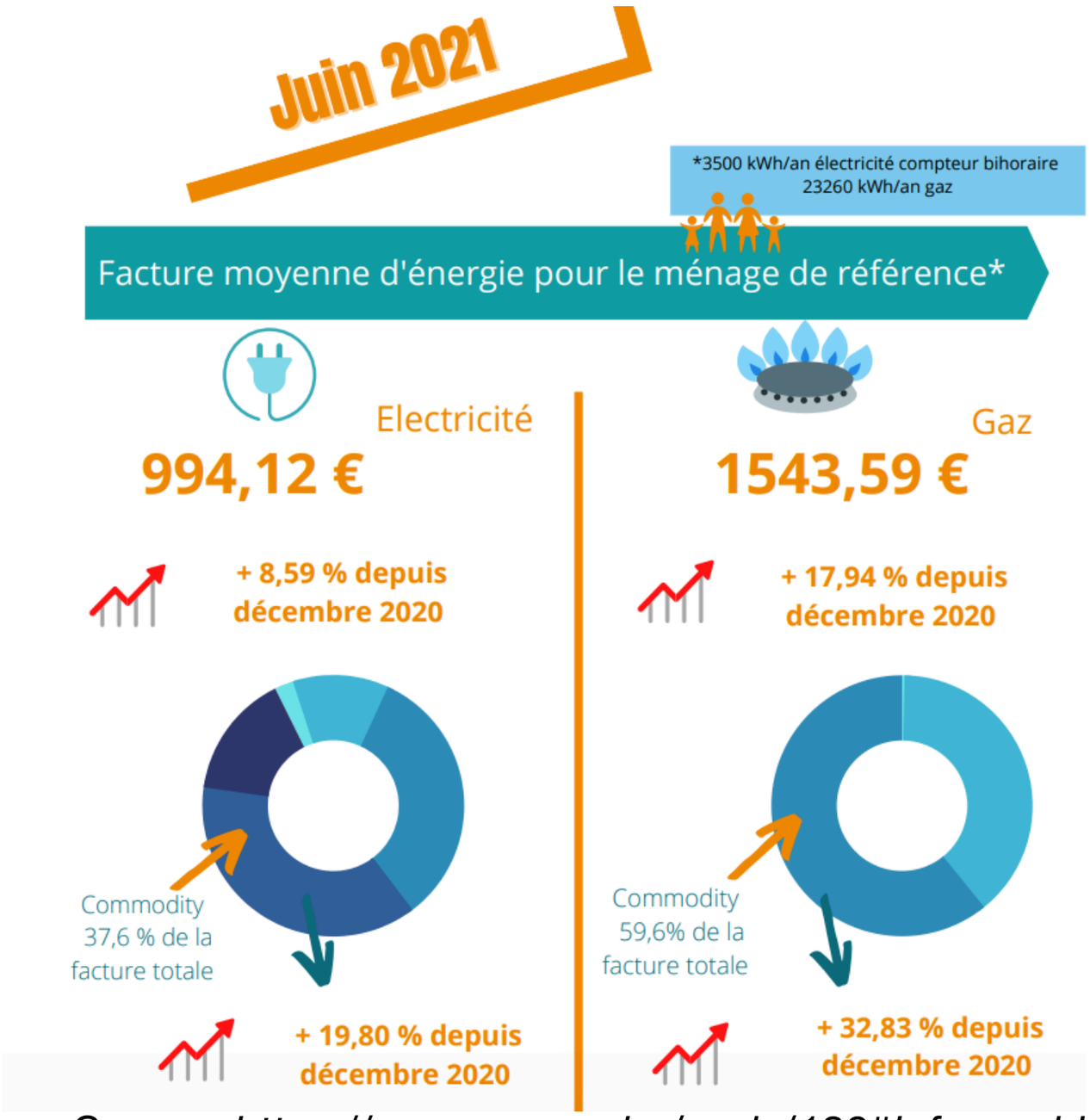
Wallon electricity & gas bill evolution between 12/2020 - 06/2021



Source: https://www.cwape.be/node/138#infographie-prix

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Summary

1. Energy part components
2. Fixed or variable price?
3. Pricing the energy part components
    1. Energy part from market
    2. Energy part directly to the producer
    3. Balancing fees
    4. Guarantee of Origin (GO)
    5. Capacity

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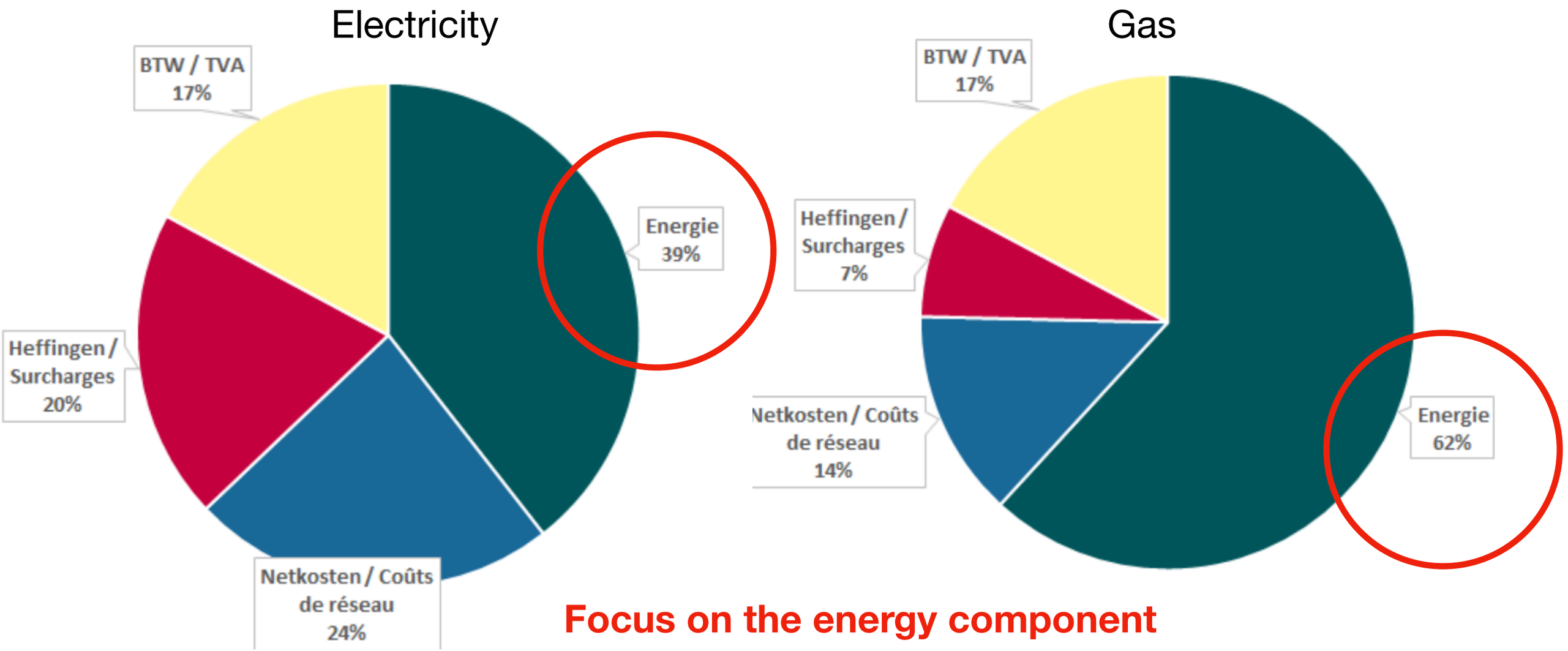
Reminder: the components of the Wallon electricity and gas bill 10/2021



Focus on the energy component

Source: https://www.creg.be/fr/consommateurs/prix-et-tarifs/comment-est-compose-le-prix-de-lenergie

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Physical electricity fluxes

Producer

TSO

DSO

Residential Consumer

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« Money » fluxes

Energy part:
- energy
- balancing fees
- Guarantee of Origin (GO)
- capacity

Markets: EEX, EPEXSPOT

Producer

Energy supplier

Residential Consumer

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Quiz

What is the difference between a fixed and variable electricity/gas price?

What is the share of Belgian consumers having a fixed price contract?

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Fixed or variable price?

Constant energy component = A + X*kWh

The energy component price is constant during all the contract duration.
-> **Less aversion** for the risk
-> If the price is high at the contract settlement it will remain high

Variable energy component = A + (Index*B+C)*kWh

The energy component price is variable during all the contract duration.
-> **More aversion** for the risk: index may be on the day-ahead or future markets

Belgium: 60% of fixed price contracts

Source: https://www.cwape.be/node/138#prix-fixes-et-prix-variables

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Quiz

Do you know the actors of the energy market?

Do you know some types of electricity/gas products traded on the energy markets?

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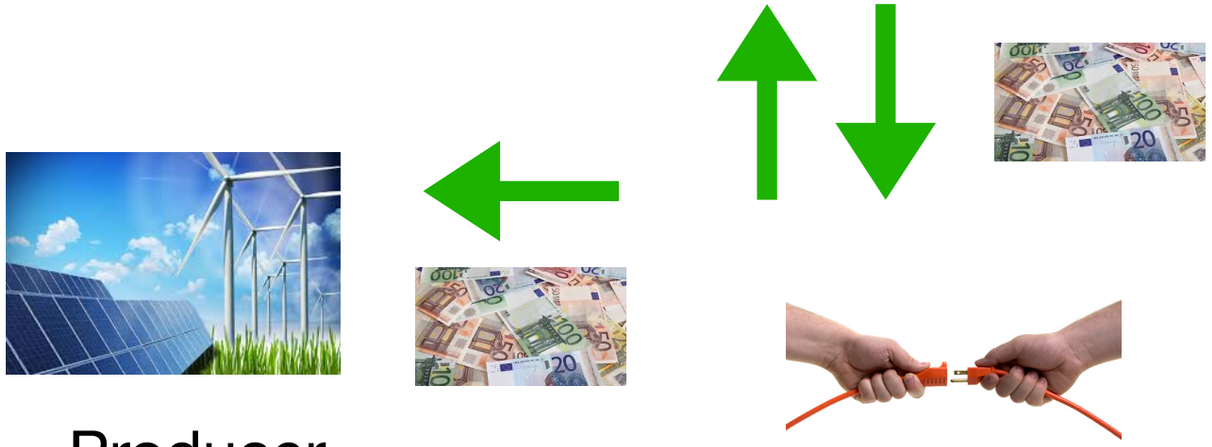
Market-based offer: energy pricing

Energy part:
- **energy**
- balancing fees
- Guarantee of Origin (GO)
- capacity

Markets: EEX, EPEXSPOT

EEX:
Calendars
Quarters
Months
Weeks
Days

EPEXSPOT:
Spot
Intraday



Producer

Energy supplier

Fixed price
Indexed price
Fixed within a threshold then indexed outside

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Quiz

Why buying different energy products? (calendar, monthly, weekly, …)

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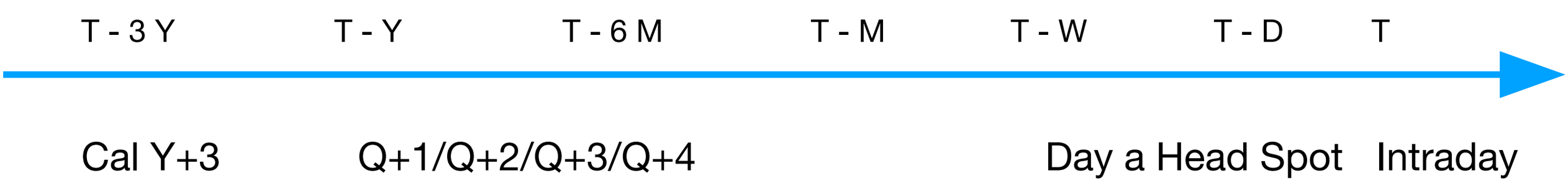
Calendar, quarter, monthly, weekly, …

Minimizing the **risk aversion** by buying futures products on different **horizons**:

- Calendar: Y+1/Y+2/Y+3 *-> to buy 3 years in advance*
- Quarter: Q+1/Q+2/Q+3/Q+4 *-> to buy 12 - 6 months in advance*
- Months: M+1/M+2…/M+12 *-> to buy 3 - 1 months in advance*
- Weeks: W+1/W+2…
- Days:D+1/D+2 …



$$Price = P_{cal} + P_Q + P_M + P_W + P_D + P_{Spot}$$

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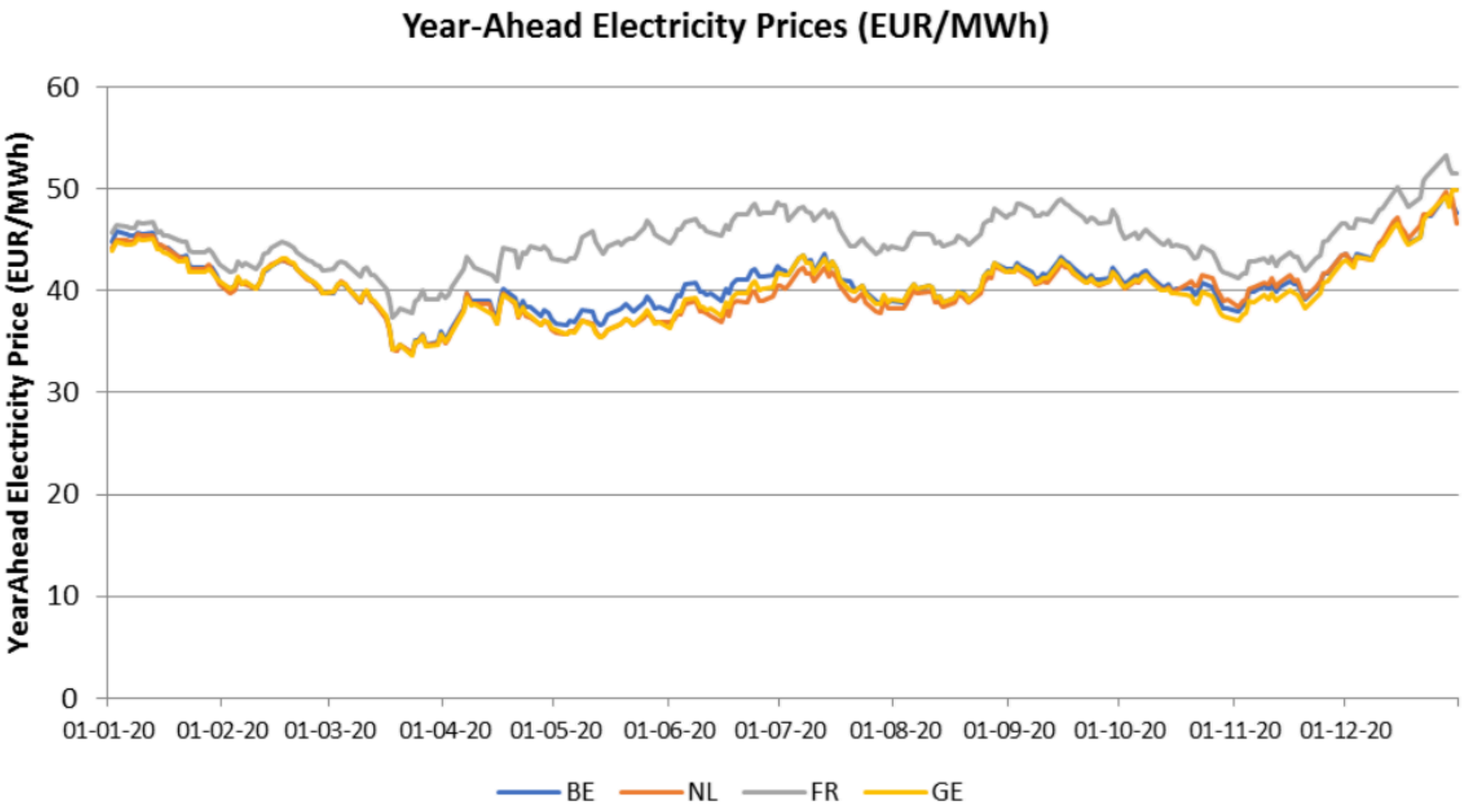
Electricity forward Y+1



Source: https://www.creg.be/sites/default/files/assets/Prices/Kerncijfers/ChiffresCles2020.pdf

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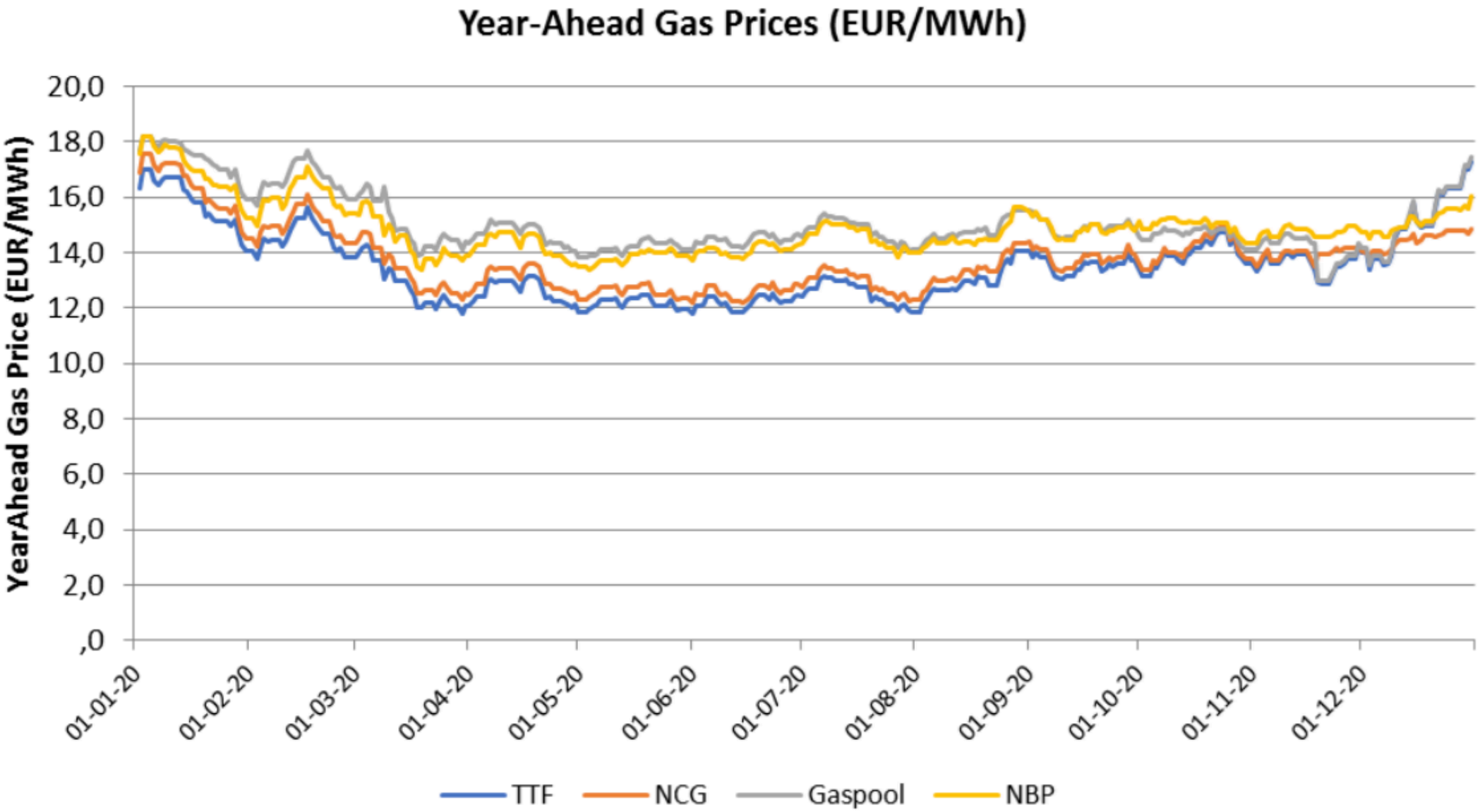
Gas forward Y+1



Source: https://www.creg.be/sites/default/files/assets/Prices/Kerncijfers/ChiffresCles2020.pdf

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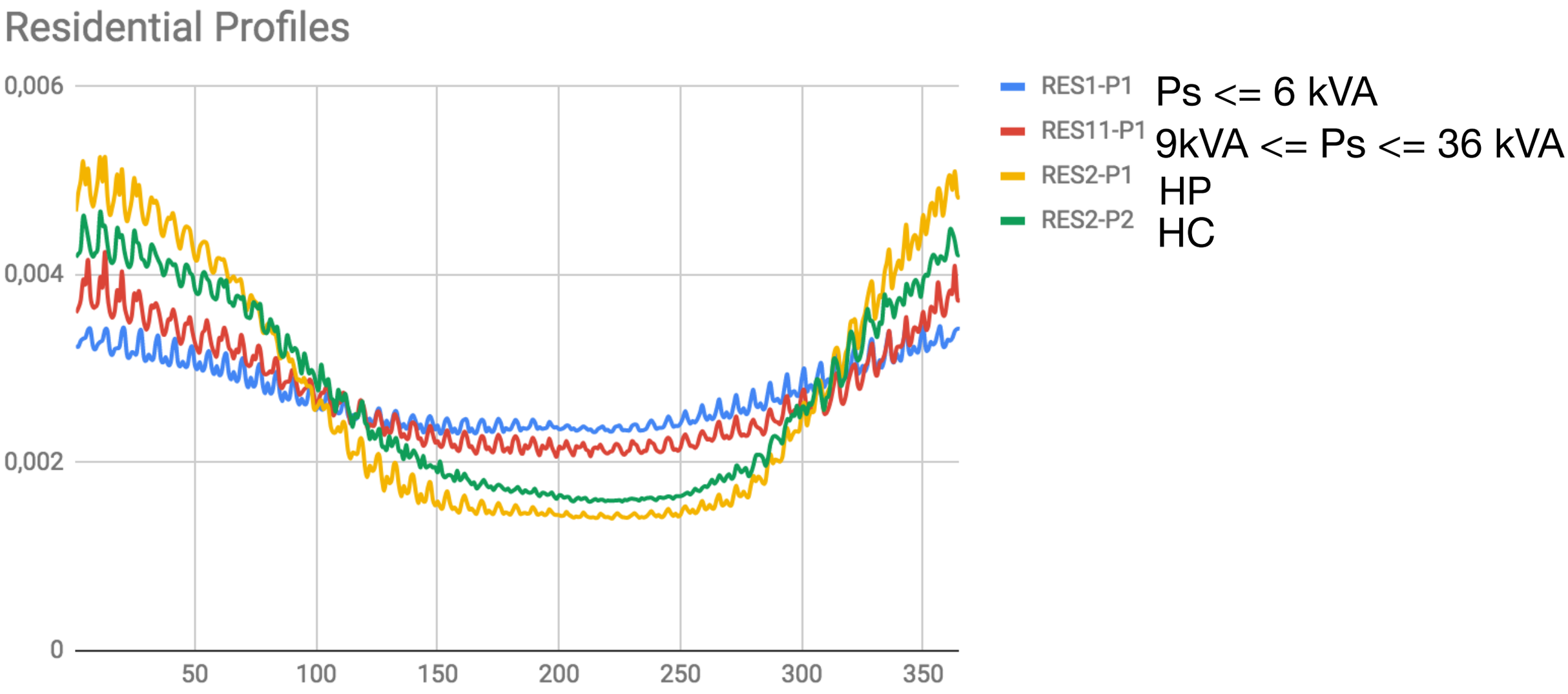
Synthetic load profiles (SLP)



Belgian SLP: synergrid
French SLP: enedis

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Quiz

How to build a constant price for the consumers by buying on the energy markets?

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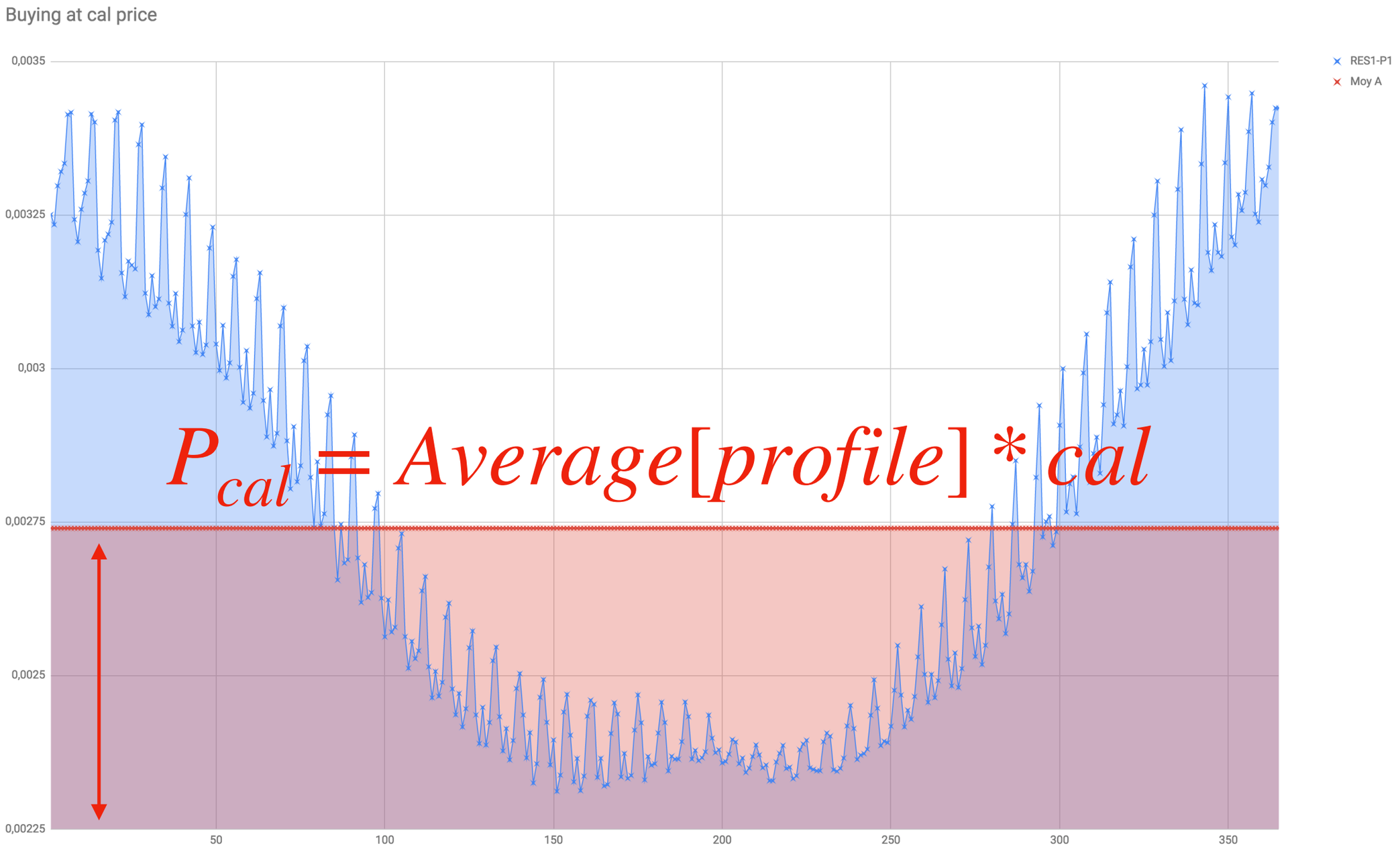
First, buy to the calendar price



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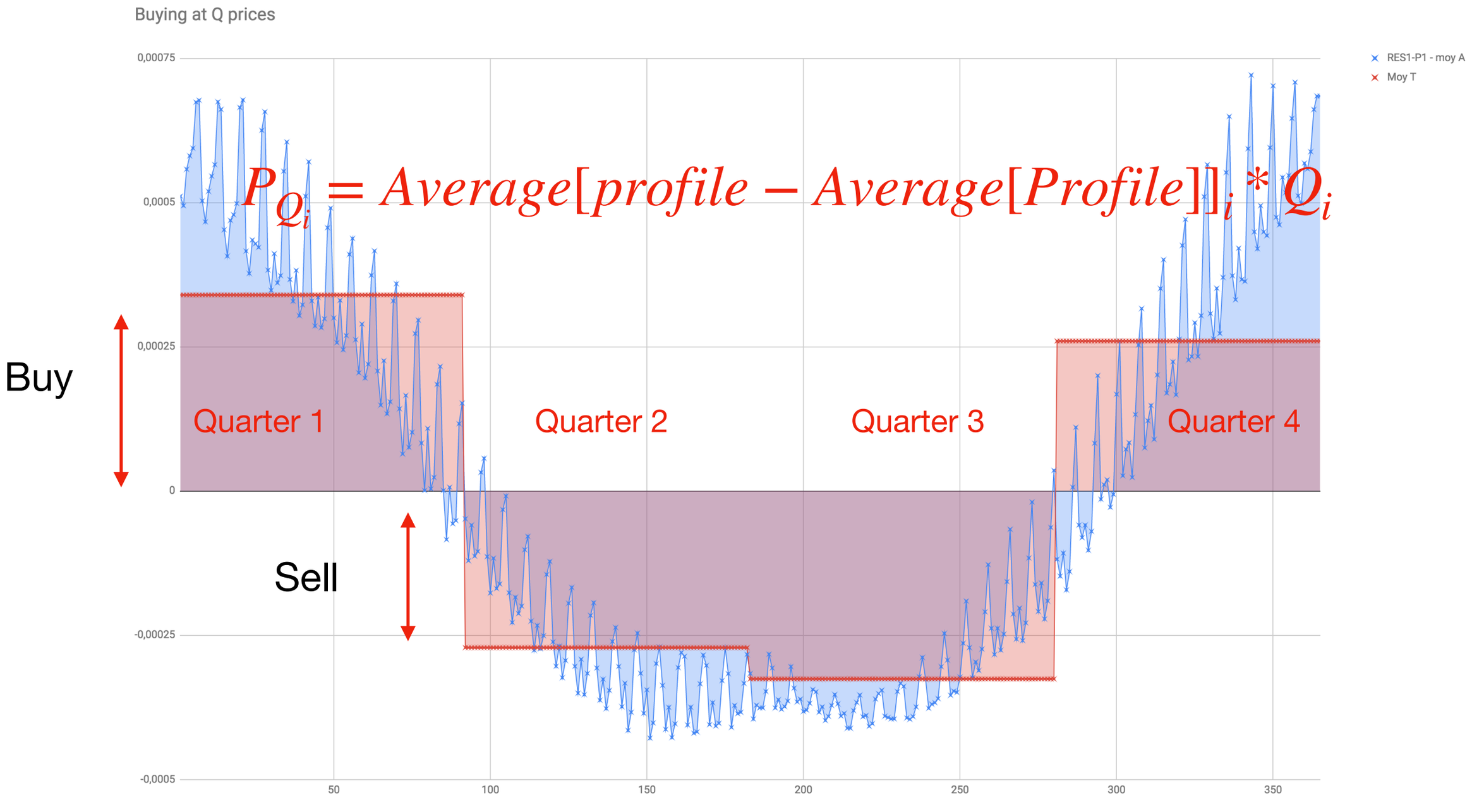
Second, buy to the quarter price



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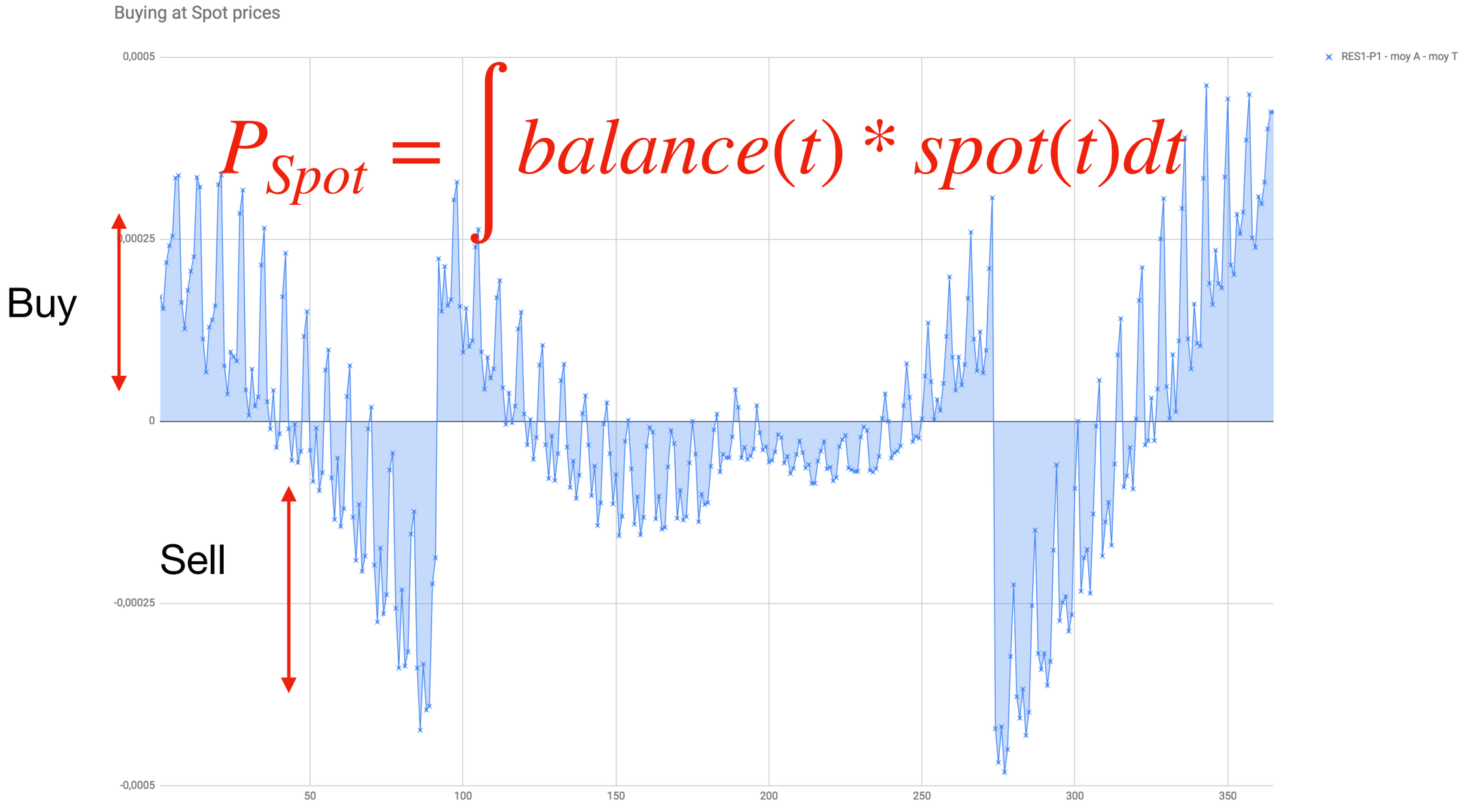
Third, balance on the day-ahead market



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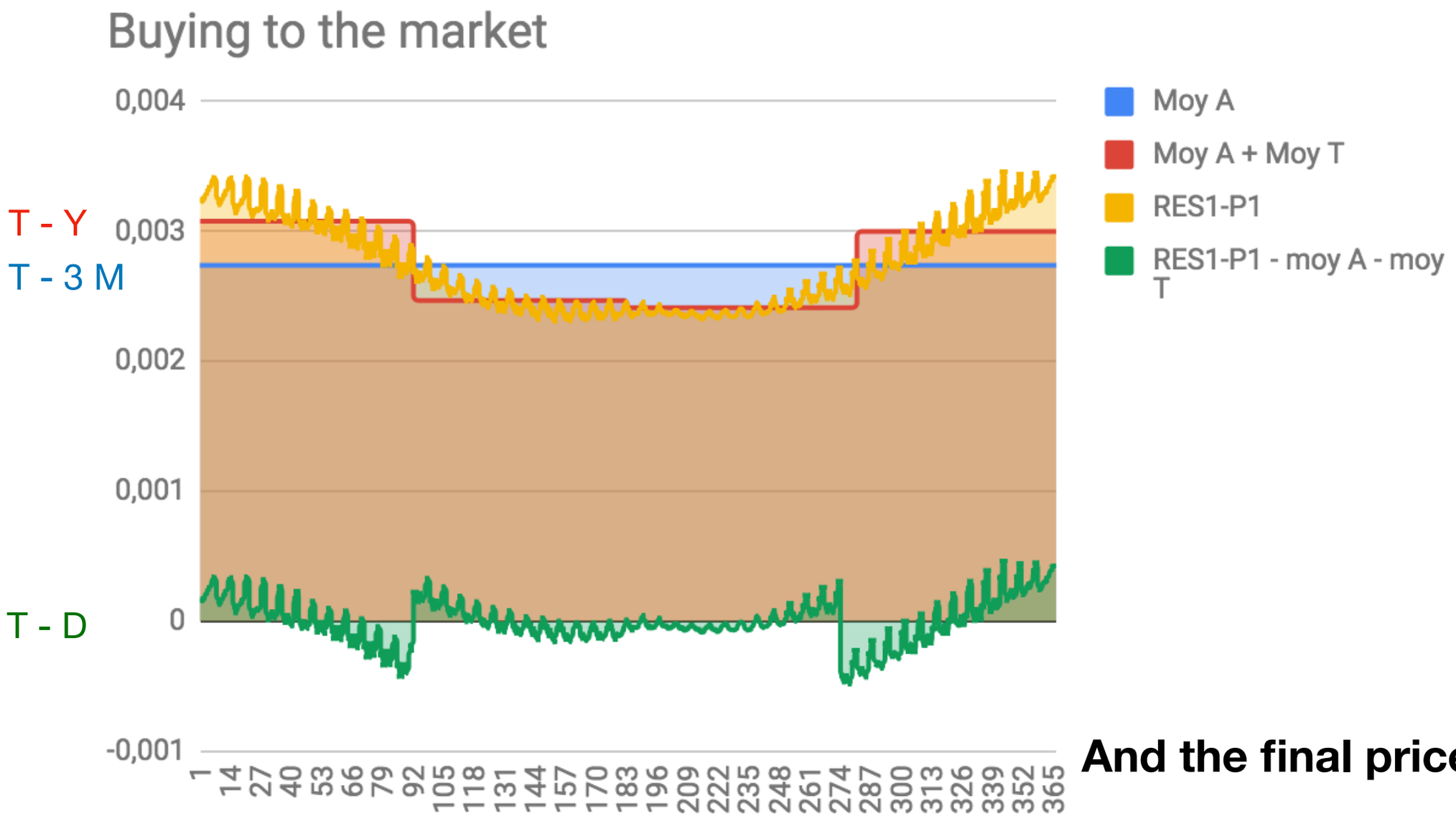
Market-based offer



And the final price is fixed!

$$Price = P_{cal} + P_Q + P_M + P_W + P_D + P_{Spot}$$

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Market-based offer

	EEX Settl
Q1 2019	68.95 €
Q2 2019	45.47 €
Q3 2018	46.43 €
Q4 2018	61.42 €
Cal19	55.50 €
Spot recalé en cal & Q	54.93 €

	RES1-P1	RES11-P1	RES2-P1 (HP)	RES2-P2 (HC)
Achat Cal	€55.50	€55.50	€55.50	€55.50
Achat Quarter	1.07 €	1.71 €	3.99 €	3.05 €
Achat Spot recalé en cal & Q	2.47 €	2.30 €	6.04 €	-6.04 €
Frais Bloc	0.00 €	0.00 €	0.00 €	0.00 €
Frais Spot	0.15 €	0.13 €	0.33 €	0.54 €
Prix Achat (euros/MWh)	59.19 €	59.63 €	65.86 €	53.06 €

Frais	(euros/MWh)
Frais blocs au settlement NEB	0
Frais blocs au settlement RE	0
Frais d'équilibrage +/-	0.6

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Residential energy supplier

Quiz

How to build a constant price for the consumers by buying directly to the producer?

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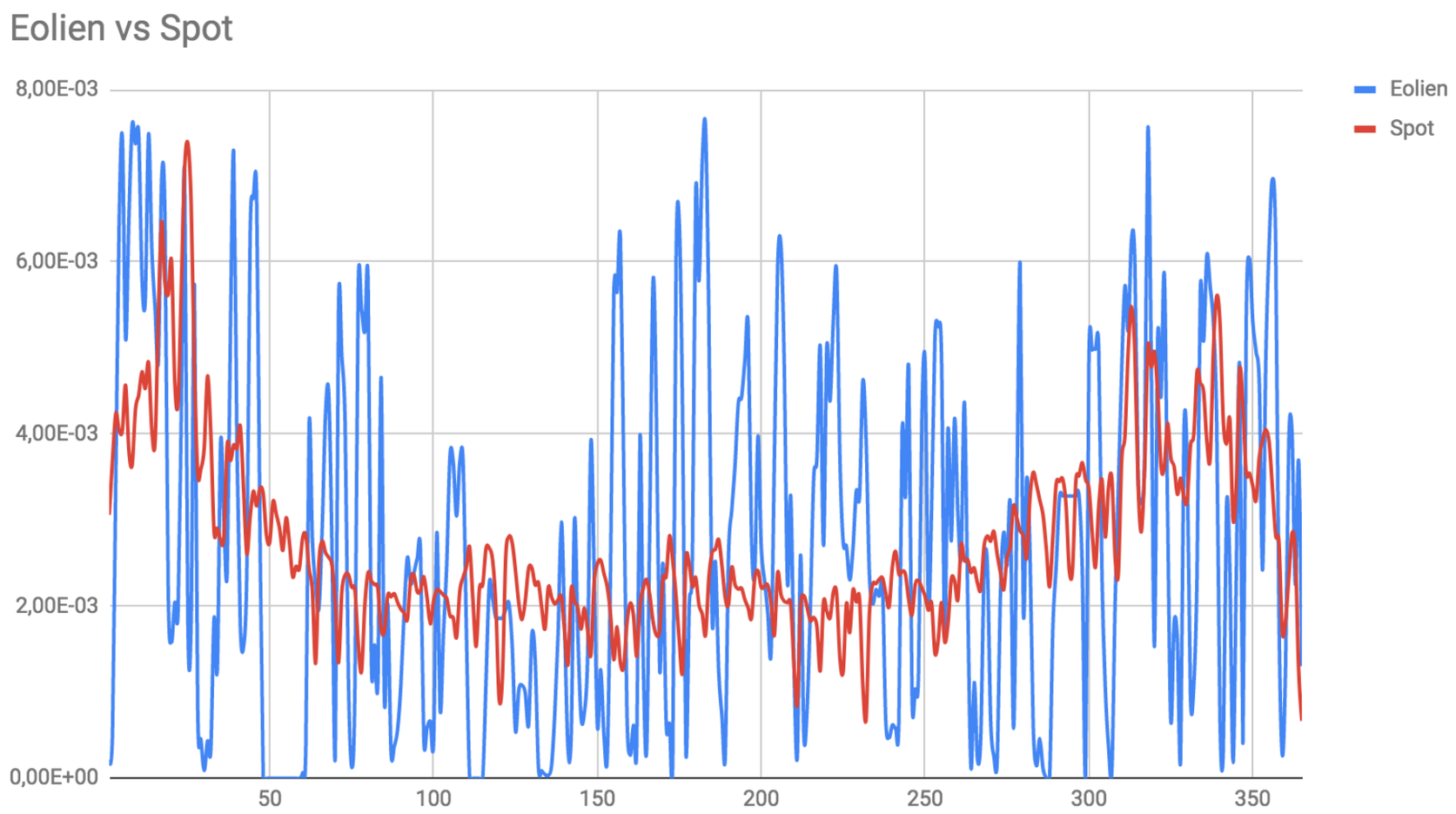
Buy directly to the energy producer



$$Price = \int p(t) * spot(t)dt$$ 48 euros / MWh with Spot 2017 on this production

$$Price(t) = spot(t) - X$$ X = 0.5 euros / MWh

Price = 48 if 40 < Spot < 48
Else Price = Spot - X

And the final price is fixed!

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Quiz

In your opinion, what are the balancing fees for an energy supplier?

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Pricing the energy part components: the balancing fees

Energy part:
- energy
- **balancing fees**
- Guarantee of Origin (GO)
- capacity

TSO

Main grid balancing responsible

Producer

Energy supplier

CC: forecast errors for consumption

CP: forecast errors for production

CR: production profile is not equal to consumption profile

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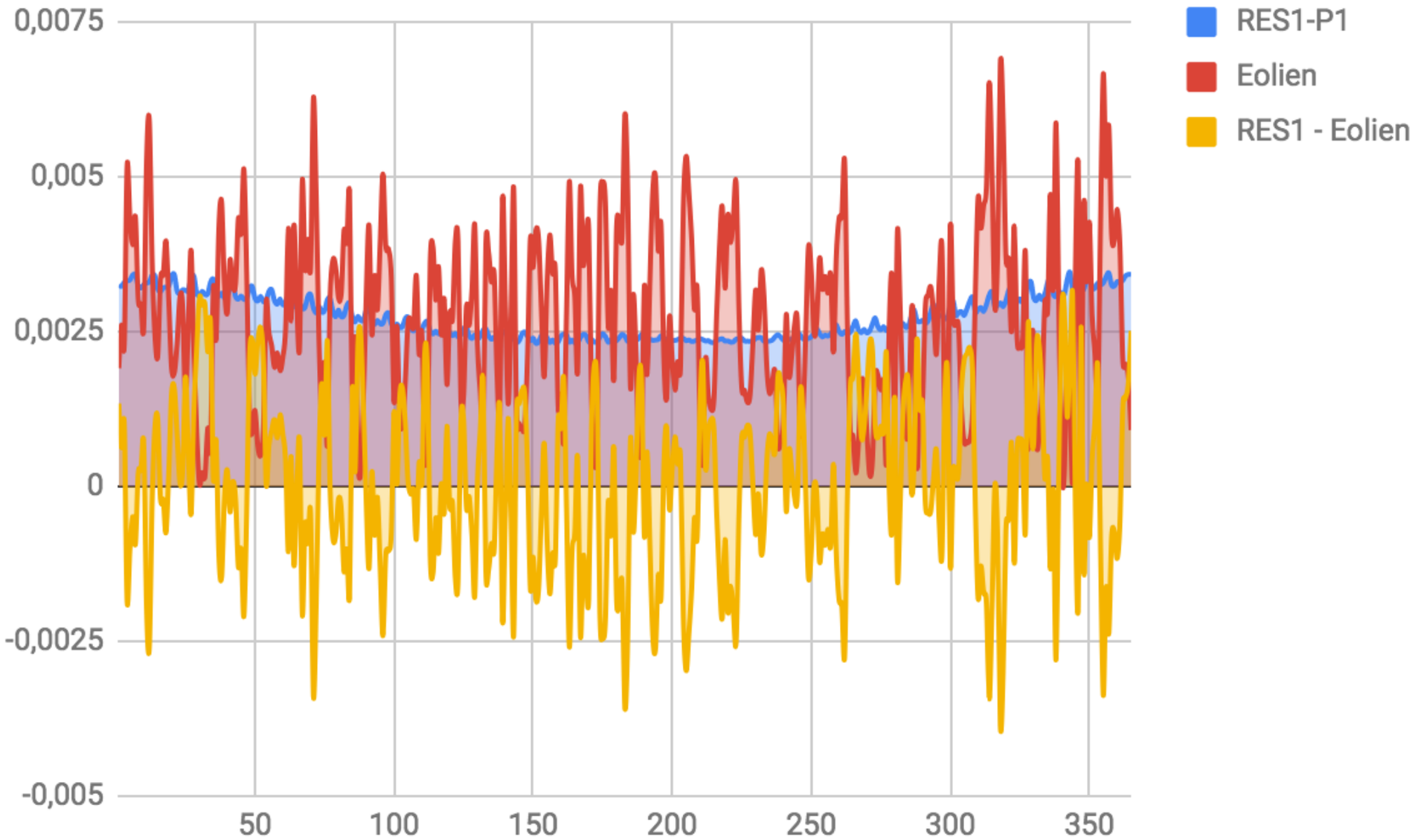
Balancing fees CR: cost of adjustment between production and consumption



$$C_R = \int [RES1(t) - wind(t)] * spot(t)dt$$

C_R 2017 = 0,24 euros / MWh

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Balancing fees CP: cost of production forecast error

The better the forecast is the smaller are Cc & Cp.

$$C_P = \int [P(t) - P_p(t)] * [spot(t) - imbalance(t)]dt$$

$$P(t) : production(t) \quad [P(t) - P_p(t)] > 0 \rightarrow selling\ at\ Imb_{>0}$$
$$P_p(t) : forecast(t) \quad [P(t) - P_p(t)] < 0 \rightarrow buying\ at\ Imb_{<0}$$

$$if\ [Imb_{>0} > spot(t)] \rightarrow P_p(t) = 0\ leads\ to\ greater\ profit\ than\ P_p(t) = P(t)$$

Wind power: **0, 7** < C_P < **2 euros / MWh**
Hydraulic power: **0, 2** < C_P < **1 euros / MWh**
Solar power: **0, 5** < C_P < **1.5 euros / MWh**

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Quiz

Why the TSO (ELIA in Belgium) uses imbalance prices?

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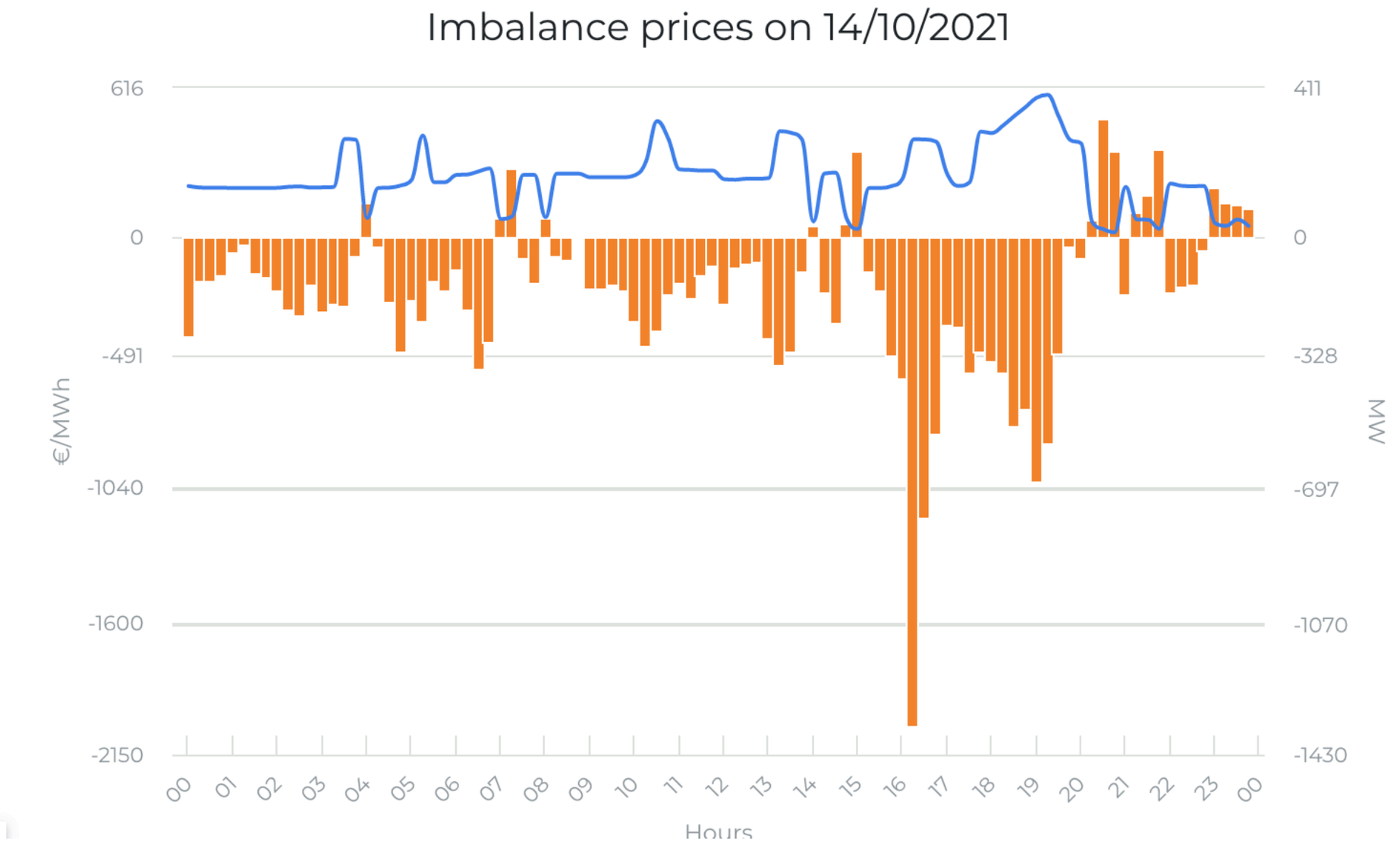
ELIA imbalance prices



Source: https://www.elia.be/fr/donnees-de-reseau/equilibrage/prix-de-desequilibre-15-min

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Balancing fees CC: cost of forecast consumption error

The better the forecast is the smaller are Cc & Cp.

$$C_C = \int [C(t) - C_p(t)] * [Imbalance(t) - spot(t)]dt$$

$$C(t) : consumption(t) \quad [C(t) - C_p(t)] > 0 \rightarrow buying\ at\ Imb_{<0}$$
$$C_p(t) : forecast(t) \quad [C(t) - C_p(t)] < 0 \rightarrow selling\ at\ Imb_{>0}$$

$$if\ [Imb_{<0} < spot(t)] \rightarrow C_p(t) = 0\ leads\ to\ greater\ profit\ than\ C_p(t) = C(t)$$

Residential: C_C <= **0.7 euros / MWh**

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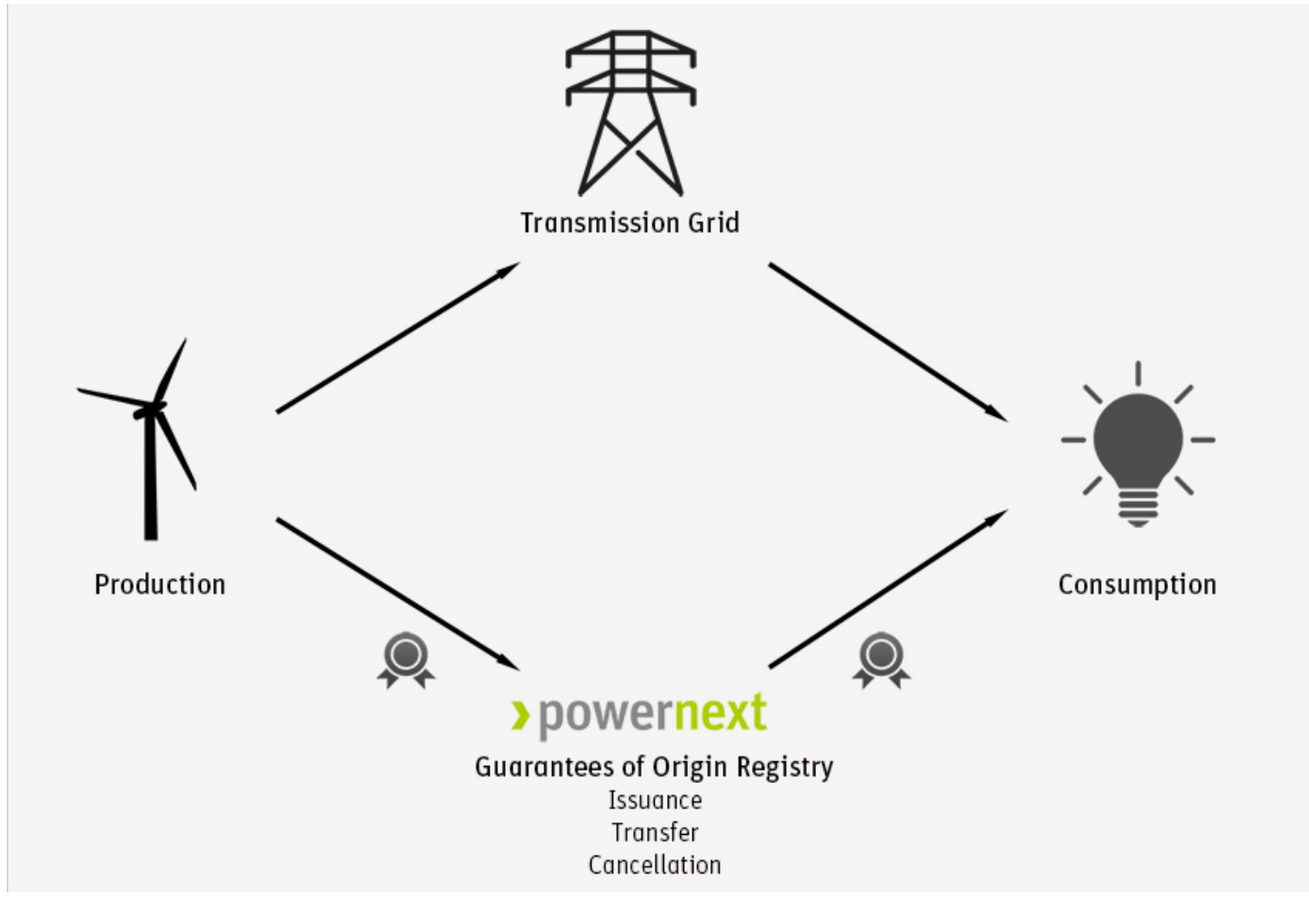
4. Pricing the energy part components: green certificates

Energy part:
- energy
- balancing fees
- Guarantee of Origin (GO)
- capacity



0.5 < Prices < 2 euros / MWh 1 GO = 1 MWh produced

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Quiz

What is the capacity market?

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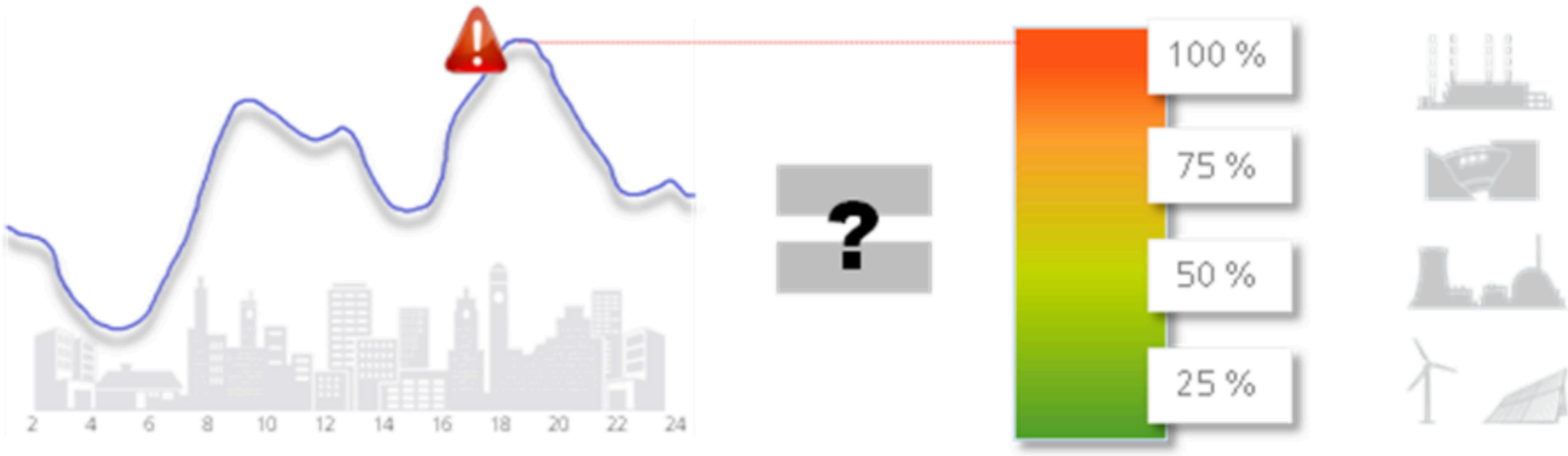
French capacity market basics

TSO Goal: To **balance the grid** at all times, especially during peak hours (evening of cold winters …)



Encourage the **consumption shedding** and the **investment in production capacities** to help balance the grid during consumption peaks.
-> capacity market to remunerate these capacities

Source: https://www.edf.fr/entreprises/le-mag/le-mag-entreprises/decryptage-du-marche-de-l-energie/mieux-comprendre-le-mecanisme-de-capacite-en-3-questions-cles

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French capacity market

Energy part:
- energy
- balancing fees
- green certificates
- **capacity**

Energy supplier

Buy the capacities required to manage its portfolio.

Producer

Given the generation curve (peaks), the TSO estimates the capacity potential (kW per kW installed) to be sold on the market.

Residential Consumer

Given the consumption curve (peaks), the TSO estimates the capacity required for a given portfolio. Then, the retailer purchases the corresponding amount on the capacity market.

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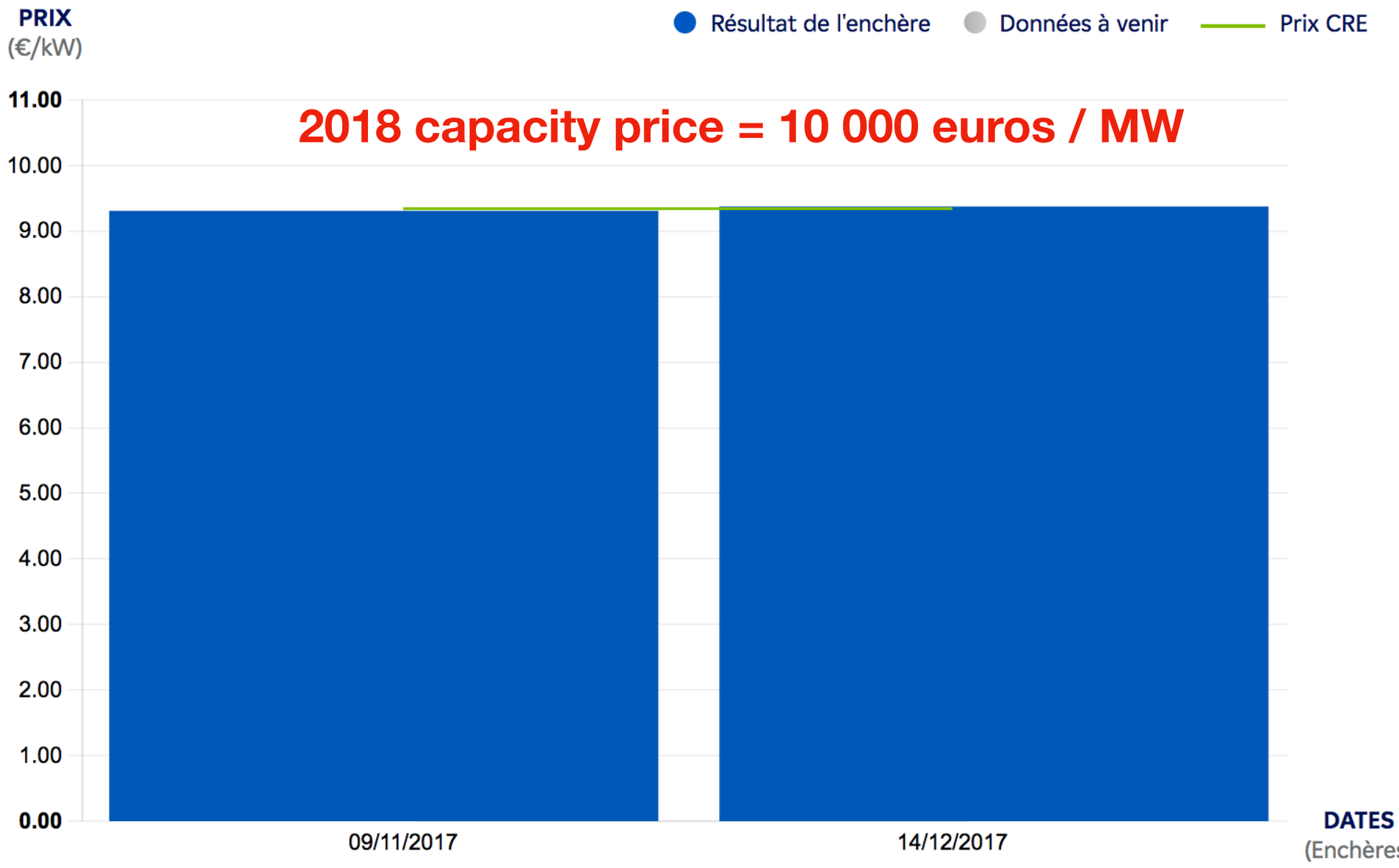
French capacity market



Prix CRE : moyenne des enchères portant sur l'année de livraison

Source: https://www.edf.fr/entreprises/electricite-gaz/electricite-offres-de-marche/mecanisme-de-capacite-explications-et-prix-des-encheres#resultats-des-encheres-de-garanties-de-capacite

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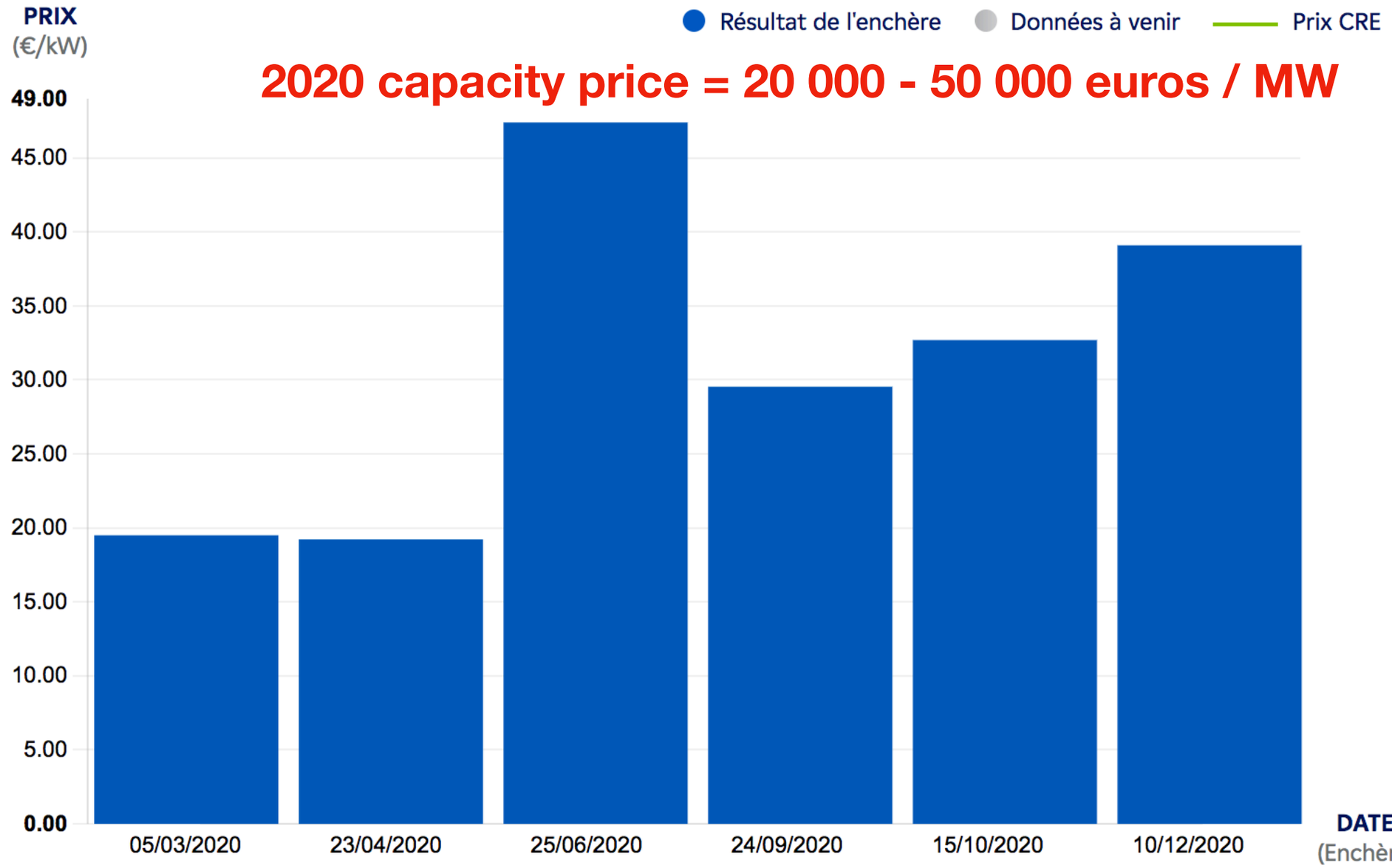
French capacity market



PREC : prix de la dernière enchère sur l'année de livraison

Source: https://www.edf.fr/entreprises/electricite-gaz/electricite-offres-de-marche/mecanisme-de-capacite-explications-et-prix-des-encheres#resultats-des-encheres-de-garanties-de-capacite

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Quiz

And in Belgium?

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Belgian capacity remuneration mechanism: CRM

Source: https://www.elia.be/en/electricity-market-and-system/adequacy/capacity-remuneration-mechanism

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Conclusion

Energy part (1/3 of the total electricity bill):

- energy
- balancing fees
- Guarantee of Origin (GO)
- capacity

Markets: EEX, EPEXSPOT

Producer

Energy supplier

Residential Consumer