THE BELGIAN CAPACITY MARKET: NUCLEAR PHASE-OUT, RELIABILITY OPTIONS AND THE CLEAN ENERGY PACKAGE

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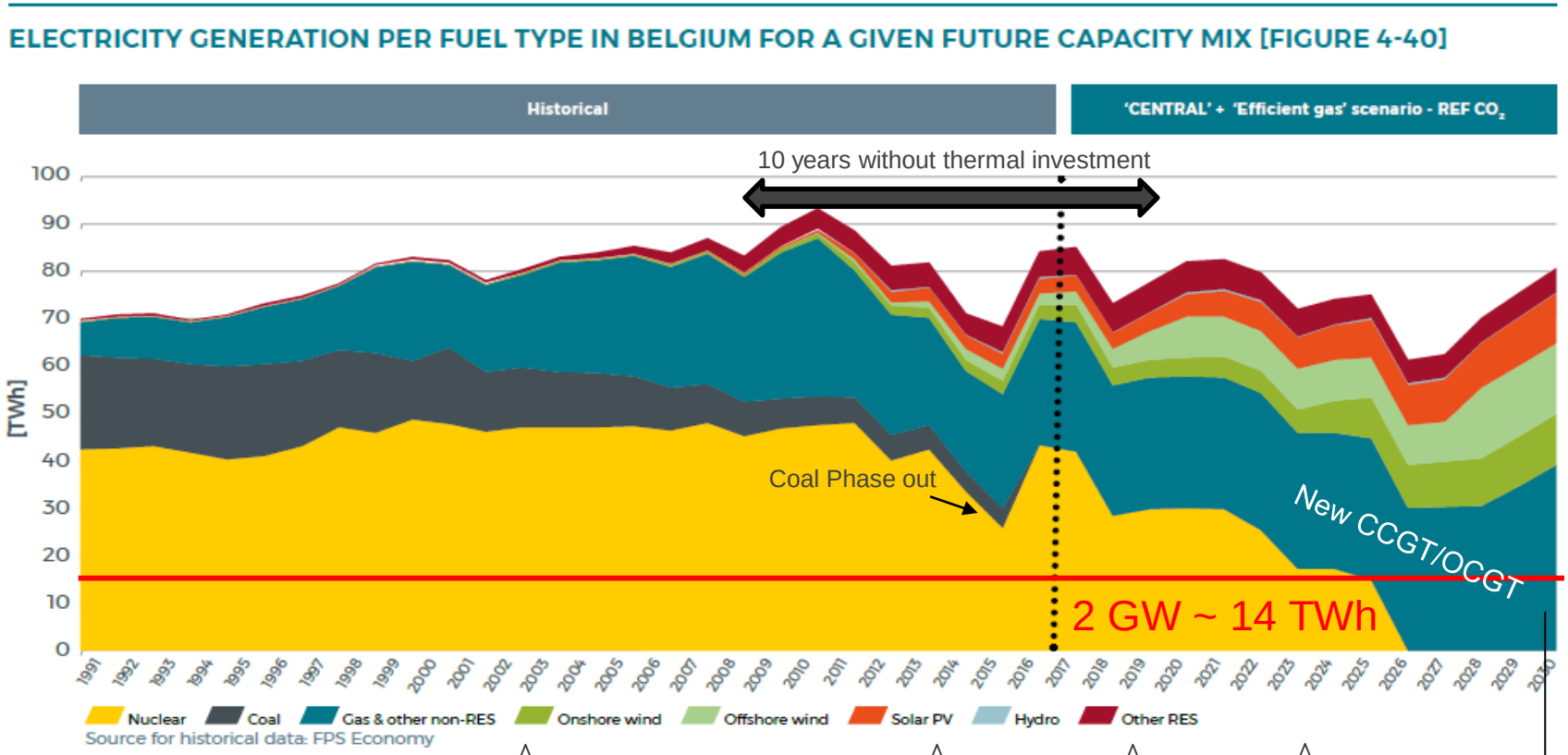
Nuclear in Belgium

Belgium: 7 reactors,~ 6GW

Source: World Nuclear Association

Reactor	Net capacity (MW)	Start	Off-line	Lifetime
Doel 1	433	1975	2025	**50**
Doel 2	433	1975	2025	**50**
Doel 3	1 006	1982	2022	40
Doel 4	1 033	1985	2025	40
Tihange 1	962	1975	2025	**50**
Tihange 2	1 008	1983	2023	40
Tihange 3	1 038	1985	2025	40

Belgium: ~ 80 TWh, 50 % Nuclear
2030: A lot of RES + Gas



2003

« Nuclear Phase out starts in 2015 to 2025 »

2012 & 2015

« Let's extend some units»

2019

« We need a CRM to address nuclear phase out»

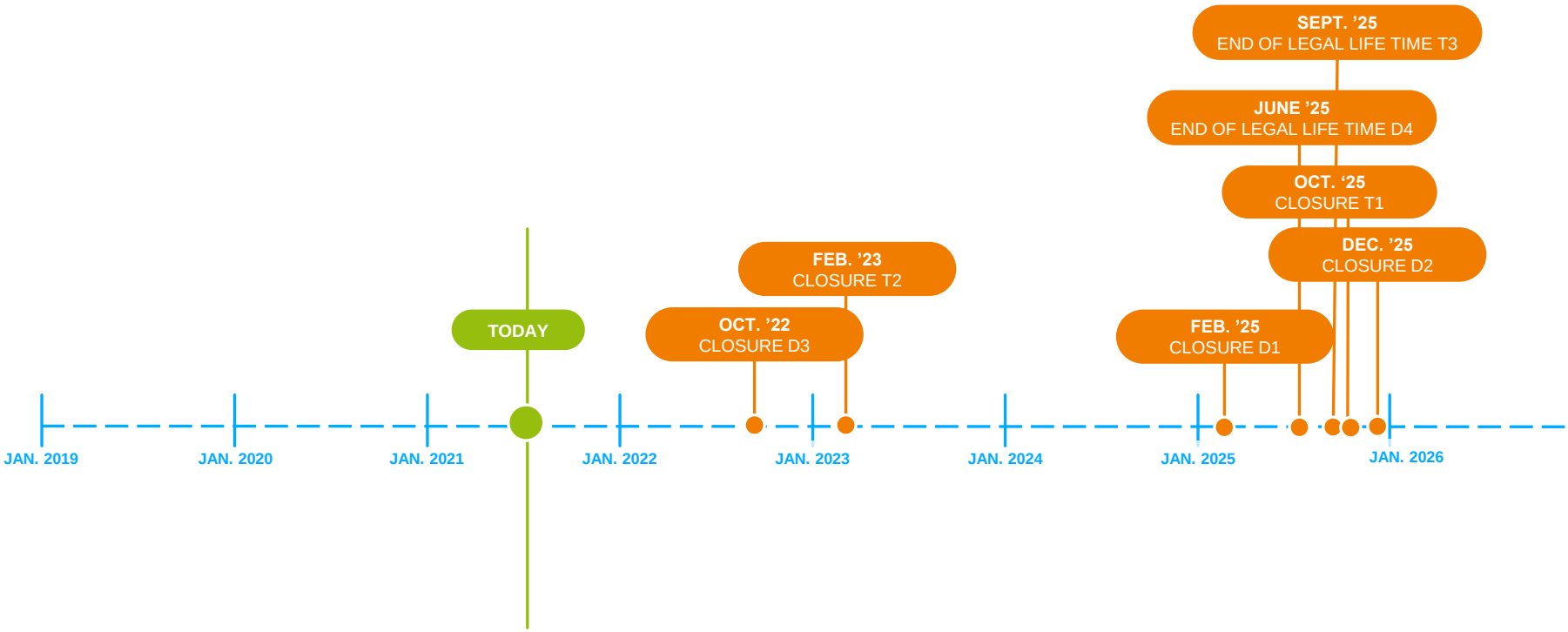
2022-2025

«Nuclear phase out as planned »

…

2 units could be extended?

Legal nuclear phase out scenario: 7 units to be closed by 2025



Phase out law and derogation

2003 law

"Belgium must commit to a gradual nuclear phase-out"

→ limit operating lifetime of nuclear reactors to 40 years…

→ however security of supply is the absolute priority = temporary derogations are possible

Why?

- No economic, ecological nor technical?
- Key reasons:
  - risk of nuclear accident,
  - nuclear weapon proliferation
  - waste management

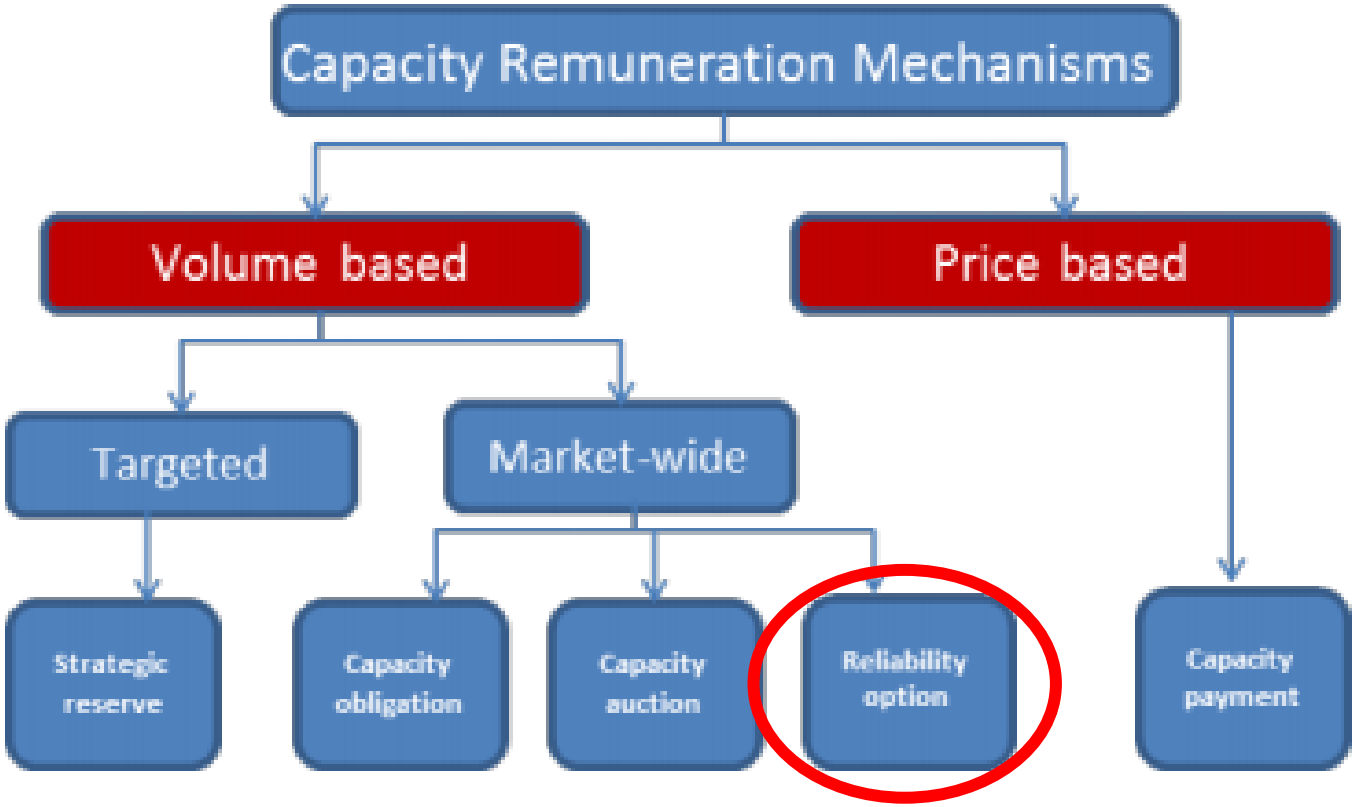
Derogation to ensure Security of supply

- No comprehensive plan to replace nuclear led to 2 LTO:
- 2012: Tihange 1
- 2015: Doel 1 & 2
- 2021: ???

02

CRM

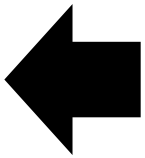
Reliability options and CRM « taxonomy »



Source: Capacity remuneration mechanisms and the internal market for electricity, ACER, July 2013.

Reliability options

- Capacity remuneration scheme (MW), which is:
  - Volume-based (MW) & Market-wide
  - Technology neutral
  - Centralized
- Capacity price determined in a competitive process
- **Excessive profits are limited with a pay-back obligation**



KEY MOTIVATION FOR POLICY MAKERS!

Ensuring adequacy, keeping cost under control beyond competition

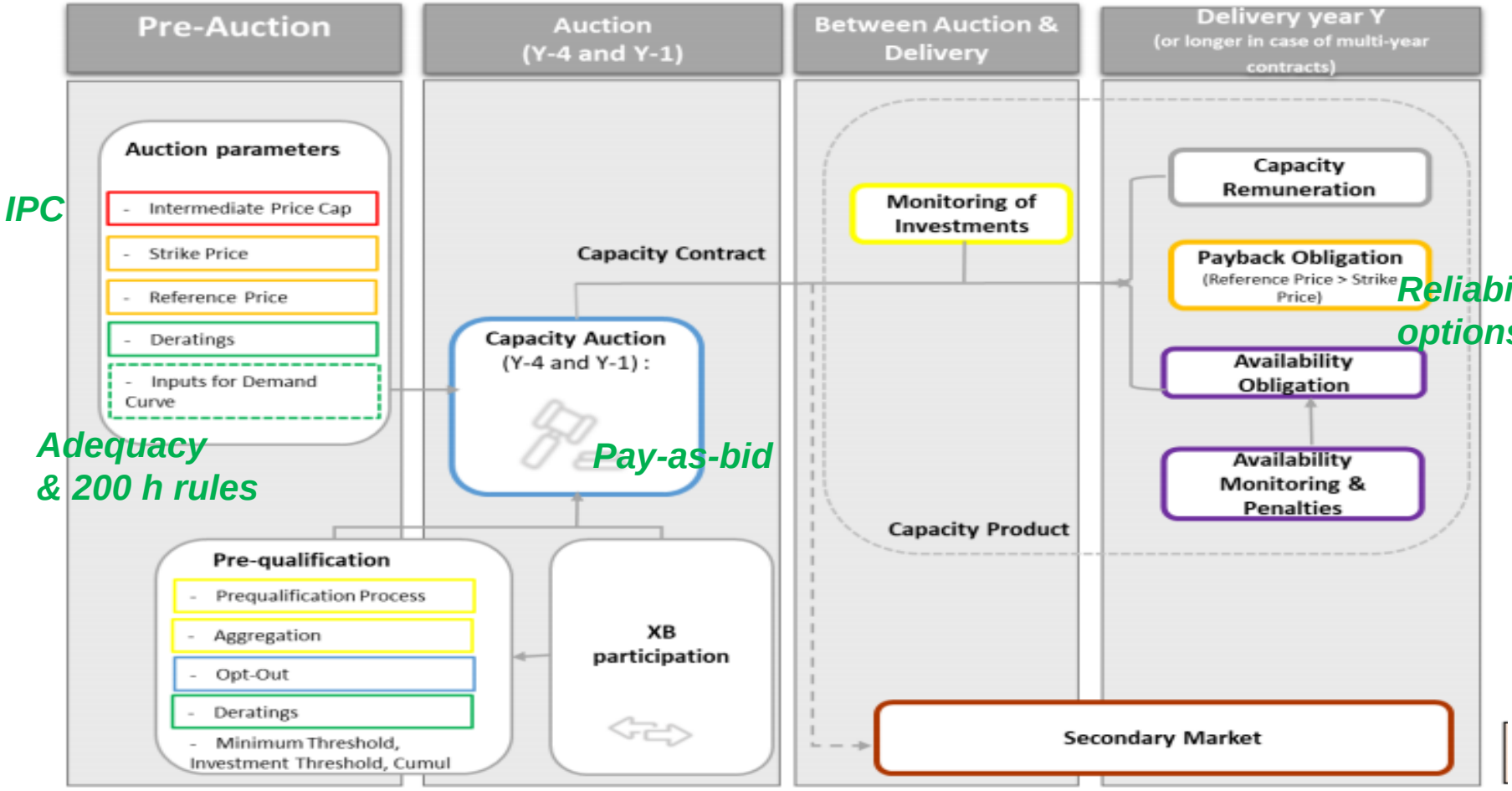
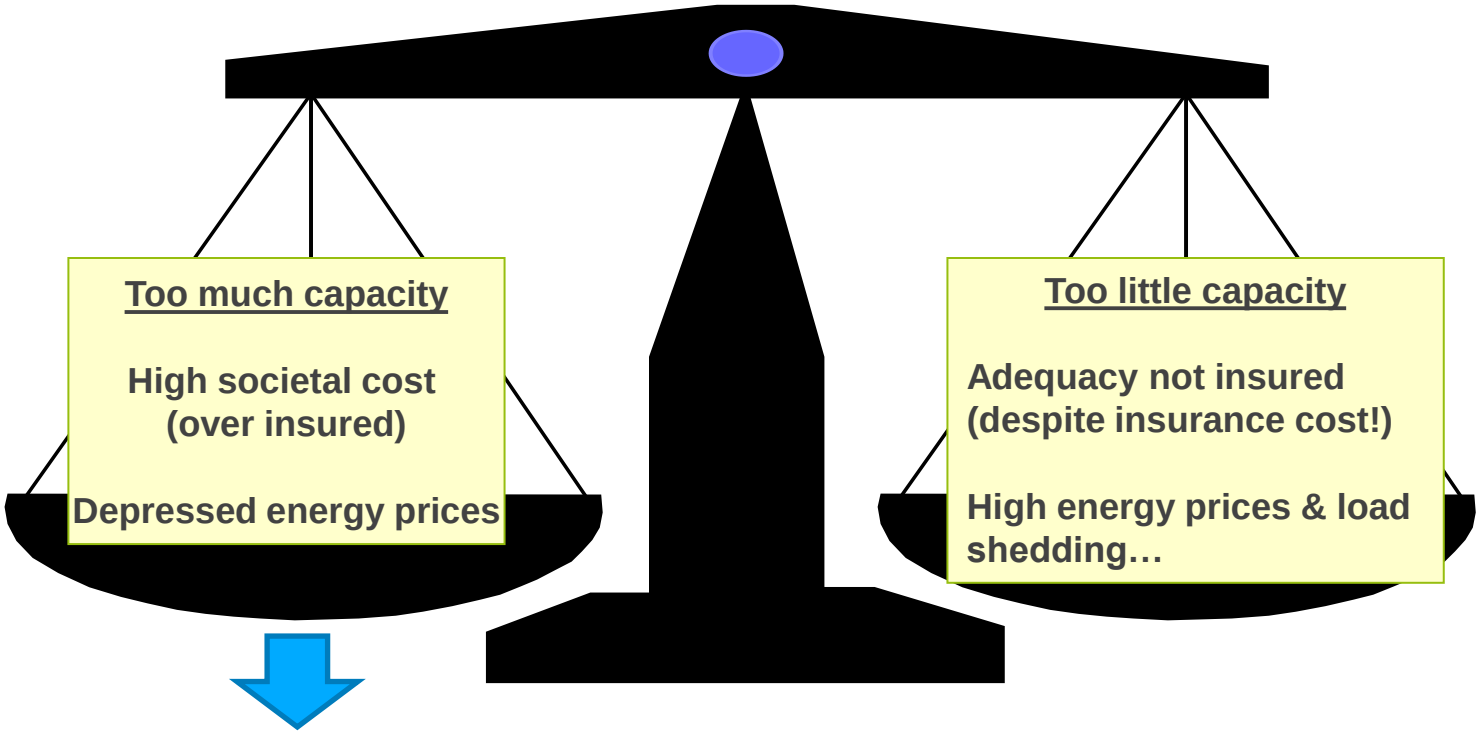


Figure 1 : Overview of the CRM process

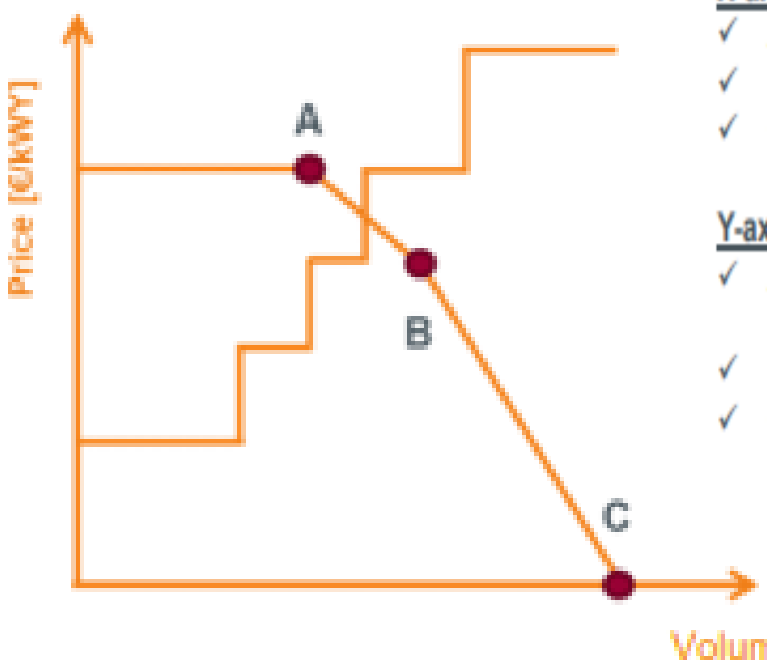
Source: Elia

How much volume? A difficult balance to find



Negative impact on CRM cost!

Volumes: Defining « ABC »…



X-axis (Volume)

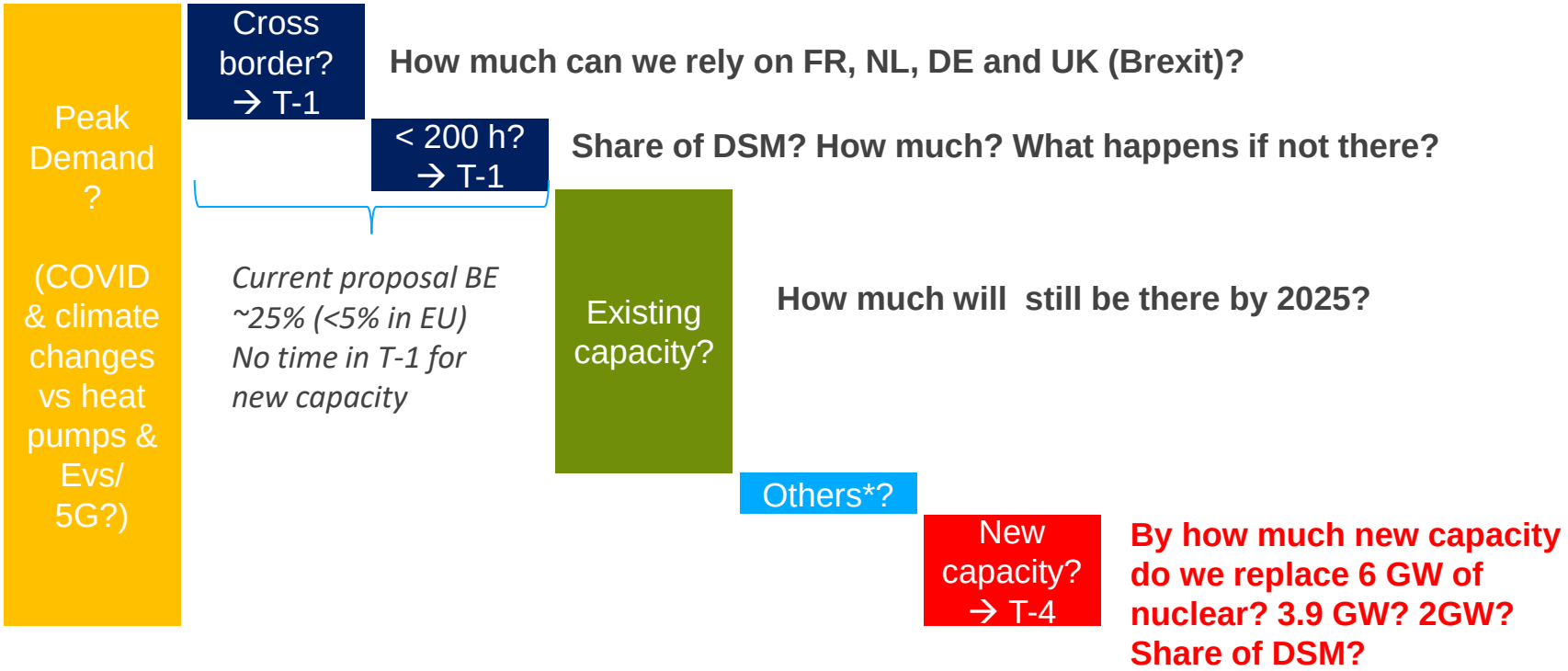
- ✓ A = Minimum capacity to be cleared at price cap;
- ✓ B = Targeted procured capacity (MW needed to meet the reliability standard);
- ✓ C = Maximum procured capacity level above which extra capacity has no further value.

Y-axis (Price)

- ✓ A = Global Auction Price Cap to avoid unreasonable capacity offers and to cover for uncertainty on point B.
- ✓ B = Price offered by (i.e. missing money of) Best New Entrant;
- ✓ C = X-axis intersect (0 €/kWY).

B: Volume we need to meet “Reliability standard”
Which level? (LOLE < 3h & LOLE95 < 20h → the Belgian law)
What is the Best New Entrant?

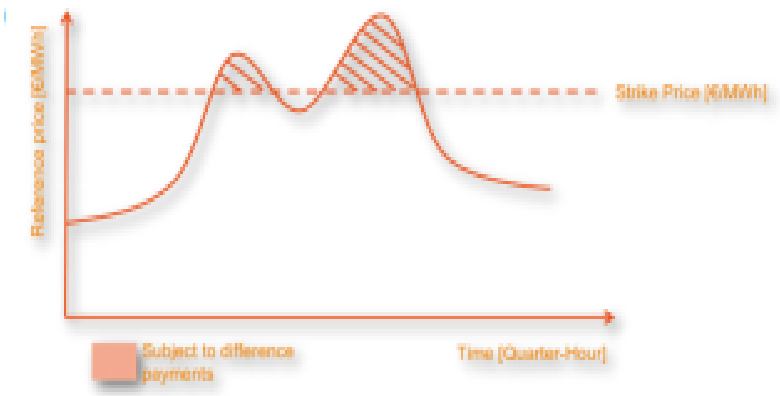
How much volume? Battle of assumptions…



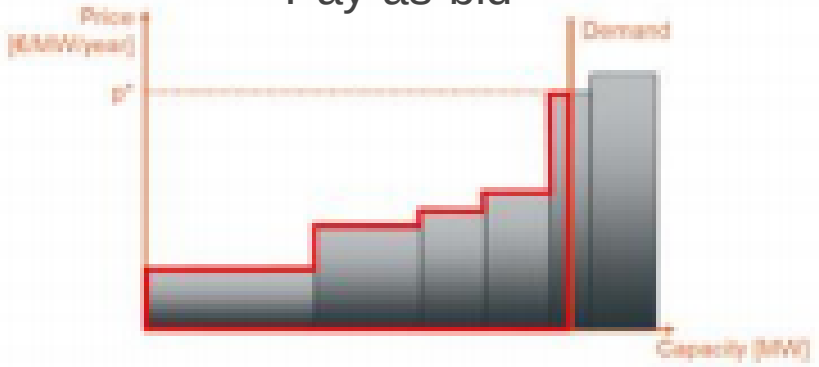
* e.g. non eligible capacity (PV, wind, CHP, below 1 MW…etc)

Keep costs under control? Several design elements

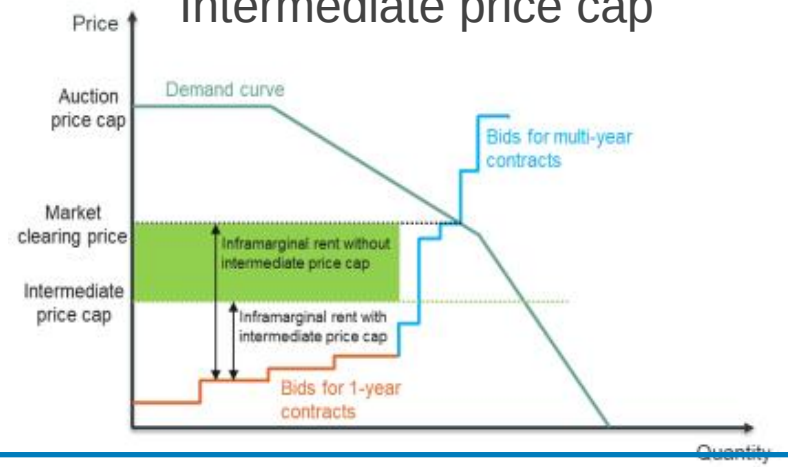
Pay-Back obligation



Pay-as-bid



Intermediate price cap



200 hours

"volume to be reserved [in T-1] is at least equal to the capacity having, on average, less than 200 operating hours per year in order to cover the total peak capacity"

Auction format: Pay-as-bid

"It is proposed to apply a pay-as-bid pricing rule for the first two Auctions (Y-4 Auctions for the first two Delivery Periods) and switch towards a pay-as-cleared pricing rule afterwards as this allows to limit windfall profits"

Source: Elia

Kahn et al (2001): *"The critical assumption is that generators will bid just as they had before. They will not"*.

200h rules, when do we Auction How Much?

2021	2022	2023	2024	2025	2026	2027	…
T-4 2025			T-1 2025	Delivery 2025			
	T-4 2026			T-1 2026	Delivery 2026		
		T-4 2027			T-1 2027	Delivery 2027	
			T-4 2028			T-1 2028	Delivery 2028

→ Simple

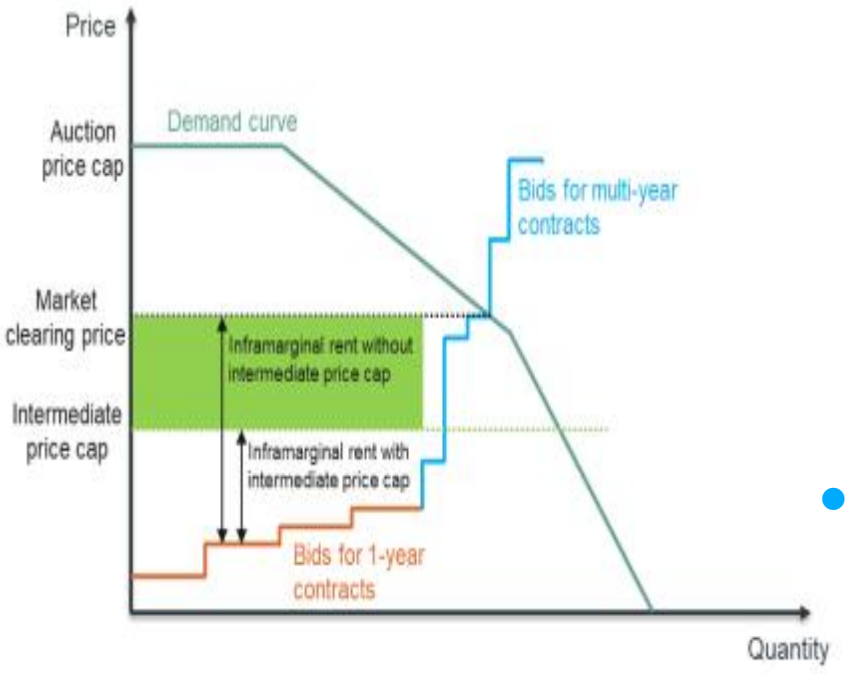
T-4 needed for new built

"volume to be reserved [in T-1] is at least equal to the capacity having, on average, less than 200 operating hours per year in order to cover the total peak capacity"

Country	Capacity reserved for T-1 auction
UK	95% confidence interval around T-4 (i.e. around 5%of T-4 auction volume)
IE	2-5% of capacity requirement
PL	1.160MW out of ca. 22.000MW (i.e. approximately 5% of mainauction)
IT	At least 1% of expected capacity demand

→ ~25% in T-1 for Belgium?

Intermediate price cap- IPC



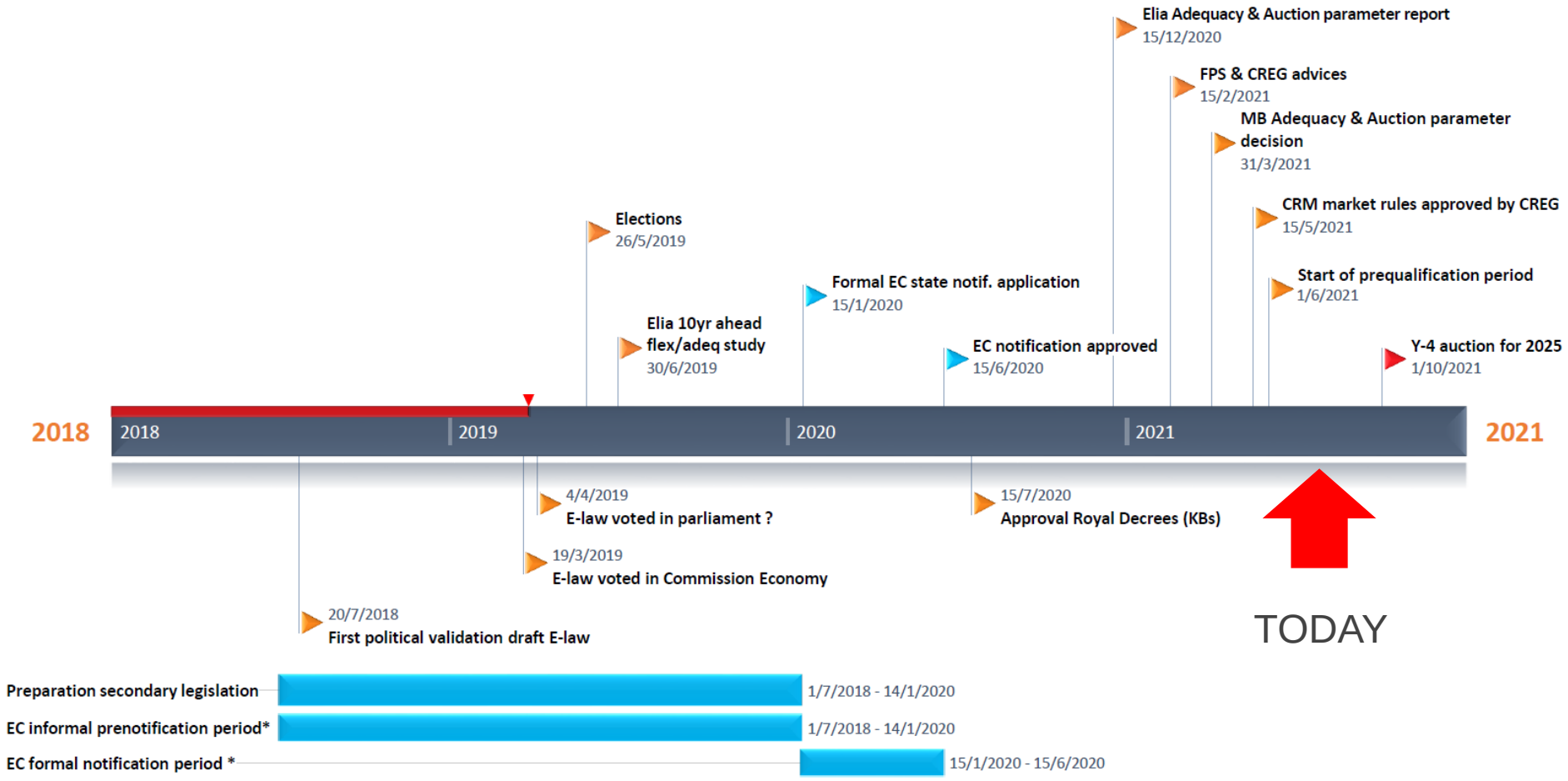
- Objective: limit the cost of the CRM
- Issues:
  - Pay-as-bid + IPC→ unique
  - Reduce competition between old and new assets
  - No incentive to offer below the IPC
  - What if too low? → exit?
  - Impact investment decision taken before the CRM (state aid guideline)
- Proposal: Derogation
  - How to give derogation? Based on missing money computation? → impossible task
  - Why a rule if everyone apply for derogation?
  - If you one can compute the missing money in the first place- Why A CRM: simply regulate!

03

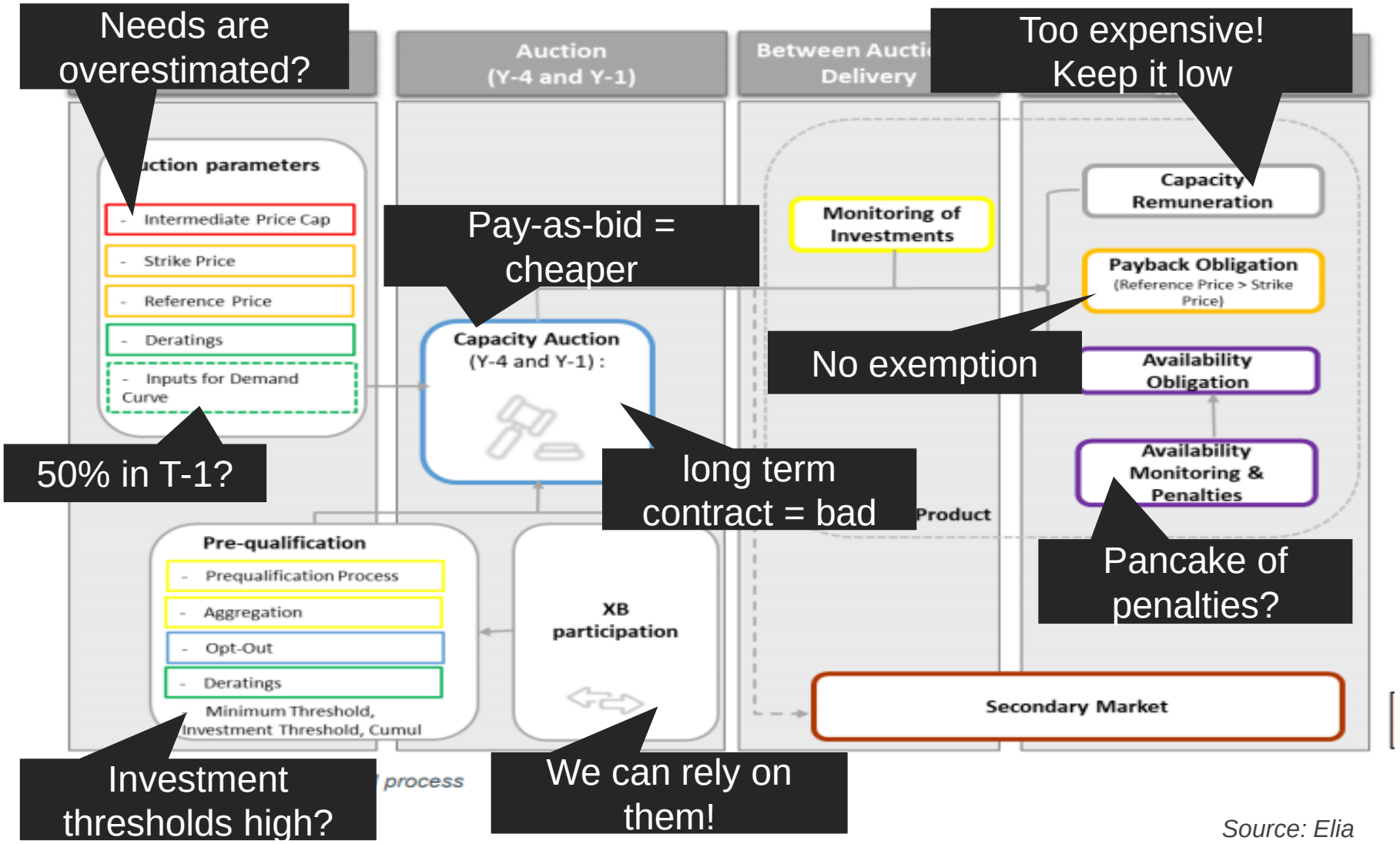
Conclusion

An ambitious planning

- **The CRM is behind schedule…5 months before the auction (Oct 2021), a lot remains to be done…**



A lot of debates in the Belgium CRM



Source: Elia

Lessons? next?

Some early lessons?

- Nuclear phase out needs a comprehensive replacement plan
- A CRM should be a competitive, clear and transparent mechanism: additional rules to "control" competition can hamper competition?
- Decarbonization creates an additional challenge
- Clean Energy package provides a rather robust framework but no standard market design
- Careful monitoring of the first results needed to address potential flaws

Next?

Optimistic scenario: DG comp approve the CRM, players able to compete on a level playing field, sufficient capacity at the lowest cost, CO2 emissions under control.

Pessimistic scenario: Delayed DG comp approval, the nuclear option re-open (feasibility?), several players bring to court legal actions against the CRM, further delay implementation security of supply 2025 at risk….

Thanks you