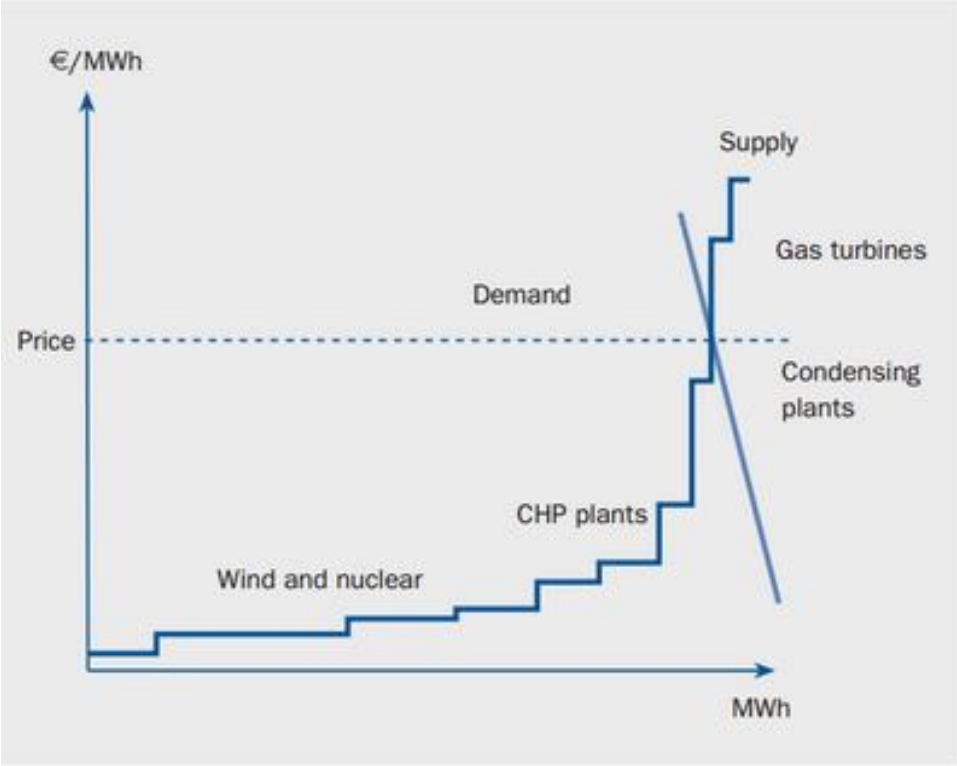
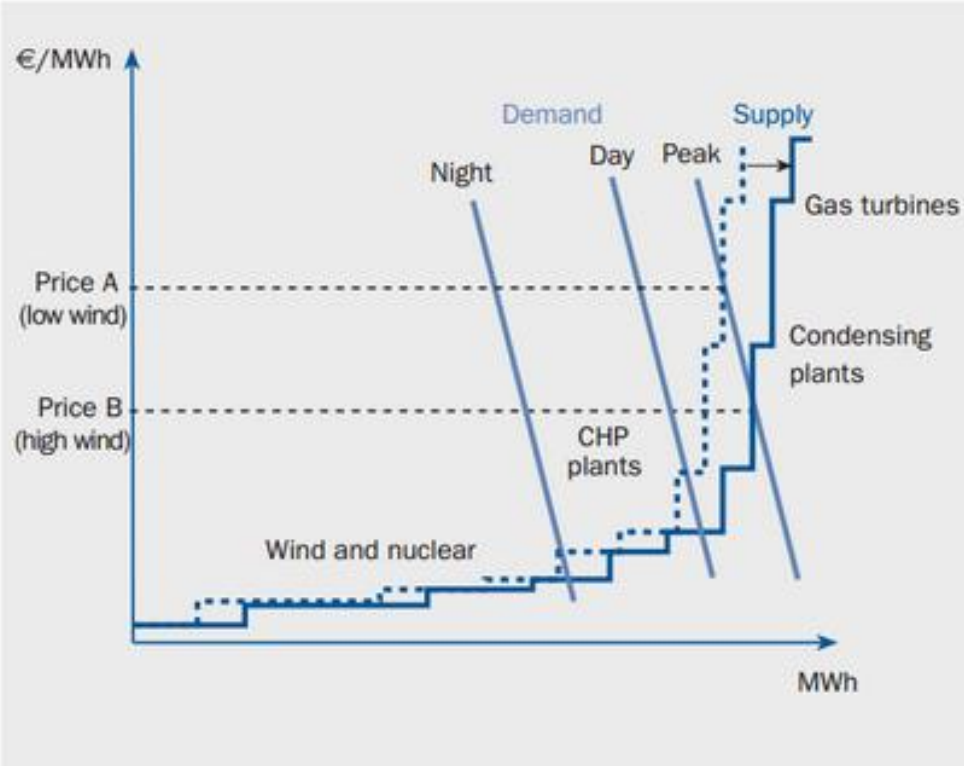
Capacity mechanisms for improving security of supply: quick fixes or thoughtfully rethinking the way electricity is traded?

Prof. Damien ERNST

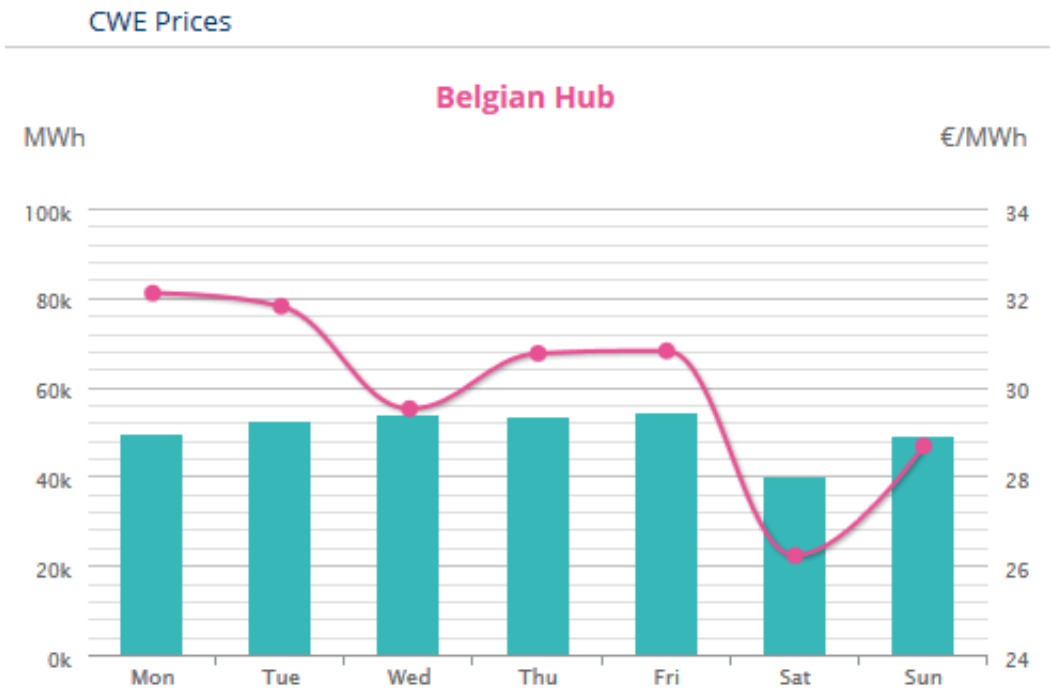
Université de Liège

Renewables and drop in electricity prices





Low electricity prices and investments



Electricity prices become ridiculously low.

Highly dependant on the price of gas.

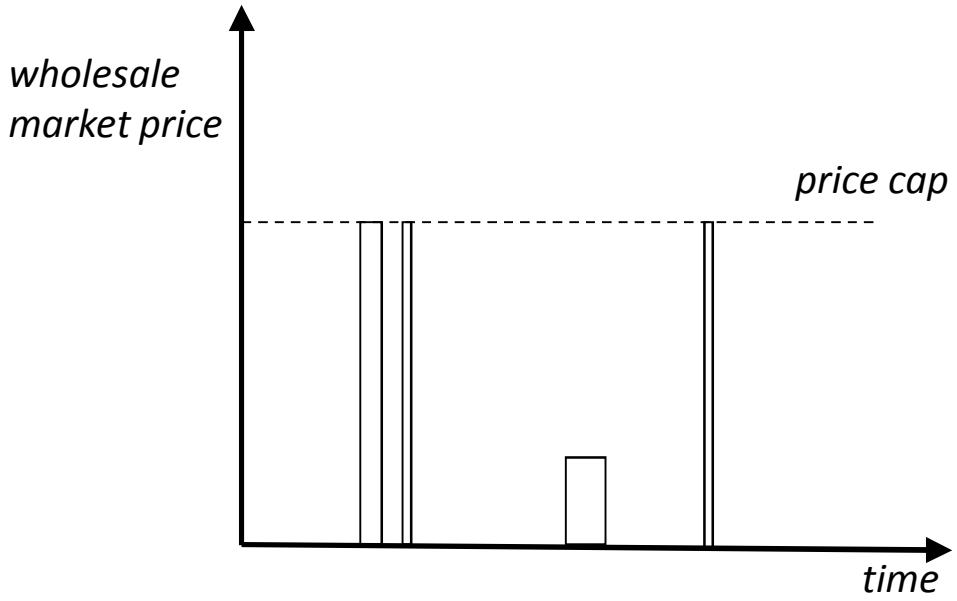
With the energy-only market, no new investments will be made anymore, except if **(i)** they are subsidised **(ii)** they take place in a microgrid-like structure (= no grid fees, no taxes)

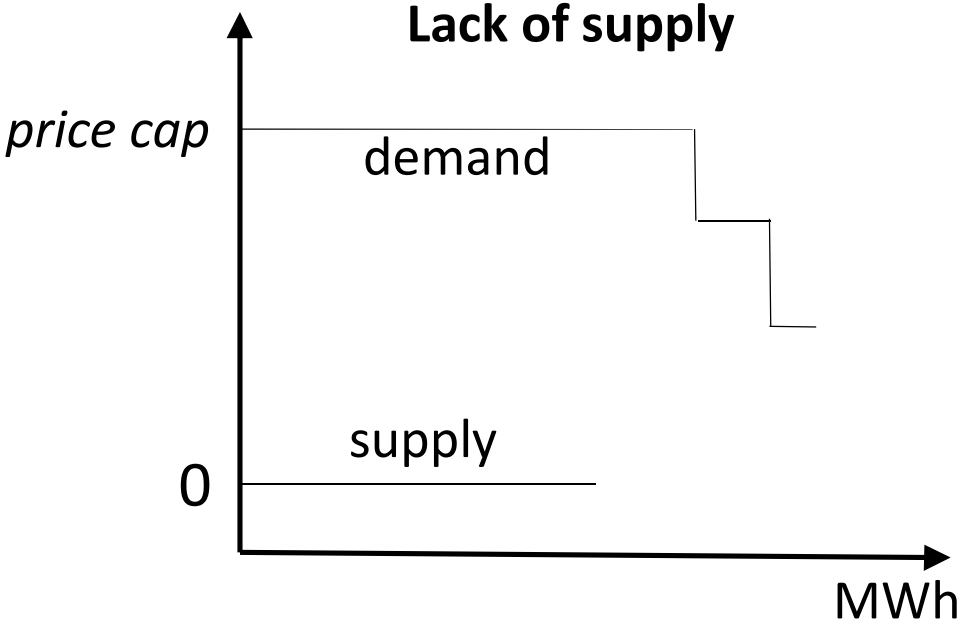
The two burning questions in electricity market design

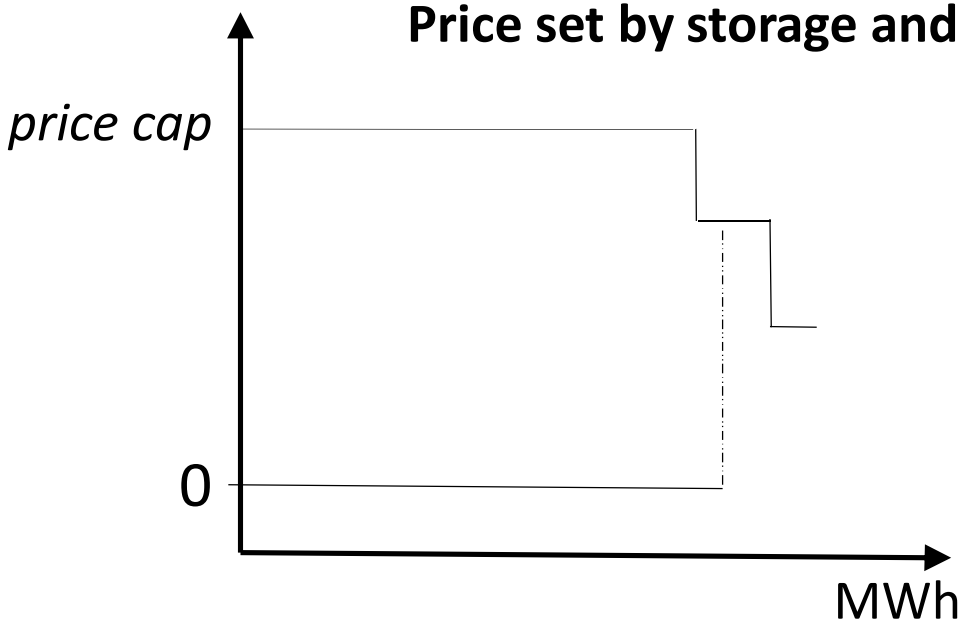
Context: The world is very likely to switch towards a 100% renewable energy mix.

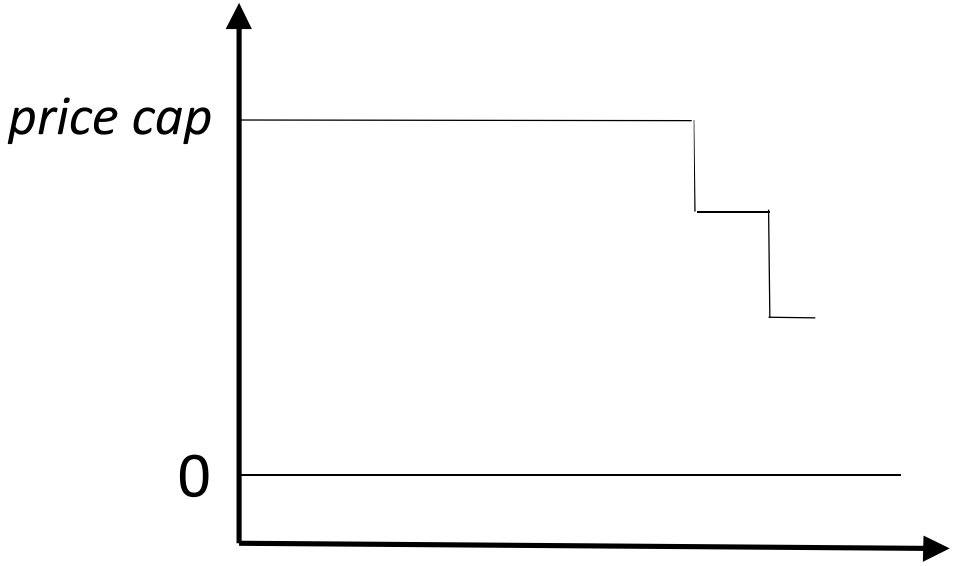
Question 1: How to create a non-subsidised EU (or worldwide) electricity market that synthetises a price signal fostering investments in renewable energy?

With the current market design, prices will increasingly be set by the load and storage, which may lead to (i) low average prices (ii) a highly volatile price signal.



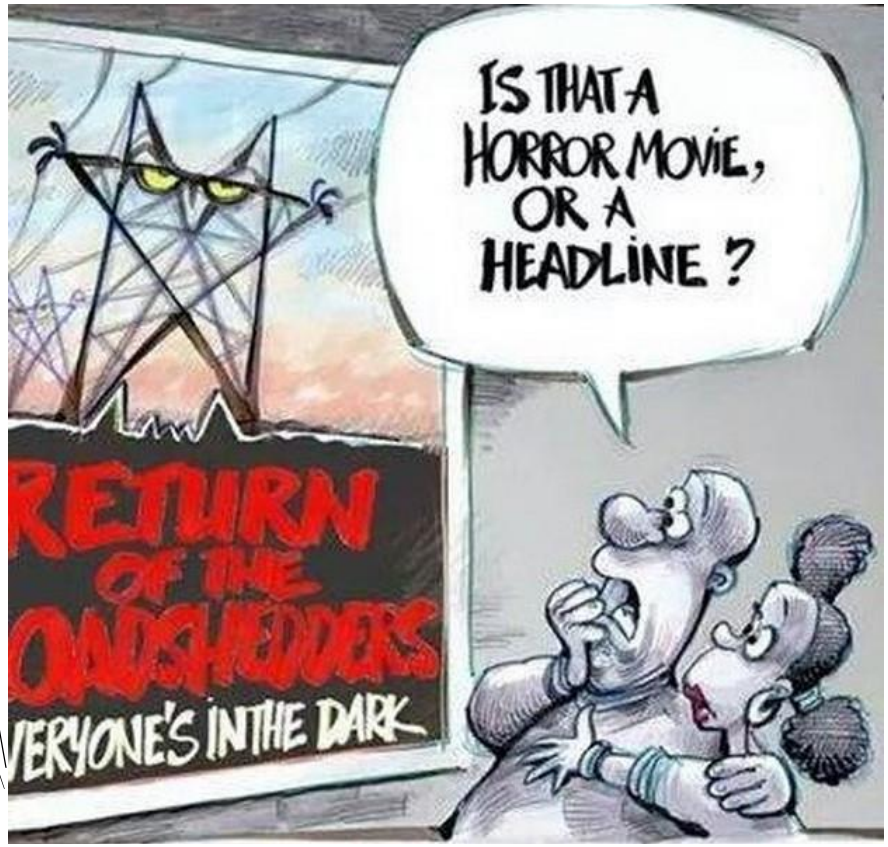

Lack of supply
price cap
demand
supply
0
MWh


Price set by storage and DSM
price cap
0
MWh


price cap
0

Oversupply

Question 2: How to ensure that there is enough capacity to supply the load at any time?



Current incentives for having enough supply are not sufficient. But what are these current (negative) incentives in Belgium?

(i) A price of 3000 €/MWh for electricity bought on the day-ahead market in case of lack of supply

(ii) An imbalance tarif equal to 4500 €/MWh.

If MWhs were bananas

Retailers cannot buy enough electricity on the wholesale market when there is a lack of supply?

Answer: If the retailer cannot convince his customers to consume less, the TSO reduces its consumption and disconnect them from the grid. IT is possible to do it with smart meters.

Issues: (i) Required technology cannot easily be put in place (ii) Poor people are likely to be frequently disconnected since they will be unable to buy a high level of security of supply (iii) Issues of transparency for customers.

Capacity mechanisms

An increasing number of analysts believe that **capacity mechanisms** that make separate capacity revenues available to generators and/or demand response are needed to ensure generation adequacy.

As a consequence, several Member States have already opted for the introduction of one or more capacity mechanisms to address perceived residual market failures.

Brussels, XXX
[…](2016) XXX draft

REPORT FROM THE COMMISSION

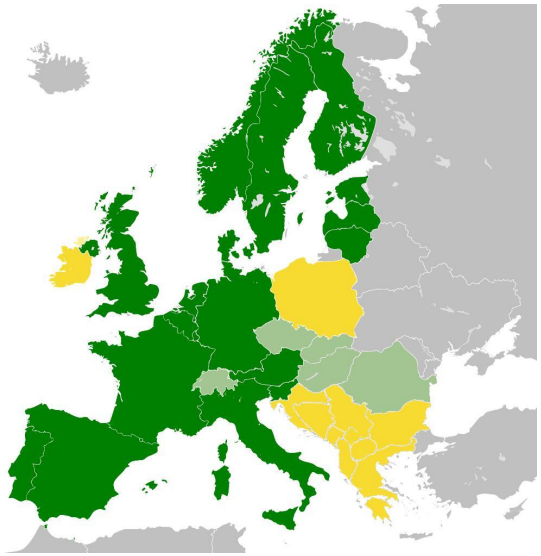
Interim Report of the Sector Inquiry on Capacity Mechanisms

Mechanisms vary widely - they may fall within the category of state aid.

The perfect capacity mechanism: difficulties ahead

(i) Difficulties for loads – especially small ones – to take part to capacity mechanisms.

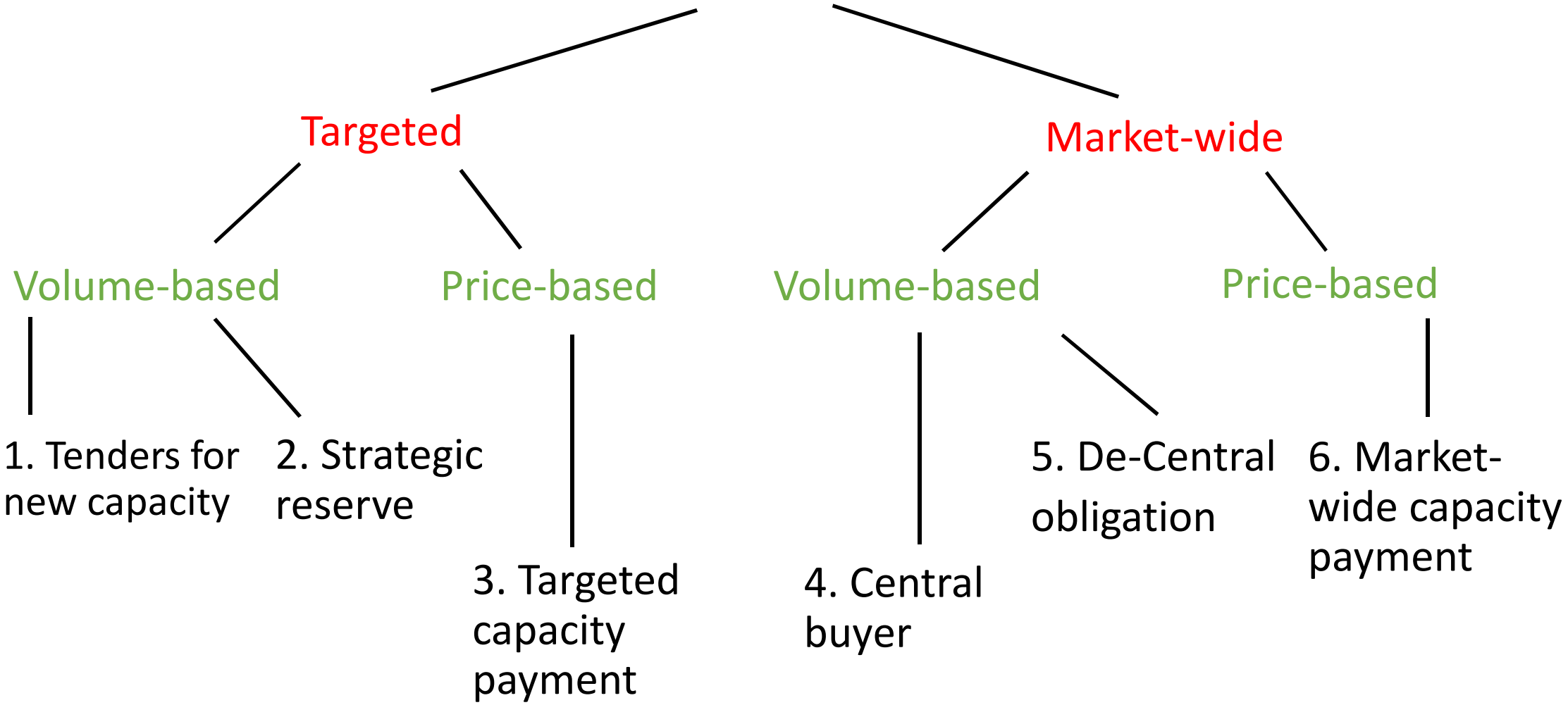
(ii) Problems of interference between capacity mechanisms and transmission/ distribution networks (loop-flows, congestions at the distribution level, etc.)



(iii) What is the place of renewables/storage within capacity mechanisms?

(iv) What about nuclear energy and capacity mechanisms?

Capacitity mechanisms: the «EU taxonomy »



See: Capacity mechanisms working group, 30 June 2015, HIGH LEVEL COMPARISON OF CAPACITY MECHANISM MODELS AND COMPATIBILITY WITH STATE AID GUIDELINES

Targeted

Targeted mechanisms are those where the amount of capacity required and the amount expected to be brought forward by the market are identified centrally. The capacity mechanism then provides support only to the additional capacity (or 'top up') expected to be needed beyond what would anyway be brought forward by the market.

- Tender for new capacity – typically, the beneficiary of such a tender receives financing for the construction of a power plant that would bring forward the identified top up capacity. Once the plant is operational, in some models the top up capacity runs in the market as normal (without a guarantee that the electricity will be sold). It would also be possible for the plant to be supported through a power purchase agreement.
- Strategic reserve – in a strategic reserve mechanism, the top up capacity is contracted and then held in reserve outside the market. It is only run when specific conditions are met (for instance, when there is no more capacity available or electricity prices reach a certain level). Typically strategic reserves aim to keep existing capacity available to the system.
- Targeted capacity payment – in this model, a central body sets the price of capacity. This price is then paid to a subset of capacity operating in the market, for example only to a particular technology, or only to capacity providers that meet specific criteria.

Market-wide

In a market-wide mechanism, all capacity required to ensure security of supply receives payment, including both existing and new providers of capacity. This essentially establishes 'capacity' as a product separate from 'electricity'.

- Central buyer – where the total amount of required capacity is set centrally, and then procured through a central bidding process in which potential capacity providers compete so that the market determines the price.
- De-central obligation – where an obligation is placed on electricity suppliers / retailers to contract with capacity providers to secure the total capacity they need to meet their consumers' demand. The difference compared to the central buyer model is that there is no central bidding process, but market forces should still establish the price for the required capacity volume.
- Market-wide capacity payment – where the price of capacity is set centrally, based on central estimates of the level of capacity payment needed to bring forward sufficient total capacity and then paid to all capacity providers in the market.

What I think of these mechanisms (in short)

1. Tenders for new capacity: May not favour enough emerging technologies like DG + Storage. May be required in case of nuclear phase-out.

2. Strategic reserve: OK as a temporary solution. But why removing the generators of the strategic reserve from the market (except when there is an adequacy problem)?

3. Targeted capacity payment: Simple to put in place but no competition/innovation. Beneficial that the units still stay in the market.

4. Central buyer: Will lead to payments to generators that would still be in activity even without these payments. Problems of market power. Good solution for fostering large-scale investments in generation. Will foster innovation and competition.

5. De-central obligation: Same drawbacks as in the « Central buyer » model, but may favour more competition and innovation. May lead to problems of transparency.

6. Market-wide capacity payment: Does not foster innovation/competition and will lead to payments to generators that are already bankable.

Targeted capacity payment for Belgium?

In Belgium, there are around 4000 MW of gas-fired power plants which are not competitive (now) and at risk of closure. This may create a capacity problem in Belgium. Real risk will occur when Germany proceeds to its nuclear phase out.

Targeted capacity payments to these power plants would be simple to put in place and effective in avoiding any risk of shortage of supply. The total payments necessary for maintaining them in operation would be around 100 million euros per year. This solution may be the cheapest one for ensuring security of supply in Belgium, even after the German nuclear phase-out.