



Forward capacity rights as hedging instrument

2-3 October 2019, Podgorica

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1. *Key features of cross-zonal market design*
2. *Regulatory framework*
3. *European market & target model*
4. *Capacity calculation in the meshed networks*
5. *Importance of forward transmission rights and their value*
6. *Hedging examples*
7. *Types transmission rights*

Key features

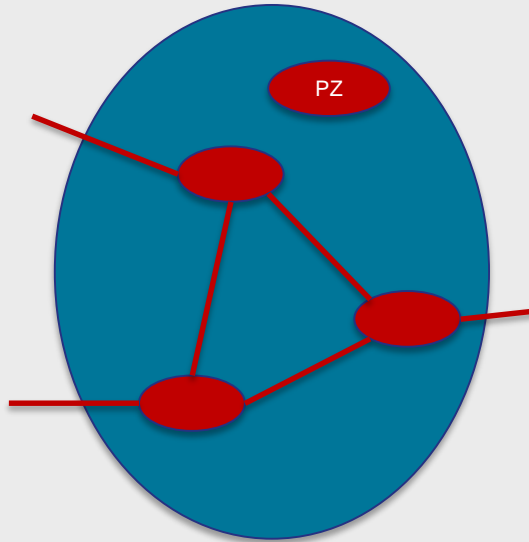
Market design defines how electricity is traded nationally and regionally

Key features:

1. how it deals with network constraints
2. dispatch policy
3. balancing responsibility
4. contractual relationship of market participants

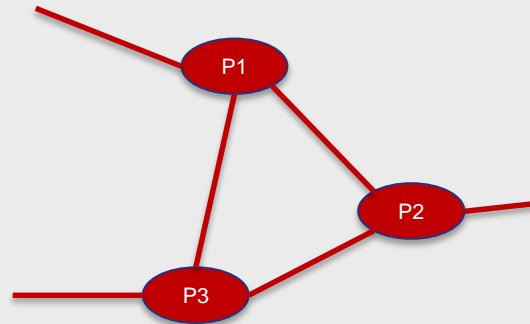
Market designs

Zonal pricing



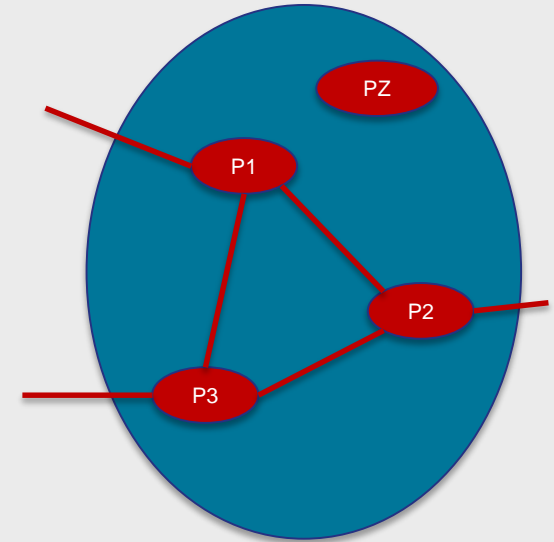
Consideration of cross-zonal capacity with other zones

Nodal pricing



Consideration of constraints between the nodes

Hybrid (nodal zones)



Consideration of cross-zonal capacity with other zones, in addition to nodal pricing

Trading & hedging under different designs

Importance of cross-zonal capacity

High system operation costs (redispatch)

Higher competition

Loop flows

Understanding the system constraints for each node

Low system operation costs

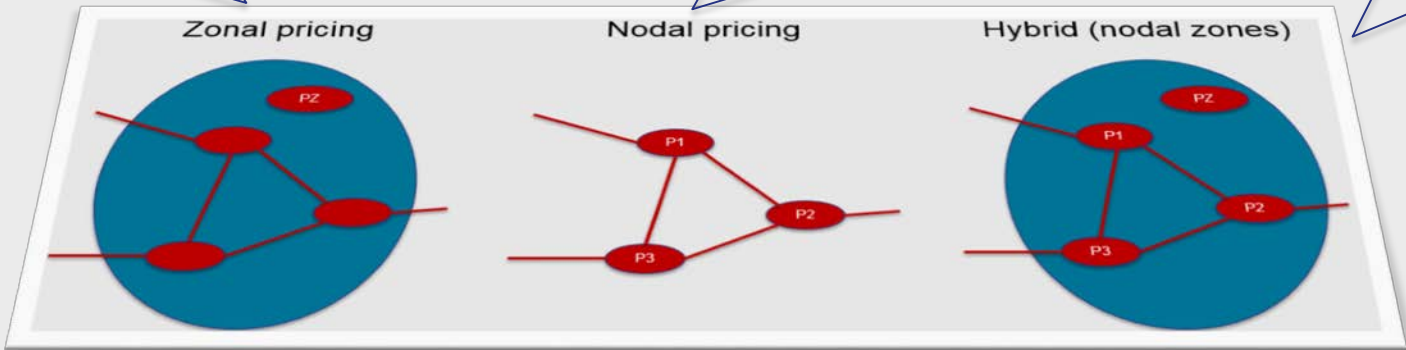
Low competition

No loop flows

Understanding the system constraints for each node, and how they impact cross-zonal capacity

Low system operation costs, but still some countertrading necessary

Competition only on zonal level



European markets

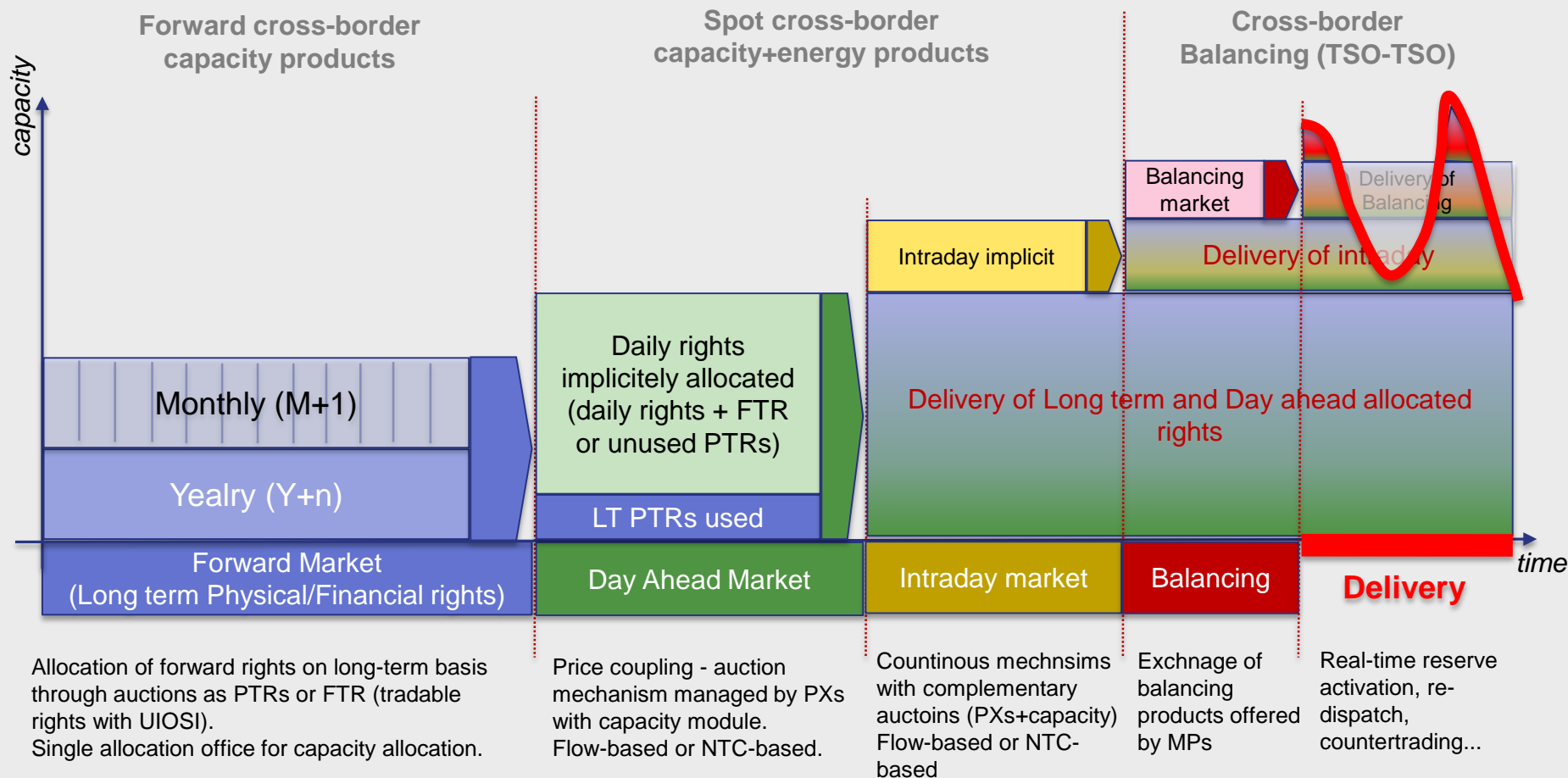
- *The zonal model is a legacy of how systems (countries' electrification) developed*
 - National systems then interconnected to other systems
 - National systems then split into more national systems 😊
- Market zones in Europe usually correspond to political borders of the countries, with some exception*
 - Nordic markets operate under several zones not related to political borders
 - Italian market is split in several zones that define system (Italian) price
 - Polish market has some sort of hybrid model (nodal with zonal pricing)
 - Ukrainian market is split in two zones (physically!)

Zones = countries!?

Reg 714/Annex 1 (third energy package) – applicable for the CPs (for EU complemented with CACM regulation)

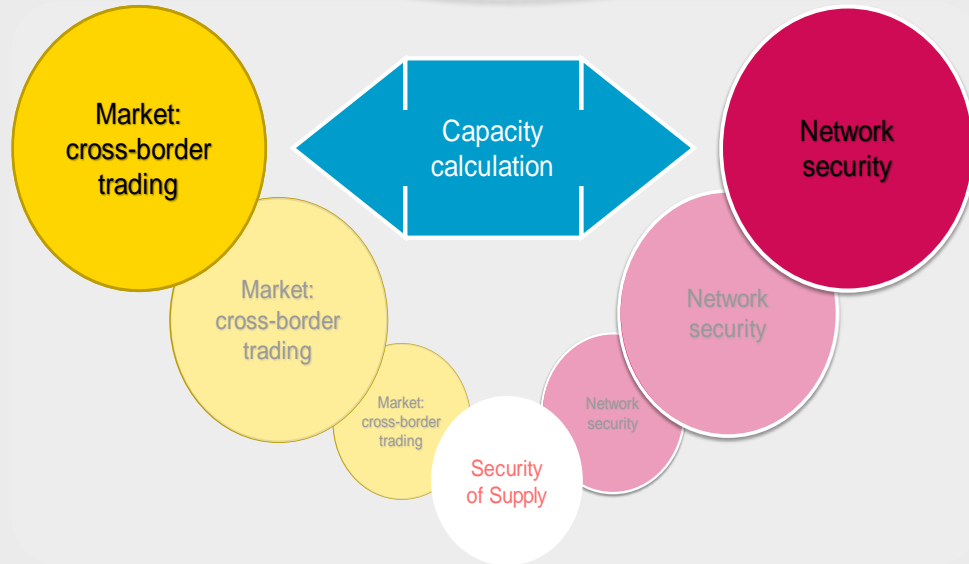
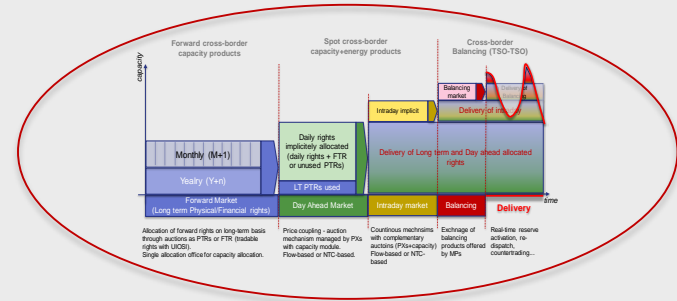
- TSOs shall endeavor to accept all commercial transactions, including those involving cross-border-trade
- No congestion = no restriction **(the default rule)**
- In case of structural congestion = cross-border(zonal) capacity should be allocated **(an exemption which applies more than the default rule)**
 - Congestion should be managed
 - Non-discriminatory and market based method that gives efficient economic signals to market participants

Cross-zonal market

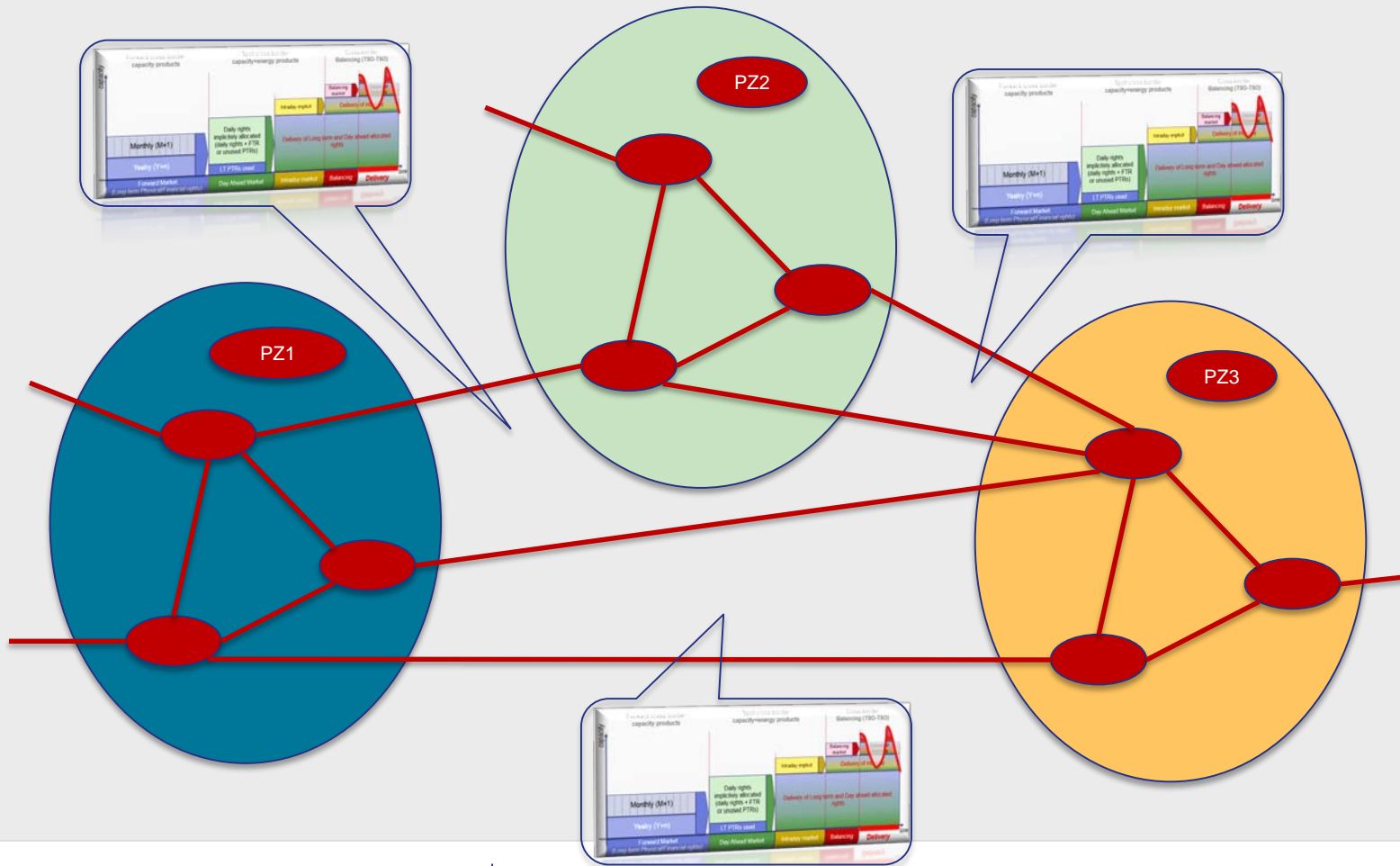


Capacity calculation as TSO activity

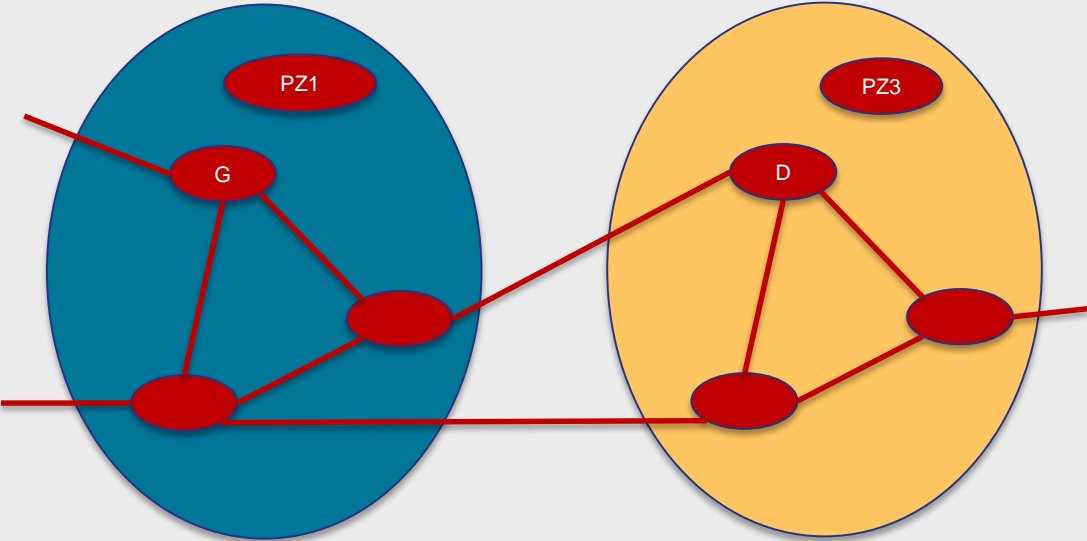
- Ensuring third party access – a guiding principle & regulatory requirement
- Capacity calculation is very much linked with capacity allocation
- Allocation is market activity with objective to ensure efficient and optimal use of resources
- The available capacity should be set at the maximum levels consistent with the safety standards of secure network operation



Zonal market



Why forward transmission rights



DAM comes with volatility and uncertainty

1. Wait and sell on DAM
 - Makes profit if market price 35 EUR/MWh
 - Makes loss if market price is 25 EUR/MWh

2. Looks at forward market
 - Cal price at PZ3 is 32 EUR/MWh
 - Ready to sell at this price and pay 2 EUR/MWh for Cal transmission rights

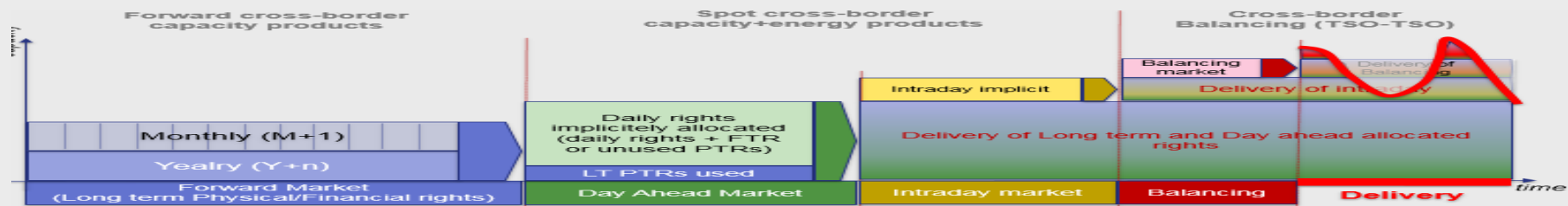
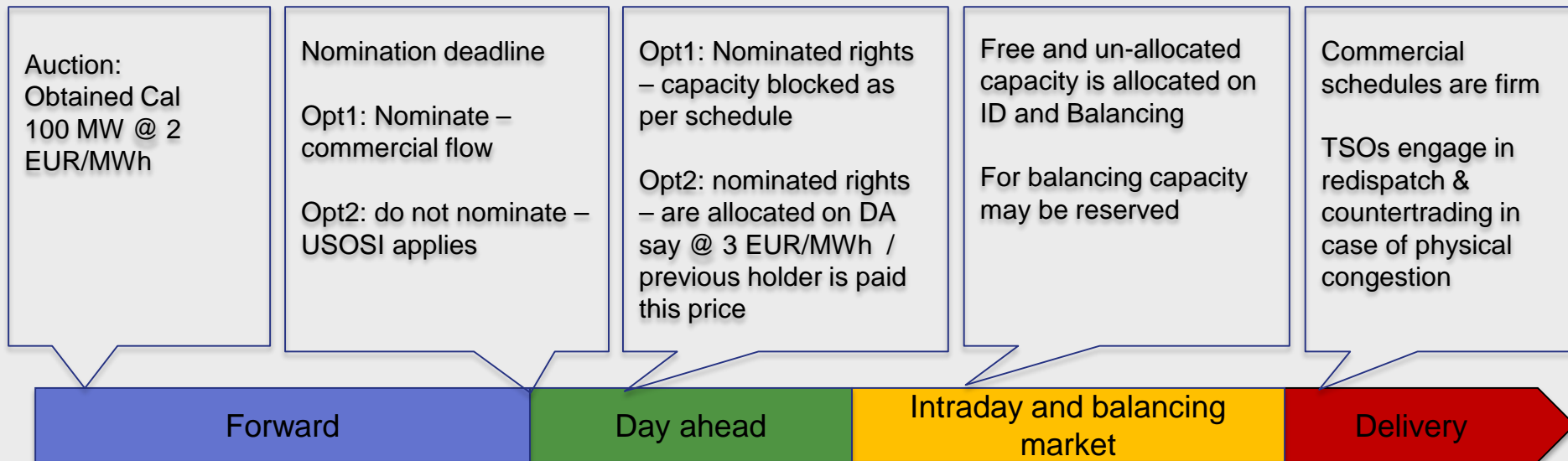
+100 MW
Costs 30
EUR/MWh

-100 MW
Buys at any
price* (up to
VoLL)

Value of the forward transmission rights

- The value of the right is the spread between the DAMs – this is considered the index
 - implicit day-ahead allocation is based on an algorithm which brings the supply and demand together at the same time, including cross-zonal capacity as supply/demand in those markets – therefore much more efficient
 - Explicit day ahead allocation is based on market participants' prediction of the DAM prices which settle on different time schedule – could imply flow in on the opposite direction, so not so efficient
 - Any price paid on forward market would be the best guess of where the DAM price is expected to be (on average).
 - Forward market prices are the reflection of this => Cal spreads = Cal rights;
Month spread = monthly rights

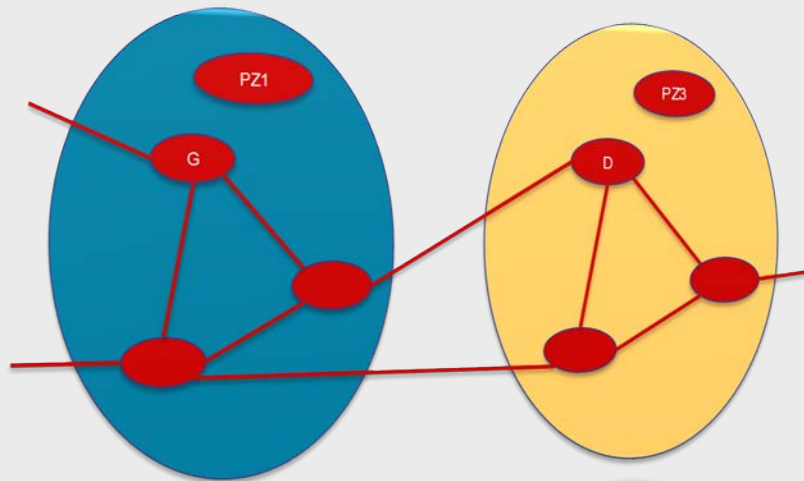
From allocation to use



Quality of the forward transmission rights

- Clear and transparent procedures, coordinated process and user friendly platform are important
- However ... to be considered a hedge:
 - Forward rights should have the optionality and be financially firm
 - The right holder:
 - has the option to use the right (nomination) or get paid the value from the day ahead market (also option to return or transfer)
 - is entitled to the payment on the value of the DAM (with certain applicable caps to protect TSOs from risk exposure), in case of curtailment

Example 1:



- G sells 100 MW to D @ 35 EUR/MWh (Cal base), delivery point PZ3
- G obtains 100MW capacity @ 5 EUR/MWh
- **G and D: hedged their positions** on forward basis

Business as usual:

- Month ahead: G and D can dynamically hedge and extract some value on monthly basis / or offset

- G & D go on DAM:

1. G nominates the rights and matches its contract?
2. G looks at the DAM expected prices and then acts?

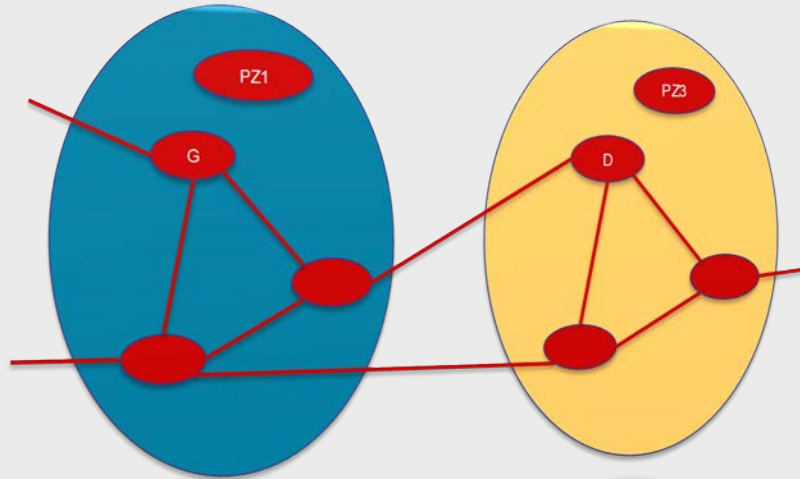
If price in PZ1 is 30 and PZ3 is 20?

If price in PZ1 is 30 and PZ3 is 35?

If price in PZ1 is 30 and PZ3 is 40?

What is the value of transmission rights in these cases on?

Example 2:



- G sells 100 MW to D @ 35 EUR/MWh (Cal base), delivery point PZ3
- G obtains 100MW capacity @ 5 EUR/MWh
- **G and D: hedged their positions** on forward basis

Curtailment:

- Month ahead: G and D can dynamically hedge and extract some value on monthly basis / or offset
- G & D go on DAM and 100MW is curtailed before DAM

Prices on PZ1 likely to get lower (say 25 EUR/MWh)

Prices on PZ3 spike (say 50 EUR/MWh)

Value of the rights?

- If the curtailed rights are not compensated, G will have to buy at high price in PZ3 to fulfill its contract
- If the curtailed rights are compensated, G will have to buy at high price in PZ3 to fulfill its contract, but he is financially hedged

Example: hedging strategies

Example:

Power plant with 50% efficiency: input of 2 units of gas to produce 1 unit of power (no CO2)

(1) Strategy “*hedge and sleep*”

T1: forward gas 22 €/MWh ; power 50 €/MWh
 ⇒ Forecast: Plant margin: 6 €/MWh => plant will run
 ⇒ Hedging: Sell power, buy gas, margin of 6 €/MWh

T2: forward gas 24 €/MWh ; power 45 €/MWh
 ⇒ Forecast: Plant margin: -3 €/MWh, but already hedged at 6 €/MWh

T3: forward gas 23 €/MWh ; power 48 €/MWh
 ⇒ Forecast: Plant margin: 2 €/MWh, but already hedged at 6 €/MWh

P&L: 6 €/MWh

(2) Strategy “*Option Value*”

T1: forward gas 22 €/MWh ; power 50 €/MWh
 ⇒ Forecast: Plant margin: 6 €/MWh => plant will run
 ⇒ Hedging: Sell power, buy gas, margin of 6 €/MWh

T2: forward gas 24 €/MWh ; power 45 €/MWh
 ⇒ Forecast: Plant margin: -3 €/MWh, but already hedged at 6 €/MWh
 ⇒ Sell gas, buy power, additional margin 3€/MWh

T3: forward gas 23 €/MWh ; power 48 €/MWh
 ⇒ Forecast: Plant margin: 2 €/MWh, but already hedged at 6 €/MWh
 ⇒ Sell power, buy gas, additional margin 2€/MWh

P&L: 11 €/MWh

Financial vs physical transmission rights

PTRs

- Options: right to nominate or get paid (UIOSI)
- Obligations: us is mandatory, effectively UIOLI (history)

FTRs

- Options: right get paid, but not the obligation (important if value is negative)
- Obligation: obligation to get paid/pay any price

CfDs

- Obligation: obligation to get paid/pay any price

Issued by TSOs		Similar rights	
		PTR Opt	FTR Opt
Market instruments		PTR Obl	FTR Obl
		Similar Rights	
		CfDs	

Thank You!

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