



## **Belpex and Trilateral Market Coupling**

Energy Exchanges and Transmission System Operators working together towards European Market Integration

**Belpex Conference Day**  
**12 January 2006**

# **Belpex: the Belgian Spotmarket**

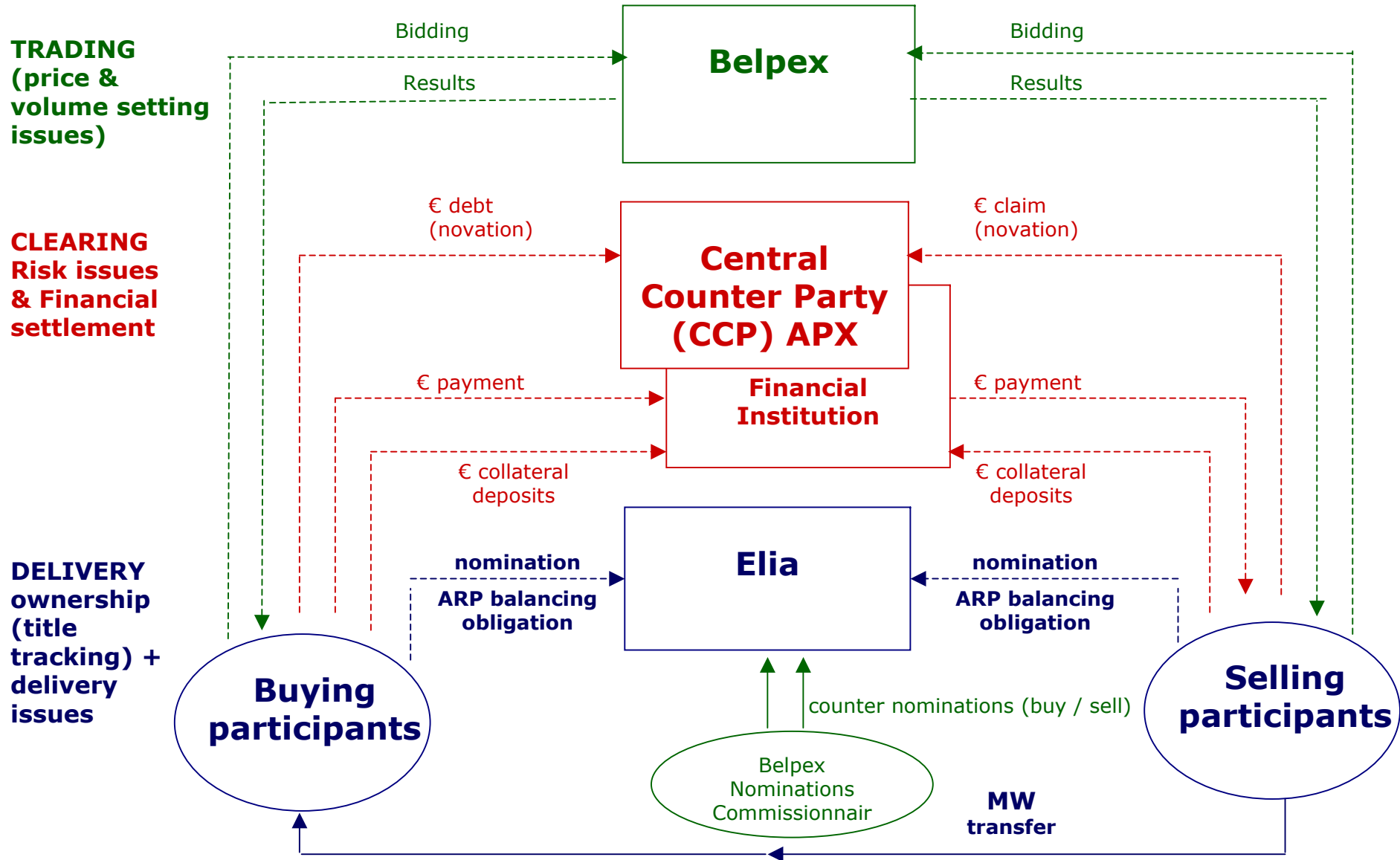
**Catherine VANDENBORRE,  
Belpex Chief Executive Officer**

## Overview

- **Day-ahead Market**
  - Goals of the DAM
  - Market model
  - Product description
  - Contracts
  - Collateral calculation
  - From 12 January to launch date
- **Corporate & Legal Aspects**
- **Next developments**

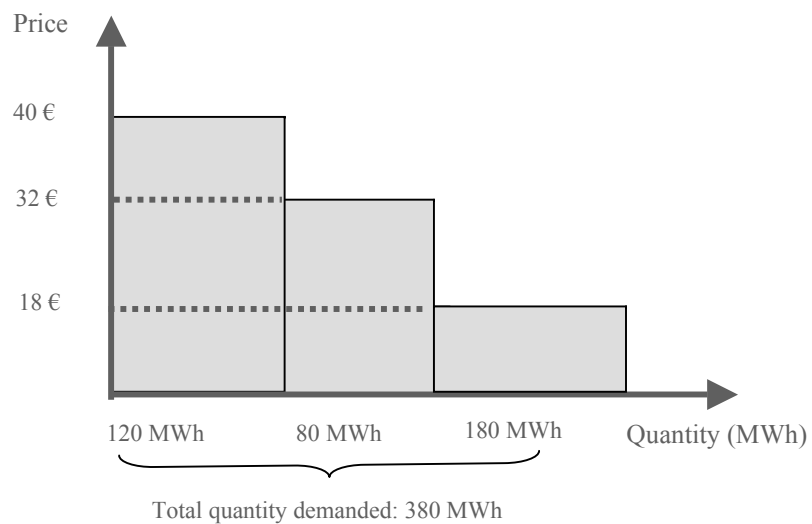
# Day-ahead Market

- Provide consumers with a wider choice of electrical energy sources
- Enable the ARP's to optimize their portfolio in terms of imbalance costs
- Reduce trade and credit risks for market players compared with the risks involved in concluding bilateral contracts
- Provide economic players with a transparent price benchmark
- Stimulate the opening of the electricity market

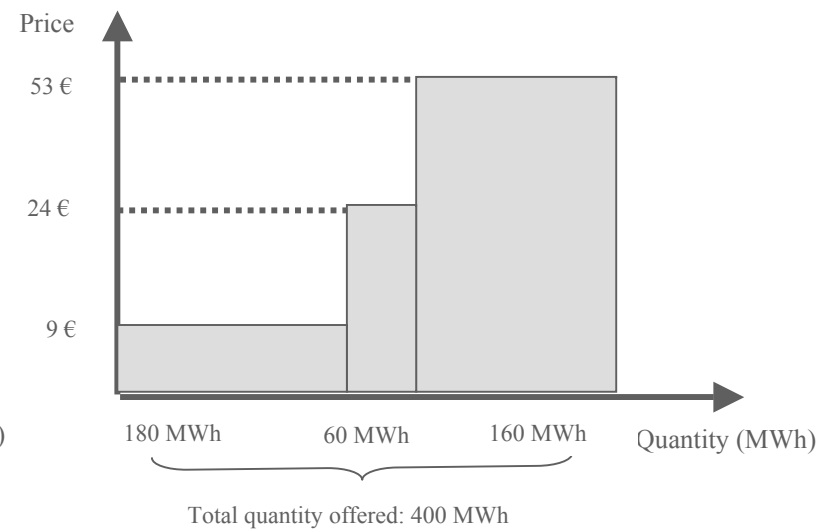


## Order types :

- Limit orders :
  - 1 hour (instrument)
  - Max/min price, volume, hour
  - Different price-quantity pairs
  - Partial execution possible



Player	type	Hour	Quantity	Price
Company A	Purchase	20	120	40
Company A	Purchase	20	80	32
Company A	Purchase	20	180	18



Player	type	Hour	Quantity	Price
Company B	Sale	12	180	9
Company B	Sale	12	60	24
Company B	Sale	12	160	53

### Order types (con'd):

- Block orders :
  - consecutive hours (instruments) during the same day
  - "Fill or Kill"
  - Maximum number and volume (liquidity)

### Order characteristics :

- Firm commitment to purchase (Purchase Order) or sell (Sales Order)
- Min and max Order price (technical reason) : 0,01 to 3 000 €/MWh

### Principles for system availability :

- Every calendar day
- From 00:30 to 24:00

### Order entry :

- Entry for Instruments related to day D possible from D-14 until D-1 11:00 (=MCT for Orders related to day D Instruments)



### **Contract :**

- Contract size : minimum 0,1 MWh
- Contracts are irrevocable; no validation phase
- Total Contract Price: Order volume multiplied by Market Clearing Price

### **Trading platform :**

- Based on the electronic EuroLight™ system
- Front-end to back-end structure
- Graphical user interface for the purpose of trading

### **Security of transactions**

### **Fees :**

- Entrance Fee : € 12.500
- Membership Fee : € 25.000
- Variable operational Fee : € 0,14/MWh
- Fees for additional services

### **Fixing :**

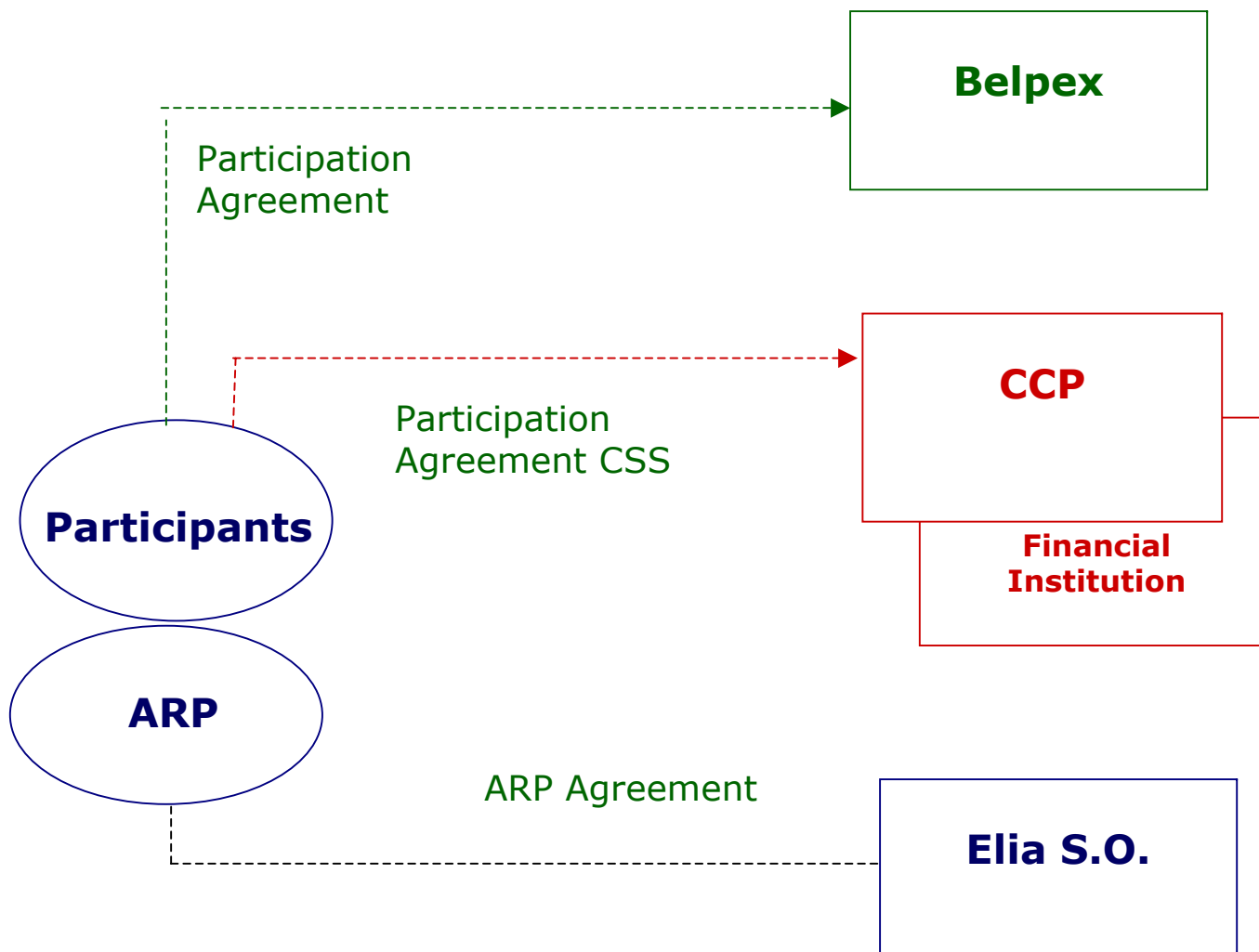
- 24 h prices
- Determine what blocks are accepted (heuristics)

### **Clearing and Settlement :**

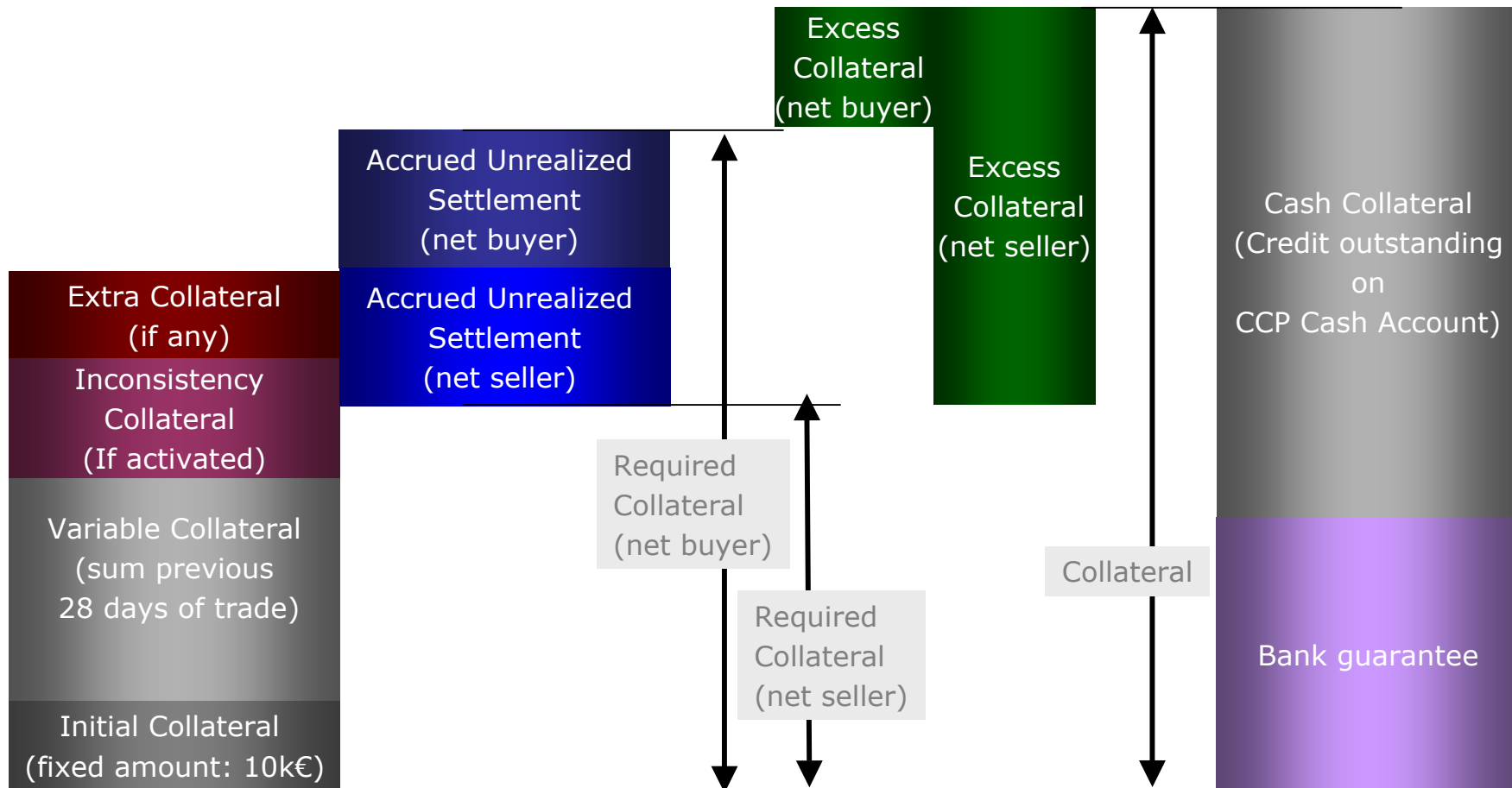
- CCP performs weekly Settlement
- CCP guarantees the financial security of the transactions

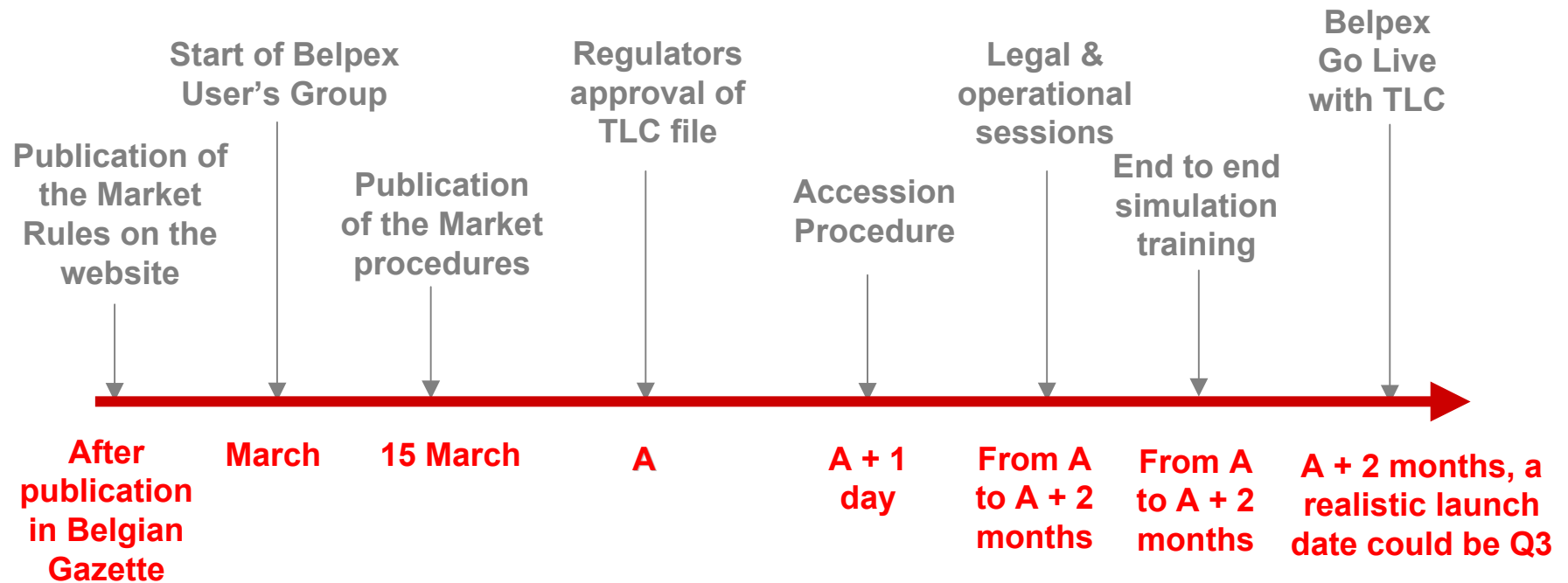
### **Delivery :**

- "Double nomination" (Participant and Belpex) of net position to Elia (exchange transactions are considered as "hub trades")



Trading requirement: Collateral > Required Collateral





## **Corporate & Legal Aspects**

### **Belpex Corporate structure :**

- Initiative by Elia in cooperation with APX and Powernext
- Belpex : Belgian company, created on the 7<sup>th</sup> of July 2005
- Shareholders: Elia 60%, APX, Powernext, RTE and Tennet each 10%.

### **Belpex Legal framework :**

- Exchange of physical energy blocks is not subject to law on financial derivatives markets
- 26 October 2005: Publication of Royal Decree
- Approval by Minister regarding License and Market Rules

### Current development :

- VPP activity running since January 1st 2006 (with Powernext)

### Other products :

- Futures
- Financial futures
- will be examined and may be introduced in due course
  
- Intraday market
  - Part of the roadmap
  - Will be addressed but a stable DAM framework is required



## Trilateral Market Coupling

**Jean-François CONIL-LACOSTE,**  
Powernext Chief Executive Officer

and

**Bert DEN OUDEN,**  
APX Group Chief Executive Officer



## Overview

- **What is market coupling and what are the benefits?**
- **Implementation of trilateral market coupling ('TLC') in France/Belgium/Netherlands**
- **From Trilateral to Multilateral**

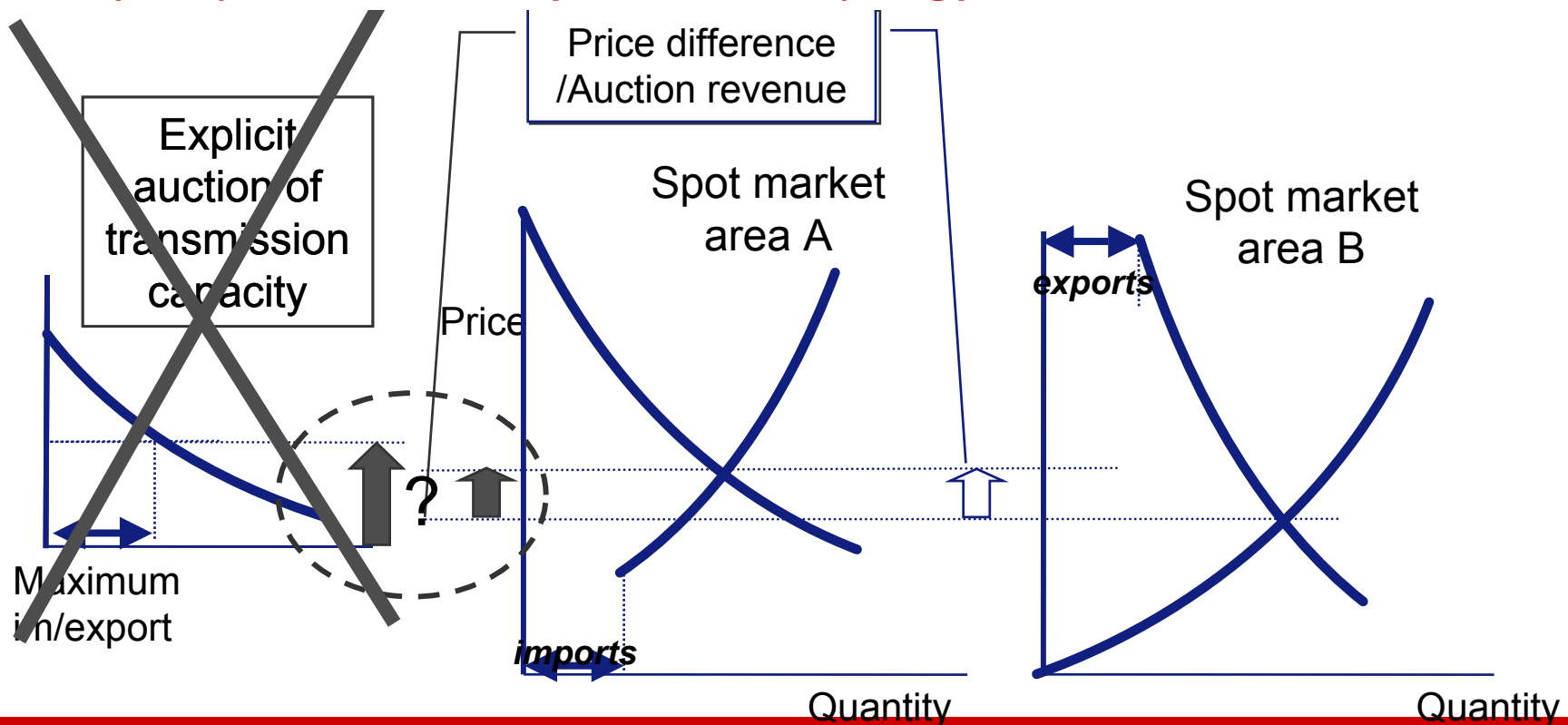
# **What is Market Coupling and what are the benefits?**

## What is market coupling?

A way of **linking** separate day-ahead (auction-style) spot markets **using cross-border transmission capacity**

- **“Implicit auction”**: transmission capacity allocation is integrated with the energy market (“explicit auctions” sell capacity separately before)
- Similar to “market splitting” used in Scandinavia to link price areas

## Daily implicit auction (market coupling)



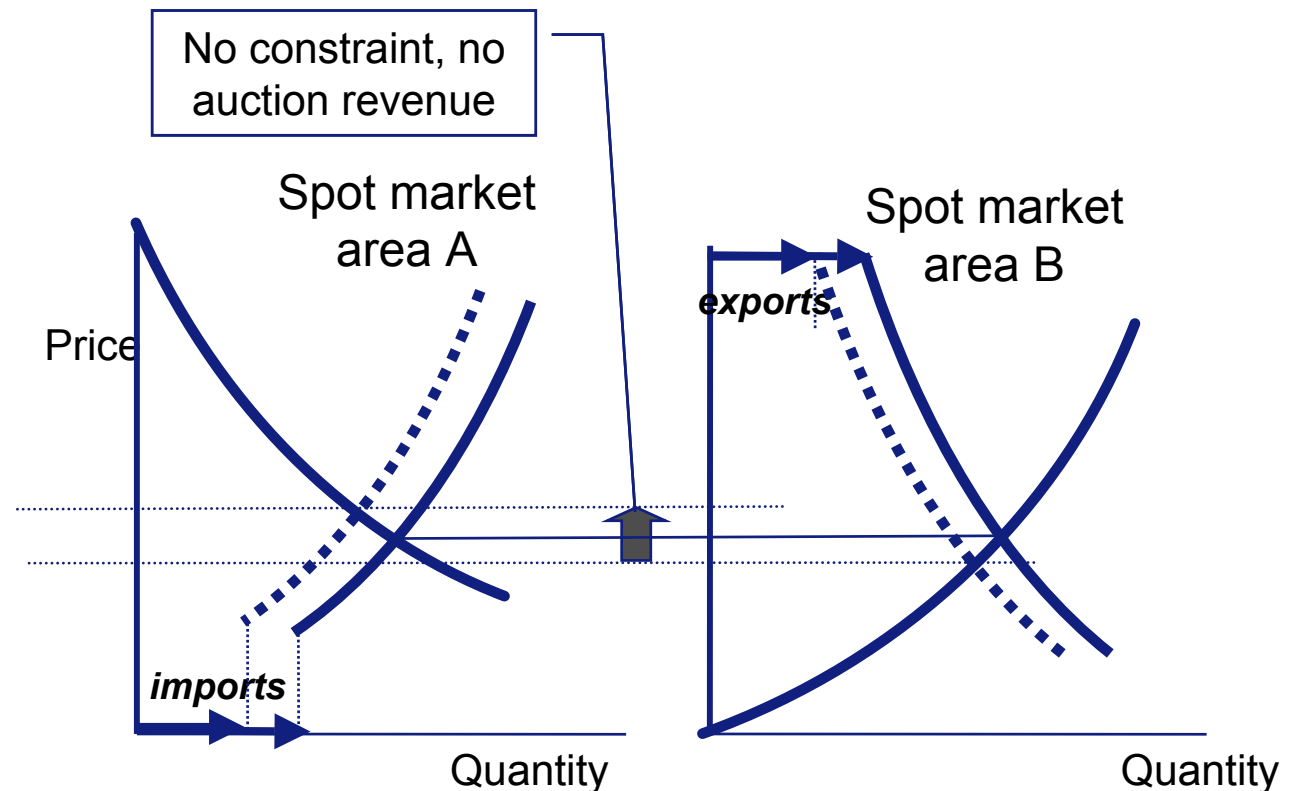
## Benefits of Market Coupling

- Removes risks of trading transmission and energy separately
- Less prone to market power abuse: transmission capacity cannot be hoarded, reserved or scheduled adversely
- All market participants benefit from cross-border capacity
- Enables netting of import / export schedules → more capacity
- Launching new spot markets – i.e., Belpex; encourages liquid, robust spot markets: indices and derivatives

## Outcome:

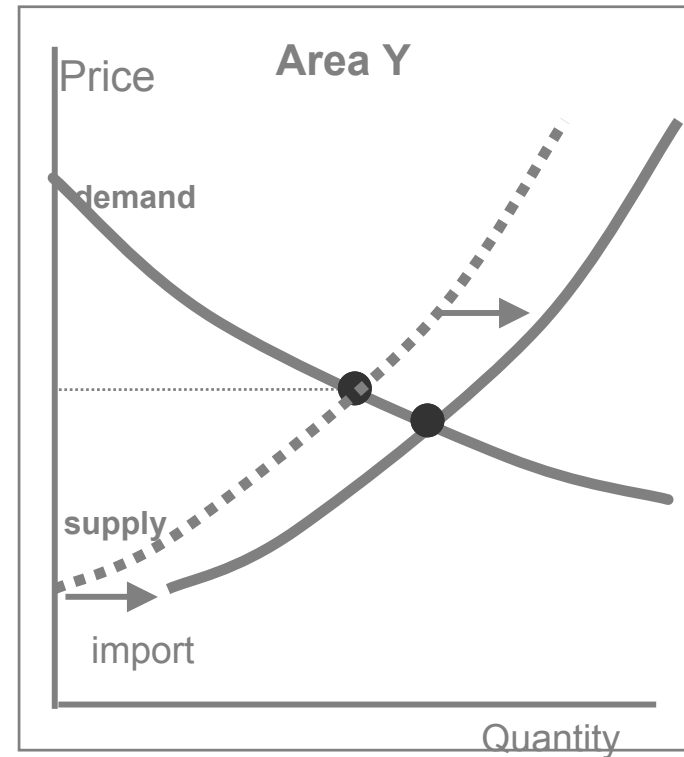
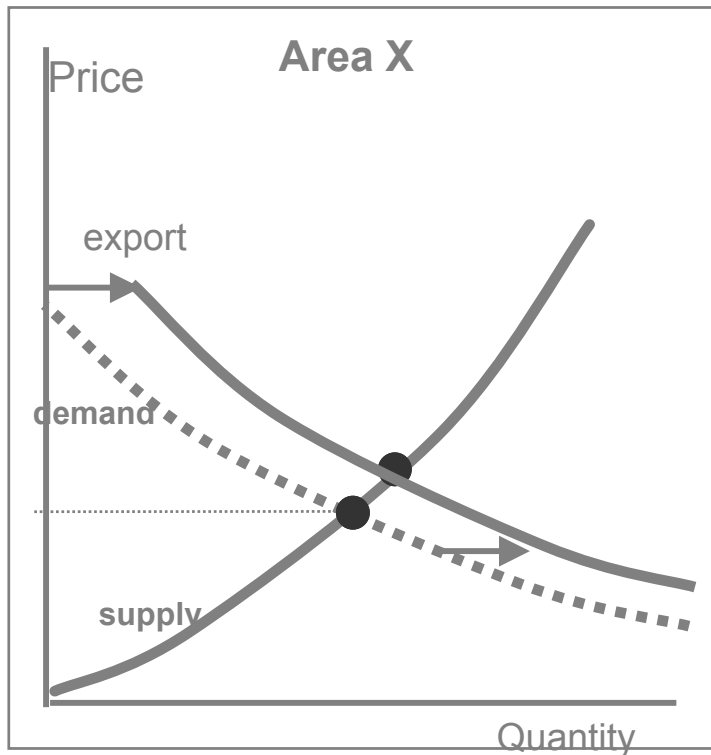
- At times of constrained connection: all capacity used, 100% use-it-or loose it, netting of flows → price differences are minimised; most efficient use of transmission capacity
- At times of no transportation constraint: markets converge totally  
→ Step towards one integrated European electricity market

## Market coupling: unconstrained situation (coupled)



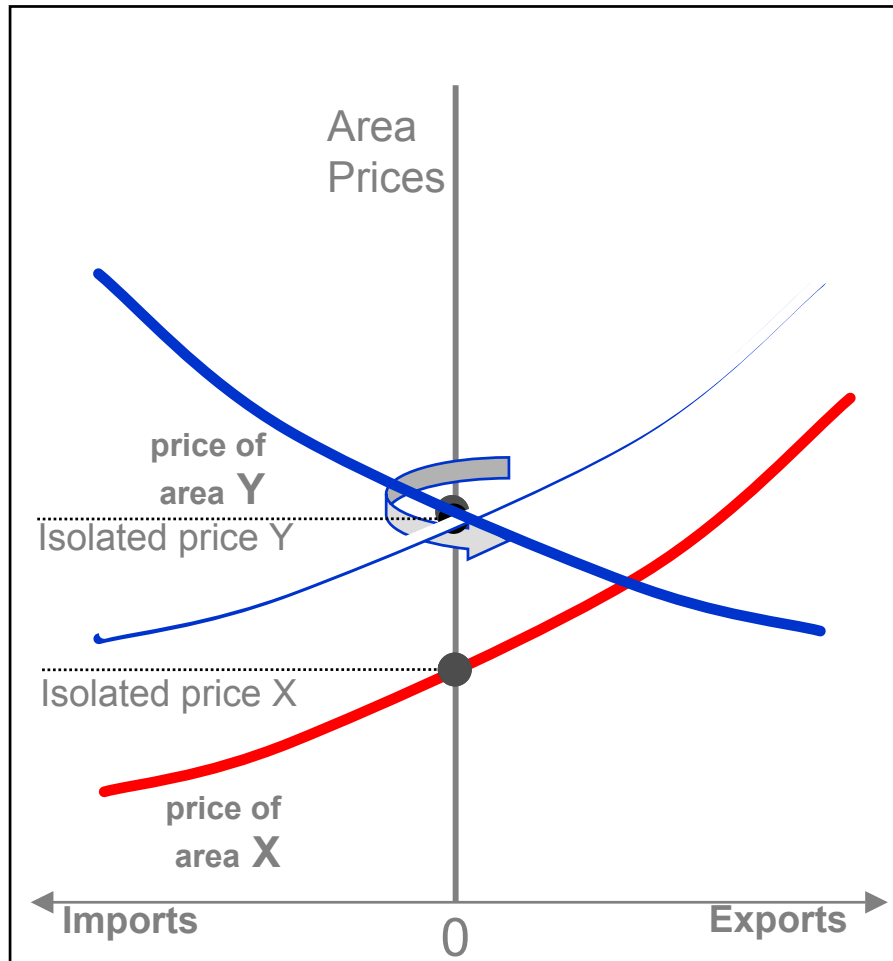
## **Implementation of Trilateral Market Coupling (‘TLC’) in France/Belgium/Netherlands**

## Decentralized market coupling mechanism influence of im- and export on area prices





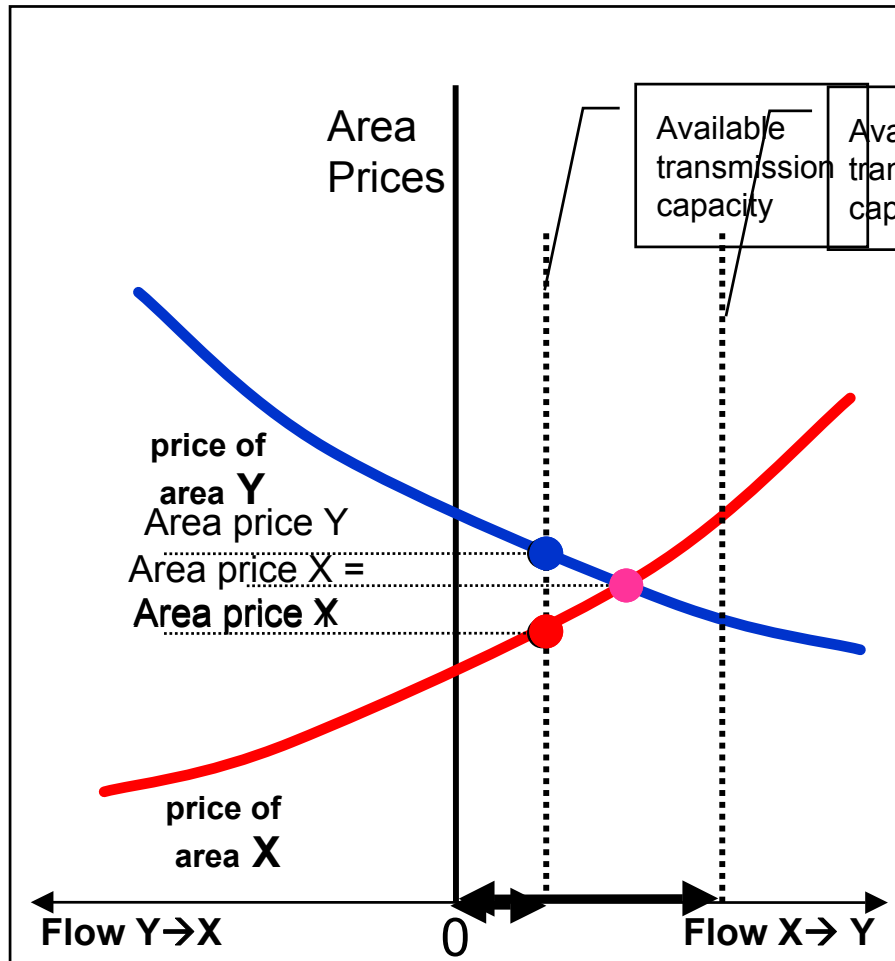
## Decentralized market coupling: 2 countries



### Elasticity curves

- Depicting price influence of potential im/exports
- Each exchange produces hourly curves
- zero import price is based on area bids like today, price dependency curve is based on the same in case of additional imports and exports

## Situations: unconstrained/constrained



Unconstrained case:

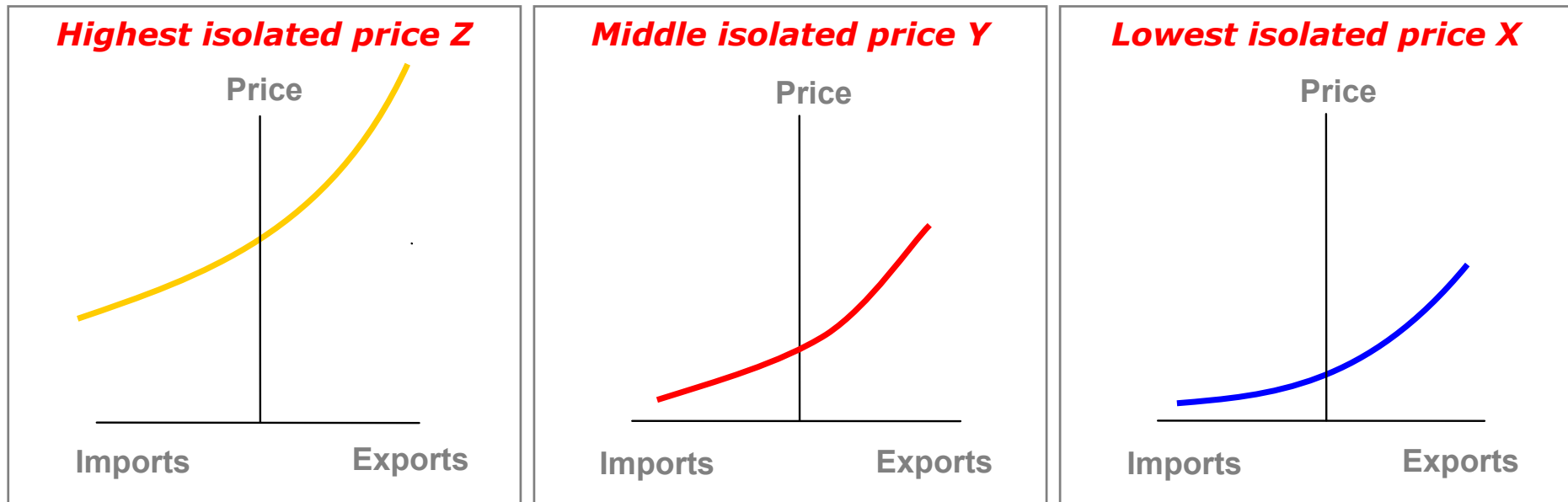
- Enough transmission capacity
- Price for both areas identical: enough capacity to set price at intersection of curves

Constrained case:

- Limited transmission capacity
- Prices for areas differ: set at max. im/exports; congestion revenue

## Decentralized market coupling: 3 countries

### Trilateral Coupling: basic solving algorithm (example)



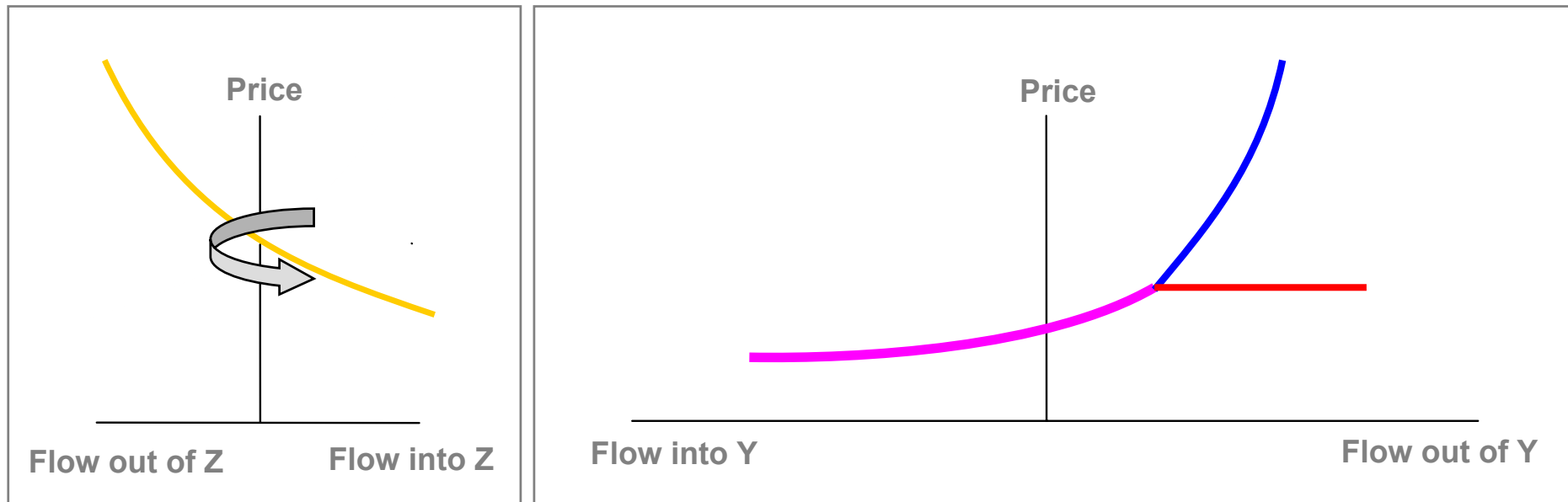
#### **3 individual elasticity curves:**

- Rank areas in order of price
- Create combined elasticity curve of 2 areas

*Example: elasticity curve of middle price market closest to lowest price market*

## Decentralized market coupling: 3 countries

### Trilateral Coupling: basic solving algorithm (example)



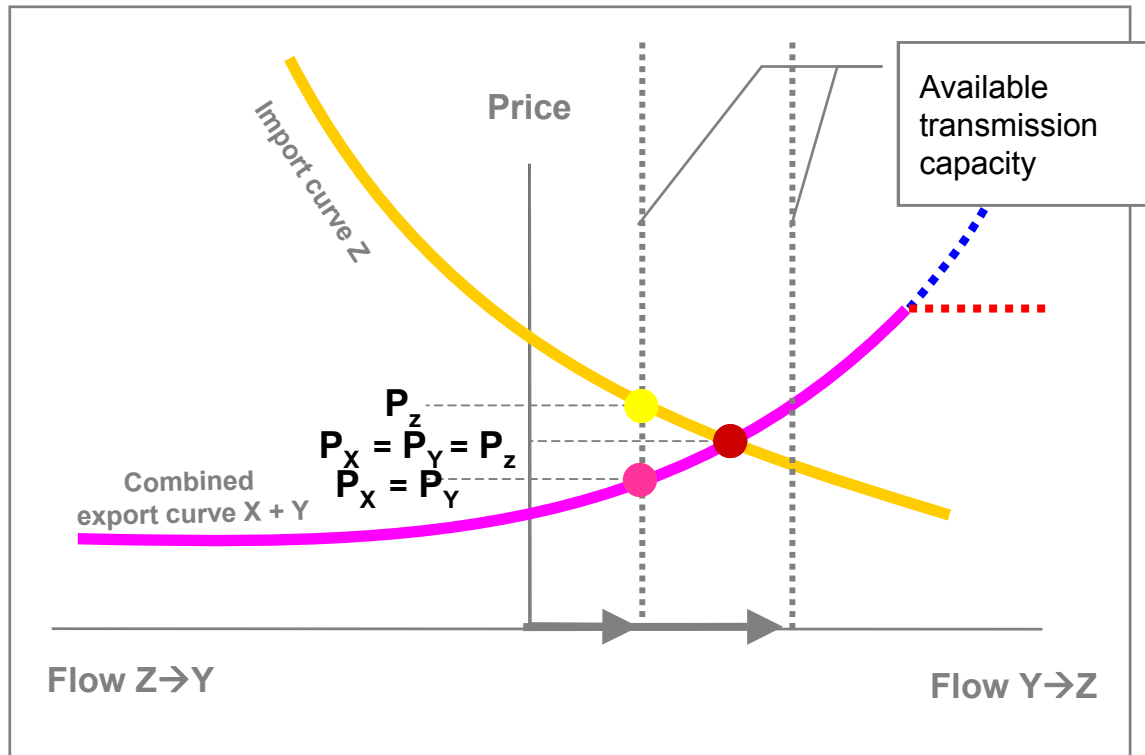
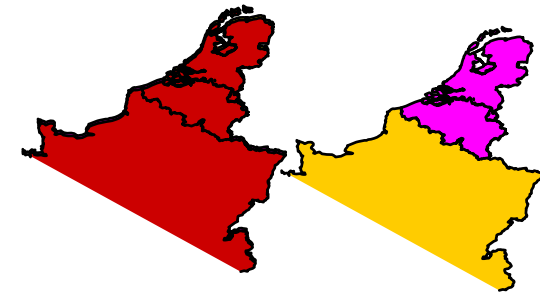
***Imports in area Z***

***Combined export curve from X+Y:***

***\*unconstrained part (coupling)***

***\*constrained part (splitting)***

## Decentralized market coupling: 3 countries



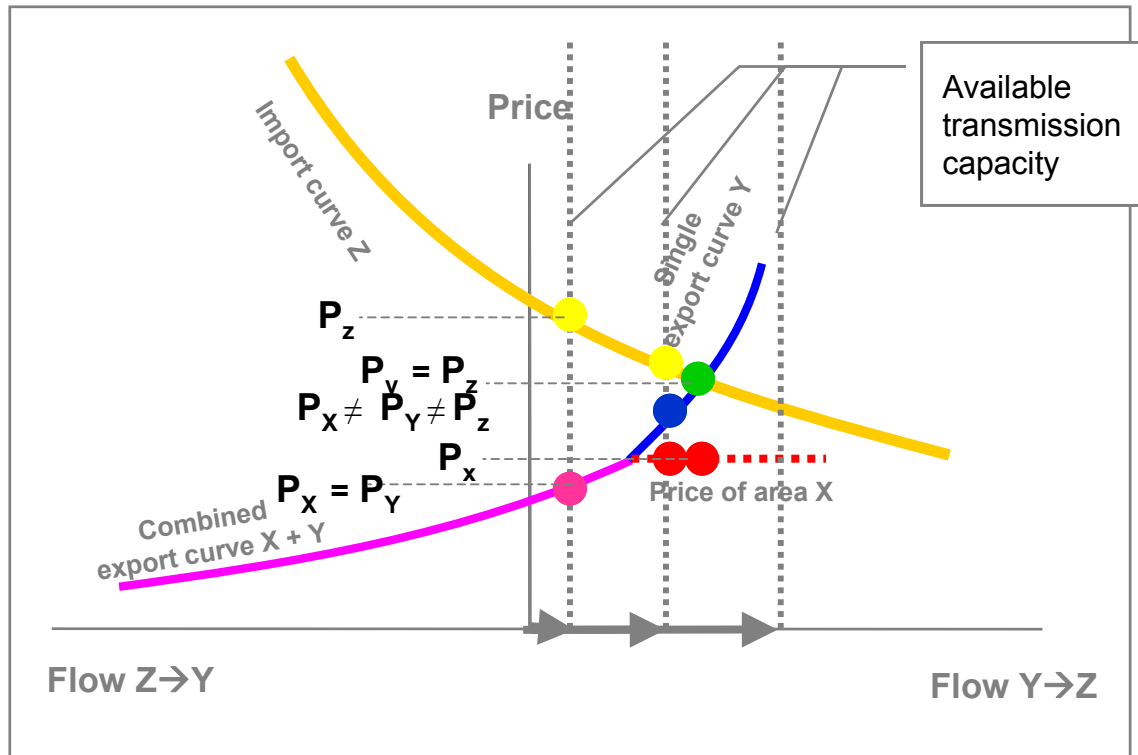
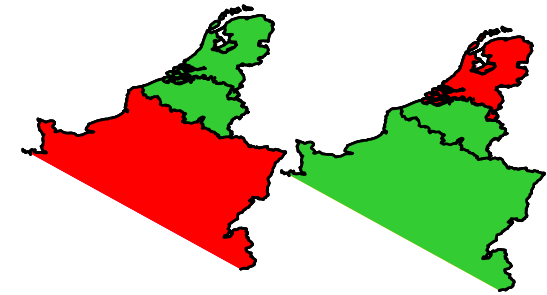
### Cases:

X+Y coupled on common price, Z split on separate price

All areas coupled, X+Y+Z converging to one common price

### Example, Scenario 1- No split between X+Y

## Decentralized market coupling: 3 countries



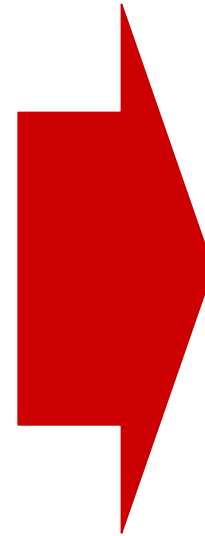
### Cases:

- X+Y coupled on common price, Z split on separate price
- All areas split on own (adjusted) price
- Y+Z coupled on common price, X split on separate price

### Example, Scenario 2- Split between exporting countries

## High Level Properties of Market Coupling

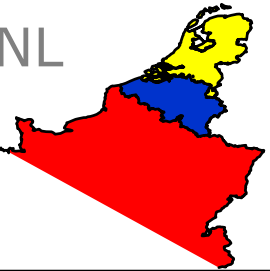
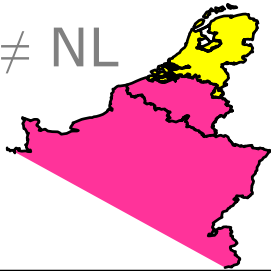

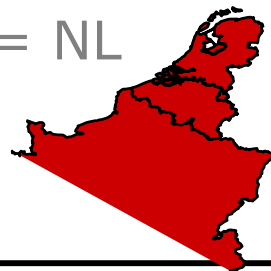
- Market prices are positive
- Flows balance overall
- Flow consistent with published ATC
- Power flows from low price area to high price area
- Maximize flow until prices across link converge (or ATC limit reached)
- Respect participants' order price and volume conditions (normal exchange rules)



***Efficient use of  
the available  
transmission  
capacity***

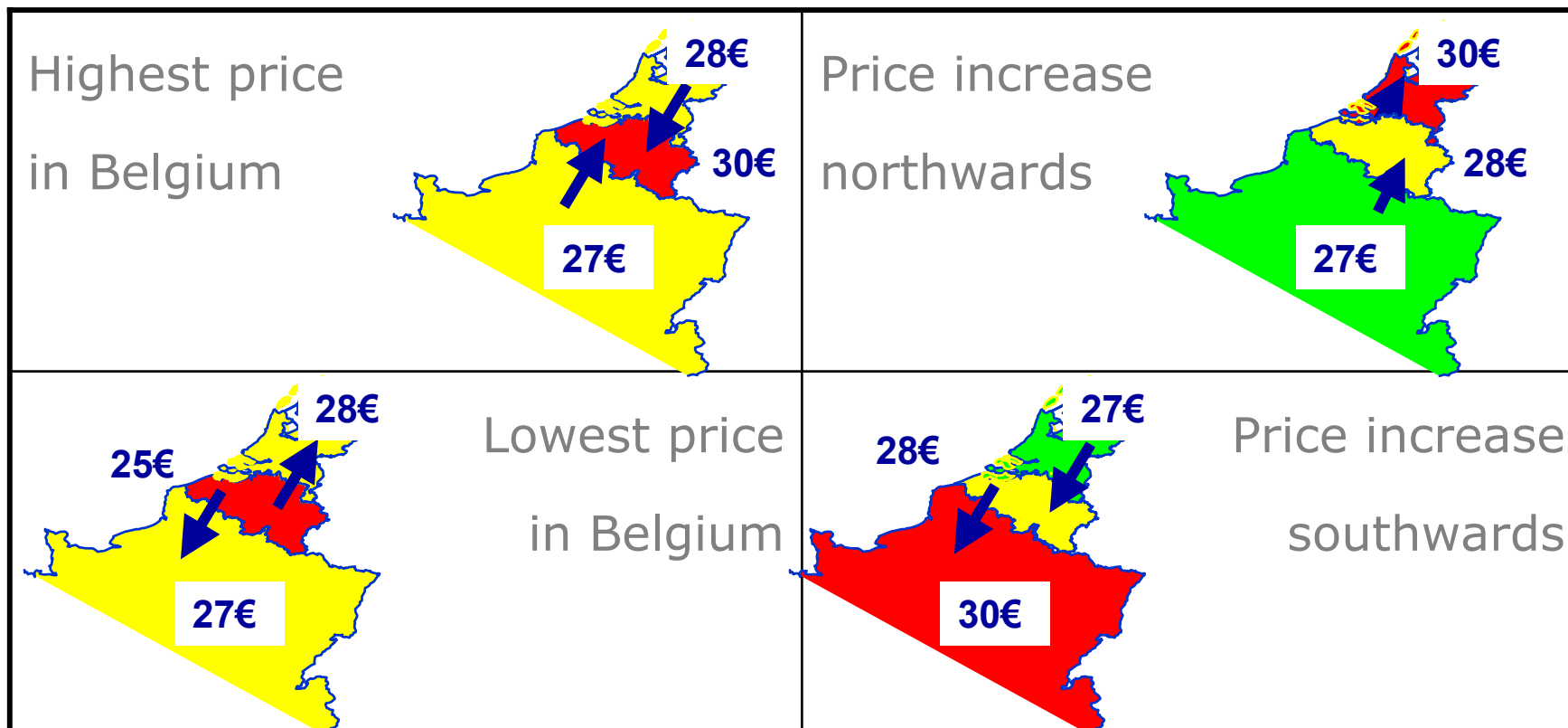
***Possible to verify  
this every day  
using publicly  
available data***

Maximize flow until prices across link converge (or ATC limit reached)

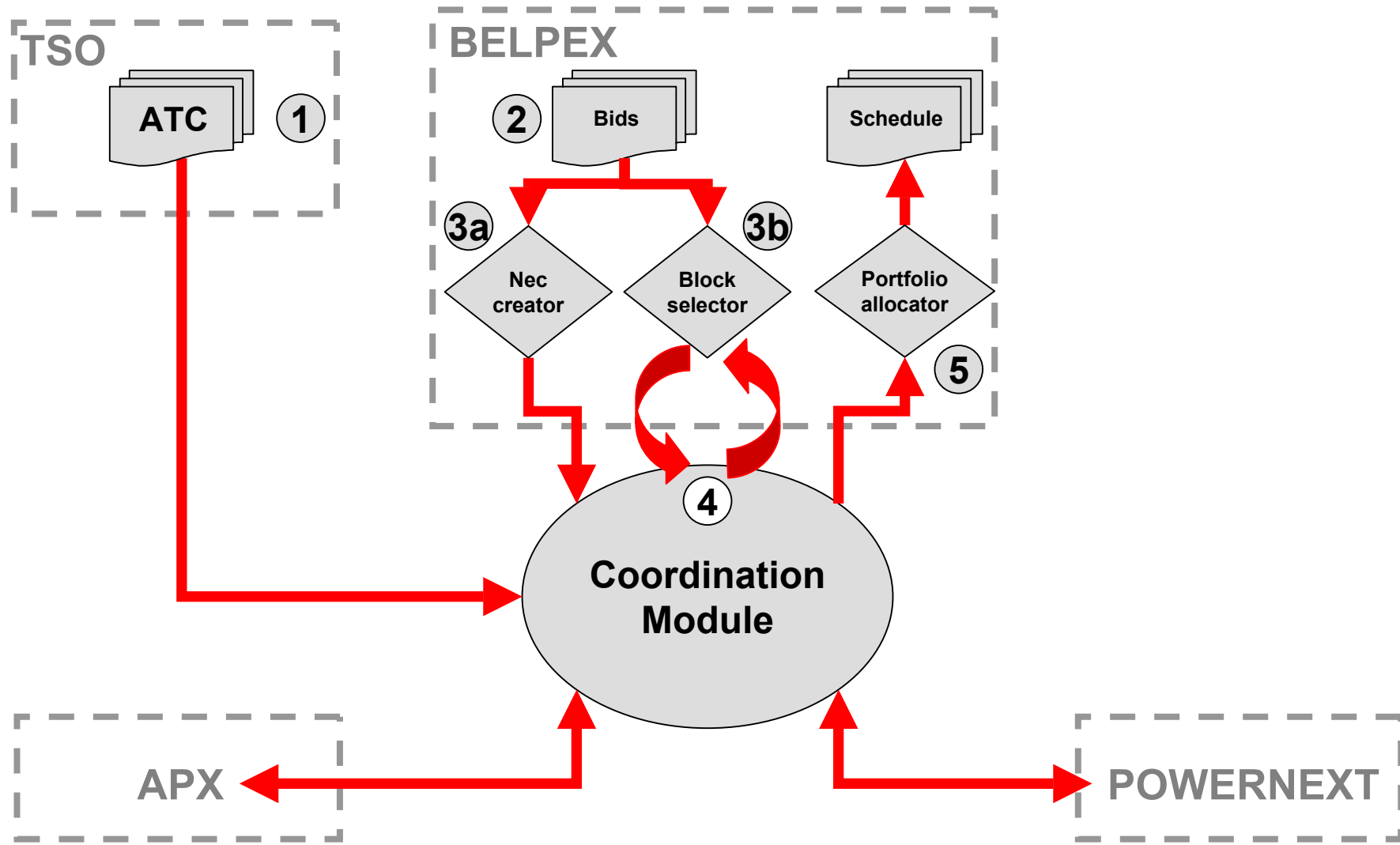
Border	Belgian-French border		
		Constrained	Unconstrained
Belgian-Dutch border	Constrained	$F \neq B \neq NL$ 	$F = B \neq NL$ 
	Unconstrained	$F \neq B = NL$ 	$F = B = NL$ 



Power flows from low price area to high price area

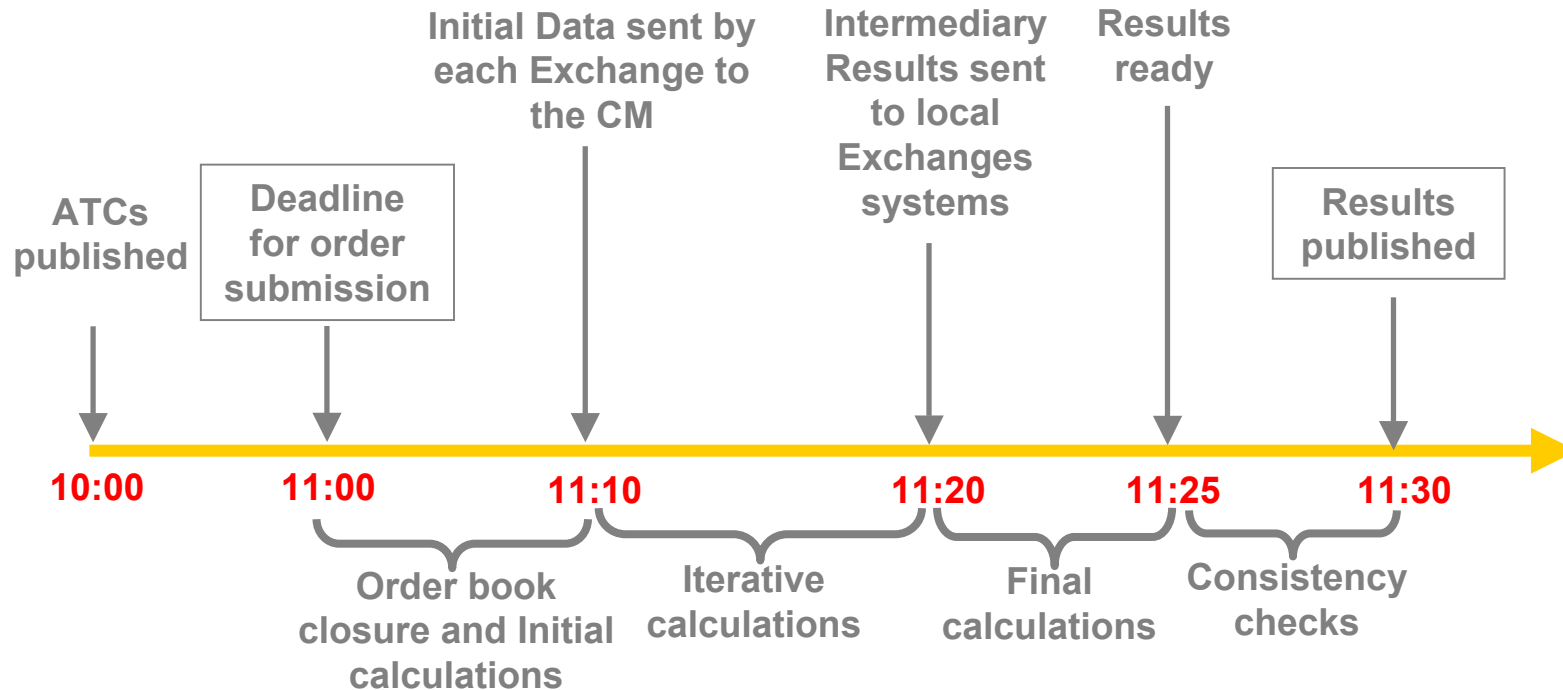


## Implementing a decentralised technical approach



## Market Coupling Daily Process

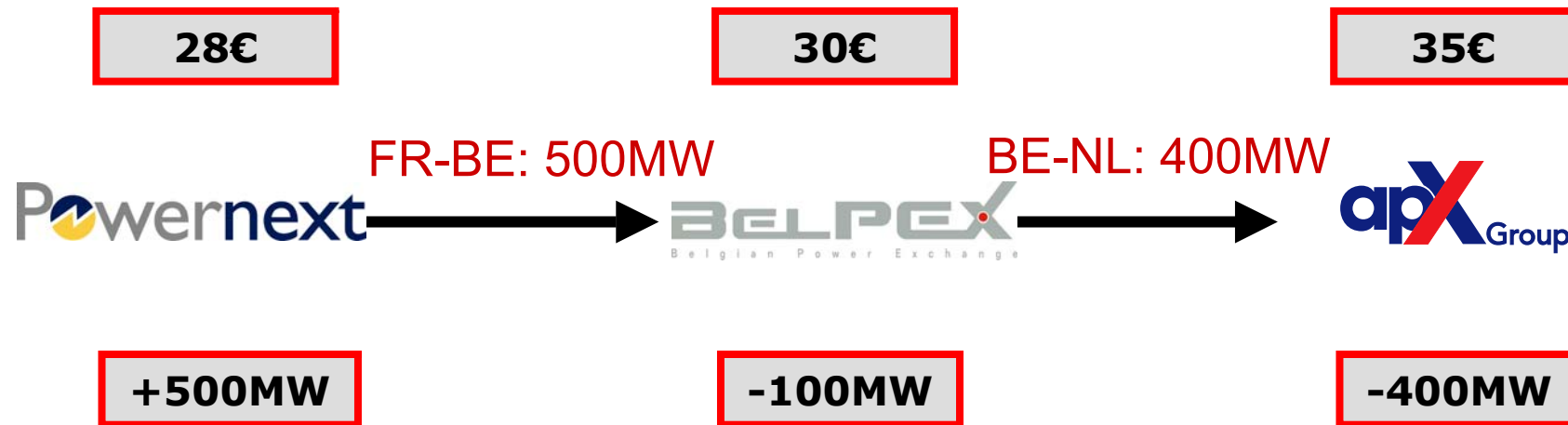
- Harmonised deadline for order submission: 11:00am
- Target time to publish results: 11:30am (latest 11:45am)



## Impact on Existing Exchange Arrangements

- Change to common market closing times ( 11:00 AM )
- Change to common technical price limits (0,01€ - 3000€/MWh)
- Participation agreements modified to reflect new matching mechanism
- That's all. On each Exchange, unchanged trading platforms, unchanged products, unchanged clearing and settlement arrangements, unchanged helpdesk, ....

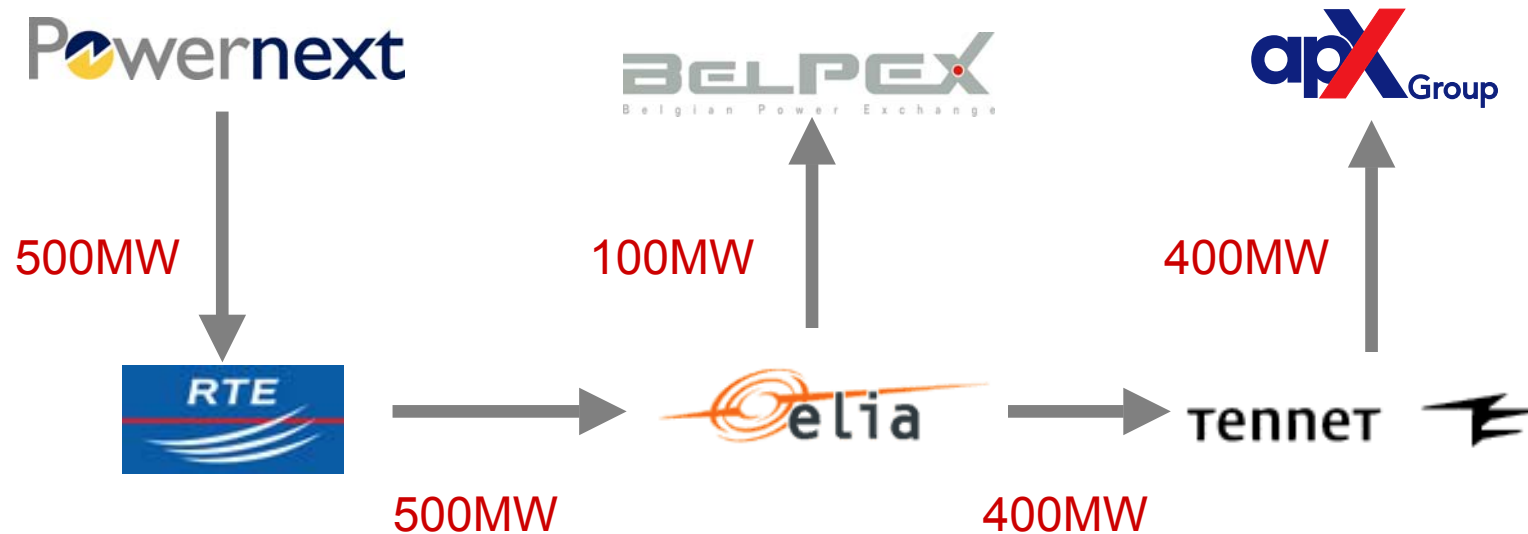
## Implementing a decentralised contractual approach (1)



What are the transactions required to ensure:

- Delivery and payment of the cross-border transaction
- Order book balance in each market
- Collection and payment of the congestion revenues?

## Implementing a decentralised contractual approach (2)

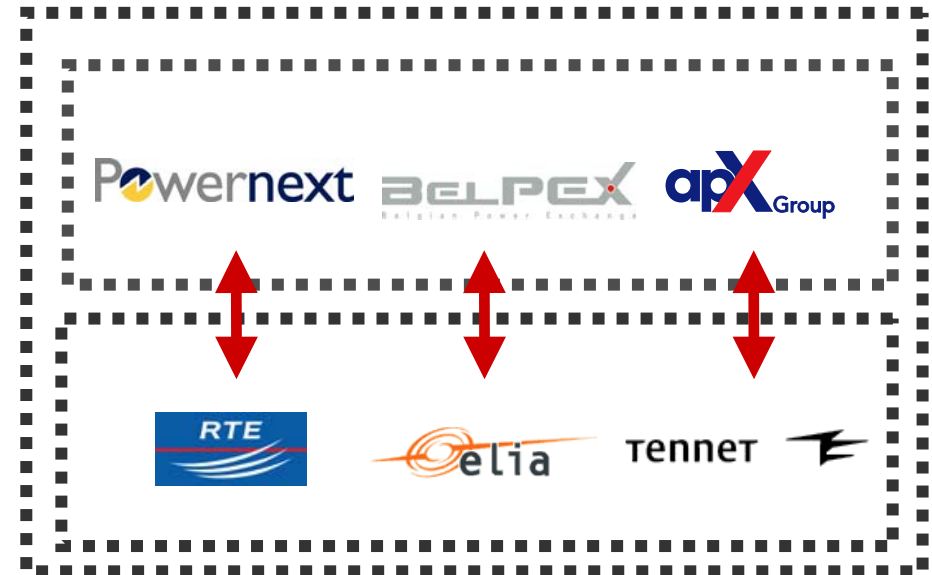


Transactions:

- TSO/ market: Each TSO gives a permanent instruction to the Exchange operating in its system to execute a transaction at market price, with a volume determined by the Market Coupling algorithm on the basis of the ATCs.
- TSO/ TSO: Cross-border transactions between TSOs to close positions and share congestion revenues

## Implementing a decentralised contractual approach (3)

- **One multilateral arrangement**
  - Principles, objectives of market coupling
  - Roles and responsibilities, main flows
  - Contractual scheme and governance structure
- **Arrangements between Exchanges**
  - Provide algorithms and systems
  - Operate Market Coupling
- **Arrangements between TSOs**
  - Calculate and Publish Capacity
  - Ship the Cross-Border Flow
  - Share congestion revenues
  - Ensure firmness



- **Local arrangements TSO-Exchange**
  - "Participation" of the TSO on the Exchange
  - Provide/ receive ATCs
  - Issue/ accept Results

## TLC Project Process

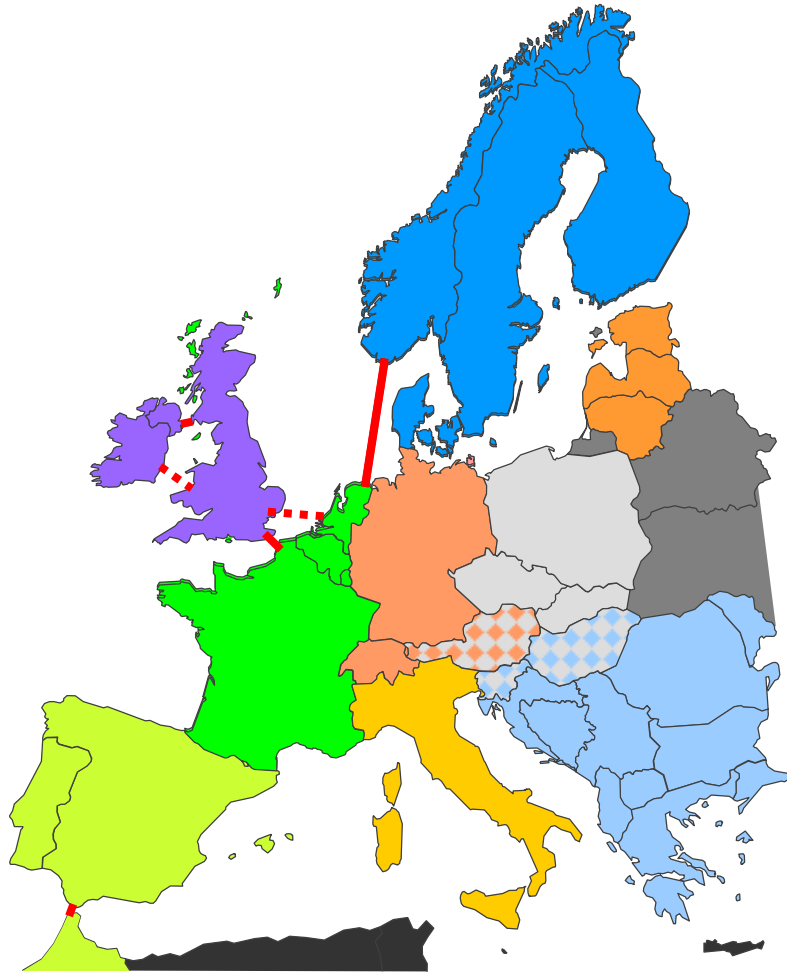
- Steering Committee, comprising all TSOs and Exchanges, oversees project and resolves key framework issues
- APX and Powernext jointly developed the algorithm, audited by external experts
- Systems now being tested, contracts close to finalisation
- Decentralisation as a working principle
  - Comparative advantages are used
  - Variety of local arrangements are supported
  - Horizontal cooperation between Exchanges, between TSOs, between regulators + vertical cooperation between those is strengthened
  - Robust grounds are created for other areas of cooperation/harmonisation





## **From Trilateral to Multilateral**

## Geographic extensions (1/2)



- TLC parties committed to facilitating the addition of further areas to TLC approach, open to any other new partners (Italy, Iberian peninsula, UK/Ireland, Central Europe, Eastern Europe)
- Regional Markets approach as foreseen by European Regulatory Forum

## Geographic extensions (2/2)

- NorNed
  - Nord Pool Spot, APX TenneT, Statnett committed to market coupling over NorNed cable (2007) – regulators' decision
  - Need to integrate: NorNed with market coupling NL-B-F (TLC) Prototype developed of possible NorNed/TLC solution, also supporting multiple markets
- Spanish-French border
  - Ministerial Order published on 31/12/2005 based on the proposal of CNE and CRE at the Iberian mini-forum.
  - **Phase 1:** coordinated explicit auctions
  - **Phase 2:** coordinated explicit auctions + UIOLI + coordinated Market Coupling (capacity: at most 15% + UIOLI).
  - **Phase 3:** coordinated explicit auctions + UIOSI + coordinated Market Coupling (capacity split to be determined)
  - Proposal for Phase 1 to be submitted by the end of January
  - Proposal for Phase 2 to be submitted 6 months after Phase 1 is in place

## Towards an Open & Multilateral Market Coupling

- First step: implementation of the TLC:
  - Easiest to make quick progress in small pilot groups
  - Reasonable uniformity of approach and objectives between the parties: 'coalition of the willing'
  - TLC regulated via TSOs
- Extending to more countries; synergy explicit – implicit  
Open model in three ways:
  - Open to market participants, re-trading their transmission capacity for optional day value
  - Open to synergy between explicit (forward) and implicit (daily) auctions
  - Open to other exchanges / price areas (geographical extension)  
With common governance (all exchanges, all TSO's)
- From TLC to MLC

# Management of Interconnection Capacities

On behalf of RTE – ELIA - TenneT



Frank VANDENBERGHE,  
Manager Customers & Market ELIA



## Overview

- **Interconnection Capacities: current situation**
- **Daily Market Process**
- **Roadmap by Regulators CRE-CREG-DTE**
- **Further steps**



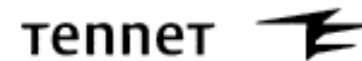
## **Interconnection Capacities: current situation**



## TSO Roles and Responsibilities in the TLC

- TSOs determine the available daily capacities for market coupling and provide them to the Power Exchanges
- Power Exchanges provide market results (market prices and flows between hubs) that comply with a certain list of criteria (respect of ATC, “no congestion – no price difference”...)
- TSOs participate in the exchanges for the global cross border flow and manage the energy imports or exports.
- TSOs share the congestion income and support the costs of the coupling algorithm
- TSOs manage the firmness of cross border capacities.

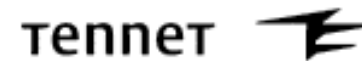




## Other Import/Export products on the interconnections

- Joint allocation mechanism (RTE – ELIA) :
  - Specific Rules (IFB Rules)
  - Joint ELIA-RTE auctions in both directions
  - Products : yearly, monthly and daily physical capacity rights
  - Daily explicit auctions will be replaced by Daily Implicit allocation through Market Coupling
- Joint allocation mechanism TSO Auction BV\* (ELIA, TenneT, RWE and E.on Netz ):
  - Specific Rules and Regulations
  - Joint auctions in both directions
  - Products: yearly, monthly and daily physical capacity rights, Resell and Transfer of the monthly and yearly physical capacity rights
  - Daily explicit auctions between Elia and TenneT will be replaced by Daily Implicit allocation through Market Coupling

\* TSO Auction BV is an independent private limited company



## Aspects of current explicit day-ahead allocation

**Explicit auctioning** involves sequential decision steps to :

- Produce or trade
- Evaluate, bid for and obtain capacity

To be made by different parties and for each border separately  
=> uncertainties, risks, inefficiencies

### **Consequences :**

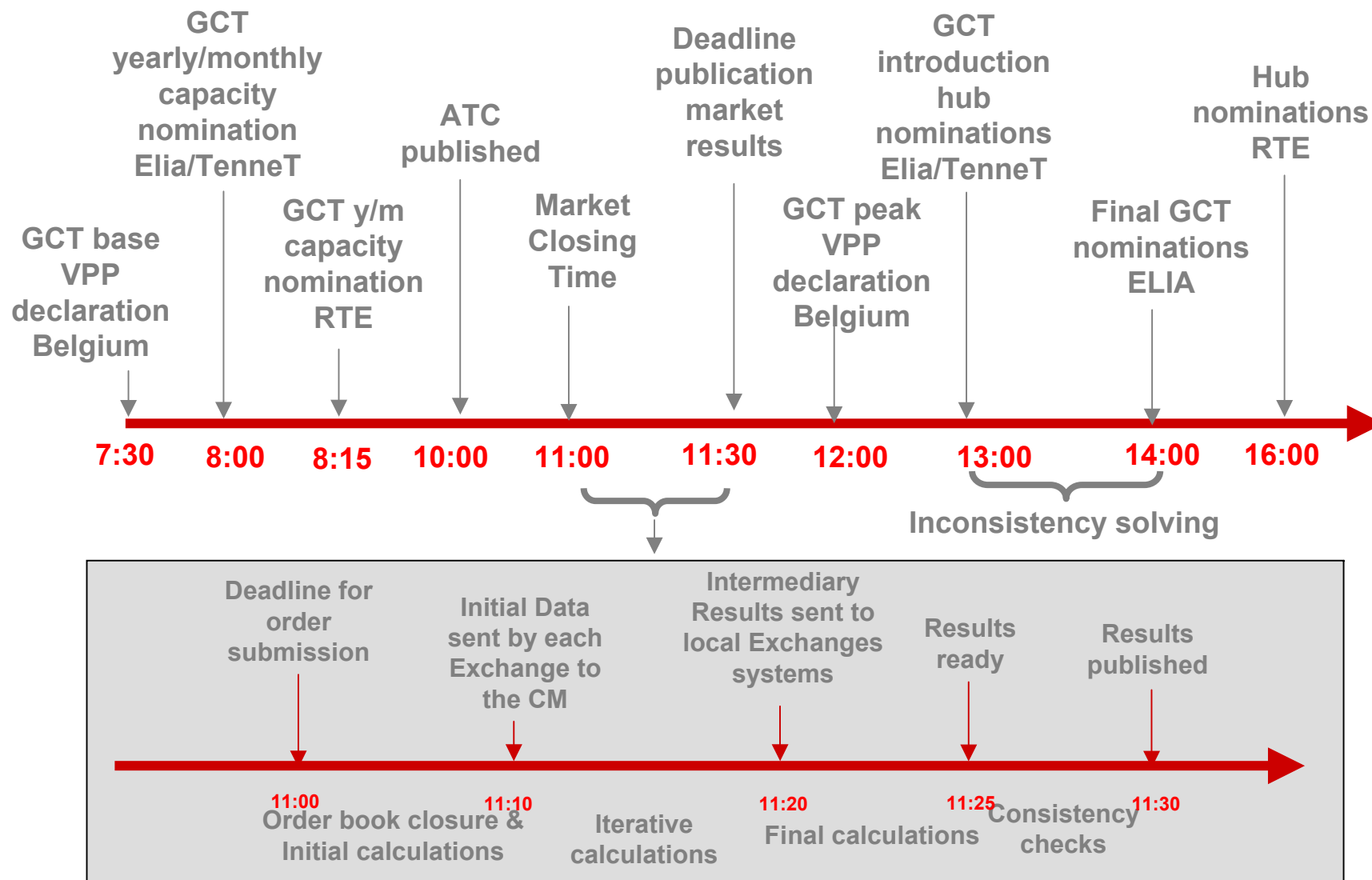
- Low usage rate of day-ahead capacity:
  - limited use for parties without generation portfolio
  - no netting possible due to optional character of products
- For n borders, pancaking effect:
  - low probability to obtain multi-border capacity in an efficient way

### **Results from day-ahead auction F-B border 6-11 January 2006:**

- Average capacity usage rate: F=>B: 23,40% B=>F: 11,20%
- Average price F=> B: 0,00667€/MWh, B=>F: 0,00271€/MWh



## Daily Market Process





## **The Regulators' Roadmap**



## The Regulators' roadmap

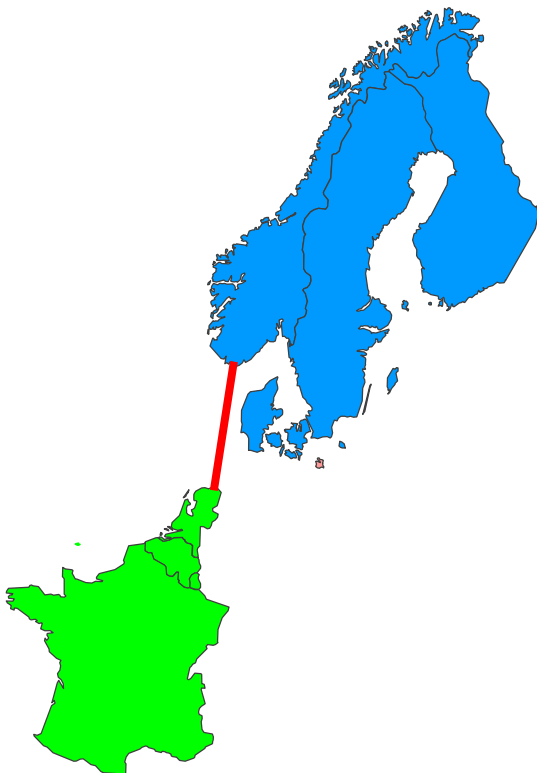
*"CRE, CREG and DTE fully support the integration of energy and transmission markets near the real time and agree that the instrument of trilateral Day Ahead Market Coupling (DAMC) could bring benefits compared to day-ahead explicit auction."*

*Regulators request 4 issues to be addressed by operators:*

- Well-functioning of the algorithm (including fallback arrangement)*
- Potential of extension of the DAMC framework*
- Absence of discriminatory treatment between programs nominated by DAMC or by explicit auction*
- Operational cost efficiency for the implementation of DAMC*



## Roadmap: Extension to NorNed and other areas



- Nord Pool Spot and TLC partners committed to implement market coupling over NorNed (2007) – Regulators' decision December 04.
- TLC parties committed to facilitating the addition of further areas to TLC, **no exclusivity**
- Extensions beyond NorNed might need adapted coupling arrangement, possibly based on flow-based transmission model



## Further steps

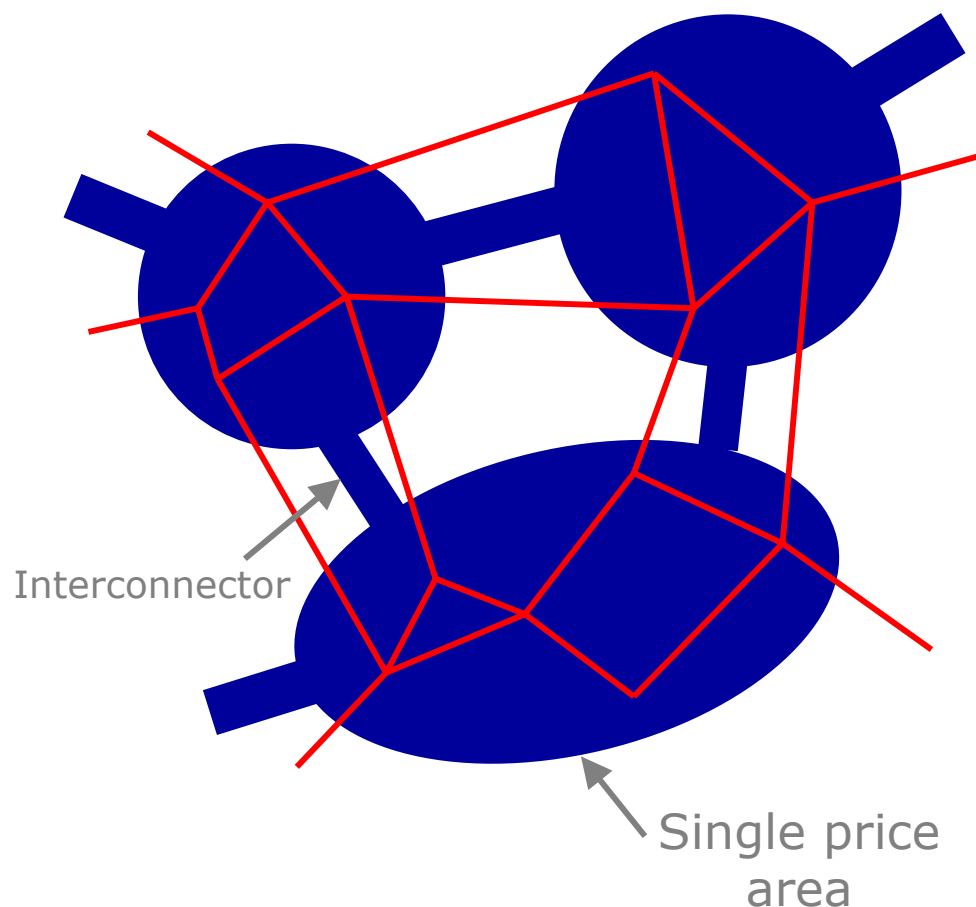




## Transmission Rights

- 2006 issue of Roadmap: facilitate secondary capacity trading
  - Yearly / monthly capacity can be re-traded for market value
  - Ideally, all non-scheduled transmission capacity to be recycled by the market parties into the daily implicit auction, for day value
- ➡ Synergy between explicit – implicit auction, open participation
- Possible future development: Financial Transmission Rights (FTR)
  - Limiting (or avoiding) the carving up of capacity in yr/m/d
  - To be introduced under regulatory control
  - Introduction will be in function of market demand
  - Appropriate risk-sharing and regulatory incentives needed

## Flow-based transmission model



- Physical electrical flow paths taken into account
- Real network capacities and flows modeled as areas linked by interconnectors
- Maximises use of transmission capacity
- In principle: no limits of extension to other interconnected areas, e.g. Germany

*but*

- Meshing jeopardizes the carving up explicit/implicit
- *Need for FTRs ?*



## Towards an Open & Multilateral Market Coupling

Possible features of future Open and Multilateral Market Coupling :

- Extension to more countries / more exchanges
- Secondary trading of forward (yearly/monthly) capacity, creating synergy between implicit & explicit auction and openness to market parties
- Flow-based transmission model, common TSO governance
- Financial products for Transmission Rights (FTR)
- Integration with intra-day market



**Questions?**