

Visit

South Asia Regional Initiative for Energy



energie in goede banen

We are a team of dedicated professionals,  
accountable for keeping the lights on,  
by serving our customers and  
the community in an efficient way

Pierre Bernard  
Secretary General

Walter Aertsens

Bernard Malfliet

Market mechanism and tariffs

23/09/2008

Visit  
South Asia Regional Initiative for Energy



energie in goede banen

We are a team of dedicated professionals,  
accountable for keeping the lights on,  
by serving our customers and  
the community in an efficient way

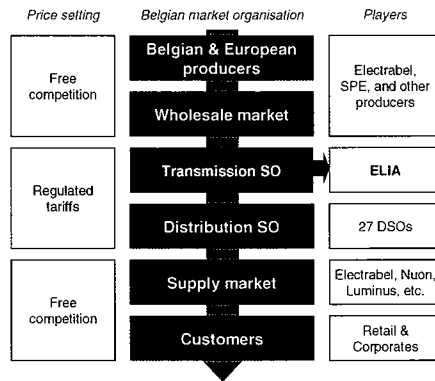
Pierre Bernard  
Secretary General  
Walter Aertsens  
Bernard Malfliet  
Market mechanism and tariffs

23/09/2008



- About Elia
- Contracts
- Balancing
- Capacity allocation
- Capacity calculation
- From a national to a regional market
- System adequacy and interconnection capacity

### A key role for all electricity exchanges in Belgium and within the EU



#### ELIA mission, legally defined, consists of the following tasks:

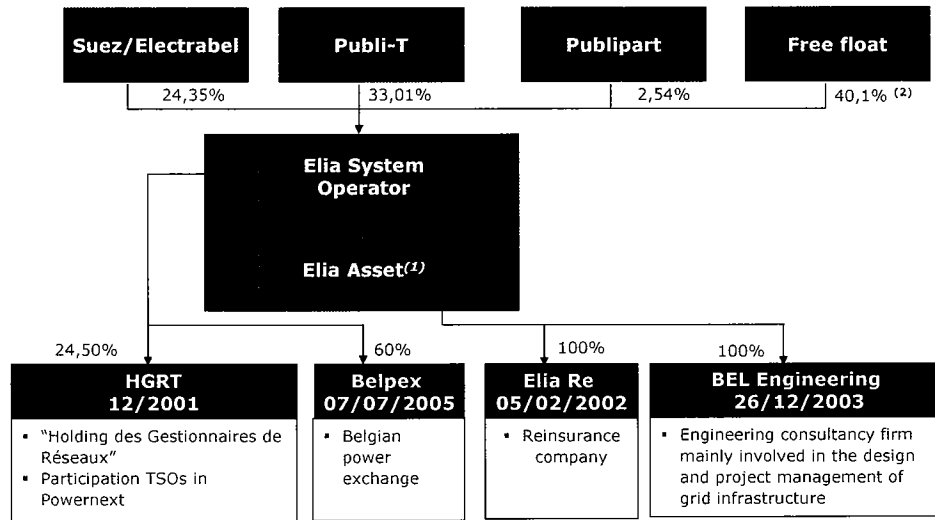
- Access to the grid for third parties.
- Operation and maintenance of the grid.
- Improvement and extension of the grid, including interconnections, so as to provide transmission capacity needs for its customers.
- Management of electricity flows so as to reach an equilibrium between supply and demand of electricity (taking exports and imports into account).
- To ensure, with the available means, the security, reliability and efficiency of the Belgian power system (including the availability of ancillary services).

3

### Elia's core competence based on nearly 70 years of history

<b>Jan 2008</b>	<ul style="list-style-type: none"> <li>▪ Introduction multi-year tariffs.</li> <li>▪ Incentive based remuneration system.</li> </ul>
<b>Nov 2006</b>	<ul style="list-style-type: none"> <li>▪ Belpex starts power exchange.</li> <li>▪ Market coupling with France and the Netherlands.</li> </ul>
<b>Jun 2005</b>	<ul style="list-style-type: none"> <li>▪ Listing at the stock exchange.</li> </ul>
<b>Jul 2003</b>	<ul style="list-style-type: none"> <li>▪ Termination of joint venture between Electrabel and SPE: CPTe demerger.</li> <li>▪ Effective from 1 January 2003; CPTe's shares are now owned directly by Electrabel and SPE.</li> </ul>
<b>Sept 2002</b>	<ul style="list-style-type: none"> <li>▪ Elia appointed, on the federal level, as TSO by ministerial decree of 13 September 2002.</li> </ul>
<b>May 2002</b>	<ul style="list-style-type: none"> <li>▪ CPTe sells a 30% interest to Publi-T (municipalities).</li> </ul>
<b>Jun 2001</b>	<ul style="list-style-type: none"> <li>▪ Creation of Elia.</li> <li>▪ CPTe contributes transmission infrastructure and related assets to Elia.</li> </ul>
<b>1937</b>	<ul style="list-style-type: none"> <li>▪ Creation of CPTe (Coordination of Production and Transmission of Energy) by local electricity producers predecessors of Electrabel and SPE).</li> </ul>

4



(1) 1 share Publi-T, 1 share Electrabel

(2) Including 0,54% personnel Elia

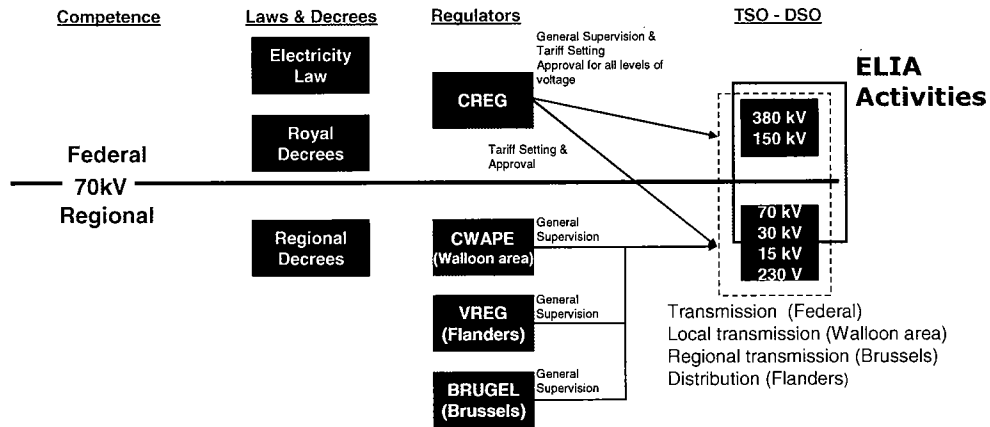
5

- Management totally separated from board of directors.
- Management fully responsible but:
  - Allocation mechanism import and export must be approved by regulator.
  - Amount of ancillary services must be approved by regulator.
  - Grid development plan must be approved by the minister.
  - Tariffs are approved by the regulator.
    - Cost plus basis
  - General conditions of contracts must be approved by the regulator.
  - Assets can only be sold after positive advice of regulator.
- Control:
  - Regulator.
  - Independent members of board of directors (supervisory board).
  - Compliance officer.
- Professional secrecy obligation.

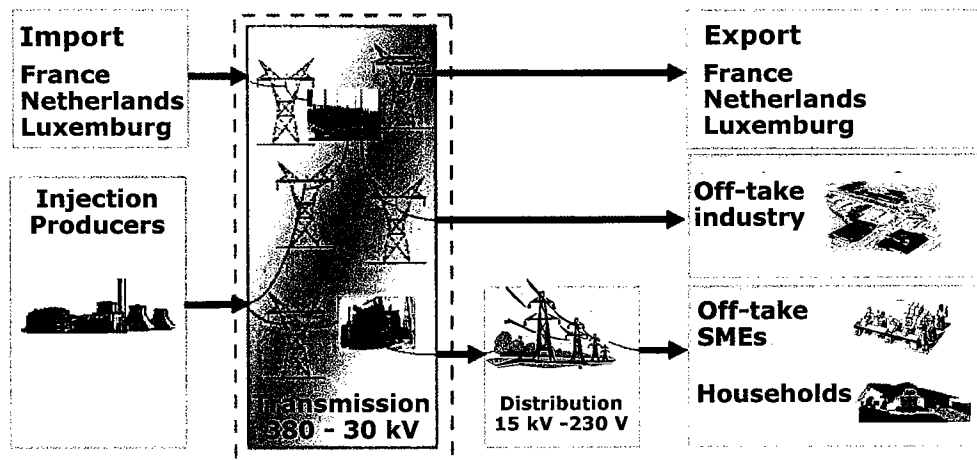
6

## Elia: Regulatory framework

A regulatory environment taking into account the Federal Belgian State



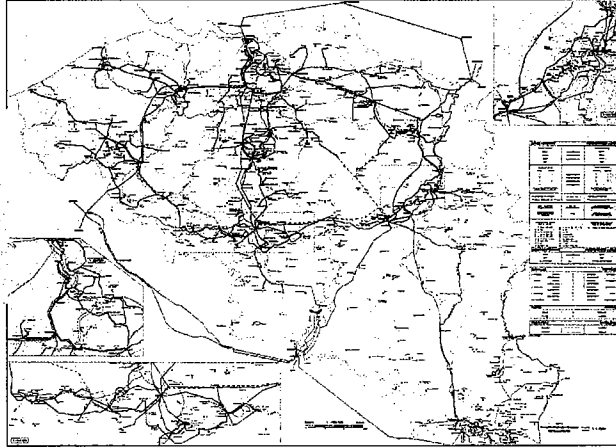
## Elia



- **ELIA = as Transmission and Distribution System Operator**
- High voltage grid: 8,276km (5,674km lines; 2,602km cables) with 800 substations converting voltage to required levels

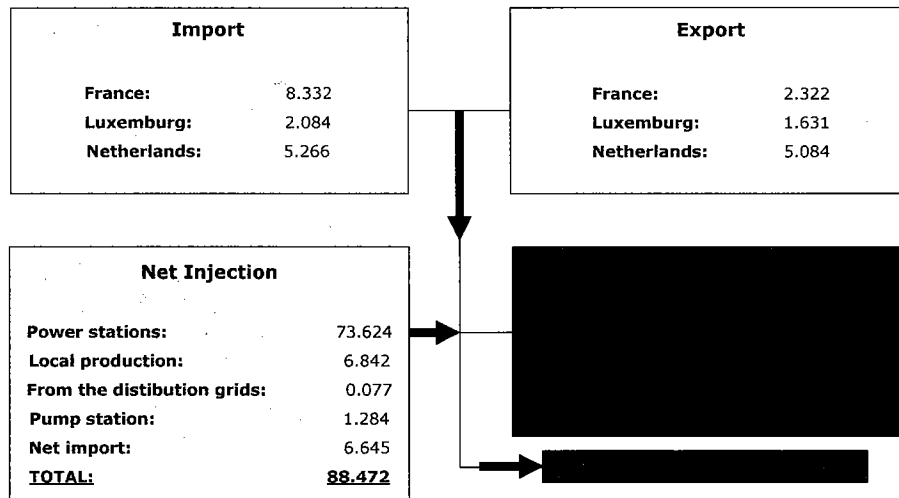
### Geographic Length (km)

Voltage	Geographic Length (km)		Total
	Overhead Lines	Underground Cables	
380 kV	890	0	890
220-150 kV	2.311	331	2.642
70 kV	2.439	189	2.628
36-30 kV	34	2.082	2.116
<b>Total</b>	<b>5.674</b>	<b>2.602</b>	<b>8.276</b>



9

## Elia : Energy Balance 2007 (in TWh)



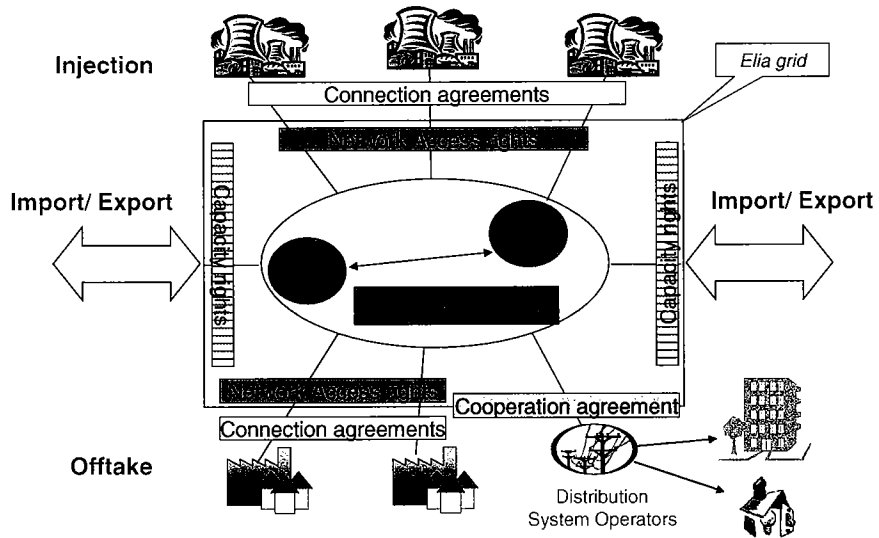
10

Handwritten scribbles

- About Elia
- Contracts
- Balancing
- Capacity allocation
- Capacity calculation
- From a national to a regional market
- System adequacy and interconnection capacity

Contracts

Handwritten scribbles



- ELIA services = 3 major contracts

- The Connection agreement governs the relationship between ELIA and the consumer or generator whose unit is connected to ELIA network.
- The Network access agreement<sup>(1)</sup> gives a 3rd party, a consumer or a supplier or ARP appointed by it, the possibility to inject or withdraw electricity over/from ELIA system.

Distribution System Operators have entered into specific contracts, called Cooperation agreement, governing their access and connection to the Grid.

- The Access Responsible Party agreement<sup>(1)</sup> contains the rights and obligations of a party to maintain the balance between sink & sources for his portfolio ; gives also rights for capacity allocation at borders.

(1) Approved by the CREG in accordance with art 6 of Grid Code

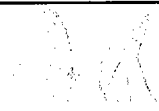
- Additional contracts

- The Ancillary Services Agreements with generators governing the procurement of the various Ancillary Services:

- Primary reserve.
  - Secondary reserve.
  - Tertiary reserve.
  - Black-start capability.
  - Voltage regulation and reactive power supply.
  - Coordination of generation units.
- } Also used for Balancing

- The Load Shedding Agreements with major industrial consumers whose main purpose is to complement, in a competitive way, the tertiary reserve provided by generators.

- Procurement of grid losses by competitive tender.



- About Elia
- Contracts
- Balancing
- Capacity allocation
- Capacity calculation
- From a national to a regional market
- System adequacy and interconnection capacity



- Injections = off takes
  - Responsibility ARPs (Balance Responsible Parties)
  - Control
    - Nominations system
      - Day ahead balance requirement
      - Possibility to adapt intraday
    - Real time control : dispatchings
  - Specific tariff for unbalance

## Day ahead programm

- Must be introduced by Access Responsible Party
- All types of energy flows
  - Load/Generation (load or generation in given access points)
  - Cross-border nominations
  - Day-ahead HUB nominations (not related to given access points)
    - Belpex
    - OTC (over the counter)
    - Exchanges of responsibilities

## Intra-day nominations

- HUB nominations
  - ✓ OTC
  - ✓ Belpex
  - ✓ Production (to come)
- Intraday cross border Belgium-France
- Intraday cross border Belgium-Netherlands (to come)

Electricity Transmission  
**elia Nominations**  
Internal Nominations

Execution Date (Day/Month/Year) 23 / 10 / 2001

Contract/ARP 033-01-00999(ATEL)

From 017-01-00999(EDF-Trading) To ATEL

Version 023-01-00999(EGL)

Schedule (unit = MWh) 014-01-00999(EnBW) 014-01-00999(EnBW Benelux) 019-01-00999(EON-Trading) 024-01-00999(NOK) 005-01-00999(Remu) 026-01-00999(RWE Plus) 009-01-00999(RWE Trading)

Total MWh: 0

	0 - 1 h	5 h	5 - 6 h	6 - 7 h	7 - 8 h	8 - 9 h	9 - 10 h	10 - 11 h	11 - 12 h
00:15									
15:30									
30:45									
45:00									

	12 - 13 h	13 - 14 h	14 - 15 h	15 - 16 h	16 - 17 h	17 - 18 h	18 - 19 h	19 - 20 h	20 - 21 h	21 - 22 h	22 - 23 h	23 - 24 h
00:15												
15:30												



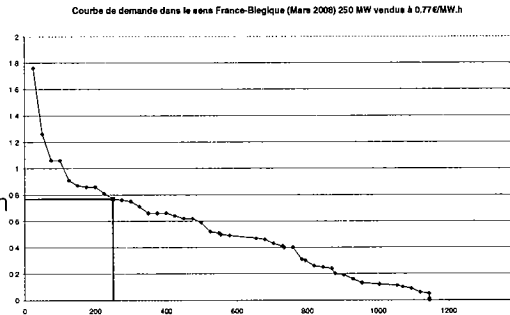
- About Elia
- Contracts
- Balancing
- Capacity allocation
- Capacity calculation
- From a national to a regional market
- System adequacy and interconnection capacity

### Capacity allocation



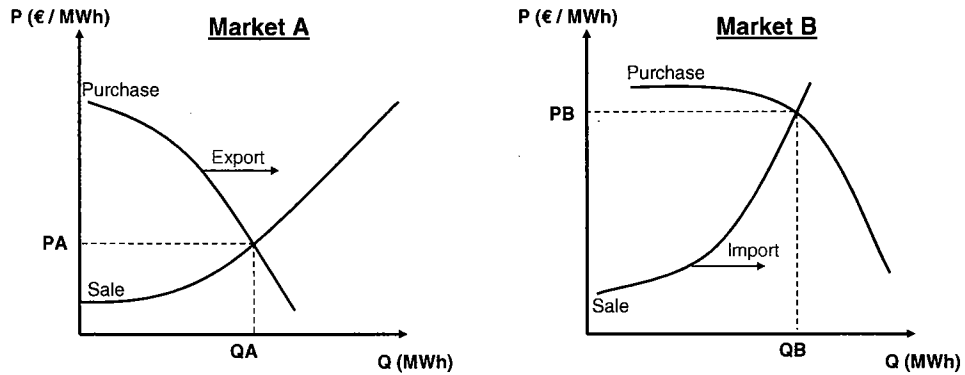
- Yearly capacity
    - For all hours of the year
  - Monthly capacity
    - For all hours of the month
  - Daily capacity
    - For each hour of the following day
  - Intraday capacity
- Explicit auctions**
- Implicit auctions**
- Improved pro rata mechanism**

- Coordinated mechanism
- One auction for each direction
  - Import and export
- Marginal pricing: price lowest accepted bid is paid by everyone
  - If demand < available capacity than clearing price 0 €/MWh
- Resell of capacity is possible
  - From year to month or day
  - From month to day
- Use it or loose it
  - Unused year or month capacity is given to day



- Implicit auctions = market coupling
- Capacity is attributed to market through power exchanges
- Daily capacity is used to limit price differences between power exchanges
  - Capacity is used to export from cheap country to expensive country
- Close cooperation between TSOs and power exchanges

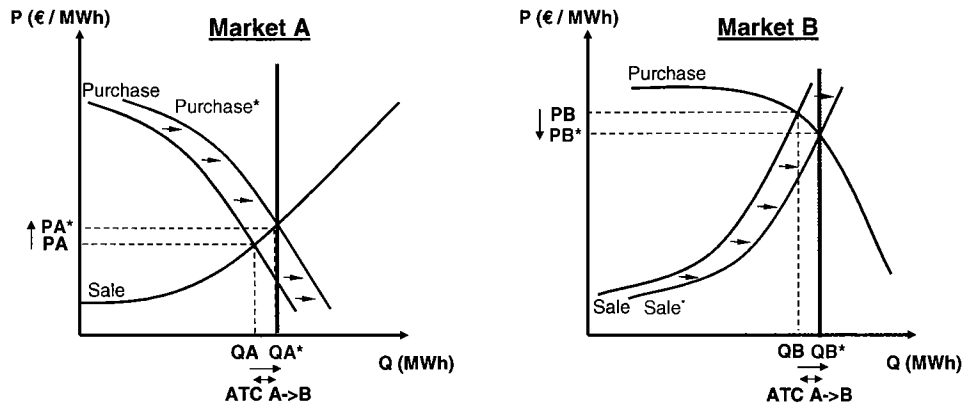
### Capacity allocation Implicit auctions - uncoupled markets



- Isolated price Market A > isolated Price Market B
- Market A can export to market B (purchase- and sale curve shift)

23

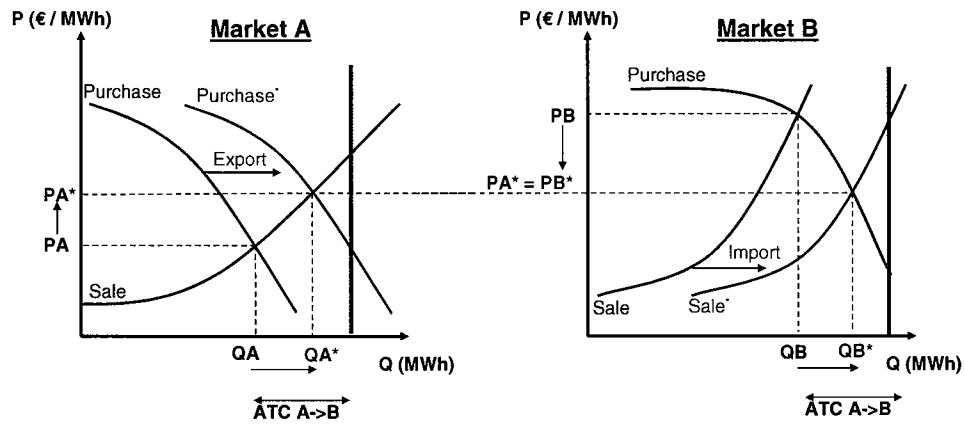
### Capacity allocation Implicit auctions - constrained case



- Isolated price Market A > isolated Price Market B
- Market A can export to market B (purchase- and sale curve shift)
- The export (and therefore price convergence) is limited by the availability of the cross border capacity

24

### Capacity allocation Implicit auctions - unconstrained case



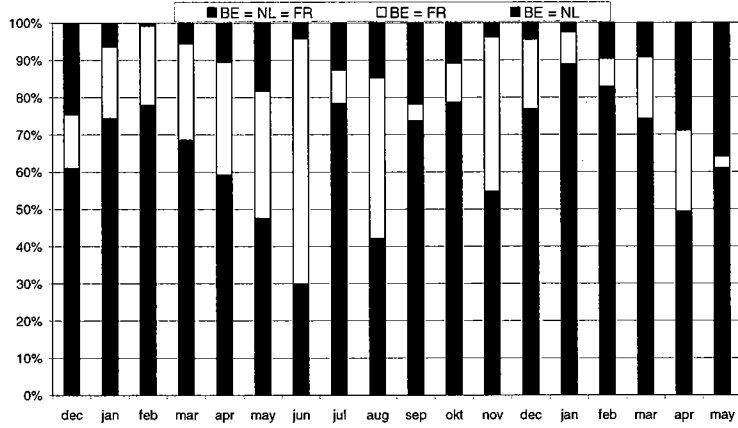
- Isolated price Market A > isolated Price Market B
- Market A can export to market B (purchase- and sale curve shift)
- Prices market A and B converge till price market A = price market B

### Capacity allocation Implicit auctions

		Belgium - France	
		Congestion	No congestion
Belgium - Netherlands	Congestion	$F \neq B \neq NL$	$F = B \neq NL$
	No congestion	$F \neq B = NL$	$F = B = NL$

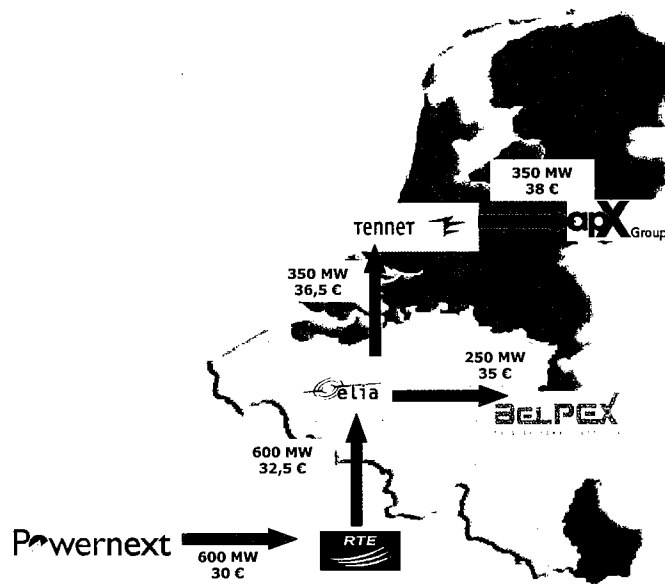
26

Evolution of convergence



27

Capacity allocation  
Implicit auctions



### Intraday:

Possibility to change existing or introducing new nominations after the end of the day ahead procedure

- **Why?**

- Incident: outage production unit, strike,...
- Commercial opportunity

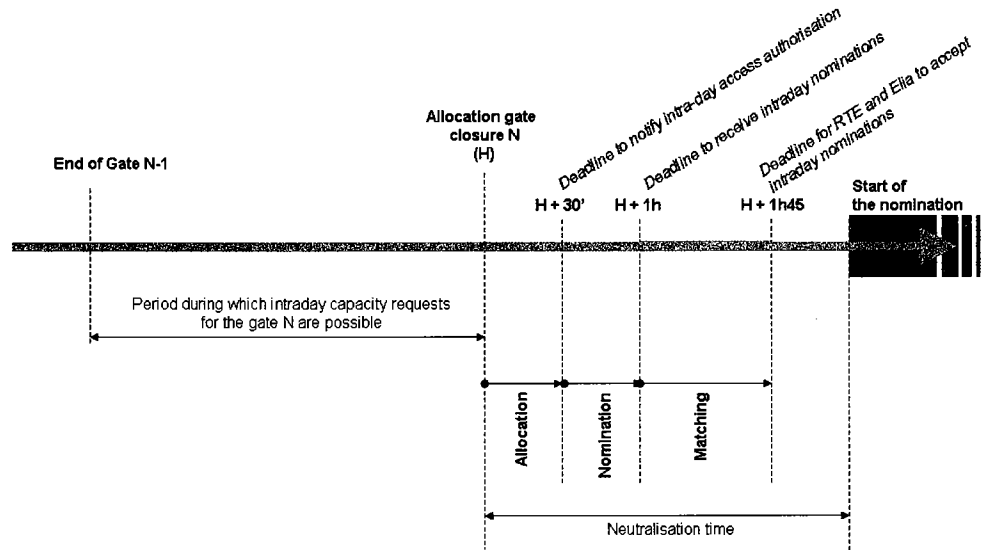


29

- Explicit allocation mechanism at several moments of the day: "gates"
- If demand > available capacity a pro rata mechanism is used
- No pricing of capacity
- No obligatory use
- Use it or loose it
  - Unused capacity is given to next gate
- In use at the French-Belgian border since May 2007
  - 12 gates
- Foreseen at the Ducth-Belgian border for January 2009

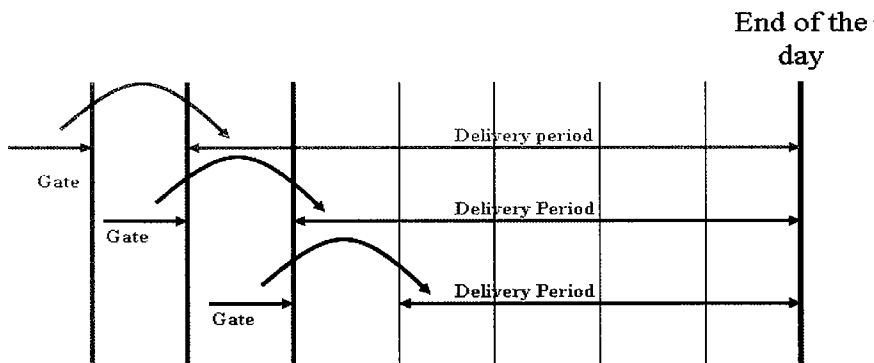
30

## Capacity allocation Intraday



## Capacity allocation Intraday

Each gate deals with all the remaining hours (also called the delivery period).



		1st iteration	2nd iteration	3rd iteration	
Available capacity		950	$(950 - 670) = 280$	$(280 - 279) = 1$	
Number of requests		5	3	3	
Maximum capacity attributed for a participant		190	93	0	

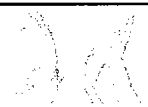
  

	Request	Attributed capacity	Attributed capacity		Allocated capacity
Participant 1	25	25			25
Participant 2	75	75			75
Participant 3	500	190	93		283
Participant 4	500	190	93		283
Participant 5	500	190	93		283
Total	1600	670	279		949

- According to european congestment management guidelines revenues shall be used for:
  - Guaranteeing the actual availability of the allocated capacity
  - Network investment maintaining or increasing interconnection capacities
  - As an income to be taken into account for calculating network tariffs
- Decision Belgian regulator: use congestion revenue to lower tariffs
- Congestion revenues are less each year due to:
  - Investment in grid (more capacity)
  - Market design
    - Resell: gives congestion revenue to market parties
    - Market coupling: less congestion

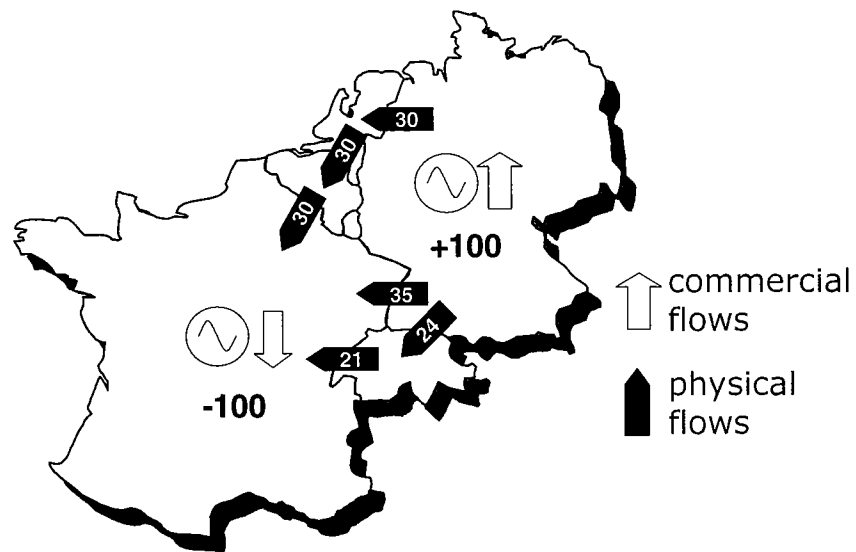


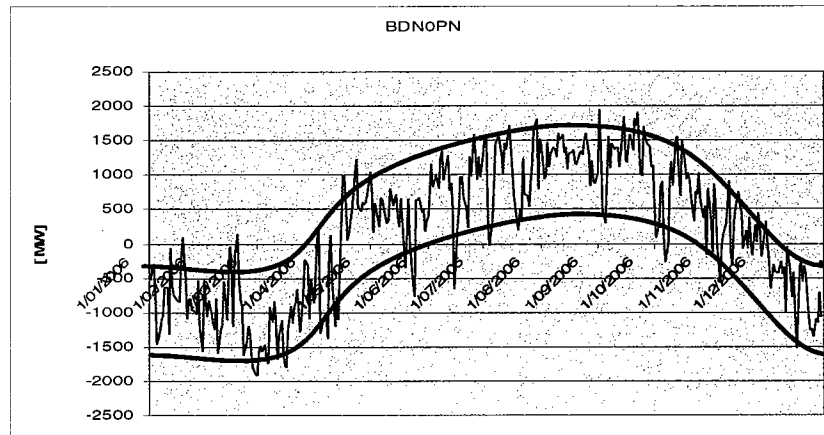
- About Elia
- Contracts
- Balancing
- Capacity allocation
- Capacity calculation
- From a national to a regional market
- System adequacy and interconnection capacity



- Capacity is calculated in function of market products
  - Year capacity, month capacity and day capacity
- TSOs are responsible to calculate NTC
  - In a coordinated way
- Method to split capacity between different products must be approved by regulators

- Net Transfer Capacity = Total Transfer Capacity (based on N-1) – Transmission Reliability Margin
  - TRM = 250 MW
- What influences the capacity?
  - Production
  - Outages
  - Season
  - Loopflows





39

- Procedure to calculate year and month capacity
  - TSOs consult each other concerning the hypotheses for all the critical periods in the Y+1 (e.g. high wind production, outage of tie lines, ...)
  - Determination and calculation with common data files
    - Individual calculation by each TSO (for the most critical periods)
    - Maximum NTC based on N-1
  - Exchange of results : lowest NTC is taken
- Procedure to calculate day-ahead capacity
  - Exchange of all usefull information between TSOs
  - Elia and RTE have decided to create a joint coordination center

40

- Split of capacities:
  - French-Belgian border : yearly decision taken by regulator based on proposal made by TSOs
    - Flow from France to Belgium
      - Year capacity: 1300 MW
      - If possible: min 400 MW month capacity and 100 MW day capacity
        - Differences will be split between month (25%) and day (75%)
    - Flow from Belgium to France
      - Year capacity 400 MW
      - If possible: min 100 MW month capacity and 100 MW day capacity
        - Differences will be split between month (50%) and day (50%)

41

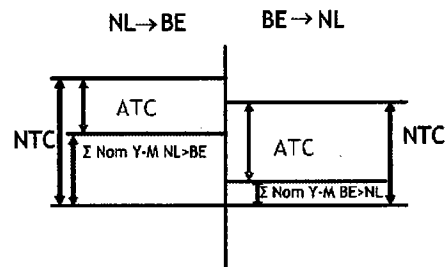
- Split of capacities:
  - Dutch-Belgian border
    - Contractual agreement for all Dutch borders (also with Germany) between concerned TSOs (based on Dutch grid code)
      - Global import capacity is divided between different borders : 36,4% goes to Dutch-Belgian border
        - Same split for both direction (B to NL and NL to B)
        - Year capacity: 468 MW
        - Month capacity 313 MW
        - Day capacity: total – year – month (min 36 MW)

42

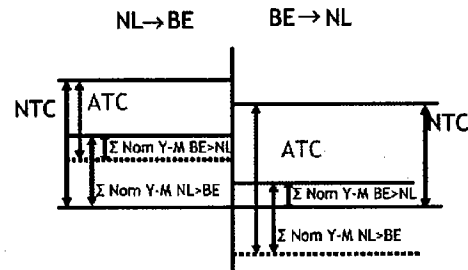
- Netting of capacities: to determine the ATC in one direction you take into account the year and month nominations in the other direction

### Daily ATC Calculation

#### Calculation without netting



#### Calculation with netting



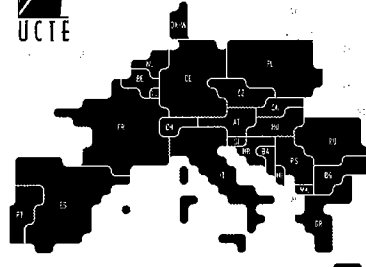
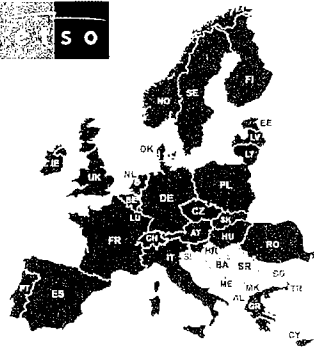
43

- About Elia
- Contracts
- Balancing
- Capacity allocation
- Capacity calculation
- From a national to a regional market
- System adequacy and interconnection capacity

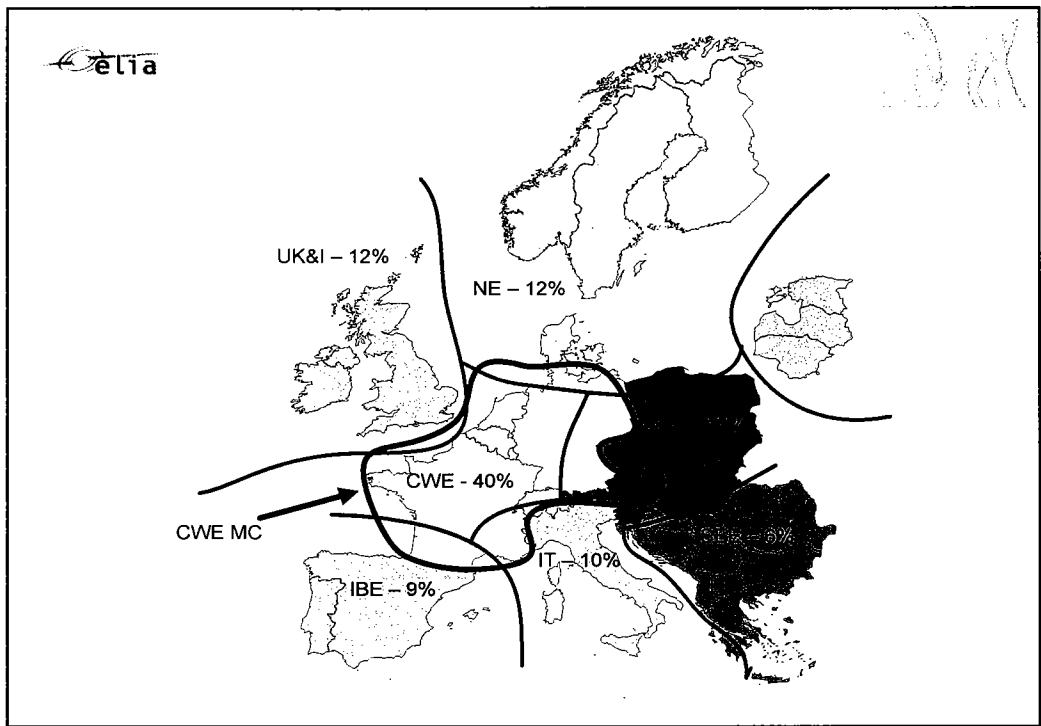
44



- European directive '96
  - Objectif: one European Market
  - But...
    - Different electrical areas (UCTE, Nordel, UK, Ireland)
    - Different level of integration
  
- « Strategy paper » EU-commission 2004
  - Proposal to create first regional markets
  - Consequence
    - From a bilateral to a multilateral approach



■ ETSO Members  
□ ETSO Associate Members  
□ SEE-TSOs Cooperating with ETSO



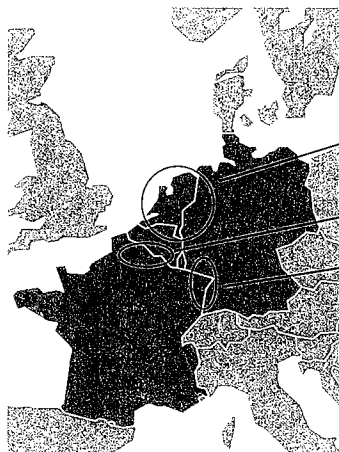
**Central-West Europa (CWE)**

- Who?: France, Netherlands, Belgium, Luxemburg and Germany (part of UCTE-block)
- Particularities
  - No direct link Belgium-Germany
  - 4 TSO's in Germany
  - Luxemburg has no balancing area of their own (partly belonging to Elia, partly to RWE)
- Cooperation
  - Between governments
  - Between regulators (RCC: Regional coordination committee)
  - Between TSOs

1. TSO of North Germany  
 2. TSO of West Germany  
 3. TSO of South Germany  
 4. TSO of East Germany

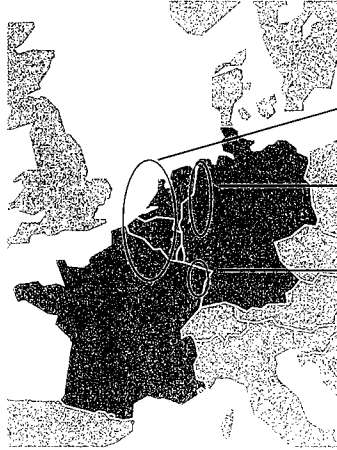
- Pentalateral forum
- Implementation group
- Stakeholders meeting

- Regional energy market (Belgium, France, Netherlands, Germany and Luxemburg)
  - Action plan regulators
    - Harmonisation and improvements of the long-term explicit auctions
    - Implementation of a day-ahead flow-based market coupling in the entire region
      - Enlarged the existing market coupling system
    - Implementation of cross-border intraday and balancing trade
    - Common calculation for cross-border capacities
    - Maximisation of the amount and of the utilisation of cross-border capacities
    - Regional capacity investment plan
    - Transparency
  - TSOs wants to establish a joint company to handle cross-border activities



- What? : allocation of yearly and monthly capacity at the borders
- Actual situation:
  - Netherlands-Belgium-Germany
    - TSO Auction Office
  - France-Belgium
    - RTE (French TSO)
  - France-Germany
    - One set of rules but two operators
      - RTE: from France to Germany
      - RWE Netz: from Germany to France
- Objectif
  - One Auction Office for the region (creation of CASC by TSOs)
  - One set of auction rules

## CWE Day-ahead flow-based market coupling



- What? : calculation and allocation of daily capacity at the borders
- Actual situation:
  - France-Belgium-Netherlands
    - Market coupling: implicit allocation of capacity through power exchanges (APX, Belpex, Powernext)
    - ATC-based
  - Netherlands-Germany
    - Explicit Auctions
    - TSO Auction Office
  - France-Germany
    - Explicit Auctions
    - RTE: from France to Germany
    - RWE Netz: from Germany to France
- Objectif
  - Flow-based market coupling
    - Allocation of capacity through power exchanges
    - Flow based (in stead of ATC)
    - Capacity allocation based on global economic welfare

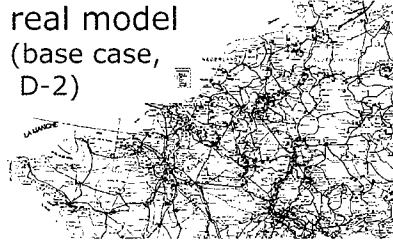
51

## CWE Day-ahead flow-based market coupling

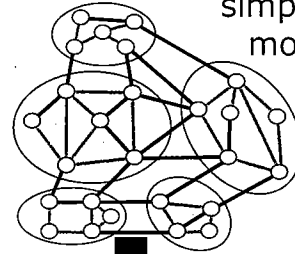
- Actual situation:
  - Proposal to start with ATC-based market coupling end of 2009
    - Flow based is still objectif
  - Project has chosen Cosmos to calculate algorithm
    - Cosmos has been developed by Elia/Belpex

52

real model  
(base case,  
D-2)



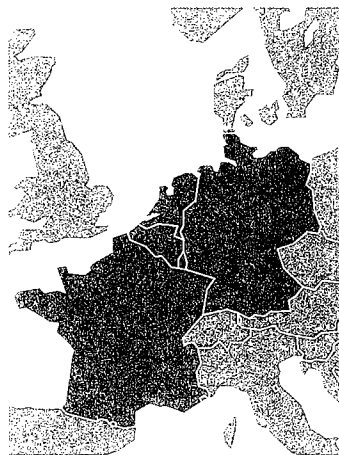
simplified  
model



bids are translated to and are within security by optimizing the market



bid data

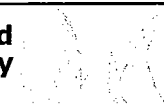


- Intraday : possibility to trade the day of execution
- Existing situation:
  - Belgium-France:
    - improved pro rata mechanism
    - RTE
  - Germany-France:
    - capacity platform
      - First come – first served
      - Continuous trading
    - Deutsche Börse
- Foreseen in near future
  - Netherlands-Germany: capacity platform
  - Netherlands-Belgium: improved pro rata mechanism
- Objectif
  - One coordinated system for CWE



- About Elia
- Contracts
- Balancing
- Capacity allocation
- Capacity calculation
- From a national to a regional market
- System adequacy and interconnection capacity

### **System adequacy and interconnection capacity**



- Production is the responsibility of the government
  - Propsective study
- GRID is the responsibility of the TSO
  - Central-West Europe investment plan
  - Federal grid investment plan 380-150 kV
    - Approved by the minister of energy on advice of the regulator
  - Underlying investment plans for each region inside of Belgium

- Questions ?

57