

# Introduction

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- ⇒ **This PowerPoint presentation is a successor to the PowerPoint presentation “*Market Coupling – European Price Coupling*” from Houmoller Consulting.**
- ⇒ **This PowerPoint presentation is animated**
  - ✓ **It’s recommended to run the animation when viewing the presentation.**
- ⇒ **On most computers, you can start the animation by pressing F5.**
  - ✓ **Now the presentation moves one step forward, when you press Page Down. It moves one step backward, when you press Page Up.**

# Structure of this PowerPoint presentation

- ⇒ For the calculation of the European spot prices, this document presents two technical issues.
- ⇒ The point is to illustrate, **we need an European price coupling council, which will take decisions on how European spot prices are calculated**
  - ✓ **Note: a pan-European council with representation from the whole, price coupled region is needed**
    - **Having the same spot price calculation contributes to the creation of a level playing field for the cross-border competition.**
    - **Also, in order to have consistency – and thereby reliable spot prices – the spot price calculation cannot have different specifications for the different parts of the price coupled region.**
- ⇒ **In appendix 1, you'll find a list of the terms and acronyms used in this PowerPoint presentation.**

# Calculation of spot prices

## Technical issue number one

- ⇒ **As explained in the presentation “*Market Coupling – European Price Coupling*”, the calculation of the spot prices implies making an economic optimization.**
- ⇒ **The optimization has some obvious, necessary constraints:**
  - ✓ **For each hour for each price zone: the spot purchase price is equal to the spot sale price.**
  - ✓ **For each hour for each interconnector: the day-ahead plan for the cross-border energy flow must not exceed the interconnector’s capacity.**
  - ✓ **Ect...**
- ⇒ **However, one extra, non-obvious constraint has been added:**
  - ✓ **If an interconnector is uncongested during a given hour, the two price zones linked by the interconnector must have the same spot prices.**

# Flat-earth thinking

- ⇒ **By intuition, you'd expect two neighbouring zones to have the same spot price, if their interconnector is uncongested during an hour.**
- ⇒ **However, intuition also suggests the earth is flat!**



# Block bids and congestion

- ⇒ **When you have block bids, it's natural for two neighbouring price zones to have different prices, although their interconnector is uncongested during a single hour.**
- ⇒ **Example for one hour of the next day:**
  - ✓ **Assume the neighbouring price zones  $A_1$  and  $A_2$  have spot prices of 51 and 52 EUR/MWh, respectively.**
  - ✓ **Assume their interconnector is uncongested – but only during this hour.**
  - ✓ **In  $A_2$  there may be unmatched single-hour purchase bids in the interval between 51 and 52 EUR/MWh.**
  - ✓ **However, in  $A_1$ : in the interval between 51 and 52 EUR/MWh, there may only be a wall of block sales offers!**
    - **And this energy is not on offer in  $A_2$** 
      - **Because these  $A_1$  blocks also cover other hours, where the interconnector is congested, no matter how you twist the system.**
    - **Hence, even though the interconnector is uncongested during the hour in question, the supply curves in  $A_1$  and  $A_2$  are not identical.**

# Reducing the economic value of the spot trading

- ⇒ **For all interconnectors and for all 24 hours of the next day, the extra constraint forces the price calculation software to make an odd block bid selection, which “magically” avoids situations like the one described in the example on the previous slide.**
- ⇒ **However, thereby the calculation system may be pushed far away from the economic optimal selection of block bids...**
  - ✓ **And this may severely reduce the economic value of the spot trading.**

# Informed, transparent decisions – 1

- ⇒ In the project *CWE-Nordic* it was observed how this extra constraint artificially reduces the economic value of the spot trading
  - ✓ However, this was merely observed by accident. It was not the aim of the project to test the effect of this extra constraint.
- ⇒ **Problem: it has never been systematically tested, how much this extra, intuitively imposed constraint costs!**

# Informed, transparent decisions – 2

- ⇒ This is one of the features of the European price coupling, which must be discussed and decided upon in a European price coupling council.
- ⇒ Where the price coupling's customers are represented.
- ⇒ The council must be presented the economic consequences of the extra constraint
  - ✓ Thereby being able to make an informed decision.
- ⇒ The information to the council must be provided by technical experts from the price coupling's central calculation site
  - ✓ Experts who know their job is to service the customers by providing information – but not to take decisions.
  - ✓ As it's the customers' money that is at stake.
- ⇒ Naturally, the council's decisions must be submitted to the regulators for approval.



# CWE selection of block bids – 1

## Technical issue number two

- ⇒ **In the CWE re-calculation of the spot prices, the CWE calculation system also uses the extra constraint described on the previous slides.**
- ⇒ **However, the CWE re-calculation has another feature: the CWE calculation does not solely aim at maximizing the economic value of the spot trading (subject to the constraints).**
- ⇒ **Instead, the CWE software discards during its computation the valid solutions with paradoxically rejected blocks that are “*very deep in the money*” (as it’s expressed in the CWE material)**
  - ✓ **The argument: “*This is implemented to guarantee fairness, as this could only happen with blocks of small volume*”.**

# CWE selection of block bids – 2

## Technical issue number two

- ⇒ **However, “*deep in the money*” is a bogus concept**
  - ✓ **For the spot price, we have seen hours where the inclusion or exclusion of a block bid smaller than 6 MW can make a difference of more than 60 EUR/MWh!**
- ⇒ **Issues like this must be decided upon by an European price coupling council**
  - ✓ **With information input from economists and experts in linear optimization.**



# **Appendix 1**

## **Terms and acronyms**

# Terminology and acronyms – 1

## As used in this presentation

- ⇒ ***Border*** means a border between two price zones
  - ✓ Hence, it need not be a border between two countries. It may be a border between two price zones inside a country.
- ⇒ ***Customers*** In this document, the “customers” of the price coupling are the market players, the end users (producers and consumers of electricity) and the TSOs.
- ⇒ ***CWE*** Central Western Europe: Belgium, France, Germany, Luxembourg and the Netherlands.
- ⇒ ***CWE-Nordic*** A market coupling simulation project carried out during 2009.

# Terminology and acronyms – 2

## As used in this presentation

- ⇒ ***Double auction*** A calculation method whereby an exchange's price is set by calculating the intersection between the exchange's supply curve and the exchange's demand curve.
- ⇒ ***EMCC*** European Market Coupling Company.
- ⇒ ***End users*** of the price coupling are producers of electricity and consumers of electricity
  - ✓ They are end users – in contrast to players, who are solely buying and selling on the whole-sale market.
- ⇒ ***EU*** European Union.

# Terminology and acronyms – 3

## As used in this presentation

- ⇒ ***Interconnector*** An electric line linking two price zones.
- ⇒ ***Market coupling*** A day-ahead congestion management system, you can have on a border, where two spot exchanges meet. The day-ahead plans for the cross-border energy flows are calculated using the two exchanges' bids and information on the day-ahead cross-border trading capacity.
- ⇒ ***Market splitting*** A day-ahead congestion management system, you can have on a border, where you have the same spot exchange on both sides of the border. The day-ahead plans for the cross-border energy flows are calculated using the exchange's bids and information on the day-ahead cross-border trading capacity.
- ⇒ ***Paradoxically rejected block bids*** Please refer to appendix 1 in the PowerPoint presentation "*Market Coupling – European Price Coupling*" from Houmoller Consulting.

# Terminology and acronyms – 4

## As used in this presentation

- ⇒ **PCSC** Price Calculation Service Centre. For the price coupled region, this is a central body calculating all spot prices and all day-ahead plans for the cross-border energy flows. The price calculations is carried out using double auction. The calculation is based on information on
  - ✓ All spot bids in the price coupled region.
  - ✓ Information on the day-ahead cross-border trading capacity for all interconnectors in the price coupled region.
- ⇒ **Price coupling** In this document, this is a system, where there is one, single body calculating the spot prices and the day-ahead plans for the cross-border energy flows. No local calculations or re-calculations are taking place.
- ⇒ **Price zone** means a geographical area, within which the players can trade electrical energy day-ahead without considering grid bottlenecks.
- ⇒ **Spot bid** A purchase bid or a sales offer submitted to a spot exchange.

# Terminology and acronyms – 5

## As used in this presentation

- ⇒ ***Spot exchange*** In this document, a spot exchange is an exchange where
  - ✓ **Electrical energy is traded day-ahead.**
  - ✓ **The day-ahead prices are calculated by means of double auction.**
  - ✓ **Note: this document strongly recommends the price calculation is outsourced to a Price Calculation Service Centre (PCSC). The PCSC will calculate the spot prices and the day-ahead plans for the cross-border energy flows for the price coupled region.**
- ⇒ ***Spot price*** A price calculated by a spot exchange. Either by a calculation performed by the spot exchange itself, or by a calculation performed by a body, to which the calculation has been outsourced (refer to PCSC).
- ⇒ ***Spot trading*** Trading with a spot exchange.
- ⇒ ***TSO*** Transmission System Operator.



# **Thank you for your attention!**

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