Introduction

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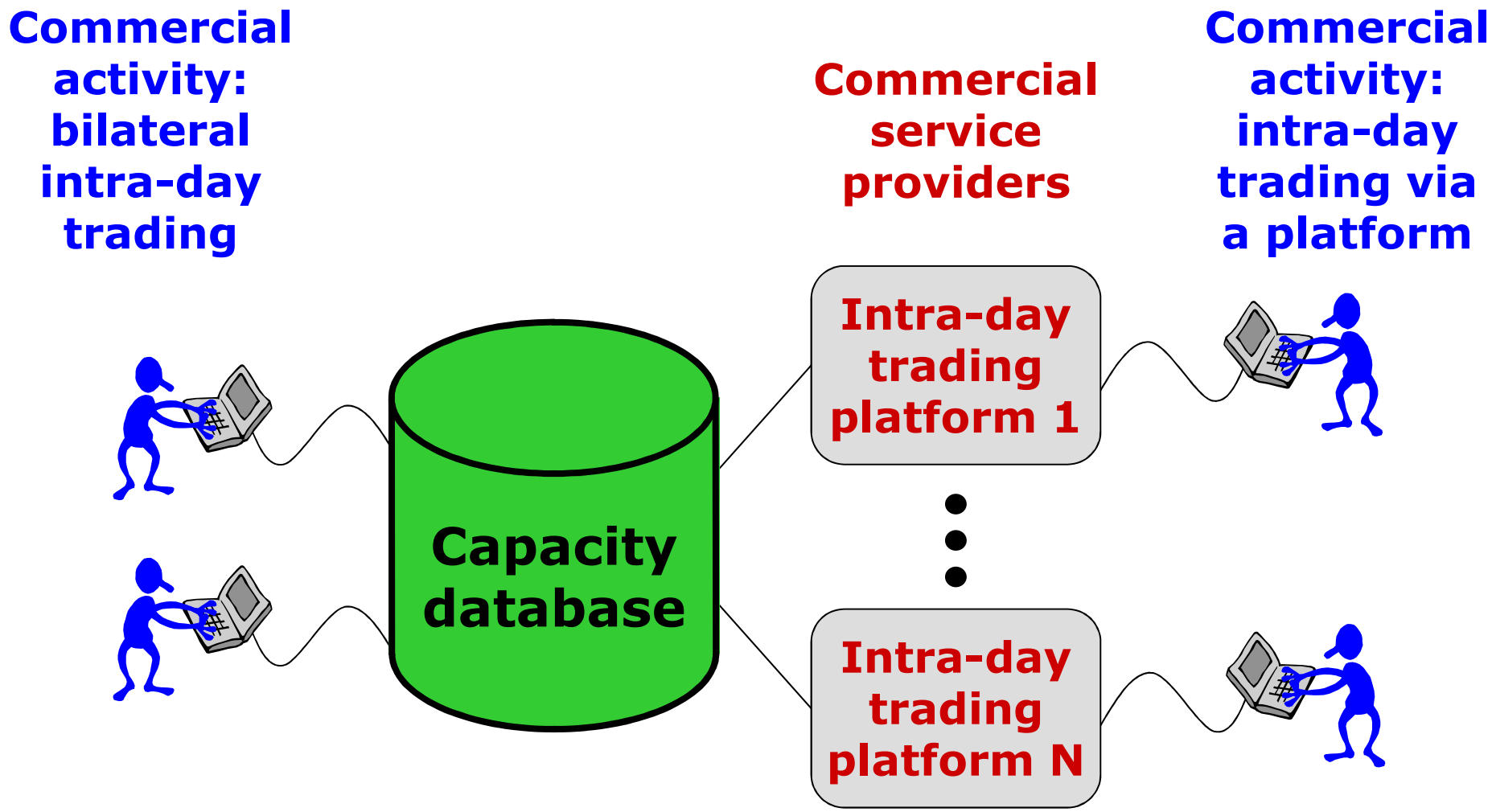
- **Appendix 1 defines what intra-day trading of electricity means in a large part of Europe.**
- **Appendix 2 contains a map of 5 of the synchronous grids in Europe – and a map showing the seven DC links between UCTE and Nordel.**
- **Appendix 3 contains a list of the terms and acronyms used in this presentation.**
- **Concerning documents referred to in this presentation:**
  - **At *houmollerconsulting.dk*, you can download the documents from the sub-page *Facts and findings*.**
- **This PowerPoint presentation is animated**
  - **It's strongly 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*.**

European intra-day trading

- **A capacity database is needed for the future pan-European intra-day trading.**
- **The database will inform traders and trading platforms on the intra-day capacity between the price zones**
  - ***For example: the database will inform whether it's possible to trade 10 MWh from Northern Sweden to France*.**
- **The establishment and operation of the database is a monopoly task**
  - **Just as grid building and grid operation are monopoly tasks.**
- **However, usage of the database for trading is a commercial task**
  - **Just as the market players' usage of the grid is commercial.**
- **Therefore, we need a separation of the monopoly and the commercial tasks**
  - **Similar to the separation we have for the grid.**

Separating monopoly tasks and commercial tasks



The TSOs must establish and operate the capacity database.

This is the monopoly task.

Blue and red colours indicate commercial tasks.

The capacity database

- **Inside a synchronous area, you cannot control the flow of energy**
  - **Therefore, the database cannot choose the routes for the energy flows created by an intra-day trade**
    - **The AC laws of nature will decide how the energy flows from source to sink.**
  - **When setting the capacity between two price zones inside a synchronous area, the database must make a (preferably flow-based) estimate**
    - **”Flow-based” means the estimate takes into account the complicated flow patterns of a meshed AC grid.**
- **However, <u>for a DC link</u> the TSOs can set the link’s flow to a given value**
  - **Hence, <u>for trades between two asynchronous areas the database must choose which DC link(s) to use</u>.**

An intra-day trading case

The function of the capacity database

- Consider a 10 MWh trade from Northern Sweden (SE1) to France.
  - This is a trade between two asynchronous areas: Nordel and UCTE (please refer to slide no. 15).
- There are seven DC links between Nordel and UCTE.
- Assume there's 10 MW capacity available on all the seven DC links. In this case: which links should be used for the trade?
- There are 127 different ways of combining the seven links – for example:
  - Use NorNed, Kontek and Greater Belt.
  - Use Skagarrak and Swepol.
  - Etc.
- For each of the 127 combinations, the database must decide how much energy to ship along each of the selected links
  - Hence, there's an infinite number of ways to use the selected combination, even after having selected one of the 127 combinations of links…

The function of the capacity database

- ***For a trade from Northern Sweden (SE1) to France: for each potential usage of the DC links, the database must determine***
  - ***Whether the Nordel grid can cope with the internal Nordel flows generated by this specific usage of the DC links.***
  - ***Whether the UCTE grid can cope with the internal UCTE flows generated by this specific usage of the DC links*.**
- **These kinds of investigations will set the intra-day capacities between all price zones**
  - **Naturally, the investigations are made in advance**
    - **Before the players start intra-day trading.**
    - **Also, after each intra-day trade, an update must be made.**
- **For trades between two asynchronous grids, the database will often have a choice of how to use the DC links.**
- **The database's choice will determine which trades can be carried out subsequently**
  - ***Example for a trade from SE1 to France: the trade will consume capacity at the Polish-German border, if SwePol is used*.**

The capacity database has two functions

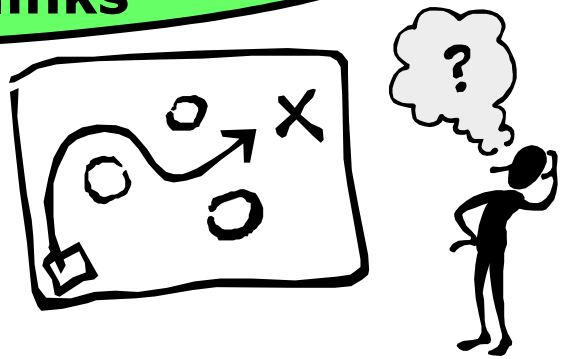
Actually, it's a database <u>and</u> a DC flow selection module

Capacity database and DC flow selection

<u>Function 1</u>
Inform on the capacities between price zones

<u>Function 2</u>
For trades between asynchronous grids: choose how to use the DC links

Concerning function 2: the IT system needs a criterion when selecting among the many possible ways of using DC links connecting asynchronous grids.



Choosing the criterion is part of the monopoly task.

And it must be done in a transparent way.

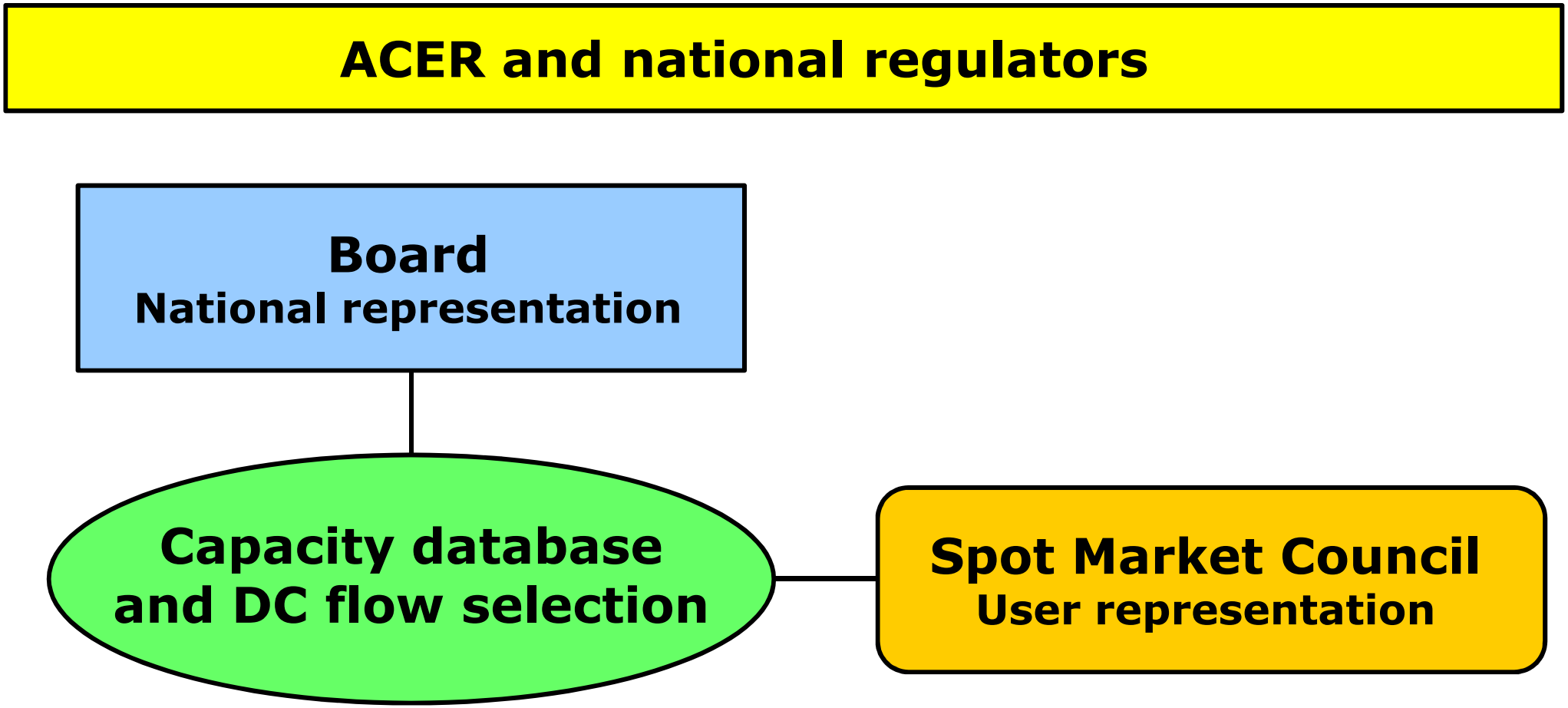
Public consultation etc.

The monopoly task and the commercial tasks

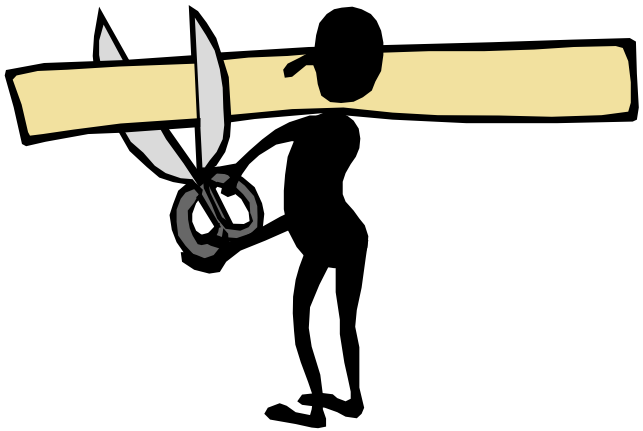
- **Establishing the database is the complicated part.**
- **Setting up trading platforms using the database is relatively trivial.**
- **As the database grants access for bilateral trading and multiple trading platforms:**
  - **Competition will keep the trading platform fees in check.**
- **Regulators must set/approve the fees for using the database, as this is a monopoly.**

Pan-European governance

If there turns out to be a single, monopoly intra-day trading platform, this is the governance for both the trading platform and the database/DC flow selection



Unbundling



Unbundling – 1

- **Unfortunately, the spot exchanges become monopolies when market coupling or market splitting is introduced as the day-ahead congestion management system**
  - **Please refer to the PowerPoint presentation *Market coupling makes real competition betw. spot exchanges unfeasible*.**
- **Hence, in order to avoid cross-subsiding, the <u>spot exchanges must unbundle</u>**
  - **Unbundling means an organisation having a monopoly task cannot have any other business**
    - **Hence, cross-subsidising is automatically prevented**
      - **The regulators can focus on controlling the organisation's economical efficiency**
        - **Please refer to the PDF document *Unbundling of spot exchanges and associated clearing houses*.**

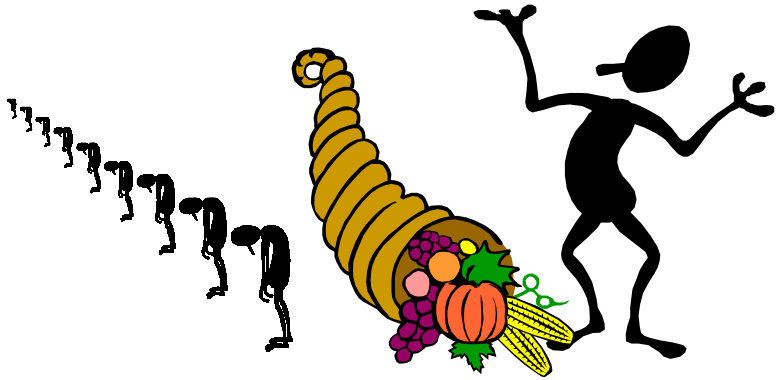
Unbundling – 2
Terminating cross-subsidizing

- **Note: this also means the spot exchanges cannot be involved in intra-day trading**
  - **As experience shows: this gives heavy cross-subsiding – with the many spot players subsidizing the fewer intra-day players.**
- **As cases – turn-over for the year 2013 (numbers in TWh):**
  - **EPEX Spot (Austria, France, Germany, Switzerland)**
    - **Spot turnover 323**
    - **Intra-day turnover 23**
  - **Nord Pool Spot**
    - **Spot turnover (Baltic-Nordic area) 349**
    - **Intra-day turnover (Baltic-Nordic, Germany) 4**
  - **APX (Belgium, the Netherlands)**
    - **Spot turnover 64**
    - **Intra-day turnover 1**
  - **As can be seen: the turnover at the intra-day markets is paltry. It cannot finance the intra-day trading platforms**
    - **Hence the intra-day trading platforms only survive due to heavy cross-subsidizing from the spot trading.**

Unbundling – 3

Terminating the spot market players subsidizing the intra-day trading platforms

Adding insult to injury: as a consequence of the cross-subsidizing, <u>small market players are subsidizing big players</u>



First and foremost, the intra-day market is important for big players

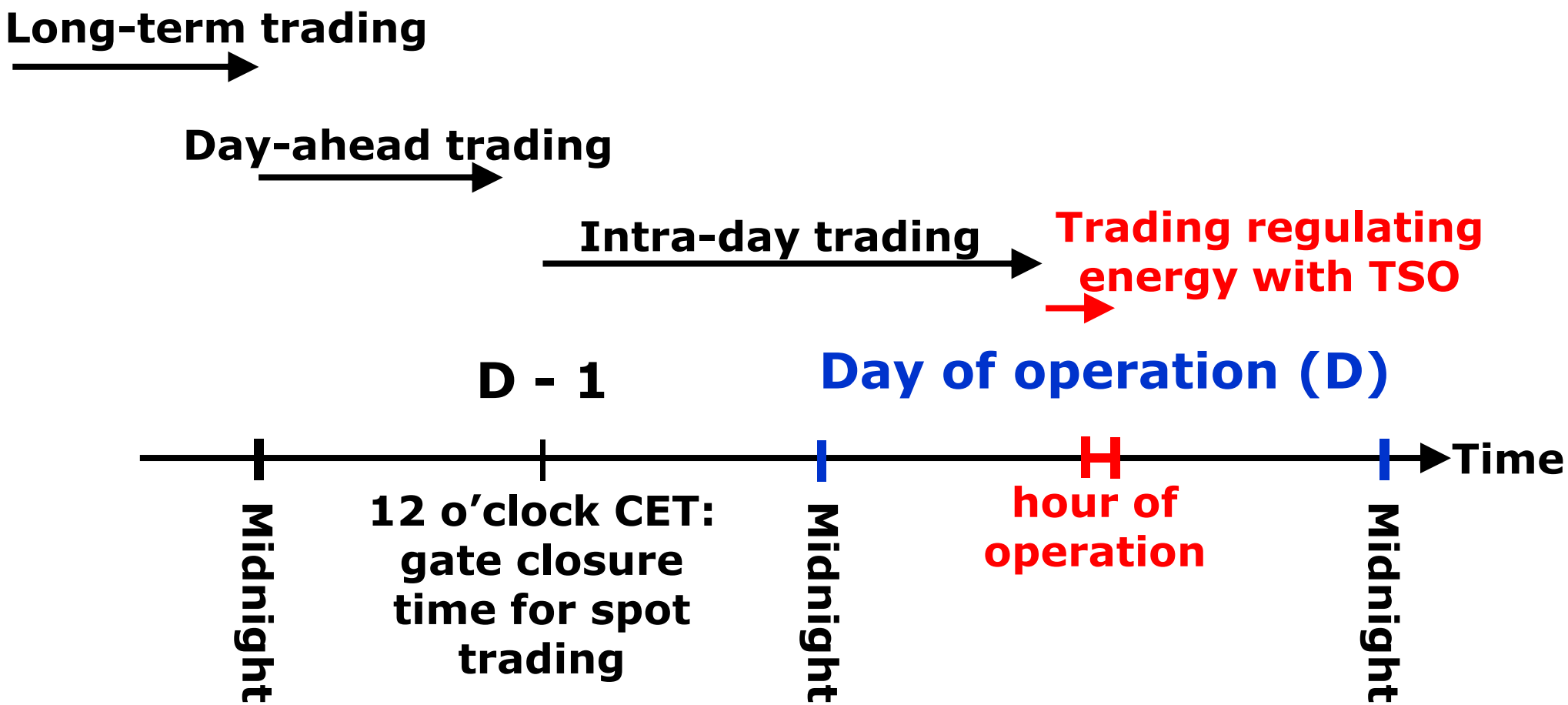
Who face the risk of big, unplanned outages.

Appendix 1

Time line for trading electrical energy in a large part of Europe

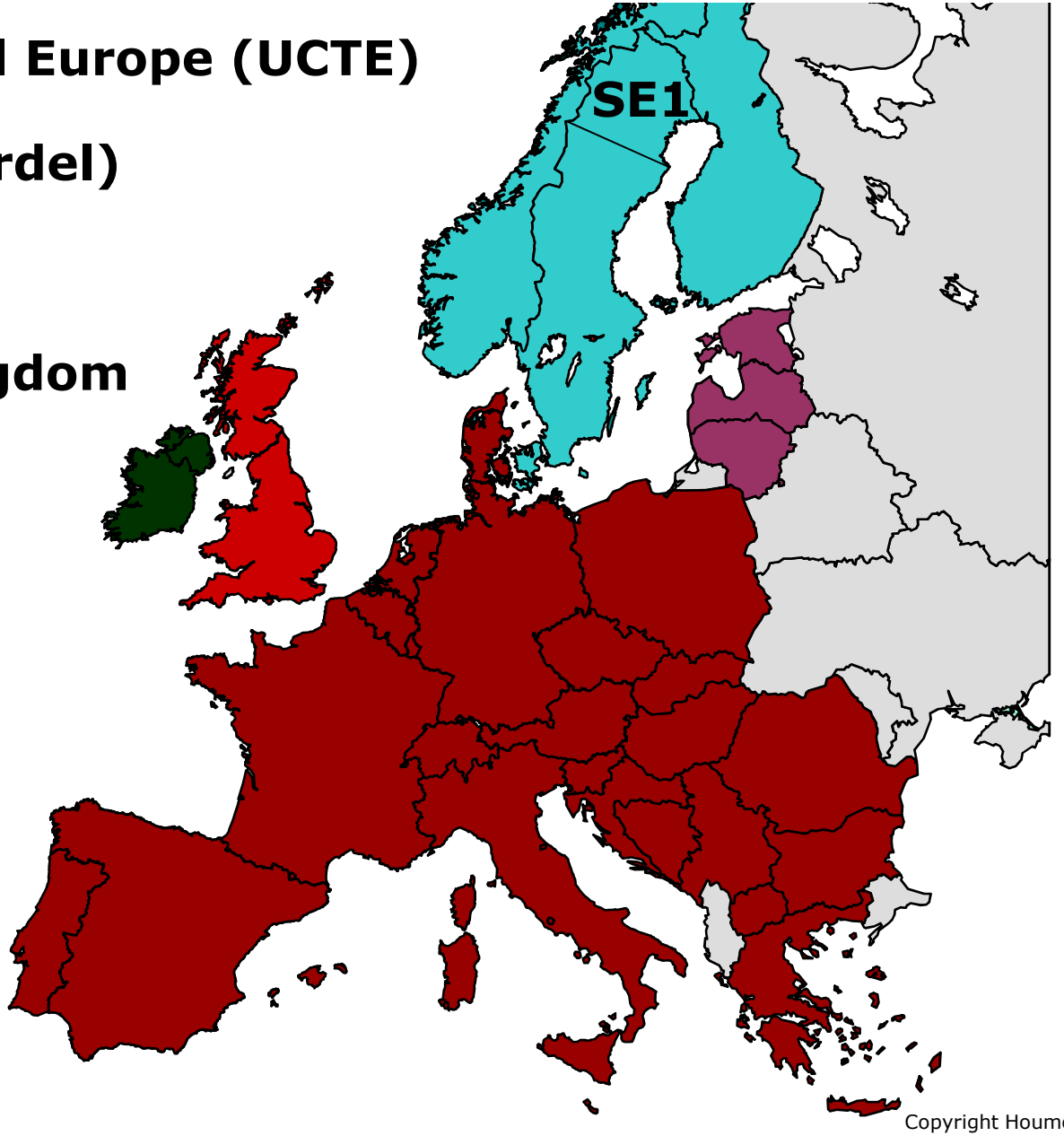
Day of operation:
The day where the electrical energy is produced and consumed.

Hour of operation:
The hour where the electrical energy is produced and consumed.



Appendix 2 Five of the synchronous grids in Europe

- RG Continental Europe (UCTE)
- RG Nordic (Nordel)
- RG Baltic
- RG United Kingdom
- RG Ireland



Appendix 2

The 7 DC links between Nordel and UCTE

DK1: Western Denmark DK2: Eastern Denmark

NorNed Norway–the Netherlands

Skagerrak Norway–DK1

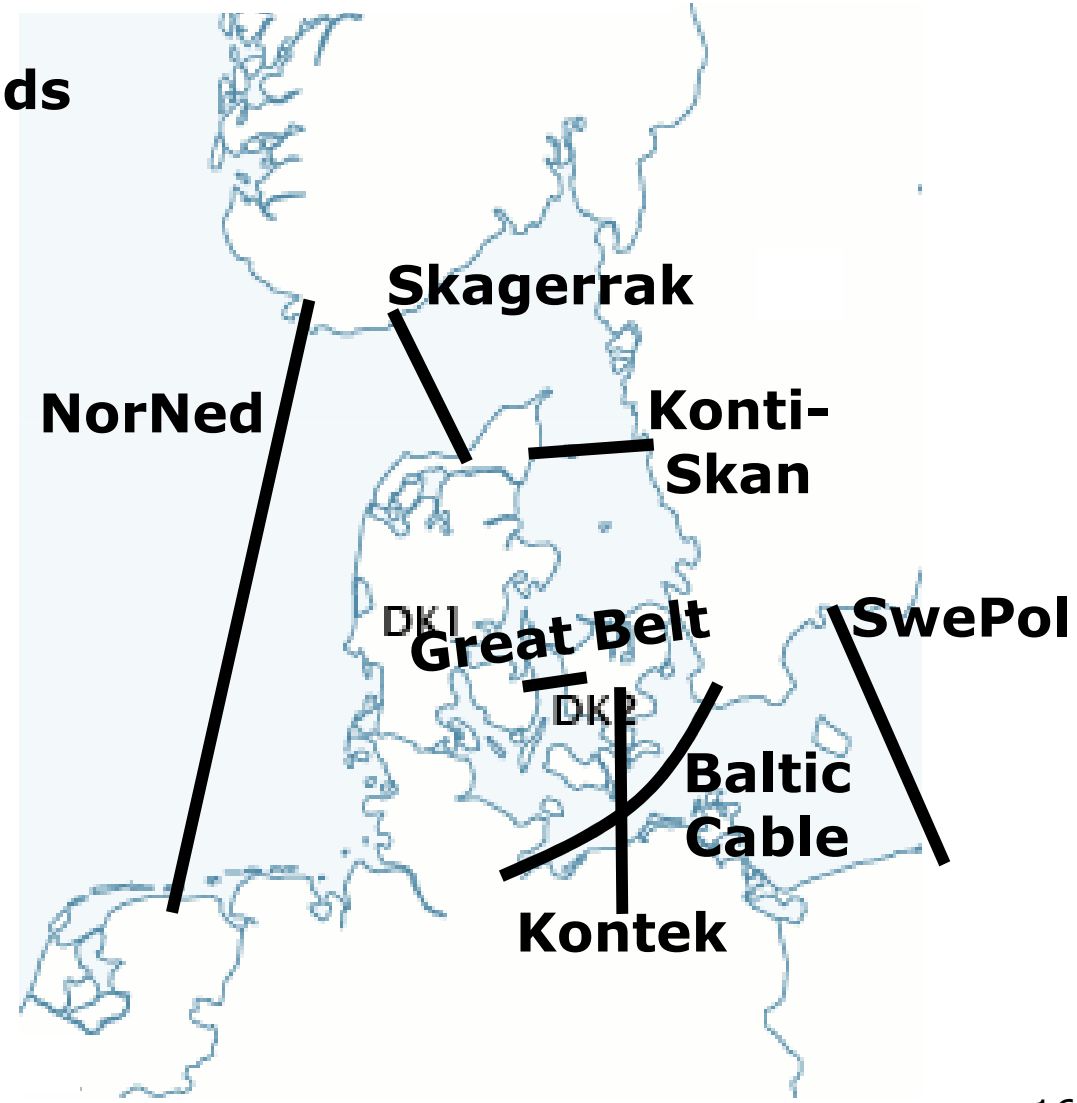
Konti-Skan Sweden–DK1

Great Belt DK2–DK1

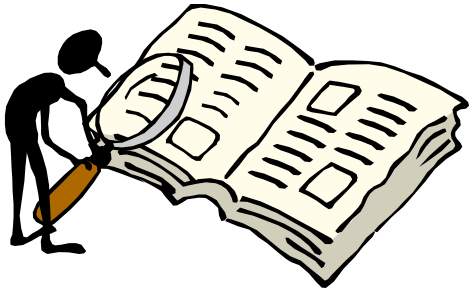
Kontek DK2–Germany

Baltic Cable Sweden–Germany

SwePol Sweden–Poland



Appendix 3
Terminology and acronyms



Terminology and acronyms – 1

- ***AC*** **Alternating current.**
- ***CET*** **Central European Time.**
- ***DC*** **Direct current.**
- ***EPEX Spot*** **See the web page epexspot.com.**
- ***Nord Pool Spot*** **See the web page nordpoolspot.com.**
- ***Price zone*** **A geographical area, within which the players can trade electrical energy without considering grid bottlenecks.**
- ***SE1*** **Sweden's northernmost price zone. Please refer to slide no. 15.**
- ***Synchronous grid*** **An electricity grid that operates at a synchronized frequency and is electrically tied together during normal system conditions.**

  In popular terms: in a synchronous grid, the electrons oscillate in lockstep.

  Two asynchronous grids can only be connected by means of DC links.

Terminology and acronyms – 2

As used in this presentation

- ***Trading platform*** **A computer system that can be used to place sales offers and purchase bids for electrical energy. The platform can also be used to execute trades.**

  The platform is similar to the electronic trading platforms used for trading shares, bonds and currencies.

  If a trading platform has access to a capacity database, the platform may include cross-border trading.

  Currently, each of the exchanges EPEX Spot and Nord Pool Spot operate a trading platform (Elbas is Nord Pool Spot's platform). However, neither of these platforms carry out pan-European intra-day trading. Also, these platforms are operated by exchanges engaged in spot trading

  Hence there's a lack of unbundling, as market coupling has made these spot exchanges monopolies. Please refer to the PowerPoint presentations *Market coupling – transparency, type, quality and unbundling* and *Market coupling makes real competition betw spot exchanges unfeasible*.

- ***TSO*** **Transmission System Operator.**

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Thank you for your attention!

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