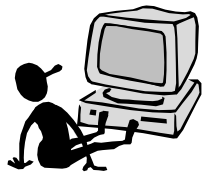
Introduction

- This presentation shows the daily operation of the European spot trading.
- Appendix 1 illustrates how the spot prices are calculated.
- Appendix 2 shows the timeline for trading of electrical energy.
- In appendix 3, you'll find a list of the terms and acronyms used in this presentation.
- Concerning the documents referred to in this presentation:
  - Unless otherwise stated, you can download the documents from www.houmollerconsulting.dk/facts-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***.



Spot trading

The daily calculation of prices and market coupling flows

- Every morning, players can send their purchase bids and sales offers to the spot exchanges
  - Deadline is 12 o'clock.

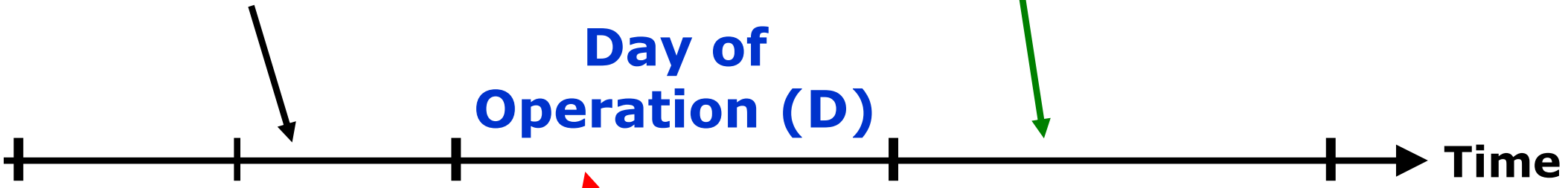
    This time is the so-called *gate closure*.
- Further, every day, around 10am or 10:30am, the TSOs publish the next day's cross-border grid capacities
  - The capacities, which will be available for market coupling.
- At 12 o'clock, the calculation of spot prices and market coupling flows starts.
- If everything goes according to plan, the prices & flows are published at 12:45pm
  - The results published at 12:45pm are preliminary. The final results are published just before 1pm.
- The procedures for the calculation of prices & flows are the same for the whole SDAC area.
- However, the settlement procedures may vary.

Settlement schedule – a case

Schedule is shifted during weekends and other bank holidays

2:15 pm D-1: Invoices and credit notes sent out electronically

11 am D+1: The exchange pays the sellers



Noon D-1: gate closure time for spot trading

11 am Day of Operation: Buyers pay the spot exchange

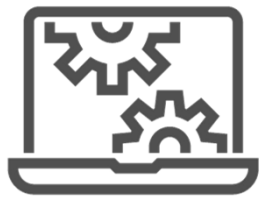
The players must post collateral towards the exchange (or towards the exchange's clearing house).

Mainly pledged cash account.

Appendix 1

Spot price calculation – a simple example

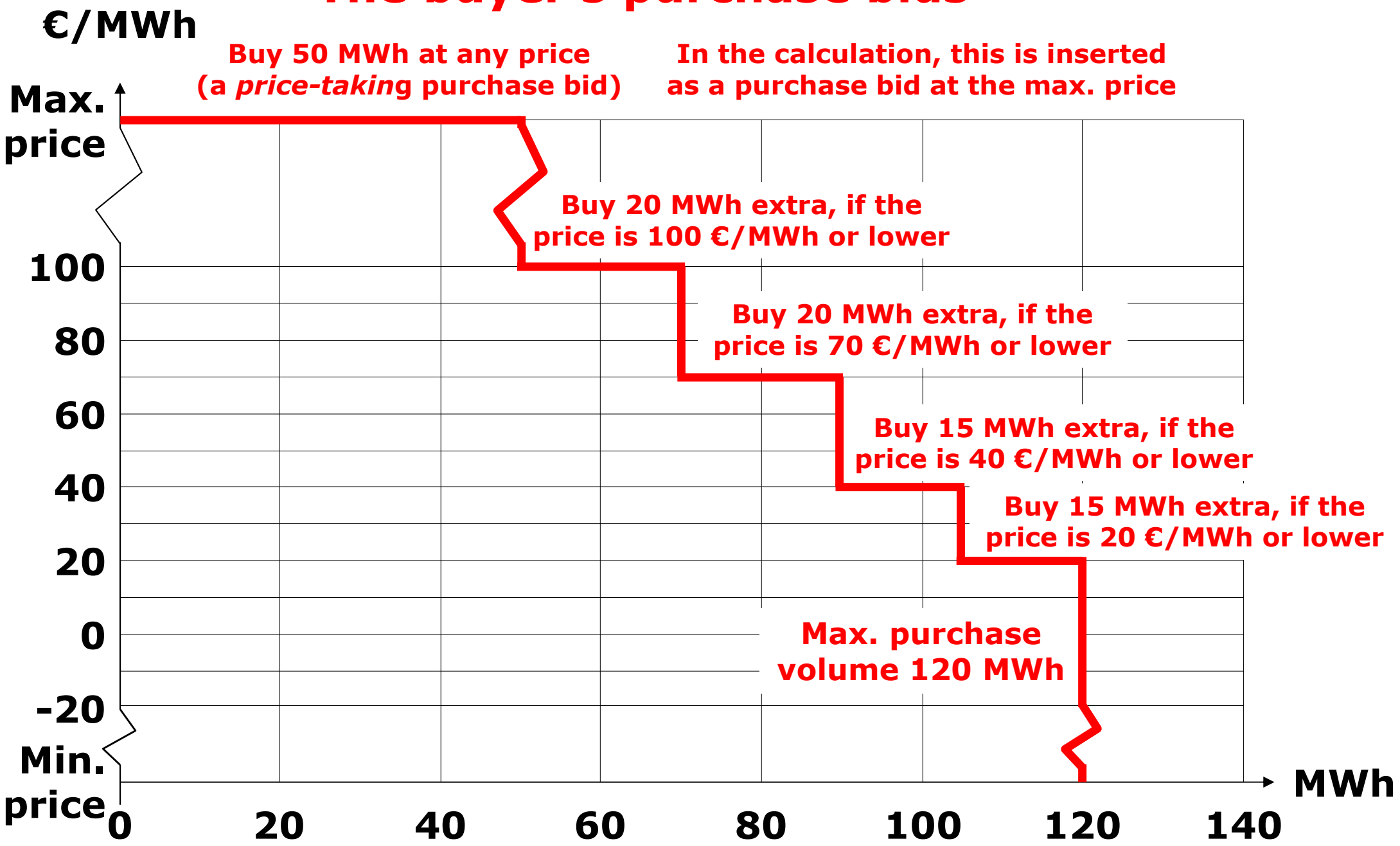
Spot price calculation – 1



- This appendix illustrates the calculation of the spot price for one hour of the next day
  - Hence, for one of the hours of the next day, this illustrates the process carried out between 12 and 12:45pm.
- The following is a very simple example:
  - Only one buyer.
  - Only one seller.
  - No block bids or other complicated bid forms.
  - Only one bidding zone
    - ✓ Consequently, no calculation of market coupling flows.
- The red curve indicates the buyer's purchase bids.
- The green curve indicates the seller's sales offers.
- Even in this simple example, there will 23 other calculations each similar to the calculation shown at the next slide
  - One calculation for each hour of the next day.

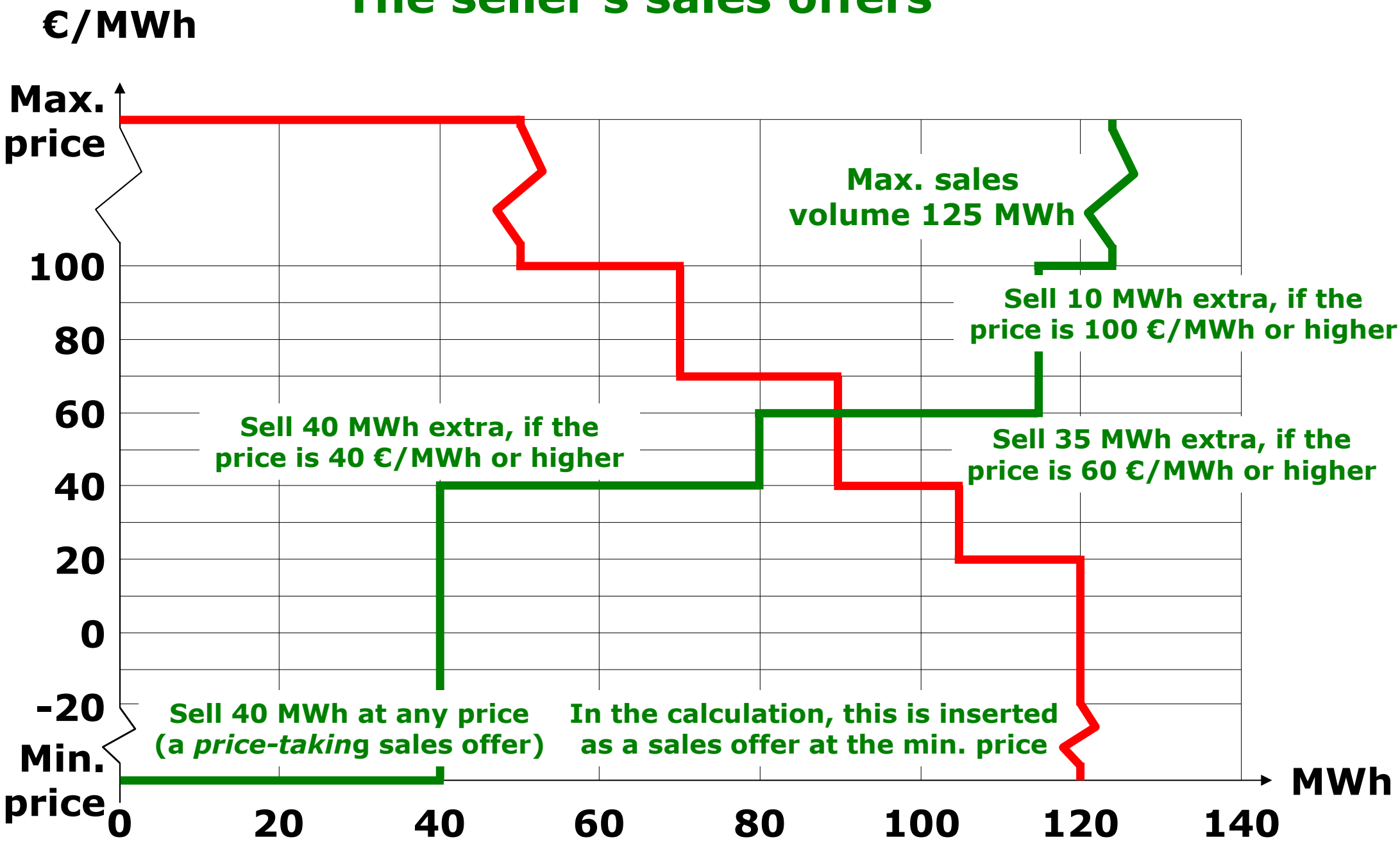
Spot price calculation – 2

The buyer's purchase bids



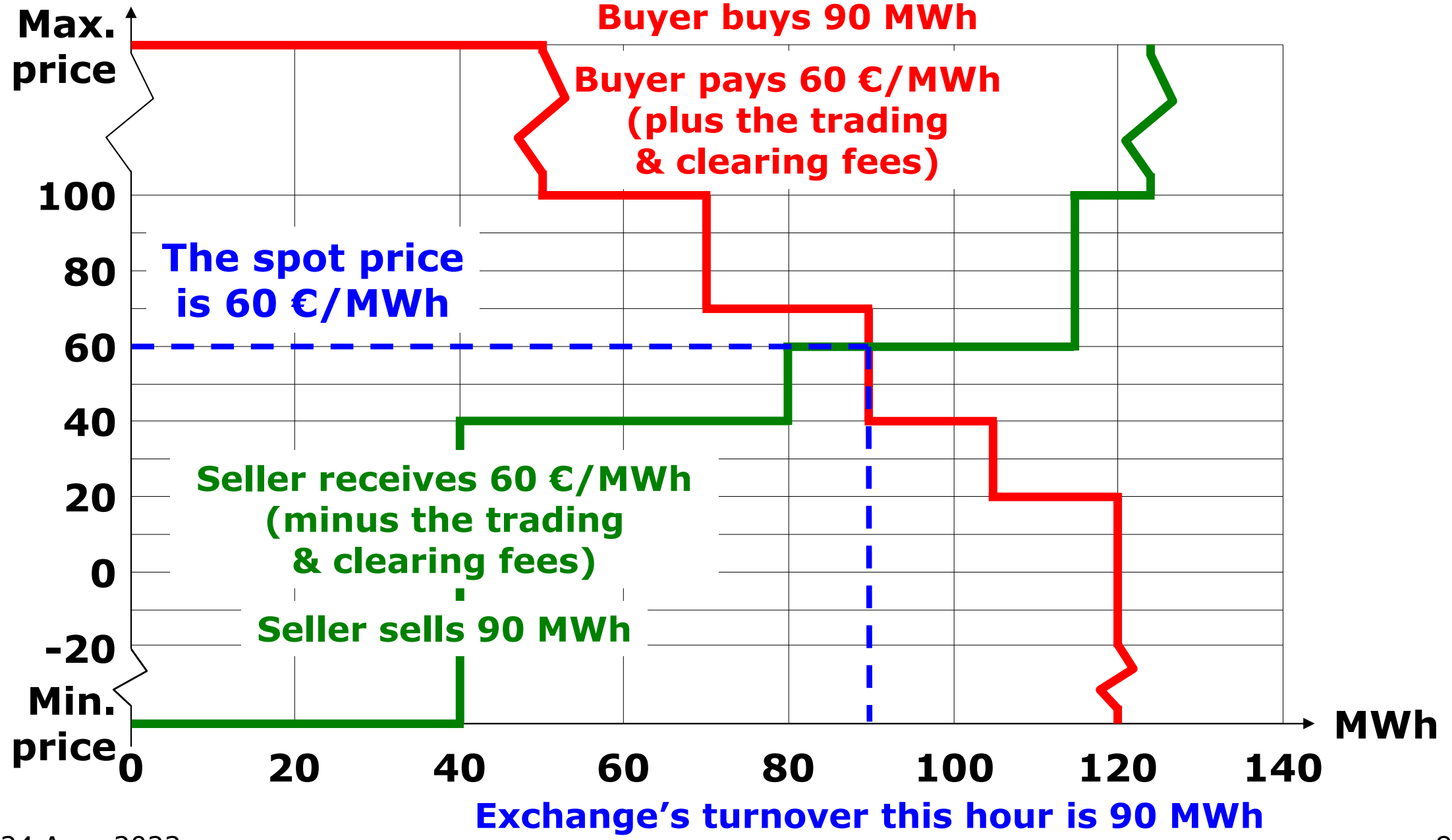
Spot price calculation – 3

The seller's sales offers



Spot price calculation – 4

Price and traded volume

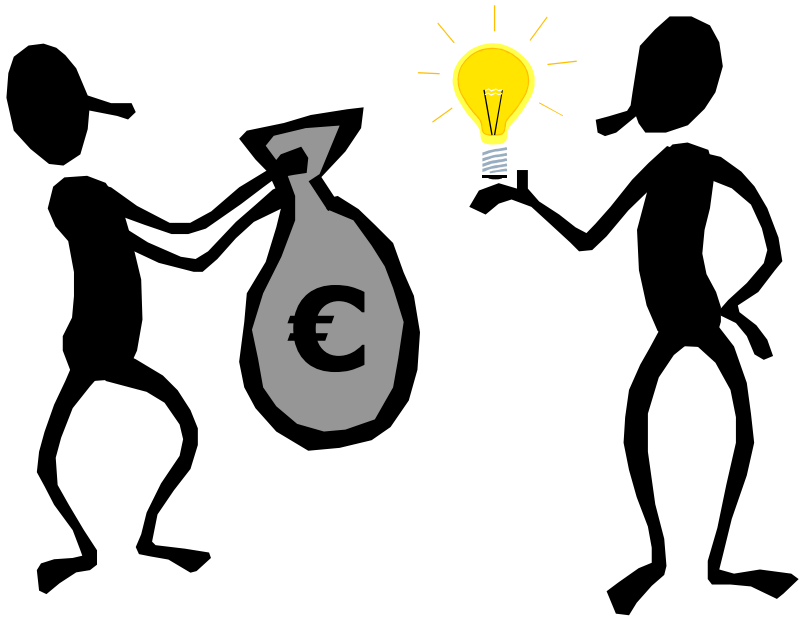


More information

- If you have more than one seller and one buyer, the red and the green curves at the previous slides will look almost the same. In this case:
  - The red curve will be the sum of many buyers' purchase bids.
  - The green curve will be the sum of many sellers' sales offers.
  - Hence, the volumes will be bigger – and there will be more steps on the red and green curves
    - ✓Otherwise, the picture will be the same.
- To get more information on the calculation of spot prices <u>and</u> market coupling flows, please see:
  - The PowerPoint presentation ***Market coupling and spot price calculation.***
  - and/or
  - The chapters 8-12 in the PDF document ***The Liberalized Electricity Market***.

Appendix 2

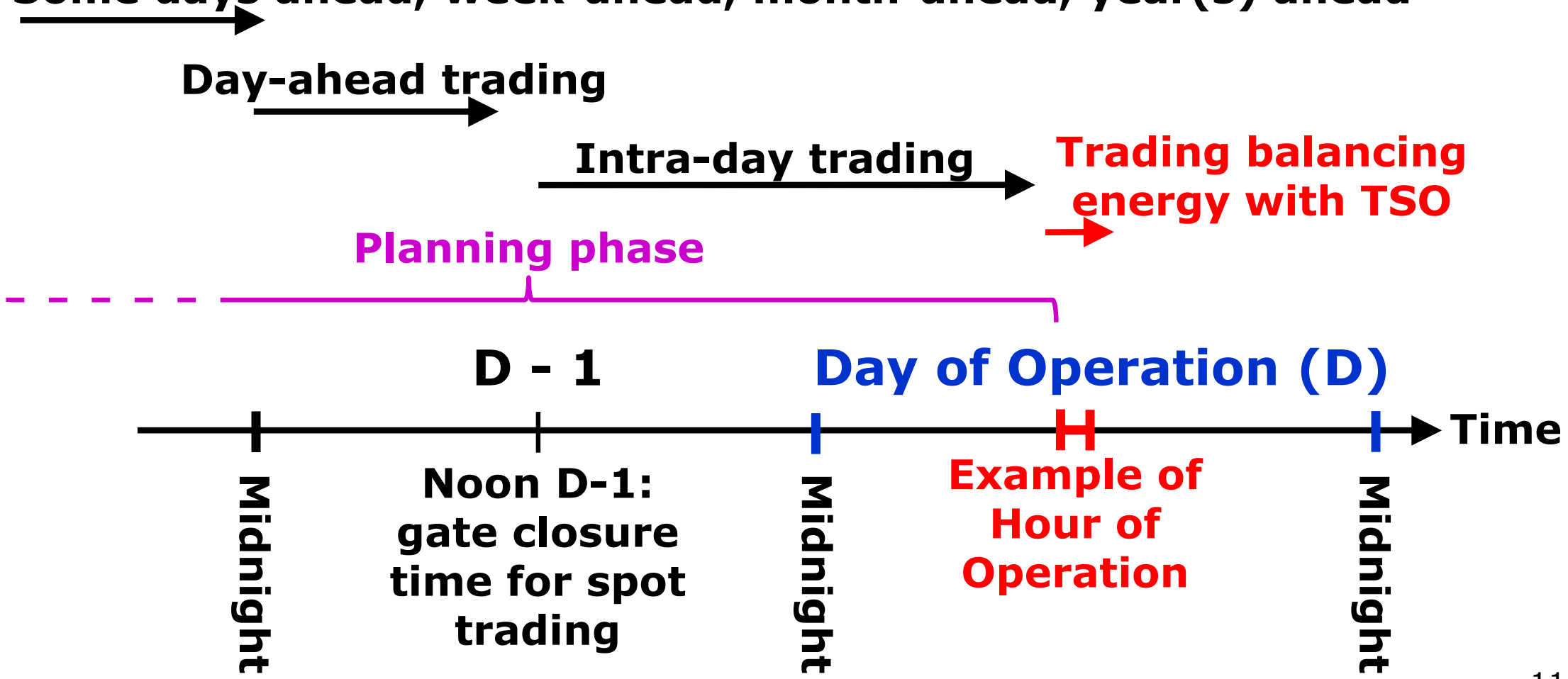
Timeline for trading electrical energy in EU



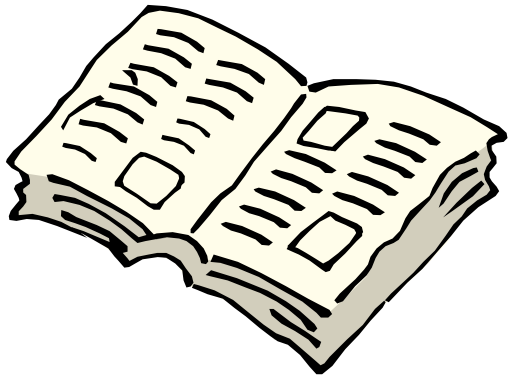
Timeline for trading electrical energy in EU

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.

Long-term contracts (physical and financial):
Some days ahead, week-ahead, month-ahead, year(s) ahead



Appendix 3
Terminology and acronyms



Terminology and acronyms – 1
As used in this presentation

- ***12 o'clock*** **In this document, this is noon (<u>not</u> midnight).**
- ***Bidding zone*** **A geographical area, within which the players can trade electrical energy day-ahead without considering grid bottlenecks.**
- ***Block bid*** **See appendix 1 of the PowerPoint presentation *Market coupling – European price coupling*.**
- ***D*** **Day of Operation.**
- ***Day of Operation*** **The day where the electrical energy is produced & consumed.**
- ***Flow*** **Short for market coupling flow.**
- ***Market coupling*** **See the PDF document *The Liberalized Electricity Market* and the PowerPoint presentation *Unbundling and EU's Single Electricity Market*.**
- ***Market coupling flow*** **Plan for the next day's cross-border energy flows calculated by the spot calculation system. See also market coupling.**
- ***Maximum price*** **At the time of writing, for most spot exchanges in the SDAC area, the maximum price is 4,000 €/MWh.**
- ***Minimum price*** **At the time of writing, for most spot exchanges in the SDAC area, the minimum price is -500 €/MWh.**

Terminology and acronyms – 2
As used in this presentation

- ***SDAC*** **Single Day-Ahead Coupling. See https://www.entsoe.eu/network_codes/cacm/implementation/sdac/**
- ***Spot calculation system*** **In this document, this means the system, which calculates both the spot prices and the market coupling flows.**
- ***Spot price*** **See the PowerPoint presentation *Maximizing the economic value of market coupling and spot trading*.**
- ***Spot trading*** **In this document, this means trading electrical energy day-ahead with an exchange.**

  "Day-ahead" means the players are selling & buying electrical energy, which is produced & consumed the next day.

  The prices, at which the players trade, are set by using the demand and supply curves created by the players' bids (see appendix 1).
- ***Time*** **The hours in this presentation are CEST (Central European Summer Time). You may refer to Wikipedia.**

  Hence, for example, 12:45pm means 12:45pm CEST.
- ***TSO*** **Transmission System Operator. See https://www.entsoe.eu/about/**

Thank you for your attention!

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