

# Commodity Trading Introduction to Markets

7.3.2011

# Transportation

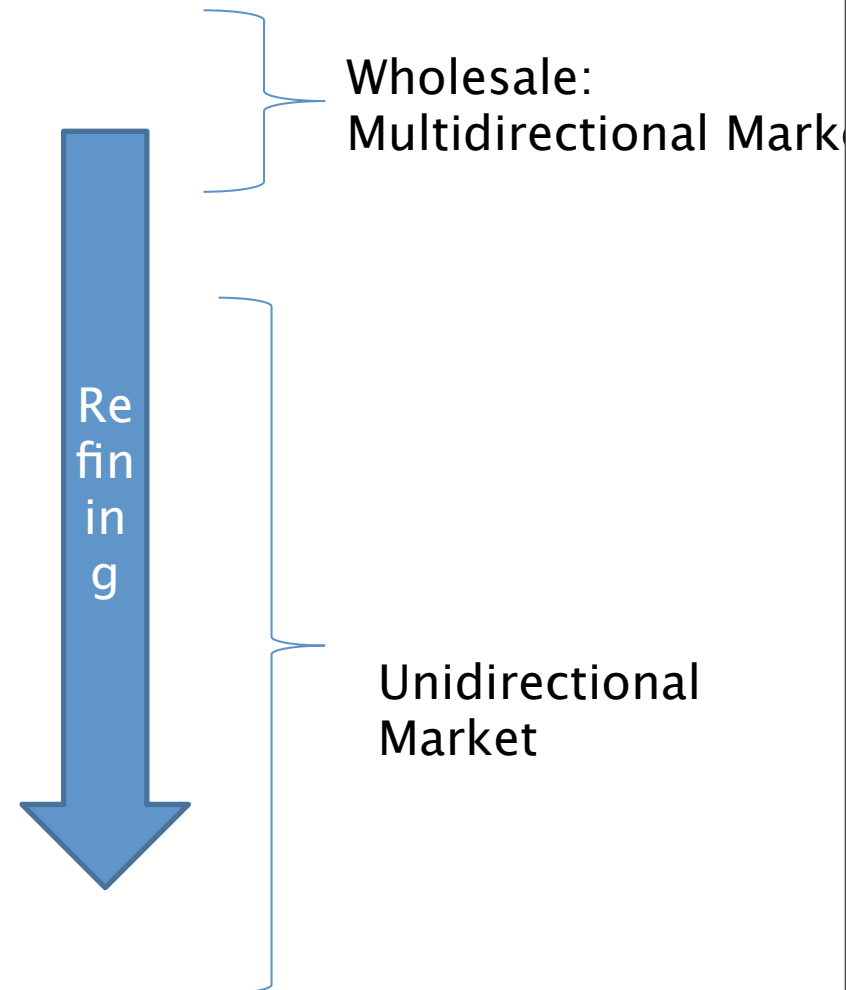
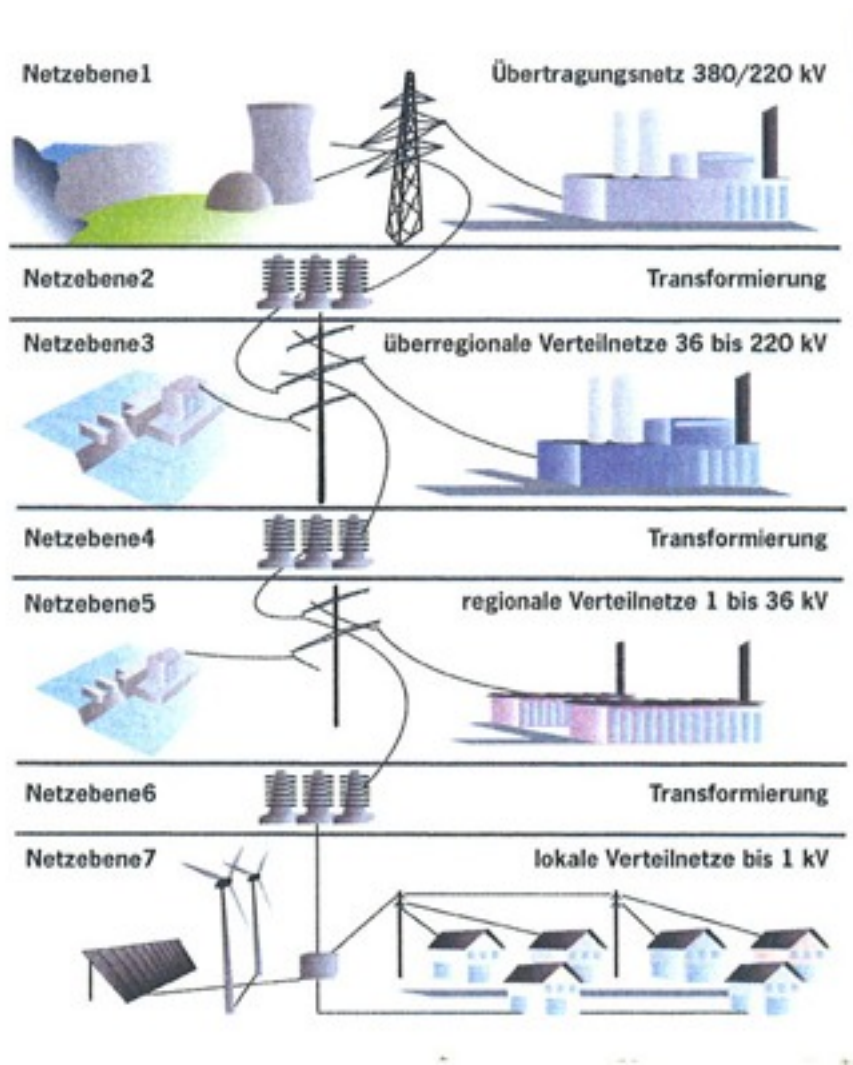


**Physics: Higher Voltage Transportation – Less Energy Loss**

# Transportation

- **Physics: Higher Voltage  
Transportation – Less Energy Loss**
- 1950s: International (Cross Border) Grids (CH-I / CH-D-F)
- 1967 Grids of F-D-CH merge (technically) on 220 kV Level. „UCPTE1“  
14 more countries join
- 2005 EU allows Cross Border Auction

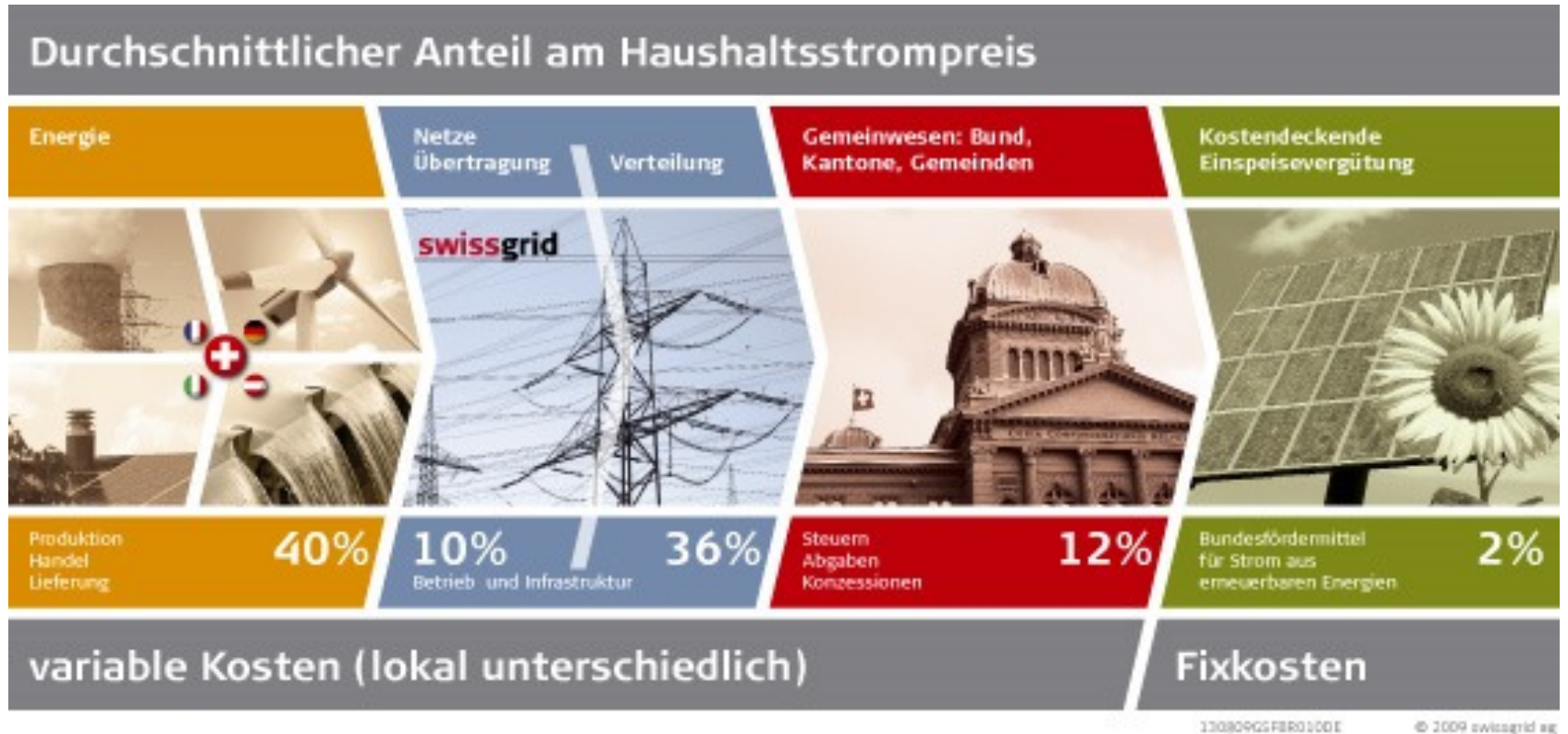
# Different Grid Levels (Voltage)



# Storage: Electricity as such is NOT storable – Flexible

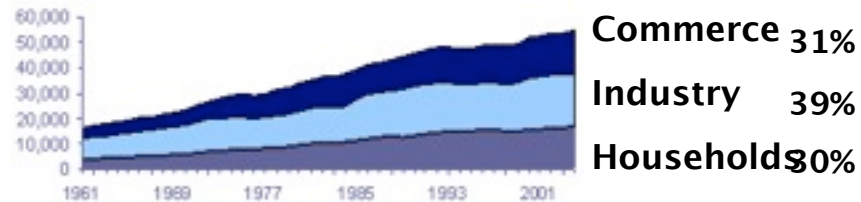


# Retail Price Composition

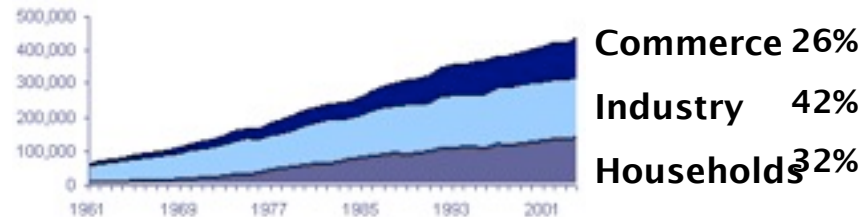


# Demand Structure

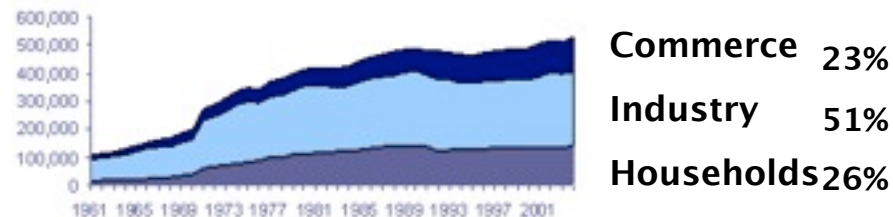
## Switzerland



## France



## Germany



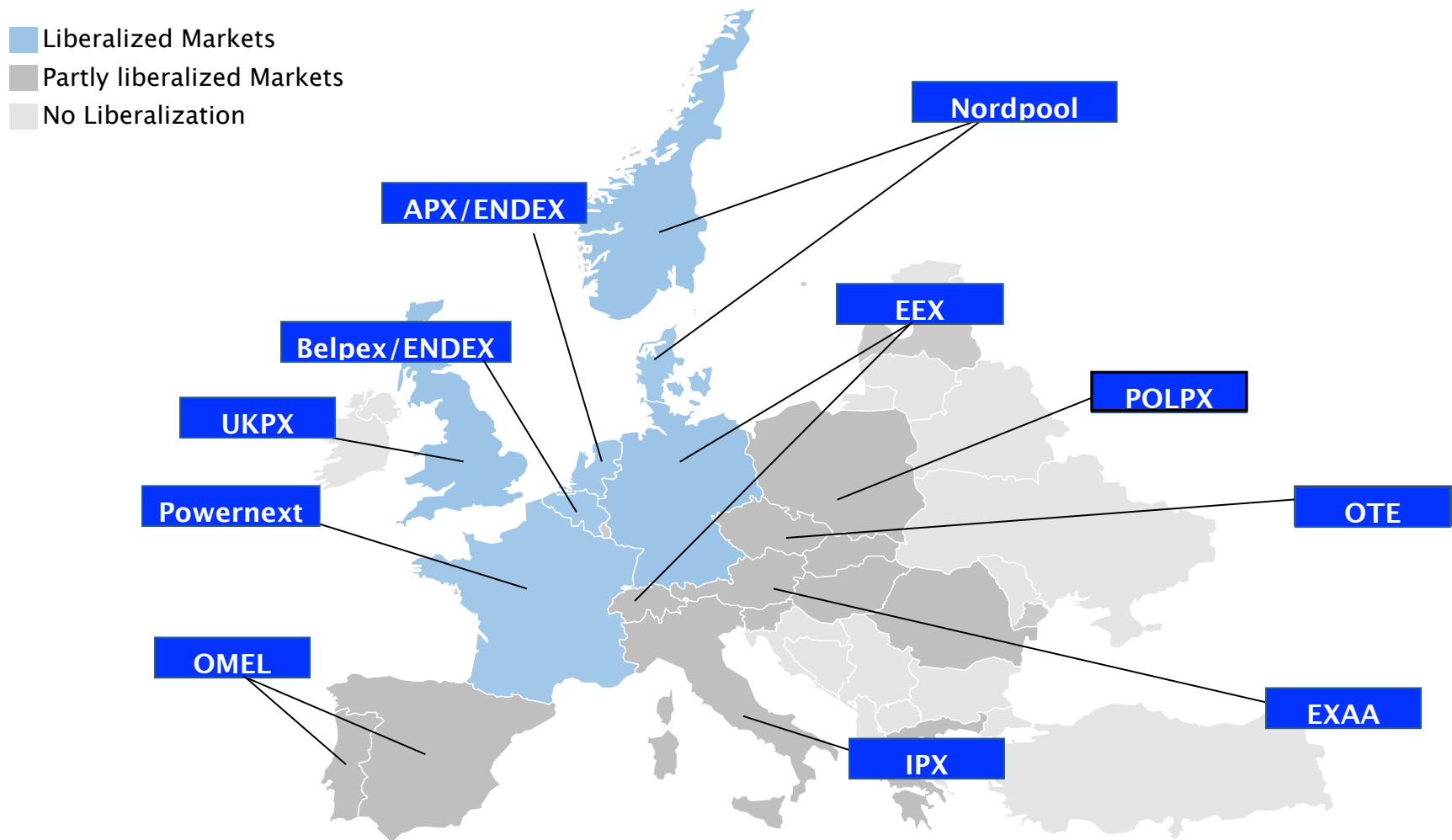
Commerce includes Public Administration

# Demand Determined by

- Economic Growth
- Temperature
- Daylight / Daytime
- Day in Week
  
- Generally Inelastic



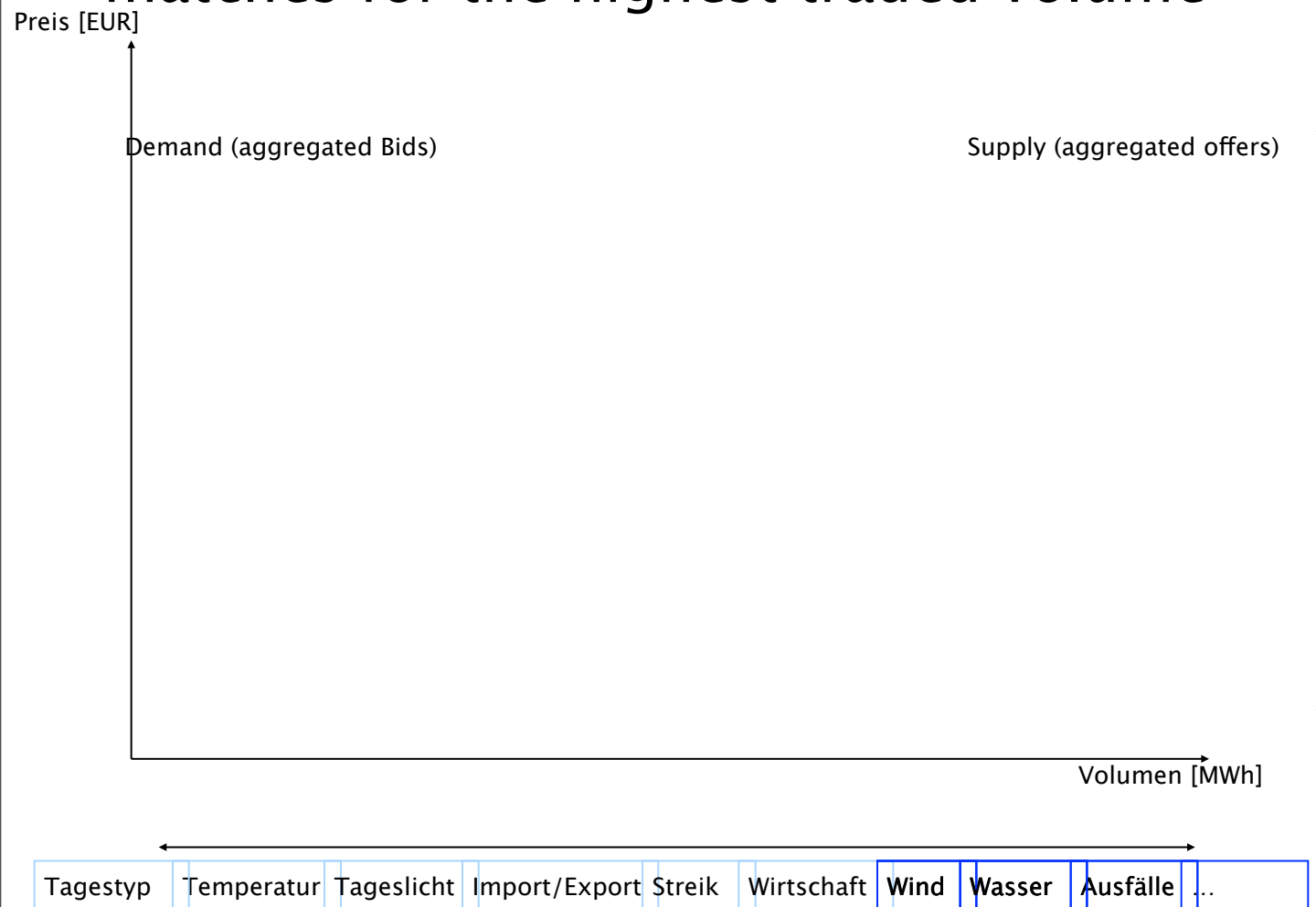
# Electricity Exchanges in Europe (2008)



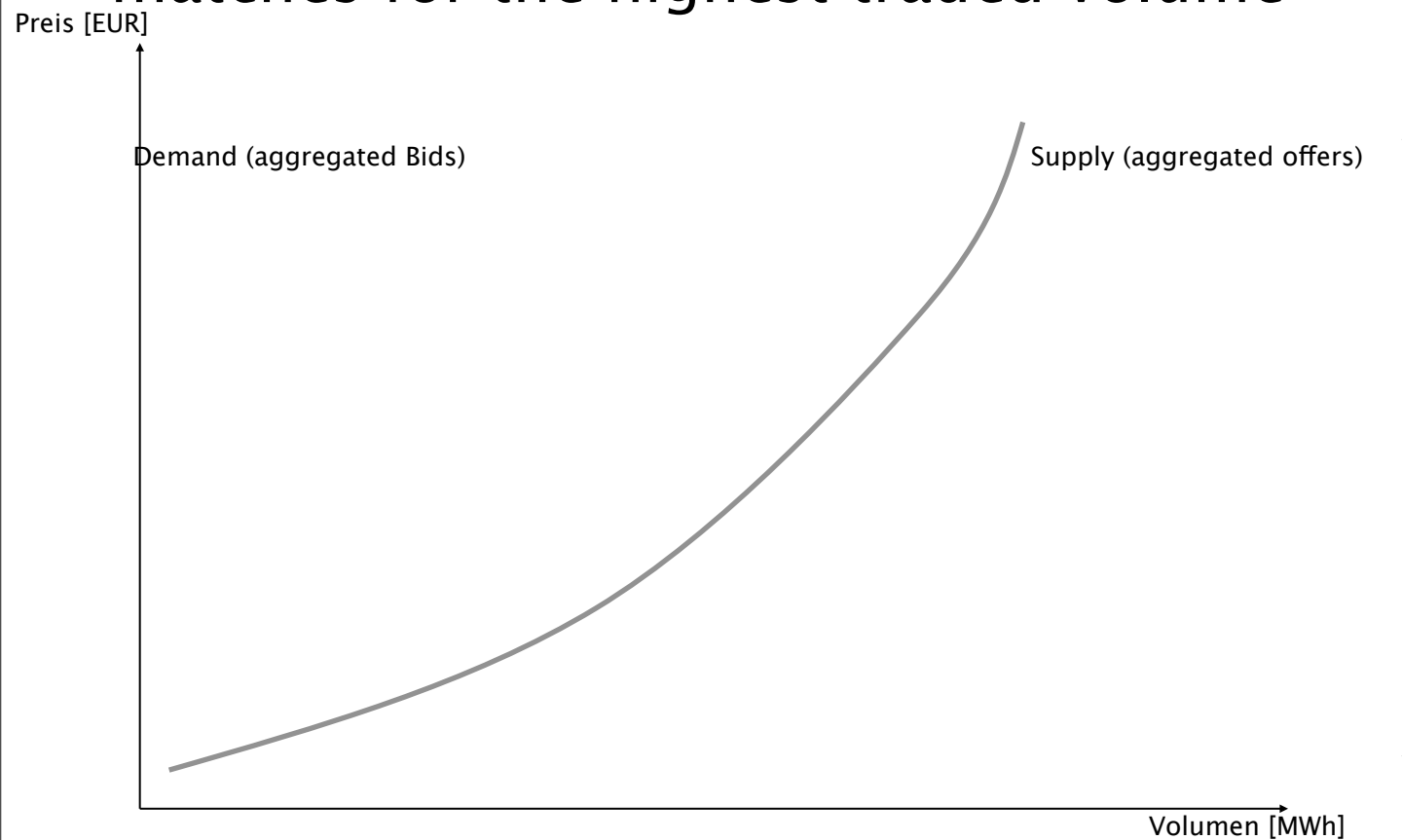
# Trading Volume increases, but less than one third at exchanges

\* Messbares Handelsvolumen an Börsen und über elektronische Brokerplattformen OTC

# At exchange the aggregated supply and demand matches for the highest traded volume

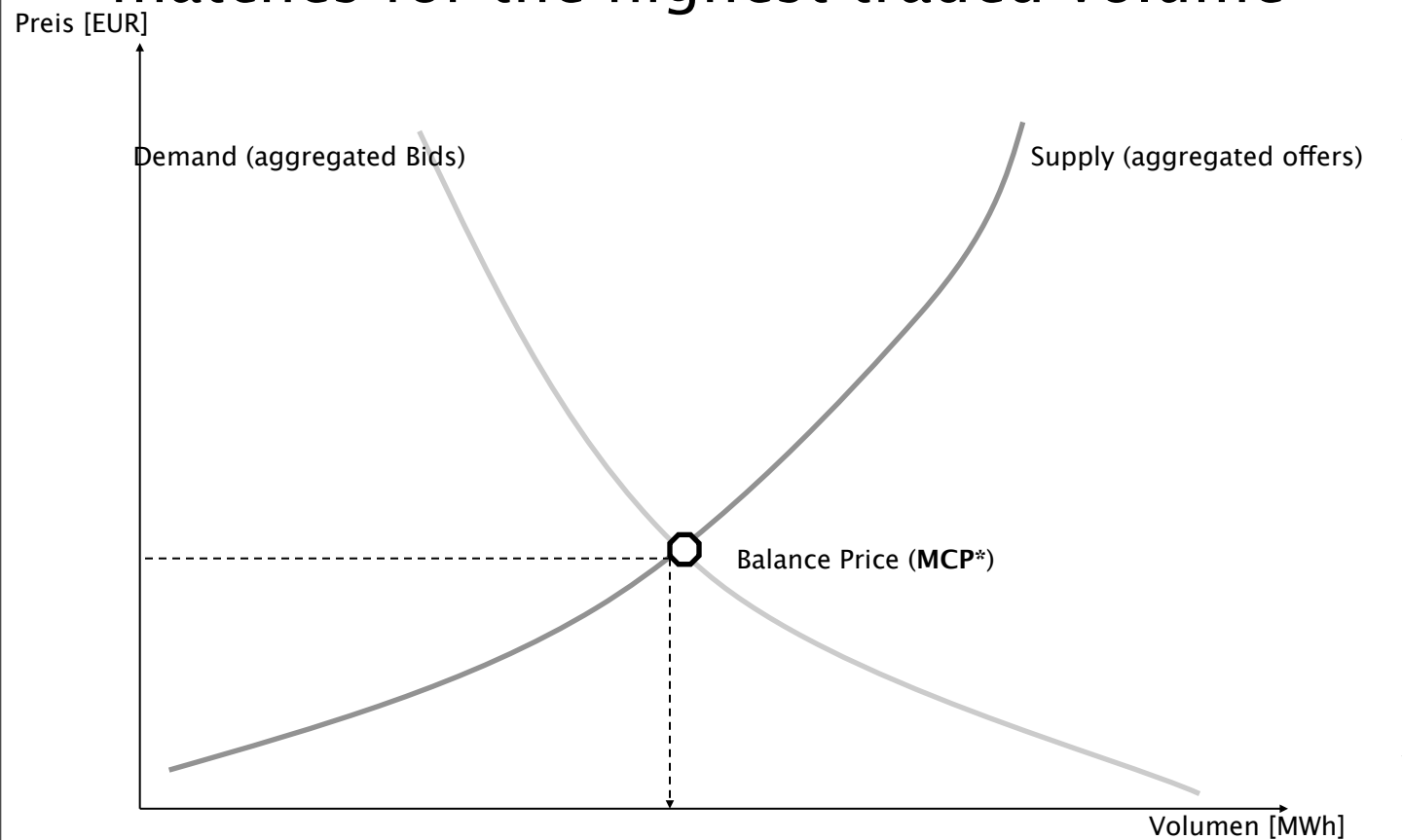


# At exchange the aggregated supply and demand matches for the highest traded volume



Tagestyp	Temperatur	Tageslicht	Import/Export	Streik	Wirtschaft	Wind	Wasser	Ausfälle	...
----------	------------	------------	---------------	--------	------------	------	--------	----------	-----

# At exchange the aggregated supply and demand matches for the highest traded volume

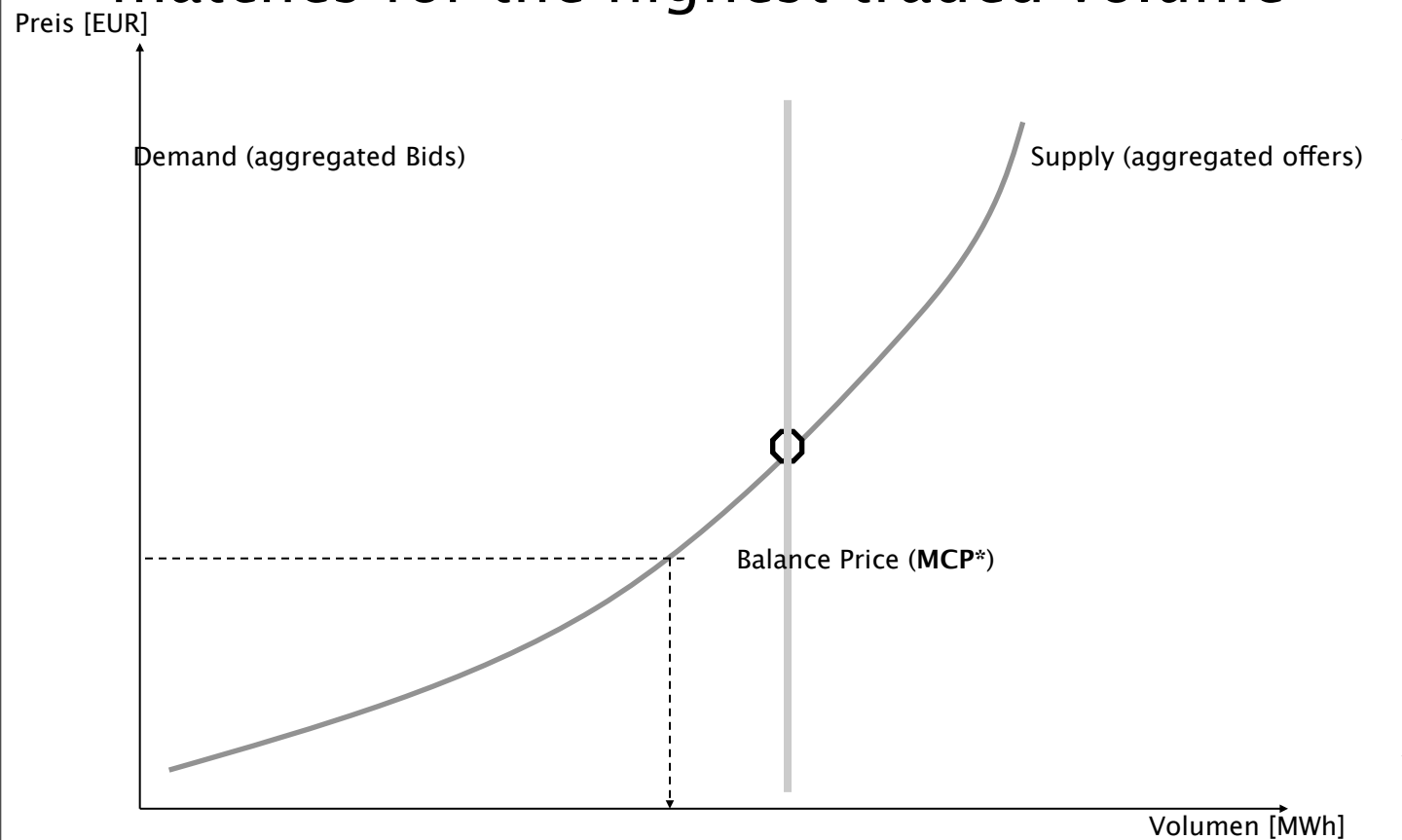


← Tagesstyp Temperatur Tageslicht Import/Export Streik Wirtschaft Wind Wasser Ausfälle ... →

Das Diagramm zeigt die Ermittlung des Balance Price (MCP\*) in einem Strommarkt. Die vertikale Achse stellt den Preis in EUR dar, die horizontale Achse das Volumen in MWh. Eine fallende Kurve stellt die 'Demand (aggregated Bids)' dar, eine steigende Kurve die 'Supply (aggregated offers)'. Eine vertikale graue Linie markiert das Gleichgewichtsvolumen. Der Schnittpunkt der Kurven an diesem Volumen ist als 'Balance Price (MCP\*)' gekennzeichnet. Gestrichelte Linien verbinden diesen Punkt mit den Achsen. Ein vertikaler Doppelpfeil auf der rechten Seite des Diagramms deutet auf die Preisänderung hin.



# At exchange the aggregated supply and demand matches for the highest traded volume



Tagestyp	Temperatur	Tageslicht	Import/Export	Streik	Wirtschaft	Wind	Wasser	Ausfälle	...
----------	------------	------------	---------------	--------	------------	------	--------	----------	-----

The diagram illustrates the market clearing process in a power market. The vertical axis is labeled 'Preis [EUR]' and the horizontal axis is labeled 'Volumen [MWh]'. A downward-sloping curve represents 'Demand (aggregated Bids)' and an upward-sloping curve represents 'Supply (aggregated offers)'. A vertical grey line indicates the total volume of orders. The intersection of this vertical line and the supply curve is marked with a circle and labeled 'Balance Price (MCP\*)'. Dashed lines show the corresponding price on the demand curve and the volume on the supply curve at this price level.





# Market and Products

## ■ Markets

- ☐ OTC (Contracts/ Broker)
- ☐ Exchanges

## ■ Standard Products

- ☐ Day Ahead
- ☐ Week Ahead
- ☐ Front Months
- ☐ Front Quarters
- ☐ Front Years

Spot

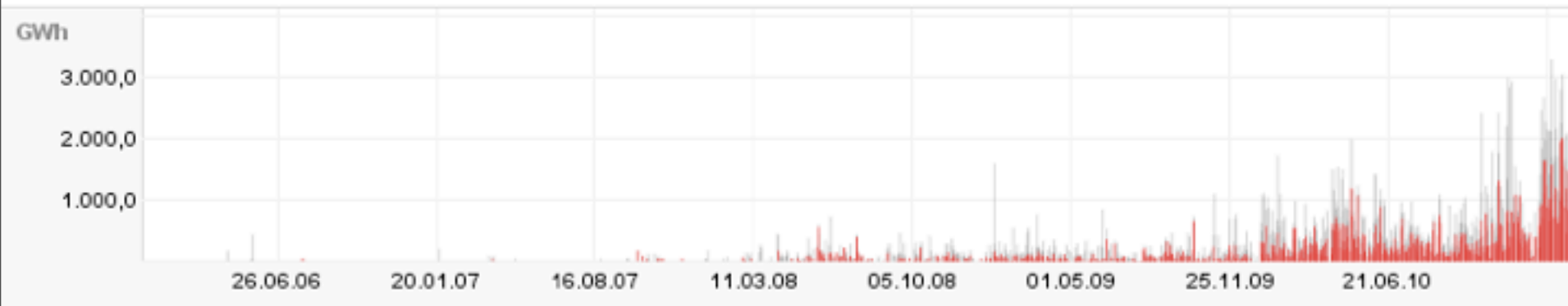
Term or Forward

# Price Development 5Y

Preis



Volumen



Optionen

Samstag, 4. Juni 2011

# Conventions

- X buys 10 MW „Cal 2012 base“ RWE Grid at 52€ from Y

means:

Y delivers from 1.1.2012 0am till 31.12.2012 12pm 10 MW for X into the RWE Grid.

X pays (monthly 20 bd after end of month) the exact amount energy (in MWh) delivered times 52€. I. e. all

# Hourly price week of 18. to 24.12.09

Price

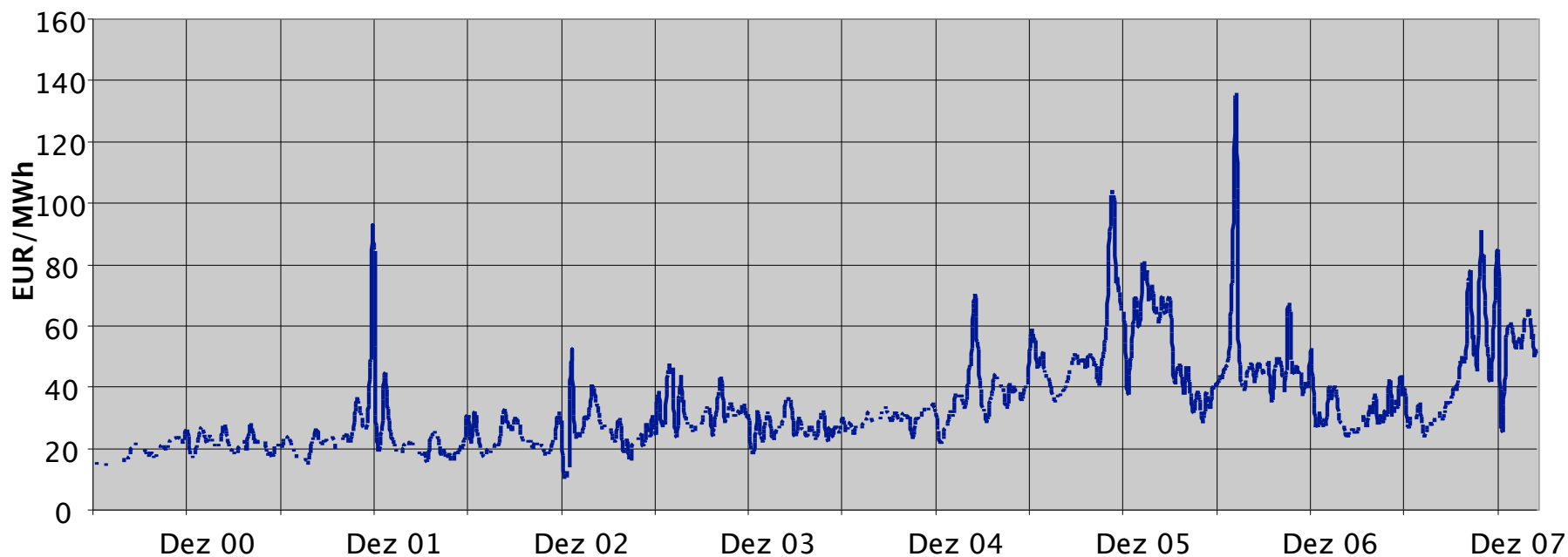
Hour

# Hourly price week of 25. to 31.12.09

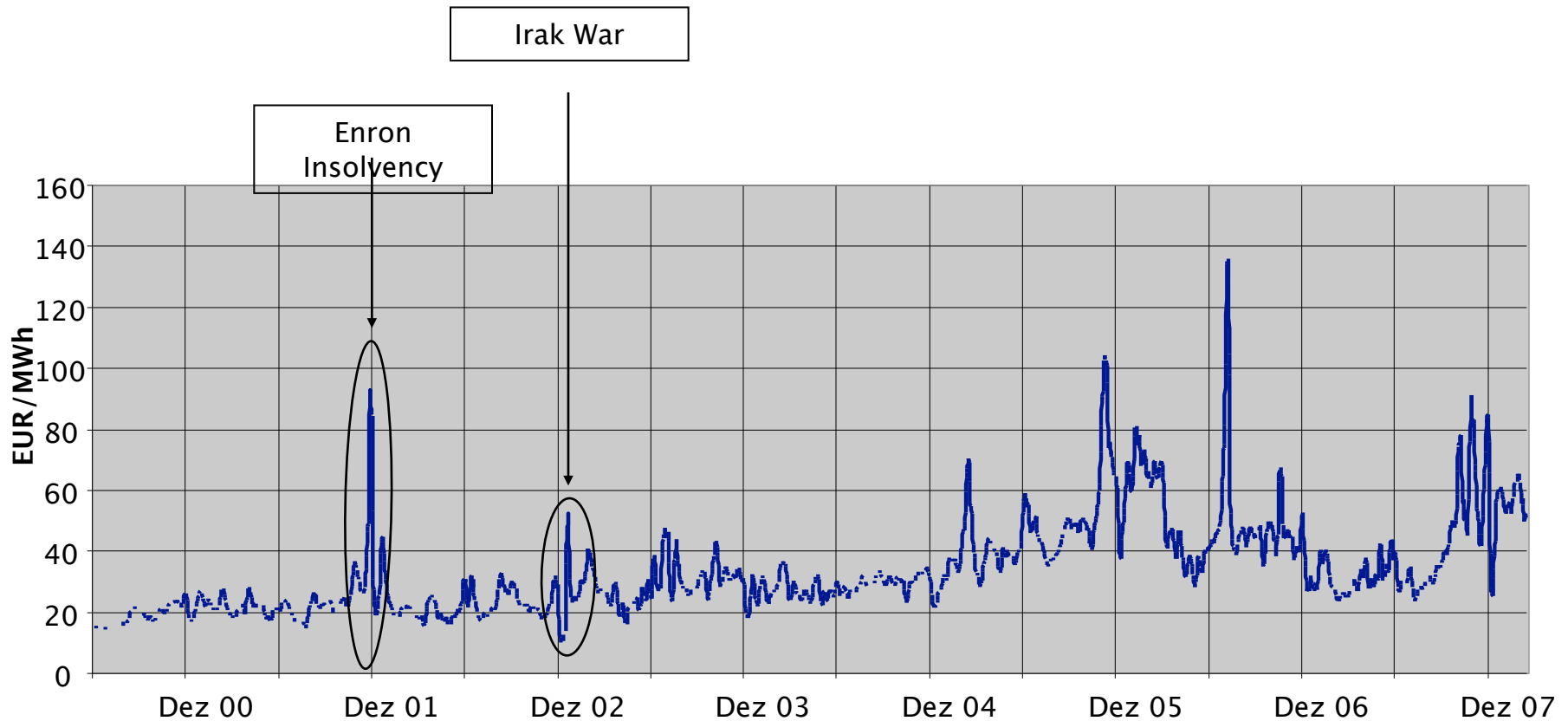
Price

Hour

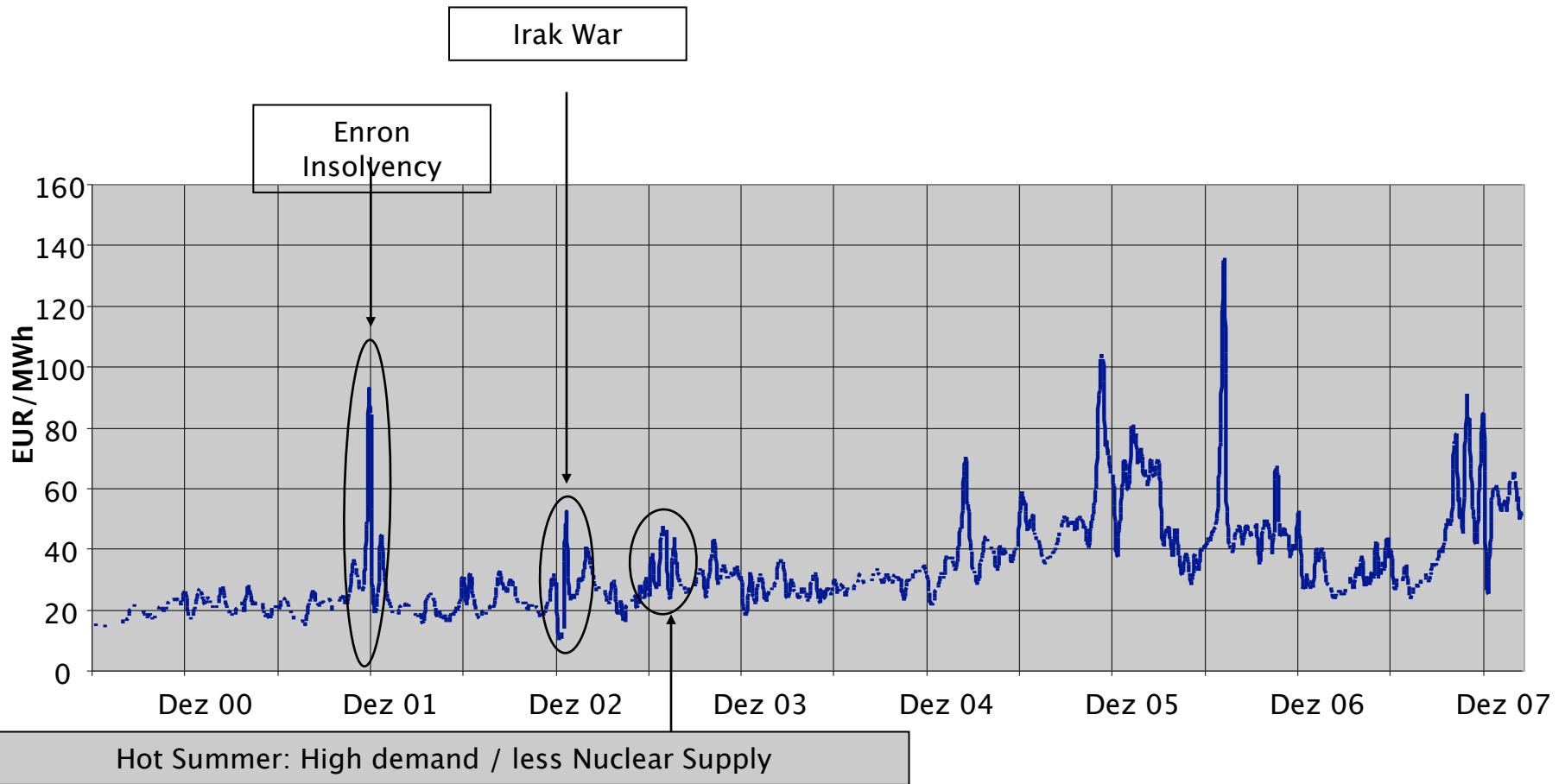
# 7- Days Average EEX Spot Prices (base) tell the history



# 7- Days Average EEX Spot Prices (base) tell the history

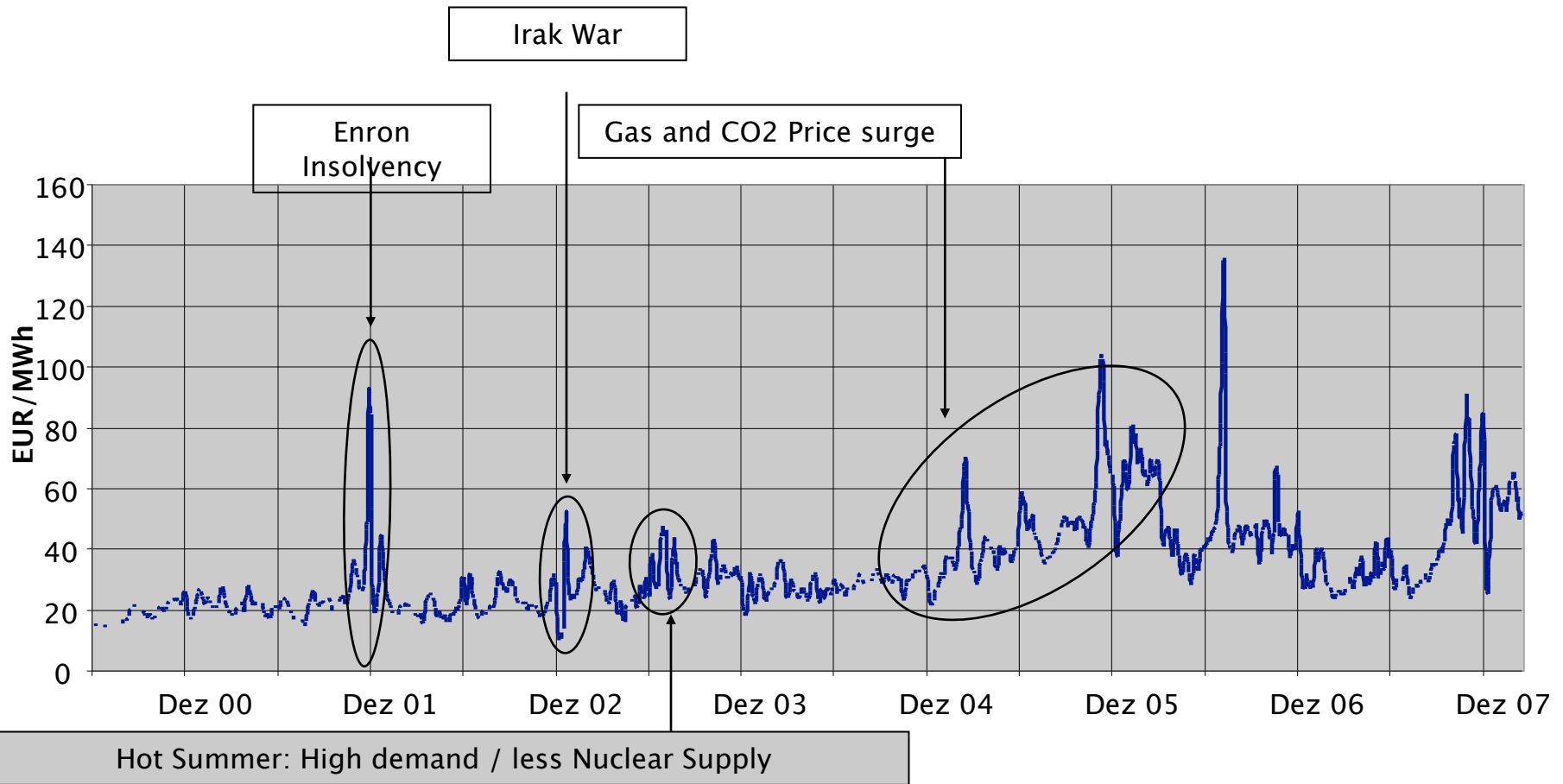


# 7- Days Average EEX Spot Prices (base) tell the history

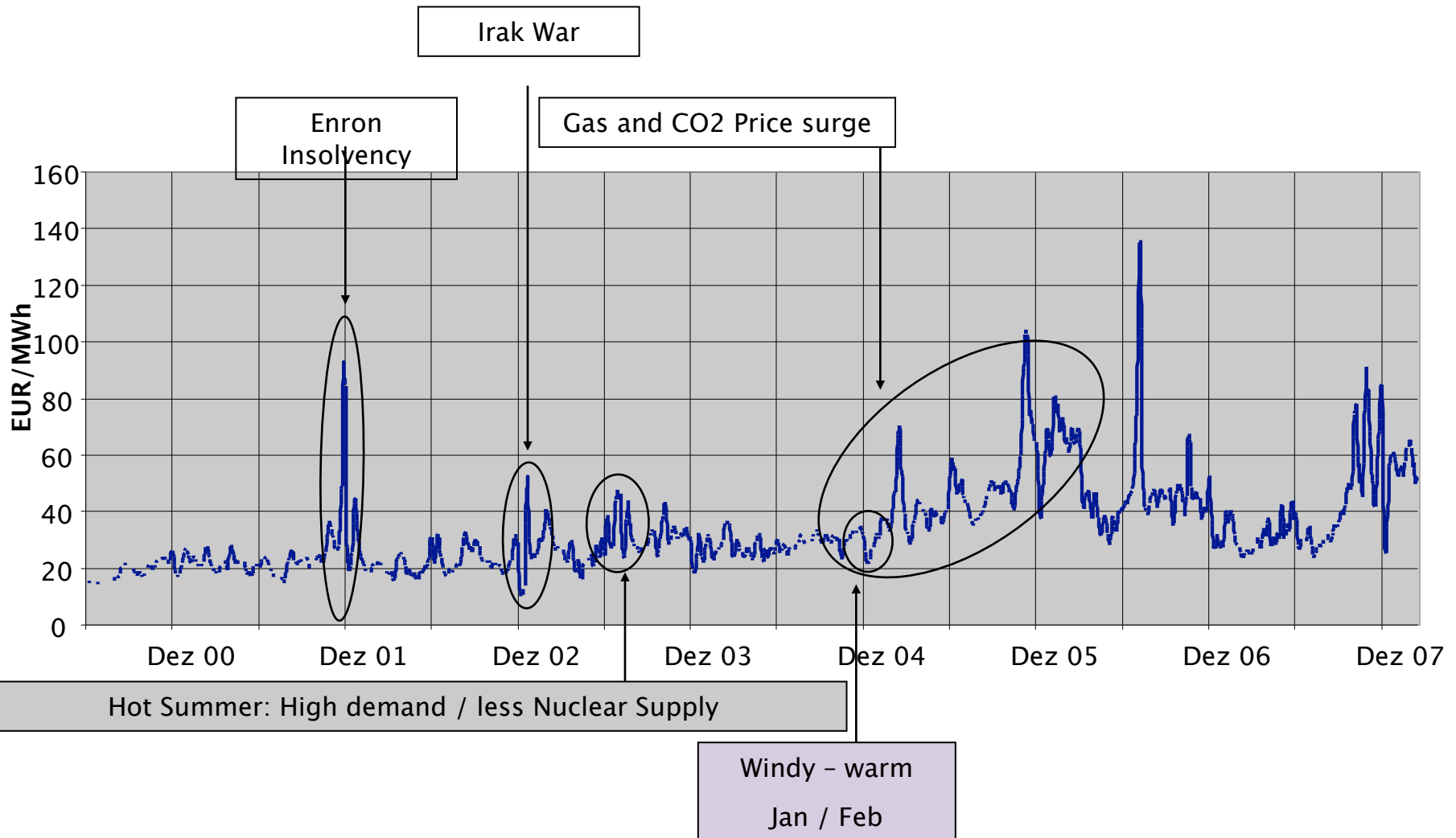




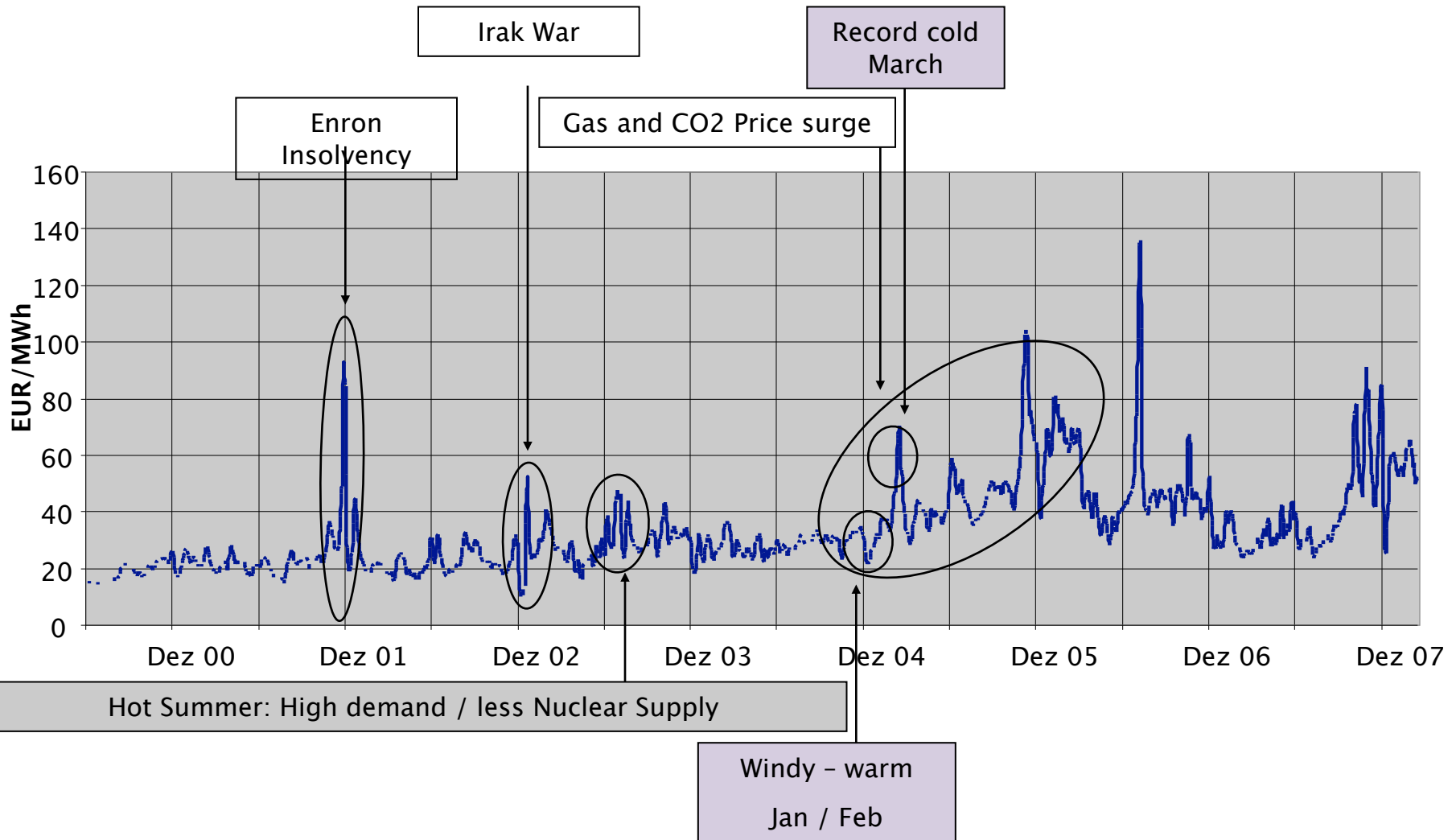
# 7- Days Average EEX Spot Prices (base) tell the history



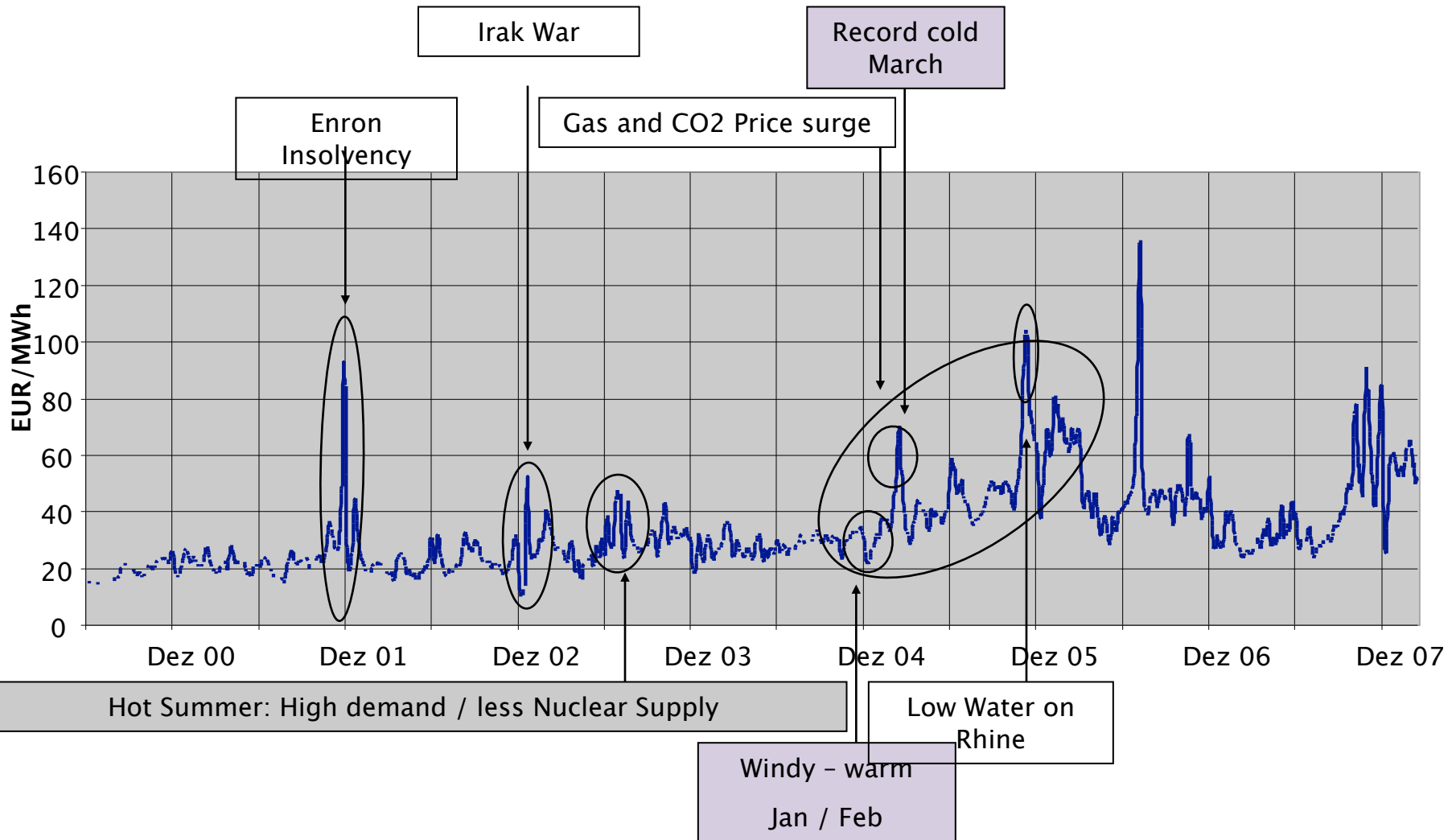
# 7- Days Average EEX Spot Prices (base) tell the history



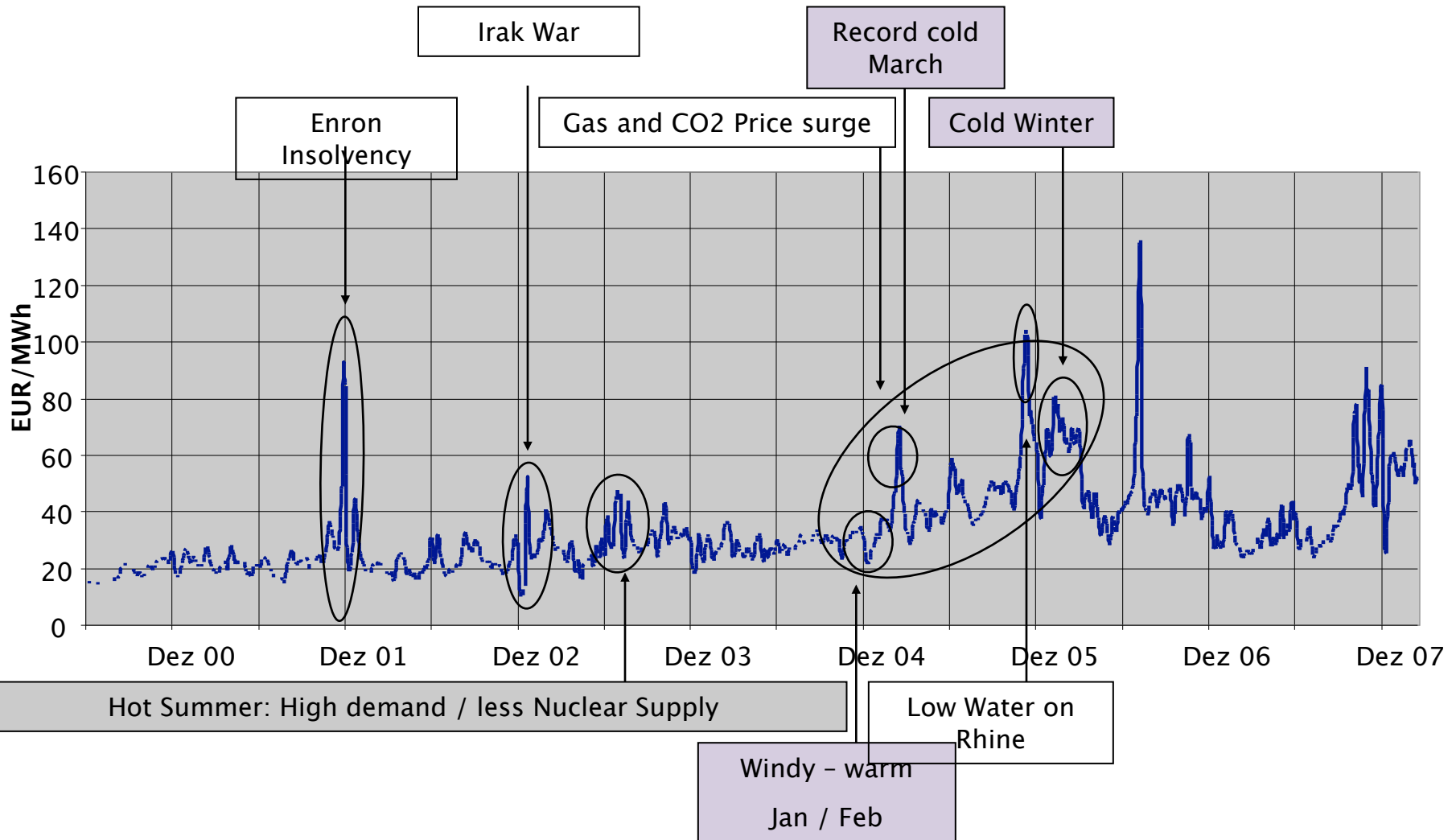
# 7- Days Average EEX Spot Prices (base) tell the history



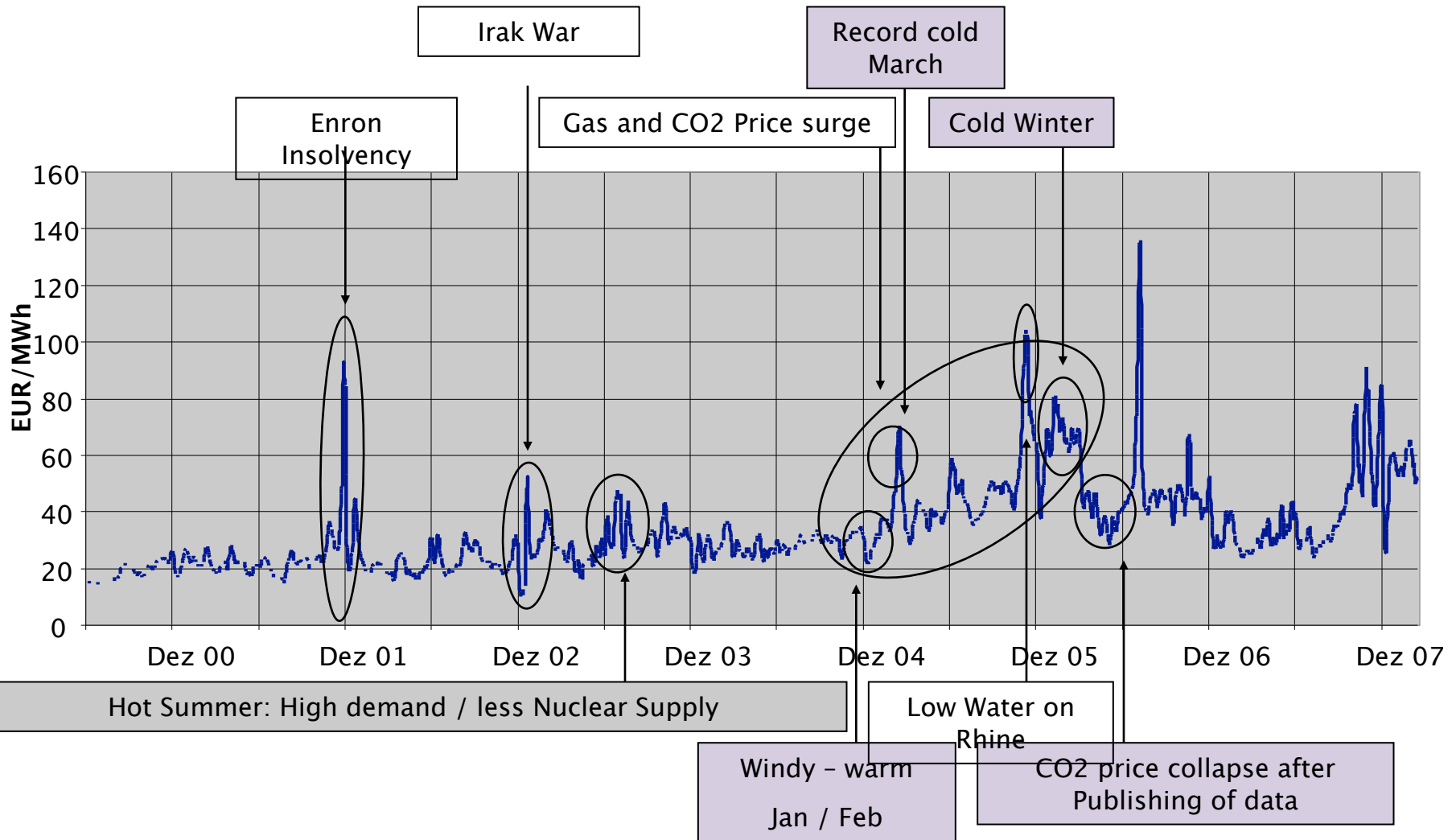
# 7- Days Average EEX Spot Prices (base) tell the history



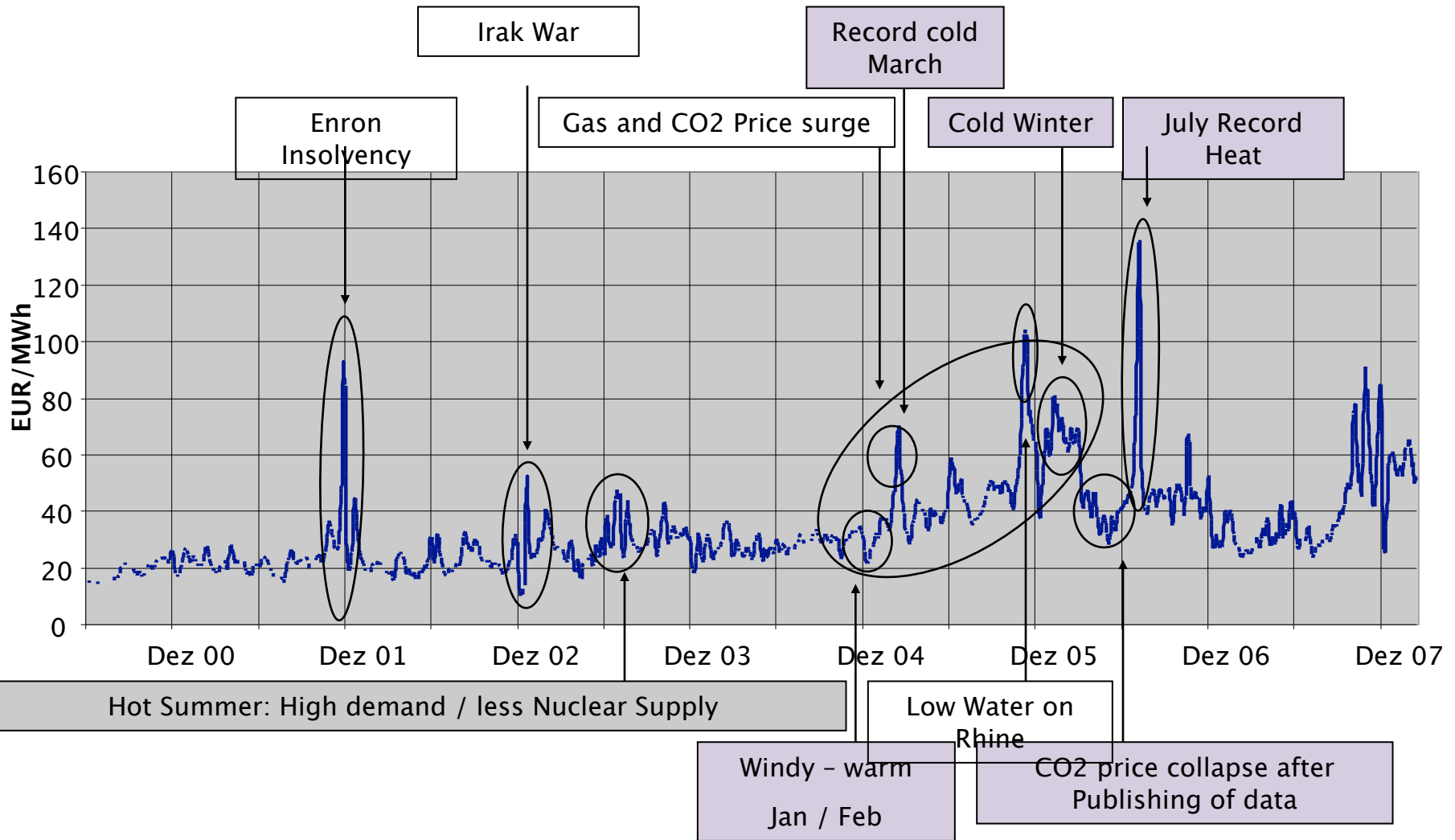
# 7- Days Average EEX Spot Prices (base) tell the history



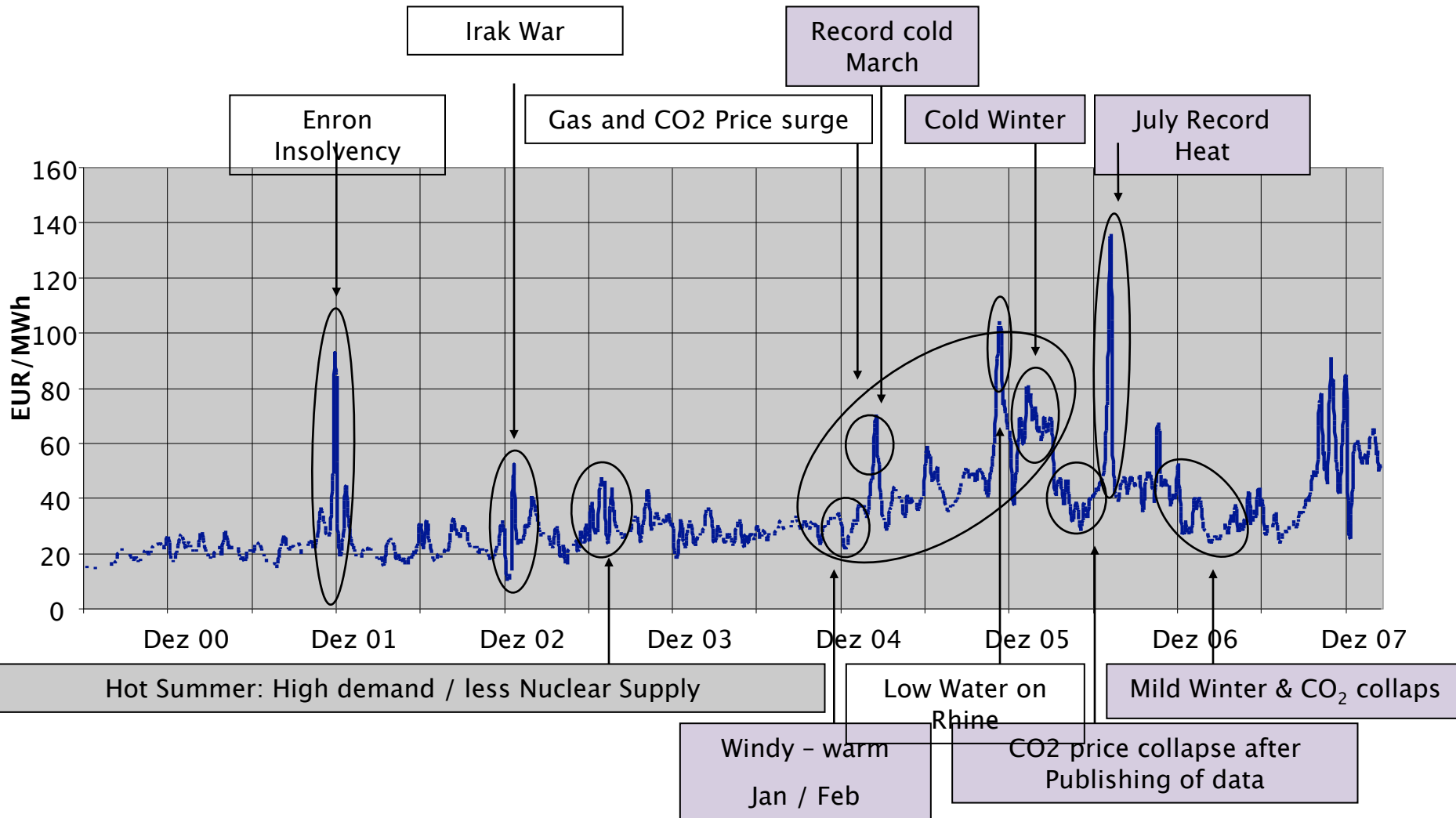
# 7- Days Average EEX Spot Prices (base) tell the history



# 7- Days Average EEX Spot Prices (base) tell the history

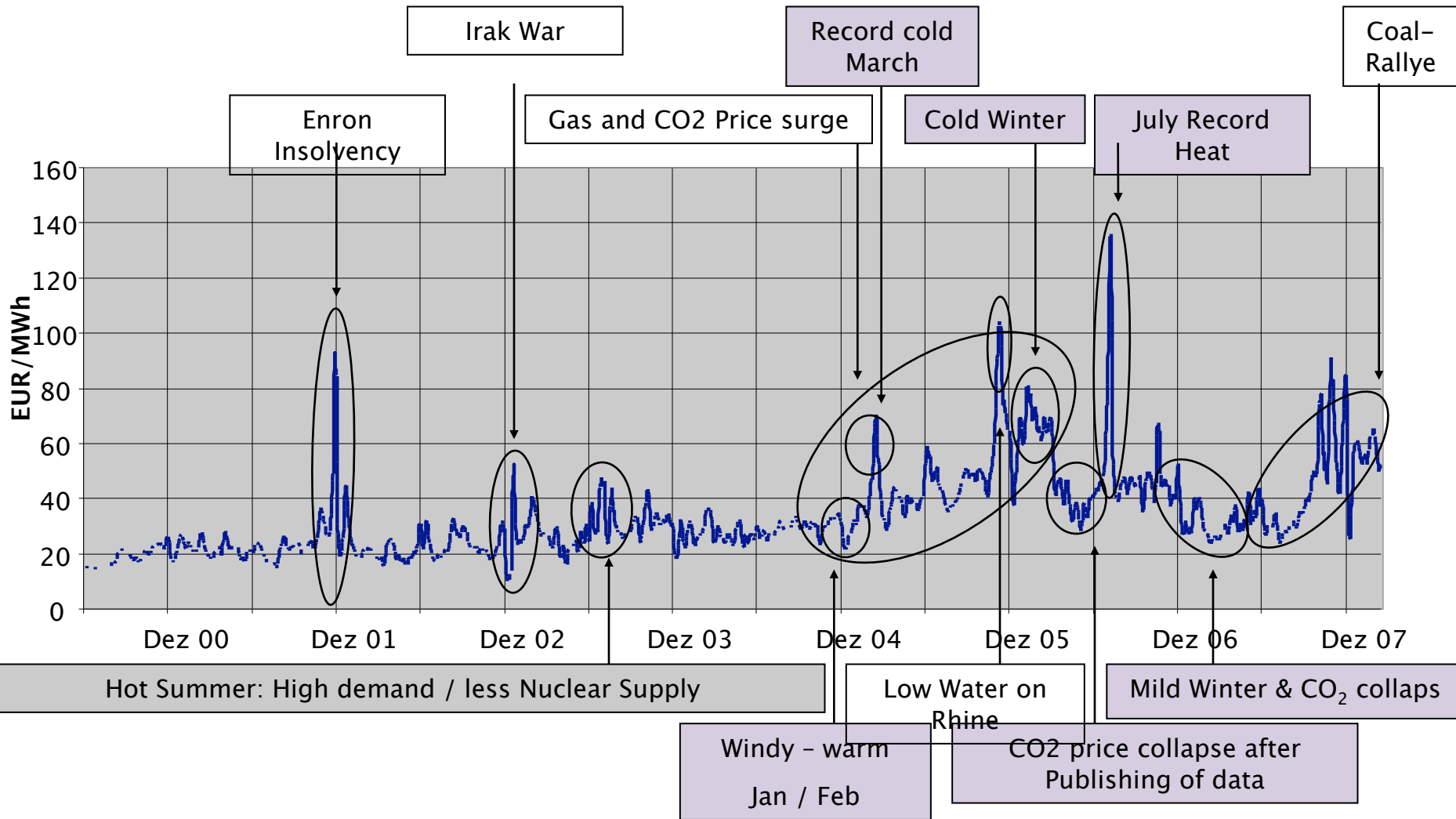


# 7- Days Average EEX Spot Prices (base) tell the history

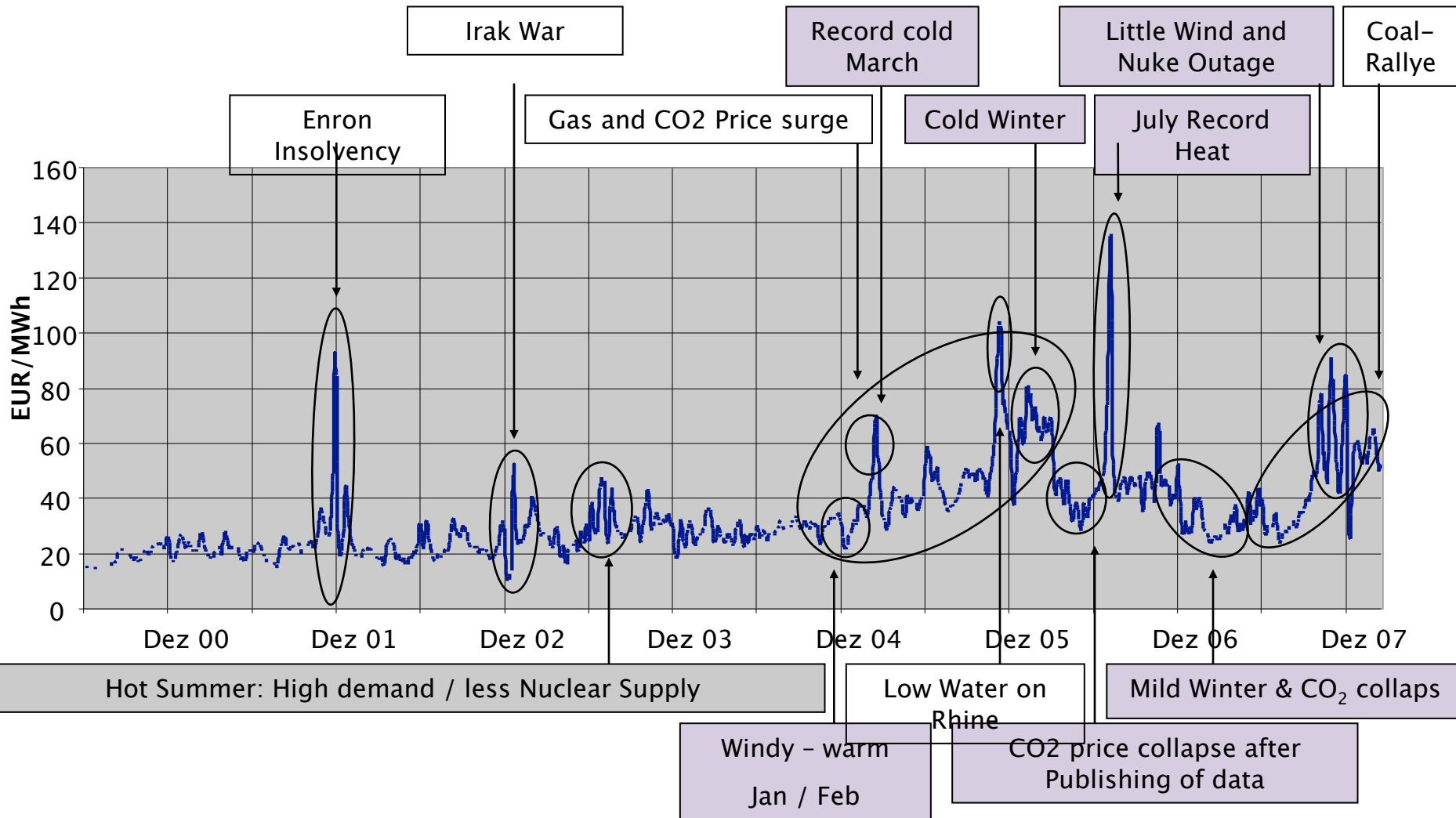




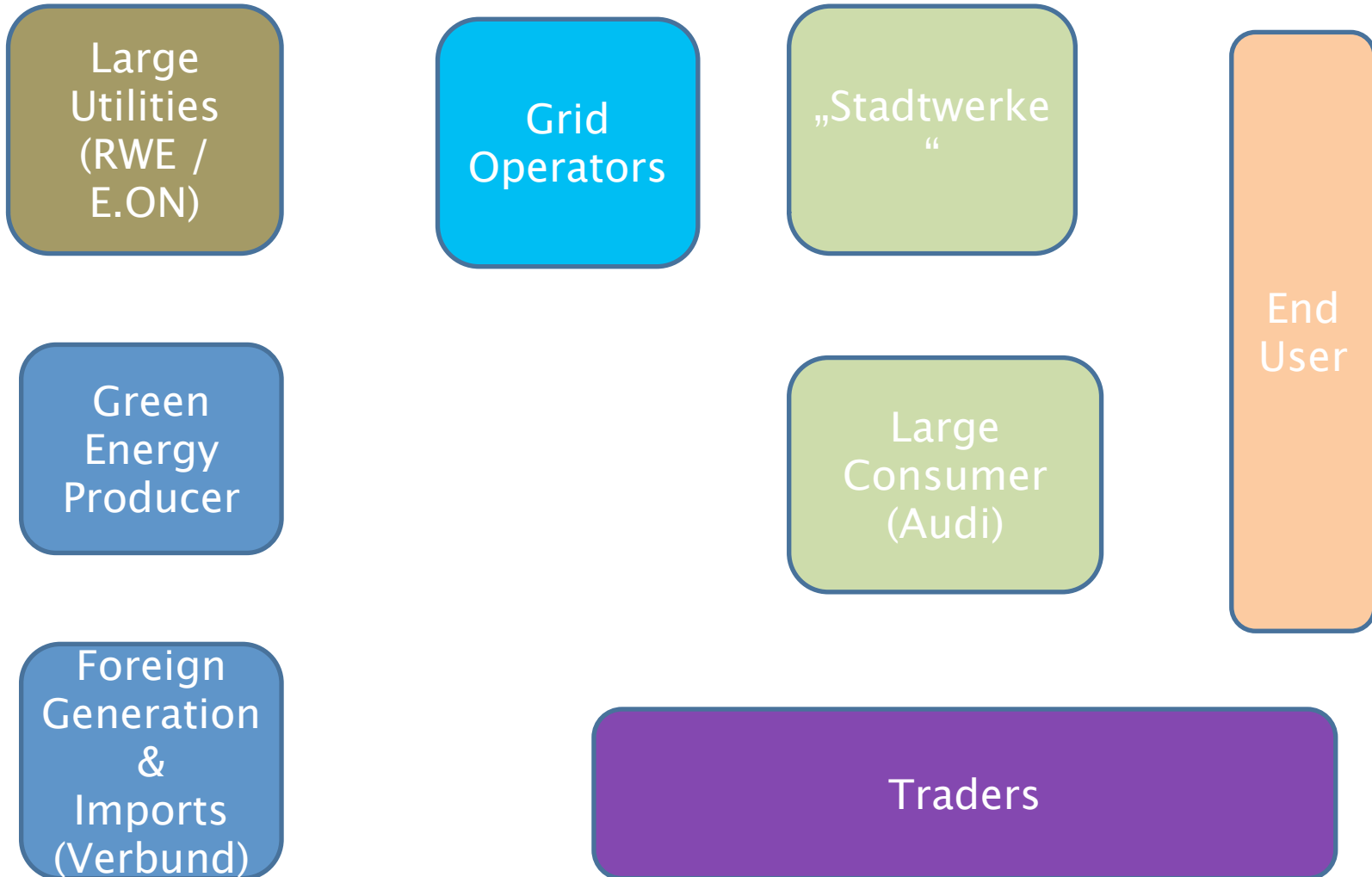
# 7- Days Average EEX Spot Prices (base) tell the history



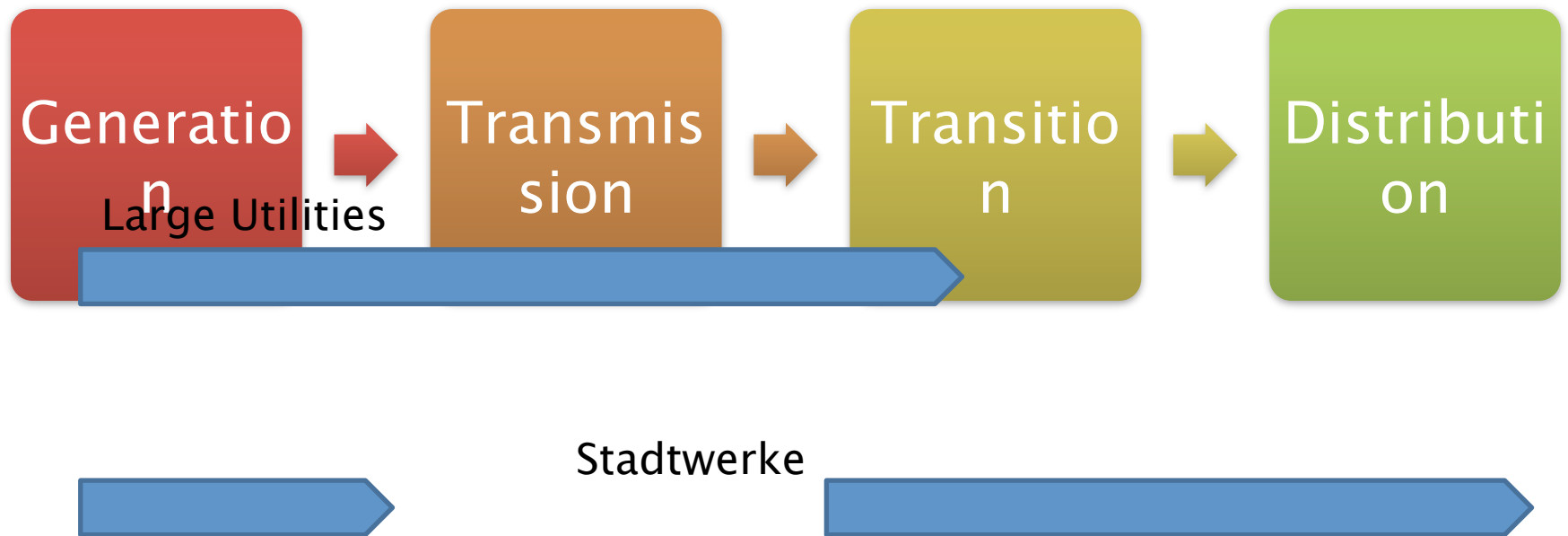
# 7- Days Average EEX Spot Prices (base) tell the history



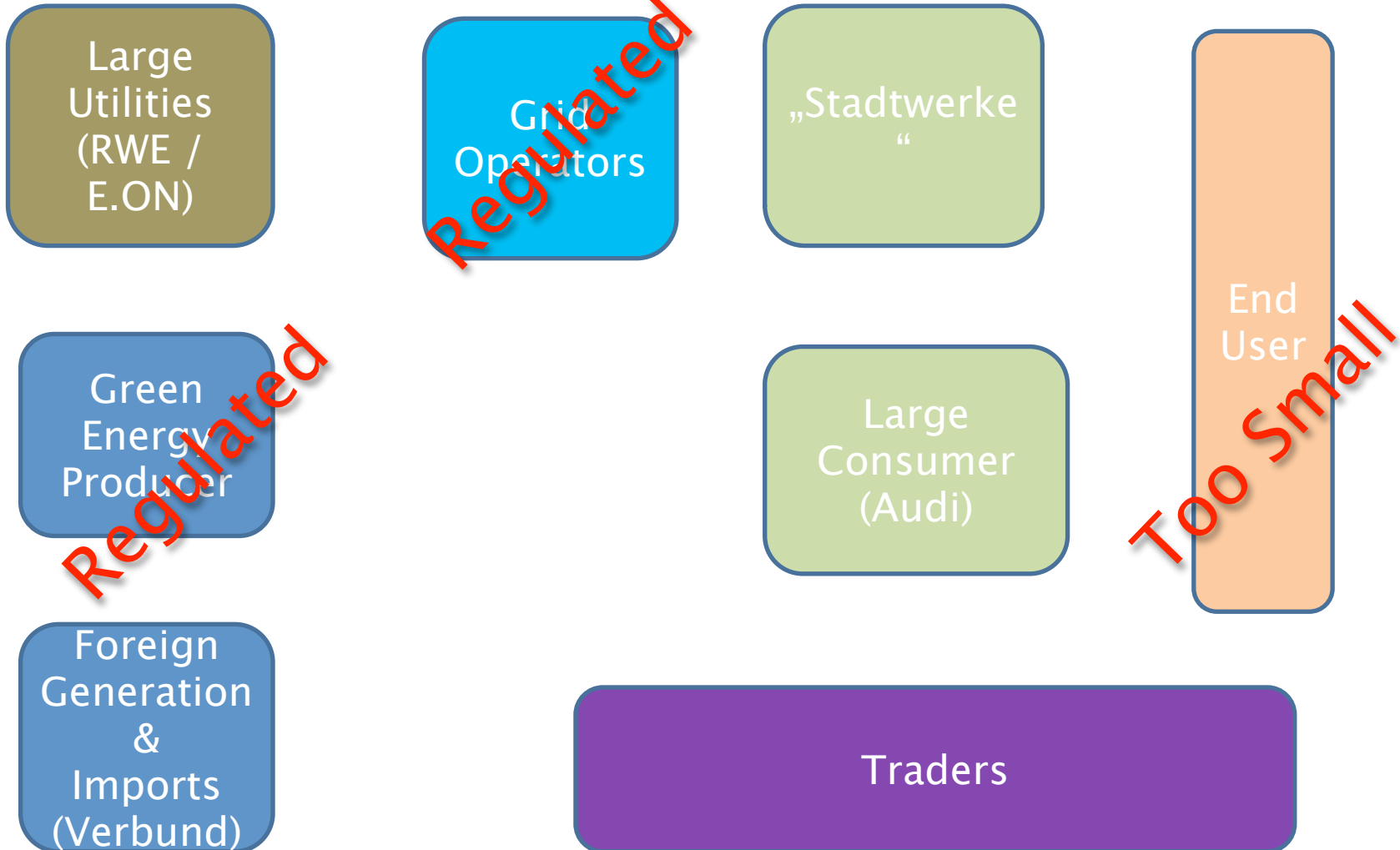
# Market Players in Germany



# Value Chain of Electricity



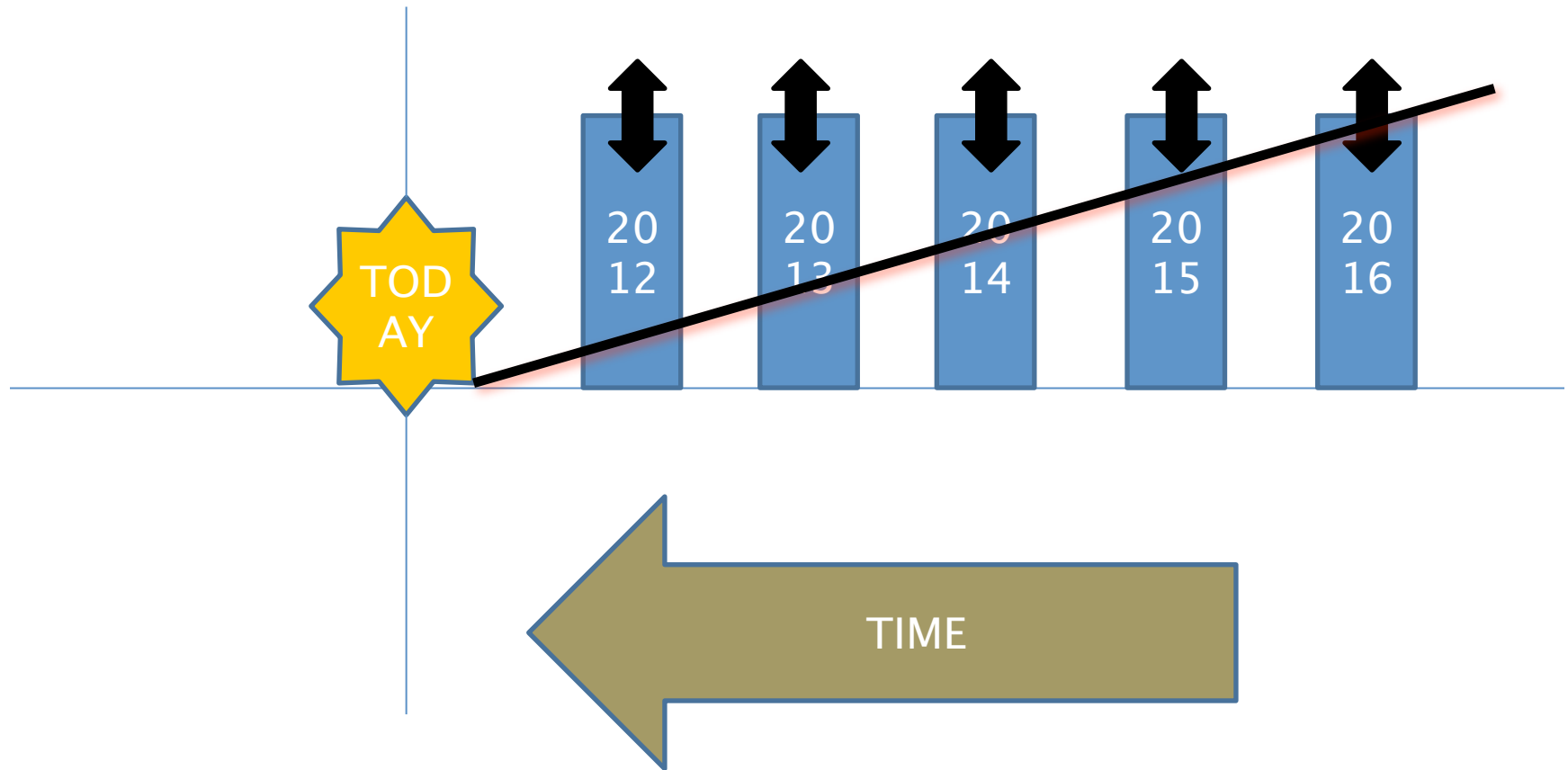
# Market Players in Germany



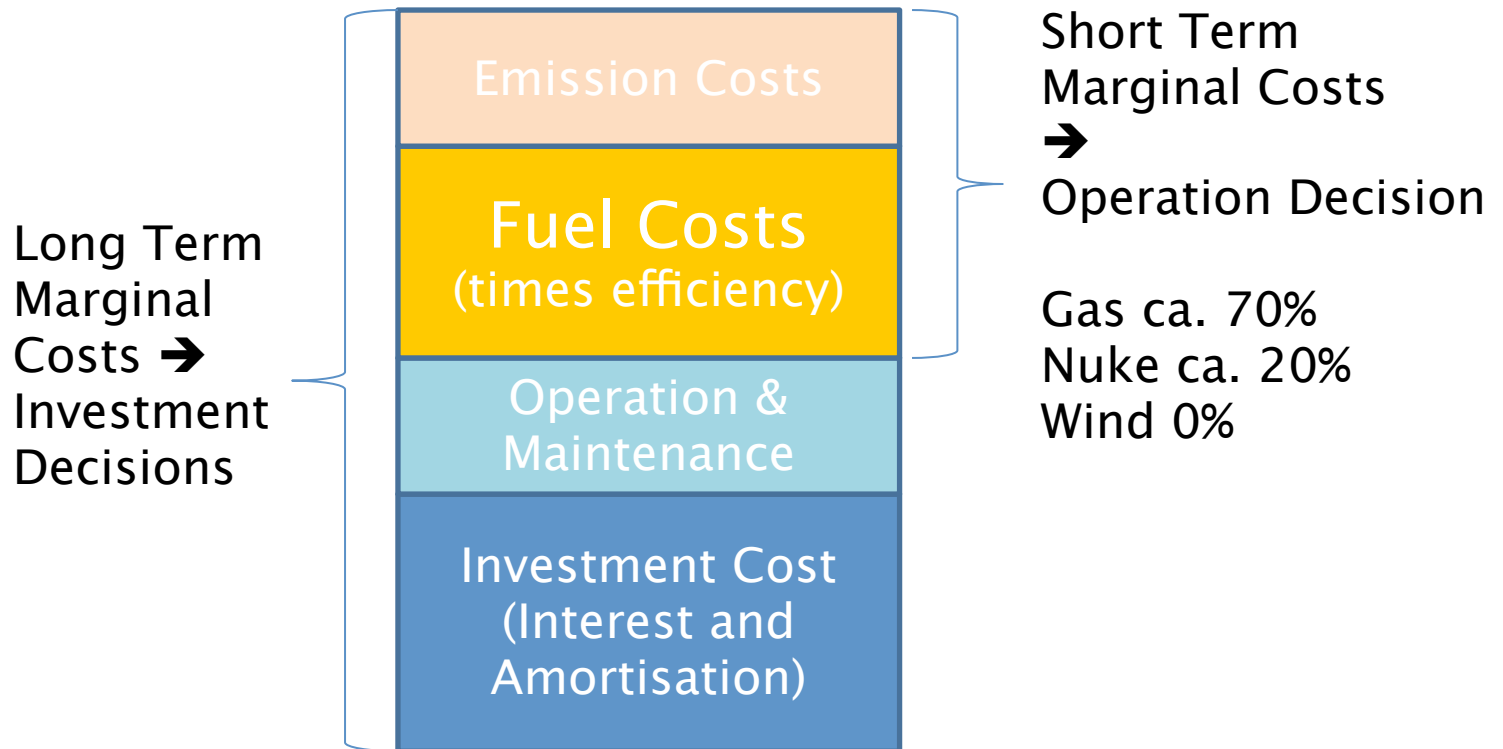
# Interest of Large Utilities

- RWE or E.ON produce each ca. 200 TWh p.a. in Germany
- Income according Market Price, i.e. for each €/MWh more, income and EBT goes up 200m€ (roughly 5%)
- 1. Interest in high prices
- 2. Interest in middle term hedging (next 2–3 years)

# Hedging: Sell the Electricity (or Fix Prices) the next years to an

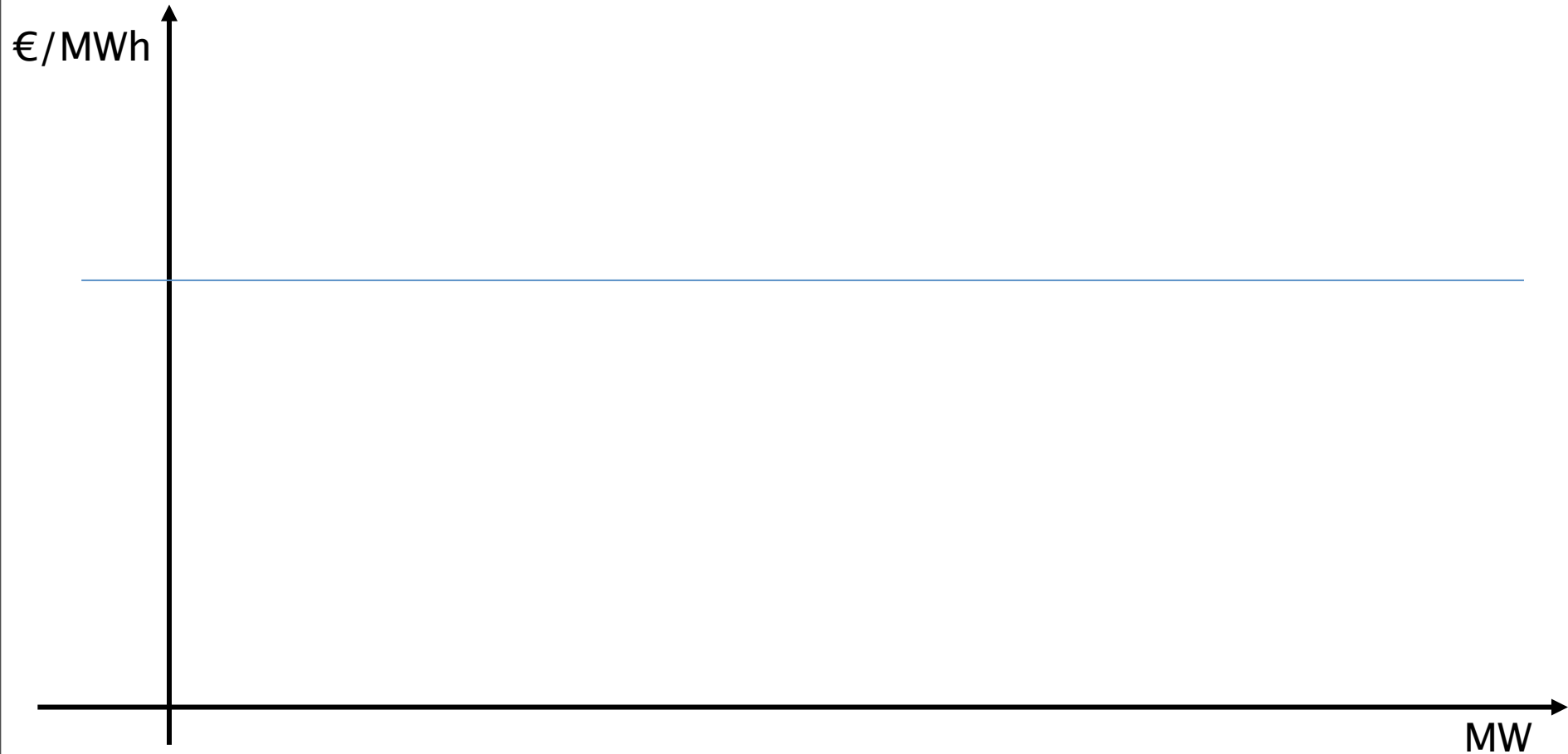


# Price Building: Cost of

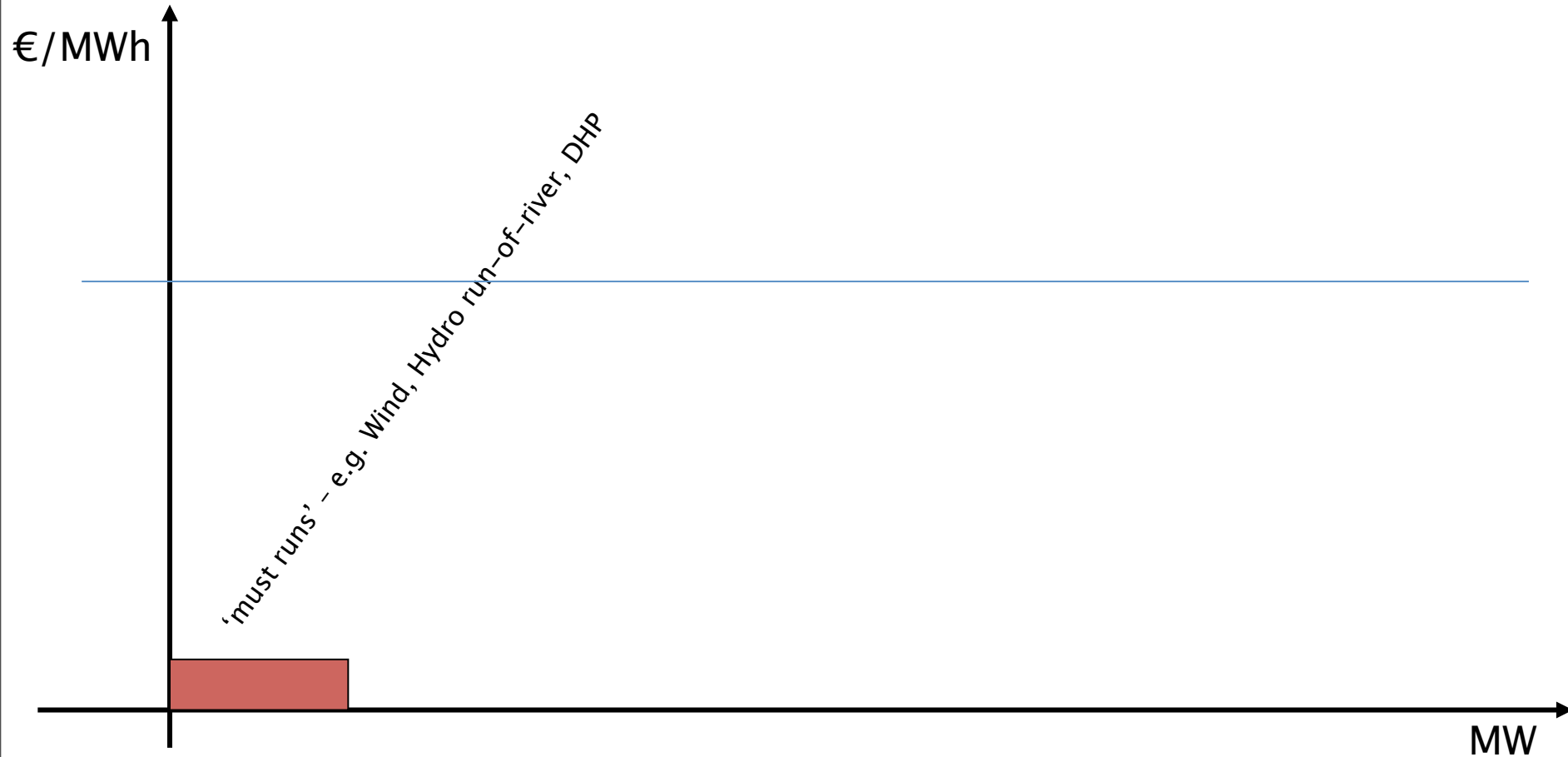




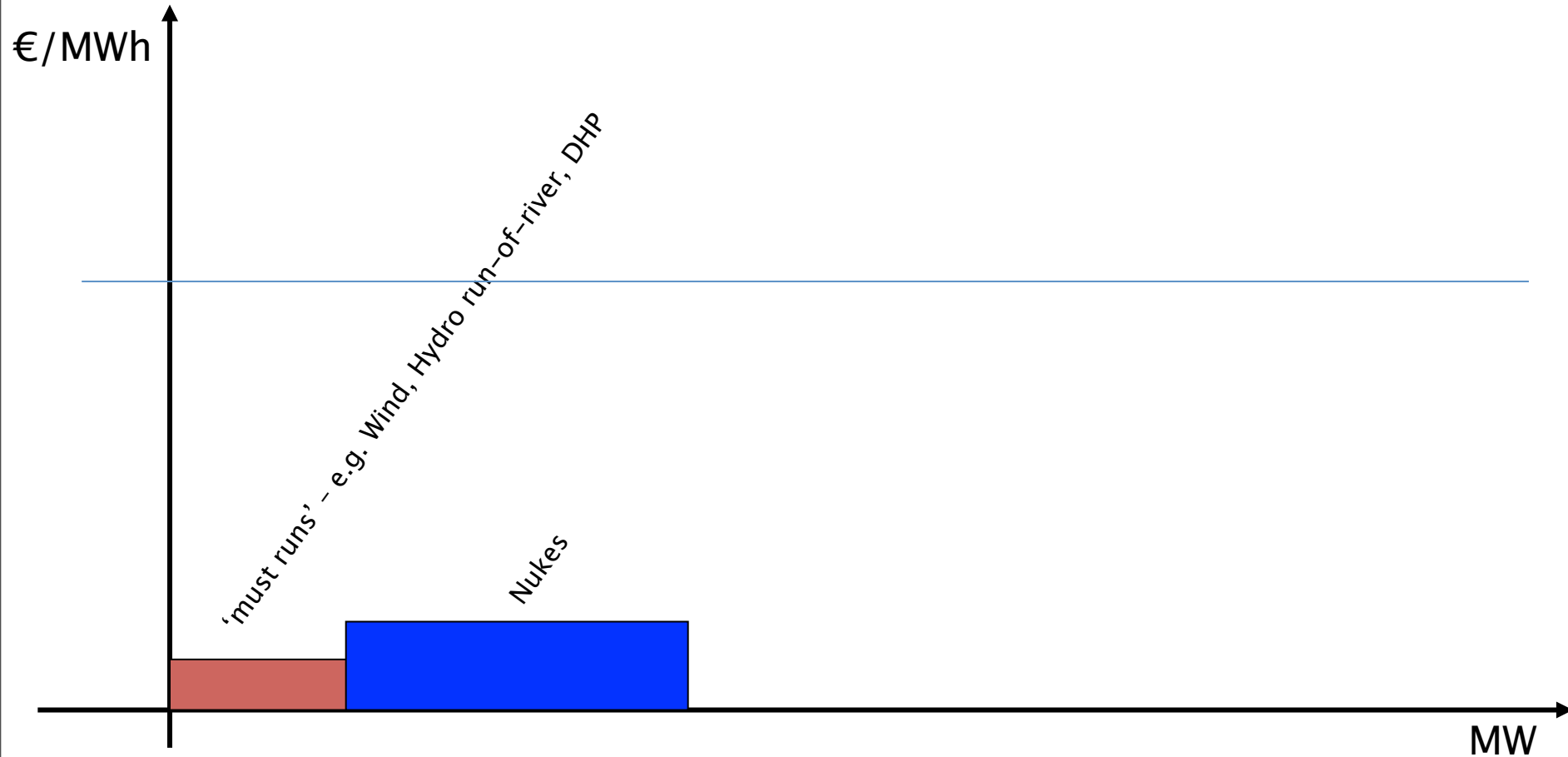
The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs



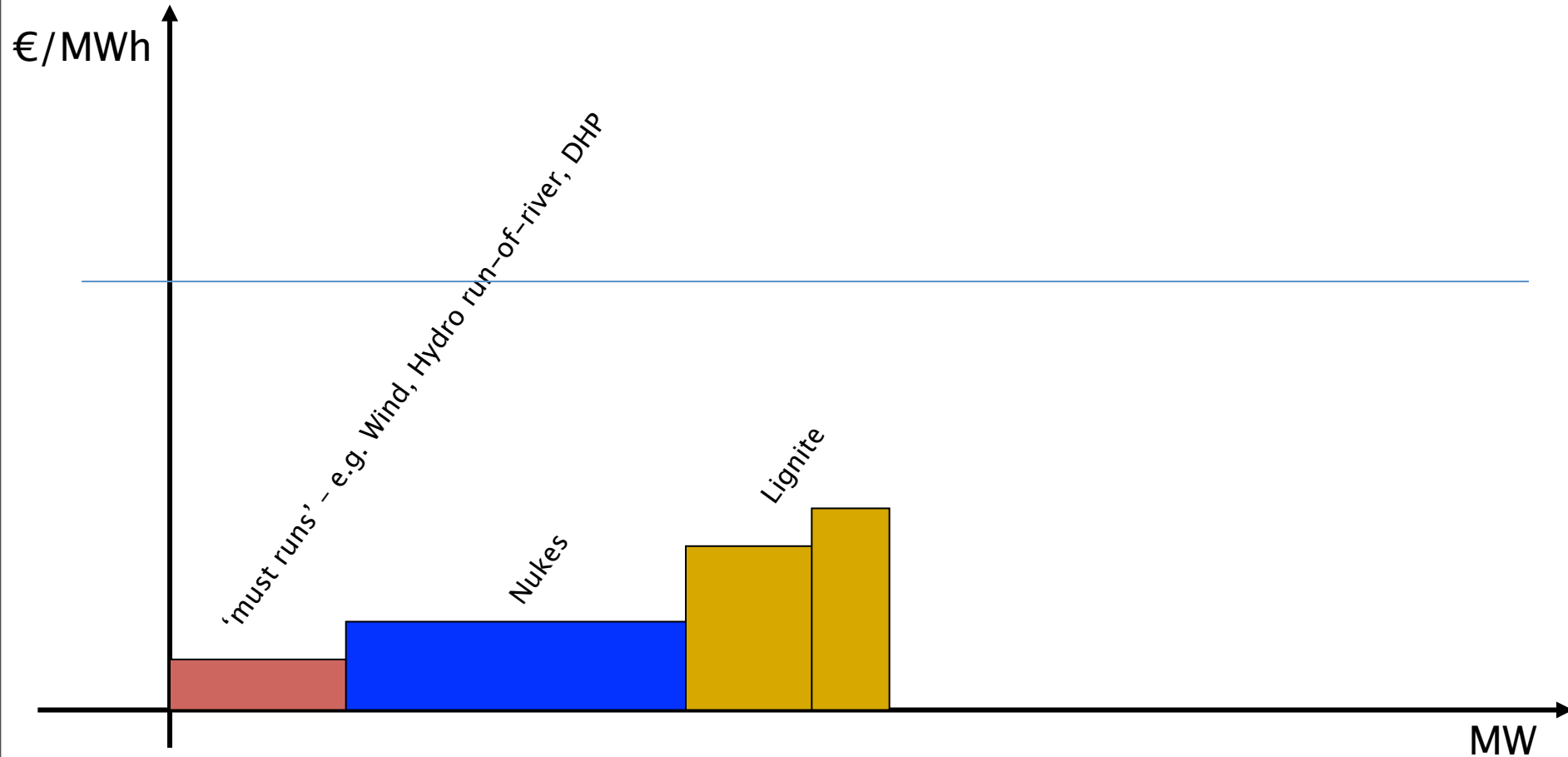
The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs



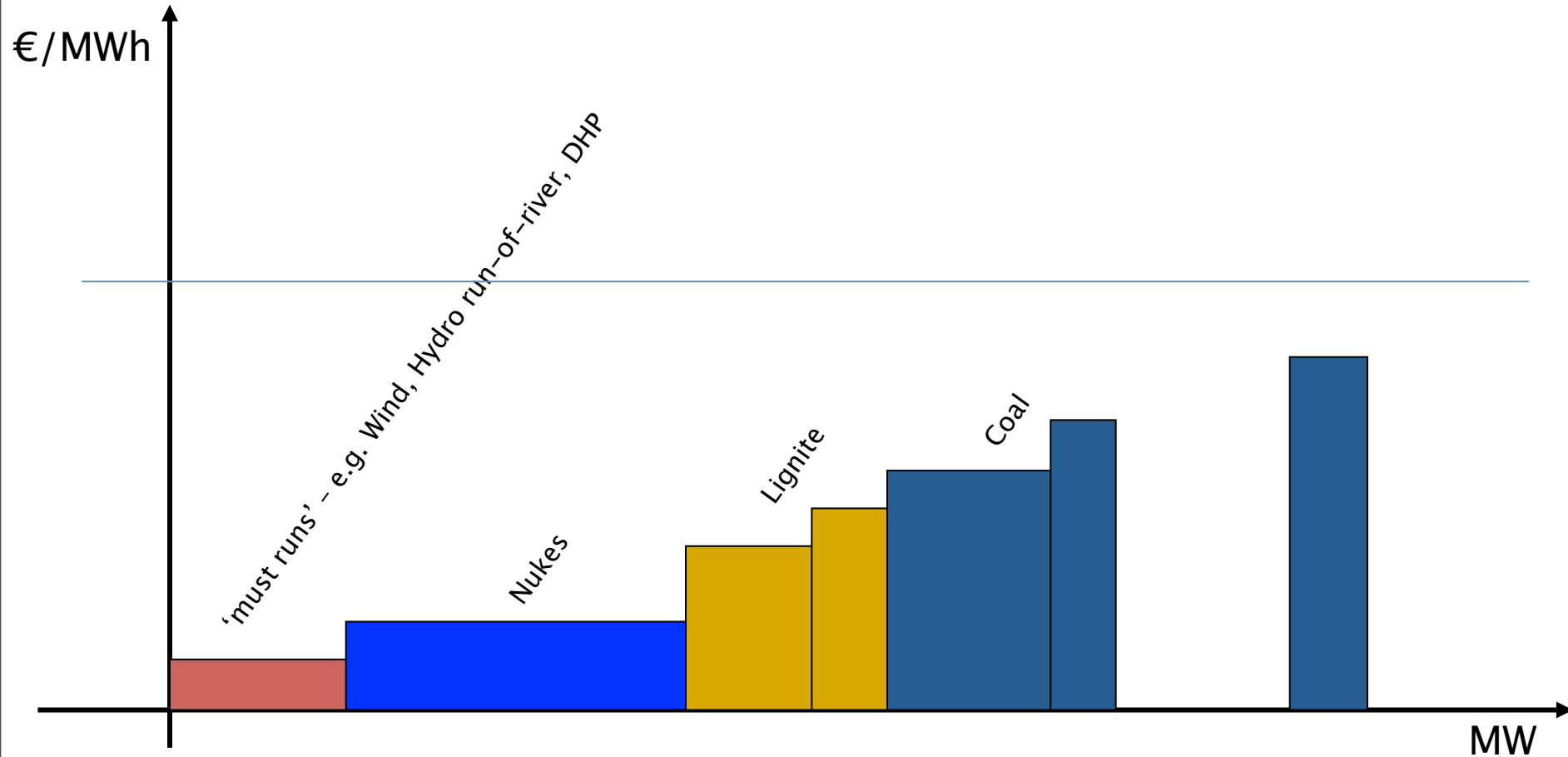
The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs



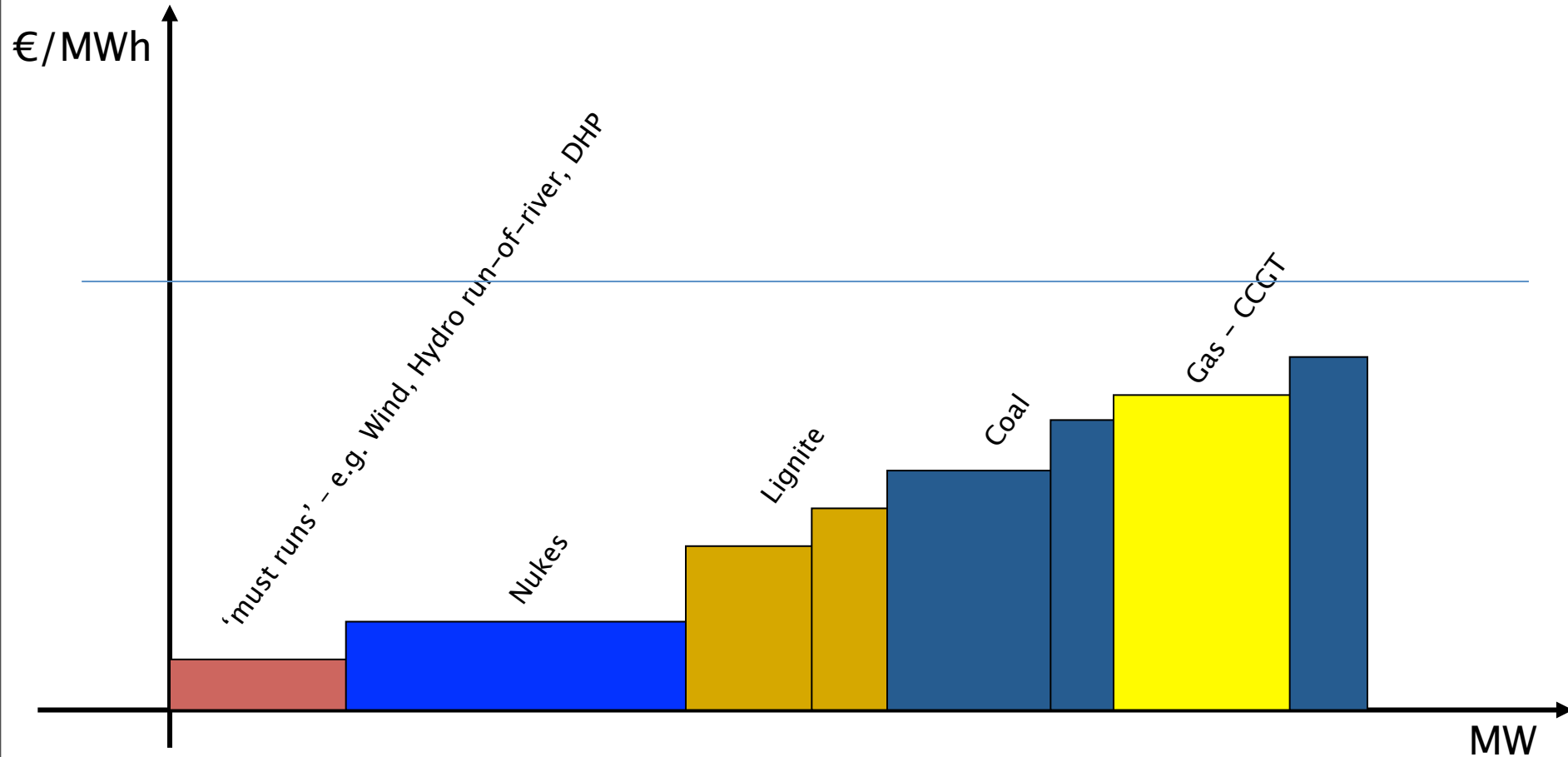
The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs



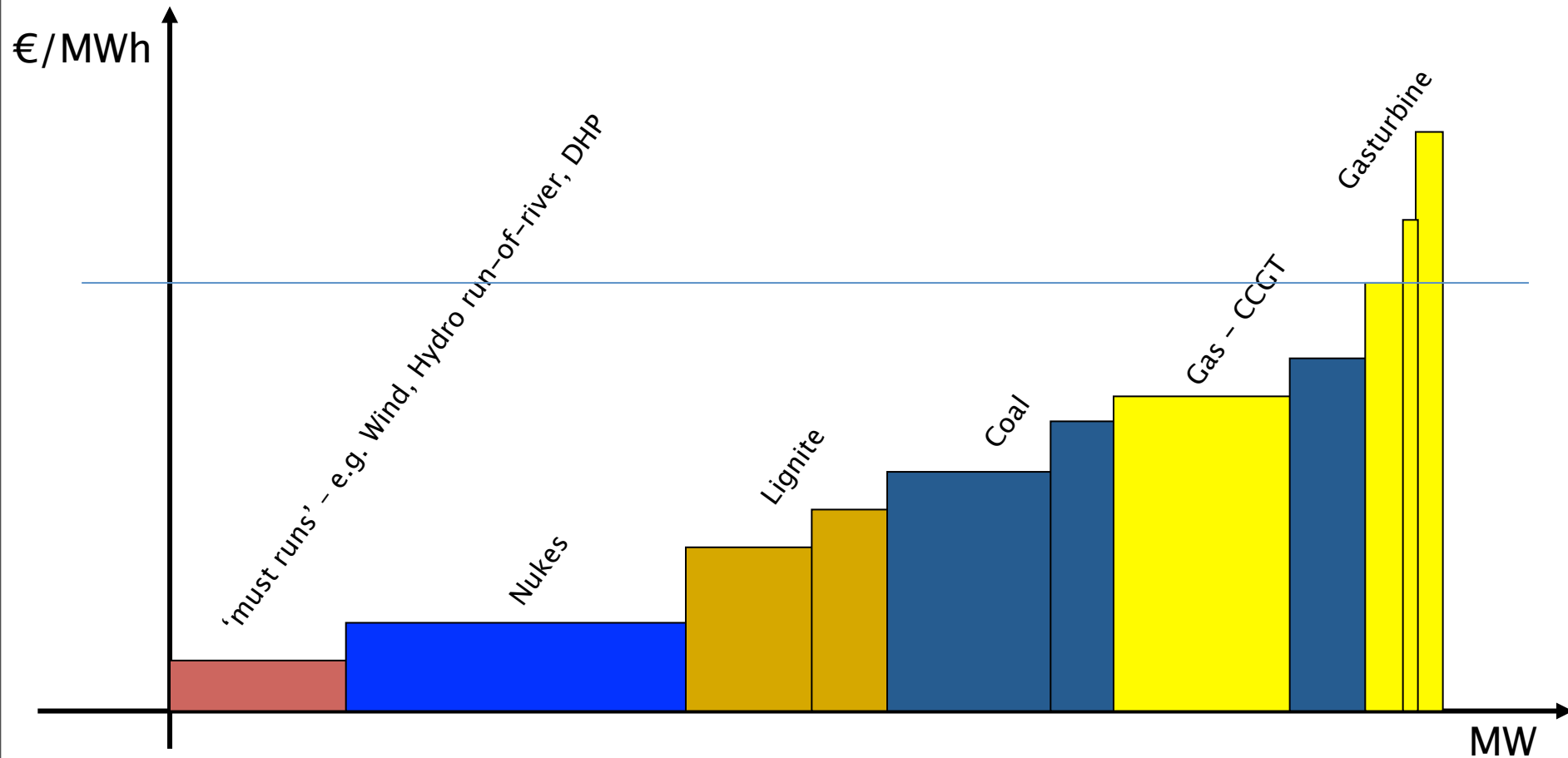
The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs



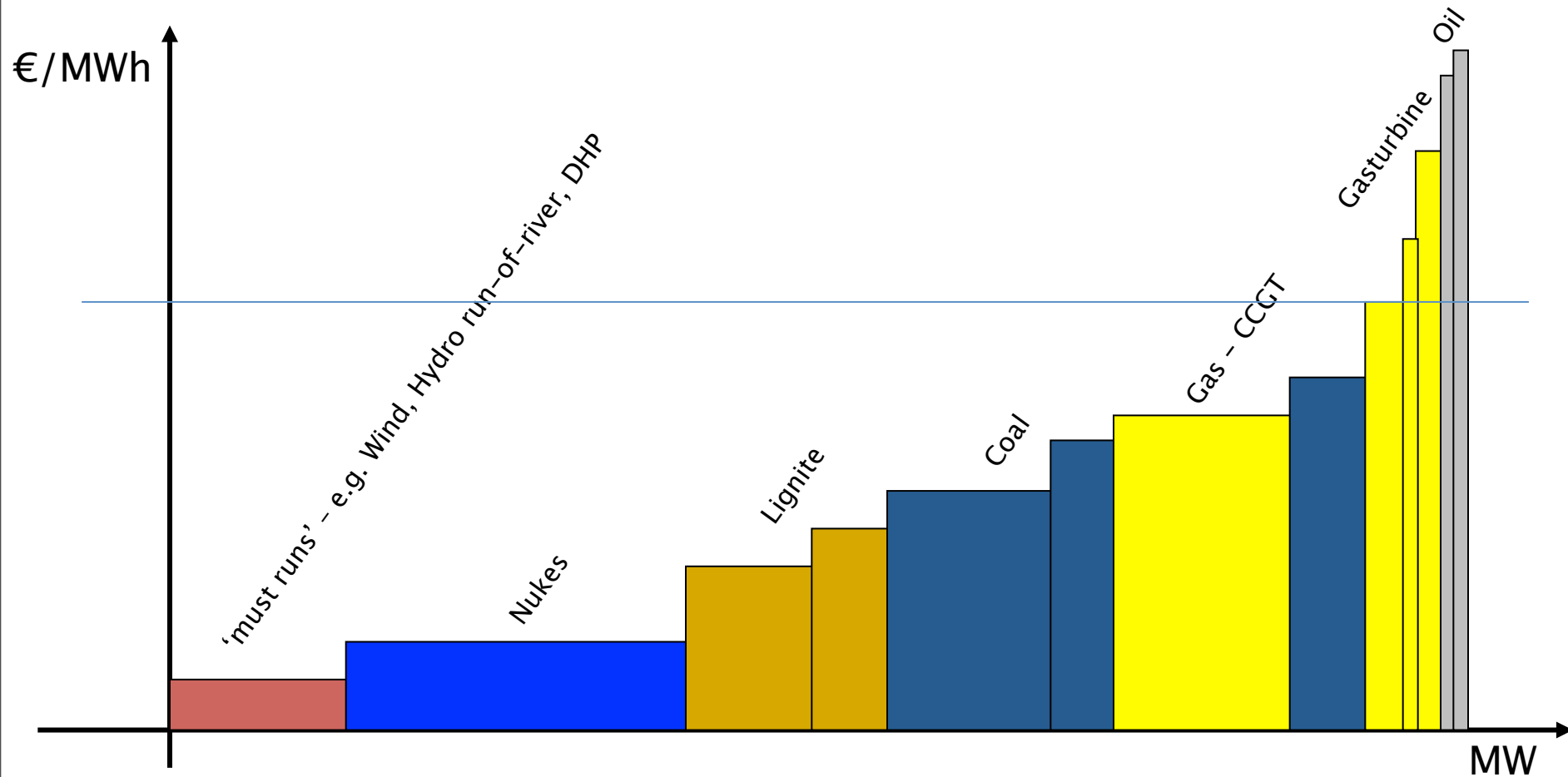
The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs



The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs

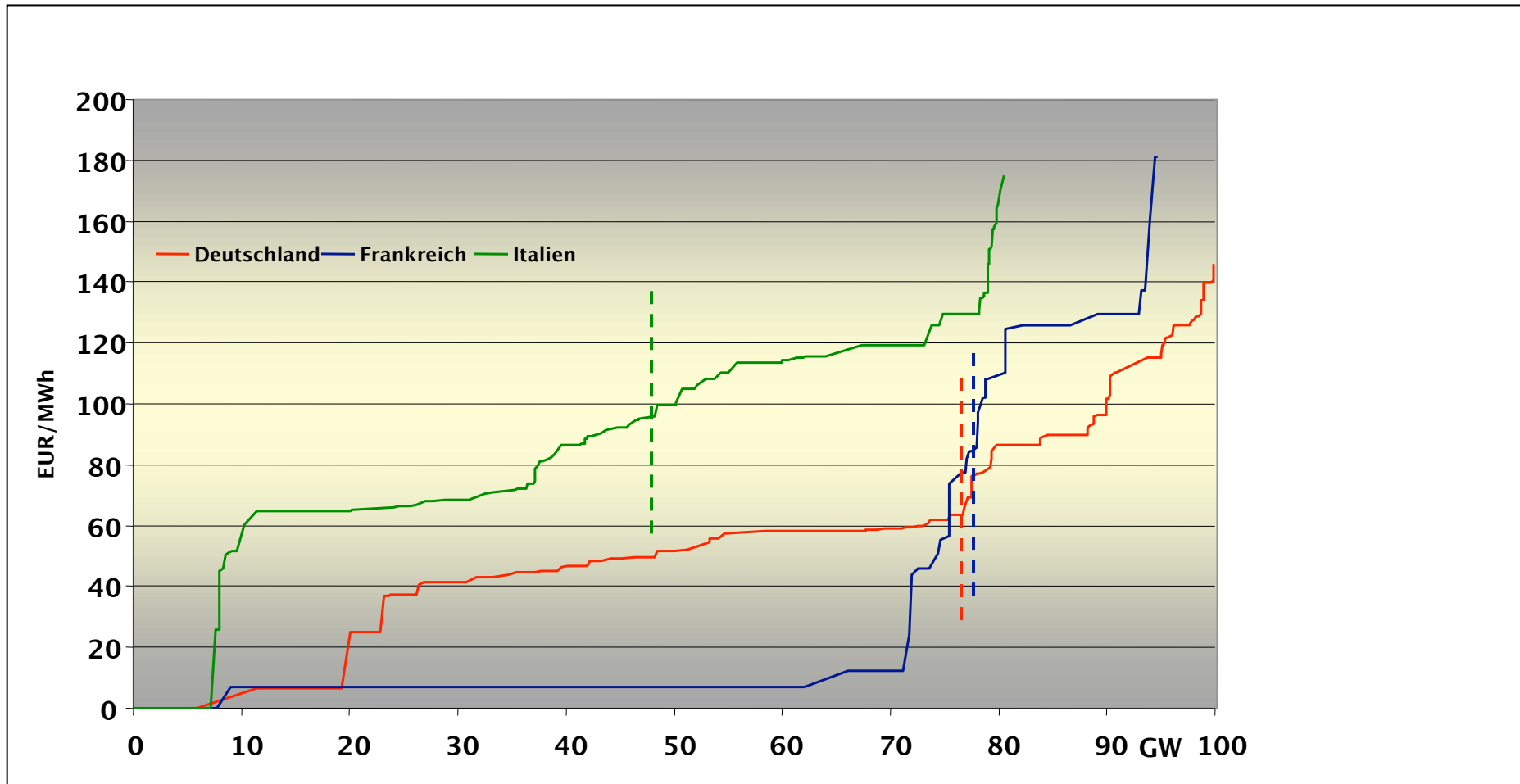


The Merit-Order-Curve reflects a order of Power Plant due to there short term marginal costs

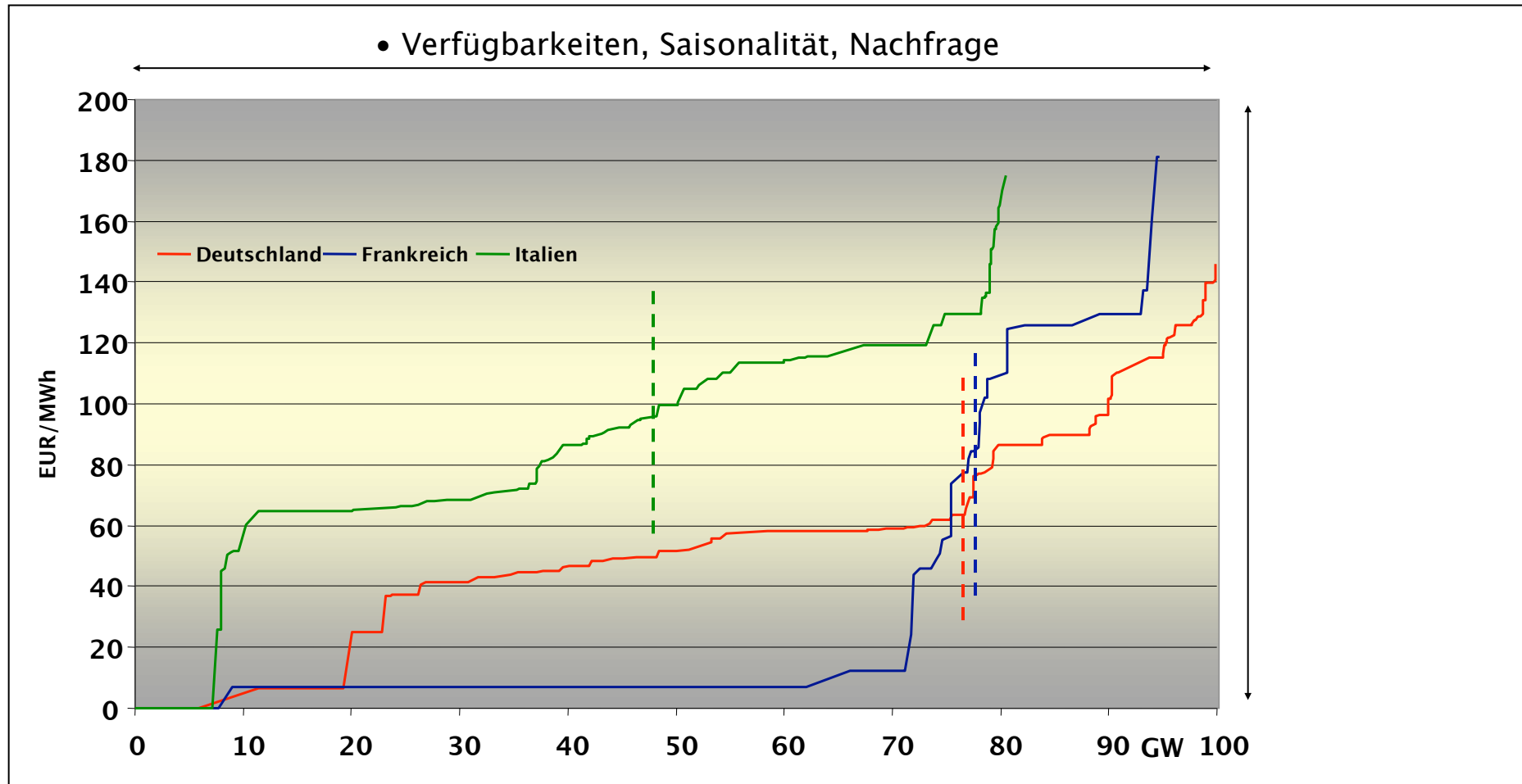




# Merit Order Curve depend on the national Power Plant Park



# Merit Order Curve depend on the national Power Plant Park



# Electricity and Politics

# Fight for Endesa

- [http://www.fundacionfaes.org/record\\_file/filename/858/00076-00\\_-\\_papeles\\_44\\_ingles.pdf](http://www.fundacionfaes.org/record_file/filename/858/00076-00_-_papeles_44_ingles.pdf)
- Endesa: Spanish Utility (0% State held in 2004)
- Gas Natural: Spanish Gas Utility
- CNE: Spanish Energy Regulator
- CNMV: Spanish Finance Regulator
- E.on: German Utility
- Acciona: Spanish Construction Company
- ENEL: Italian Utility (31% state-hold)

# Fight for Endesa



# Fight for Endesa



# Fight for Endesa



# Fight for Endesa

- January 24th, 2007. The European Commission announced that it will take the Government of Spain to the European Union's Court of Justice because of the "Anti-E.On Decree".
- March 12th, 2007. Enel announced that it controlled 24.98% of Endesa and stated its intention to appoint three Directors, despite the fact that current Spanish legislation prevents foreign state-owned companies from sitting on the Board of Directors and limits their voting power to 3% of the share capital.



# Electricity Facts: Value Chain

- Storage: Only indirect (flexible generation)
- Transportation: Over Grids (standardized, Grid-Monopols: TSO) [www.swissgrid.ch](http://www.swissgrid.ch)  
[www.rwe.de](http://www.rwe.de)
- Transportation: limited (ca. 1000km) due to energy loss
- Refining: NO chemical processing but voltage transitors
- Production (Generation): Dependent on fuels, different generation  
EU27: 28% Nuke, 26% Coal, 24% Gas / US: 45% Coal / China 70% Coal

# Electricity Facts

- Demand:
  - dependent on GDP and population (Western Europe, US, 6–7 MWh p.a. per capita)
  - Average EU/ US: 33% Industry, 33% Household, 33% Administration
  - US 4000 TWh / Europe 3500 TWh / China 4000–4500 TWh / Japan 1000 TWh / Russia 1000 TWh
- Market, Standards:
  - Energy – Capacity (maximal Generation) = Energy per time
  - Capacity Unit MW
  - Energy Unit MWh: (1TWh=1'000 GWh=1'000'000 MWh=1'000'000'000 kWh)
  - Price ca. € 50 / MWh
  - Specify Delivery Point and Period (e.g. base load May, RWE Grid)

# Electricity Facts

- Market, Exchanges: Regional markets,
  - US: PJM, ERCOT, New England, NY, California, Midwest  
[www.ferc.gov/market-oversight/mkt-electric/overview.asp](http://www.ferc.gov/market-oversight/mkt-electric/overview.asp)
  - Europe: EEX, Nordpool, et al.  
[www.eex.de](http://www.eex.de)
- Market, Players: Utilities, some commodity traders
- Politics: Large political (nationalistic)