

Transparency and Use of Published Data

Price Formation and Fundamental Analysis

Presentation for Kyiv Energy Transparency Week

Day 1: Transparency in Wholesale Energy Markets

Outline

- Introduction
 - The GEN-I Group – Geographical Presence and Key Indicators
 - Presence in Ukraine – GEN-I Kiev
- Fundamental Analysis and Price Formation
 - Consumption as Demand
 - Production as Supply
 - Net Positions, NTCs, and Cross-Border Flows
 - The Fundamental Model
- Use of Data and Importance of Transparency
 - Market Participant Analytics
 - Efficient Price Formation – Theoretical Examples
 - Practical Importance and Implications
- Conclusions and Key Messages

The GEN-I Group – Geographical Presence



Wholesale market

22 On electricity markets

8 On natural gas markets

16 Subsidiaries

The GEN-I Group Key Indicators

Traded Volume in 2017

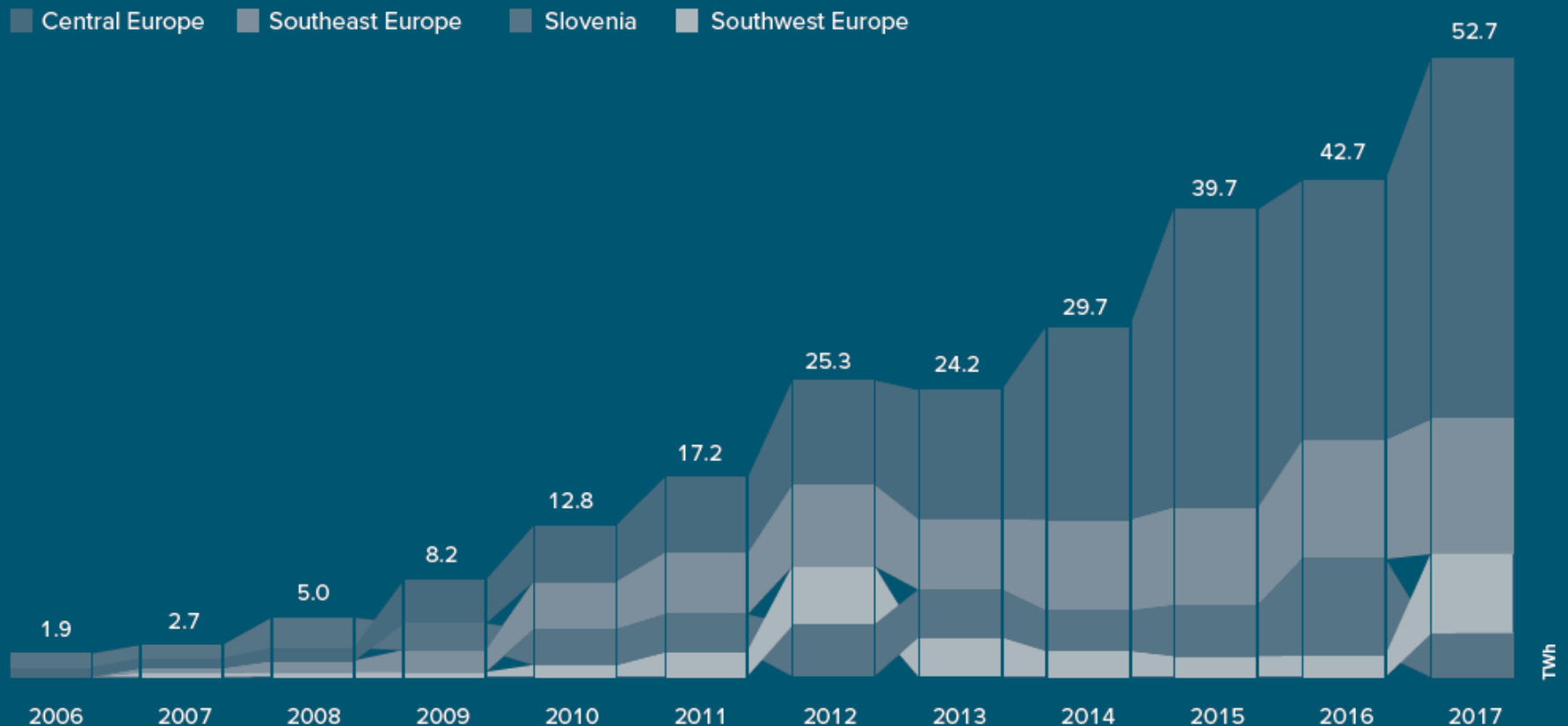
- 52.7 TWh of electricity sold in physical deliveries
- 12.3 TWh of electricity sold in financial derivatives
- 3.8 TWh of natural gas sold in physical deliveries and financial derivatives
- 6.5 TWh of electricity and 1.1 TWh of natural gas was delivered to business clients and small consumers

Electricity

65 TWh

Natural gas

3.8 TWh



PHYSICAL ELECTRICITY DELIVERED BY REGION

The GEN-I Group – Key Indicators

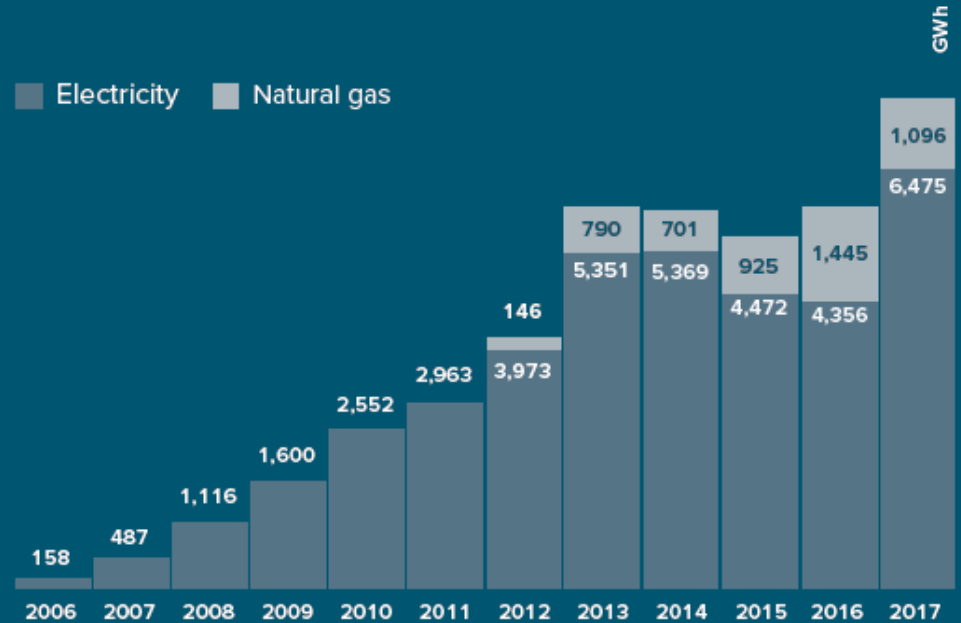
Market Share

In 2017 GEN-I re-confirmed its strong presence in Southeast Europe. In nine countries we are the leading company by market share in cross-border electricity flows.

54% of the total acquired cross-borders capacities on the borders of Central and Southeast Europe electricity markets in 2017.

41% share of the end-customer electricity market in 2016, and for the fifth year in a row we were the largest supplier of electricity in Slovenia.

19% of the Slovenian household natural gas market was achieved in less than four months, resulting in the most successful switch rate ever recorded in Europe.



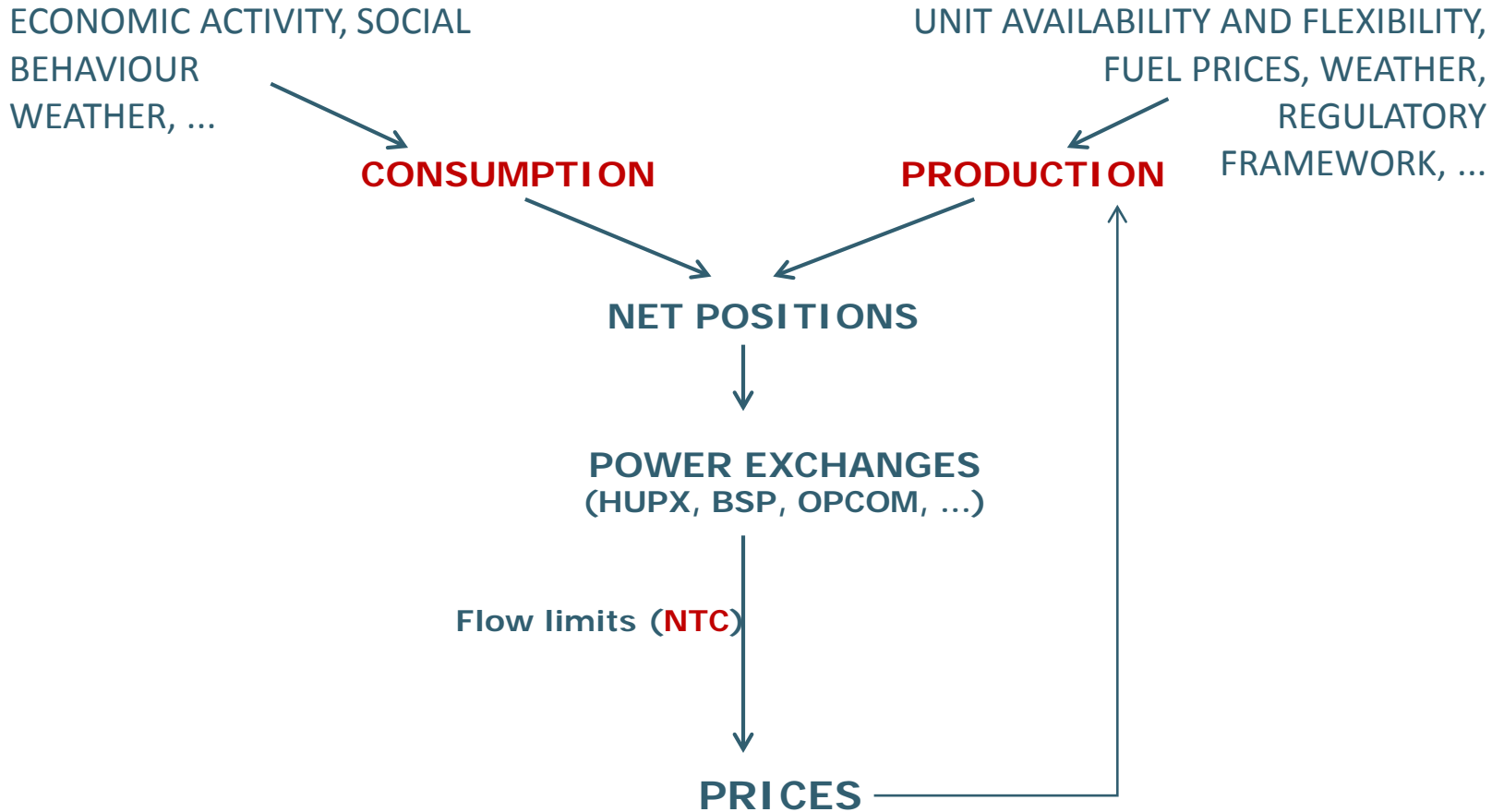
PHYSICAL ELECTRICITY DELIVERED TO END CUSTOMERS

Presence in Ukraine: GEN-I Kiev



- GEN-I Kiev (ТОВ «ДЖЕН-АЙ КИЇВ») established on 30.04.2015
- Wholesale Electricity Market (WEM) Member since 27.10.2015
- Having cross-border trading (export) infrastructure since 2016
- Holding License for Electricity Supply since 31.08.2017
- Carrying out continuous electricity export activity from Ukraine to Hungary since January 2018
- Total quantities exported so far app. 63 GWh (Jan-Sep 2018)

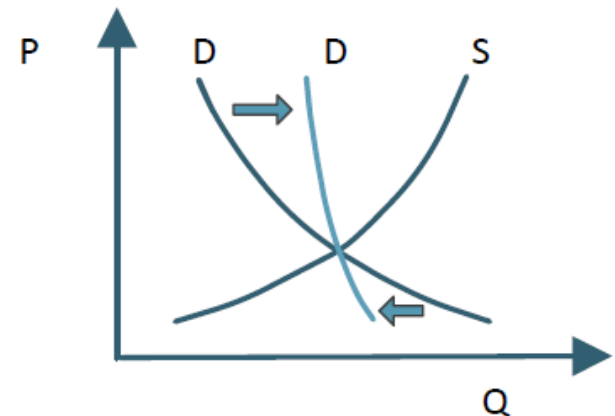
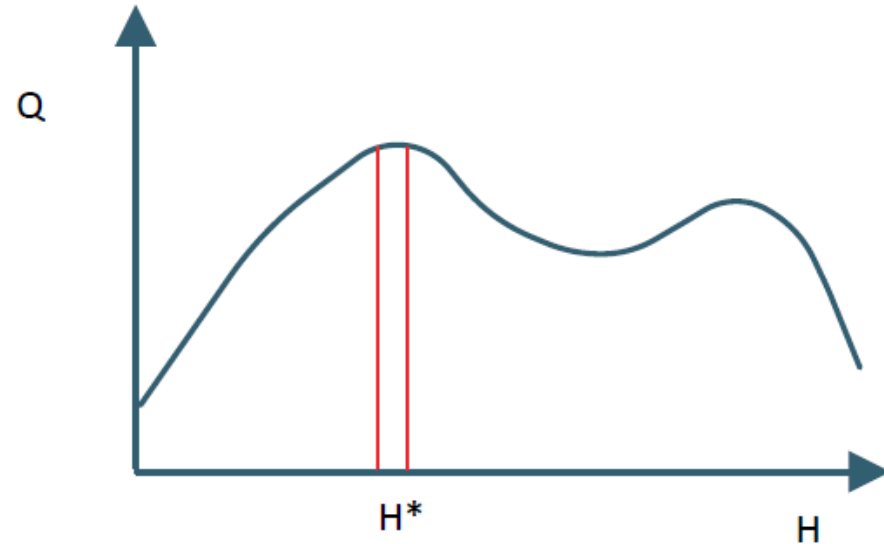
Fundamental Analysis and Price Formation



Fundamental Analysis and Price Formation

Consumption as Demand

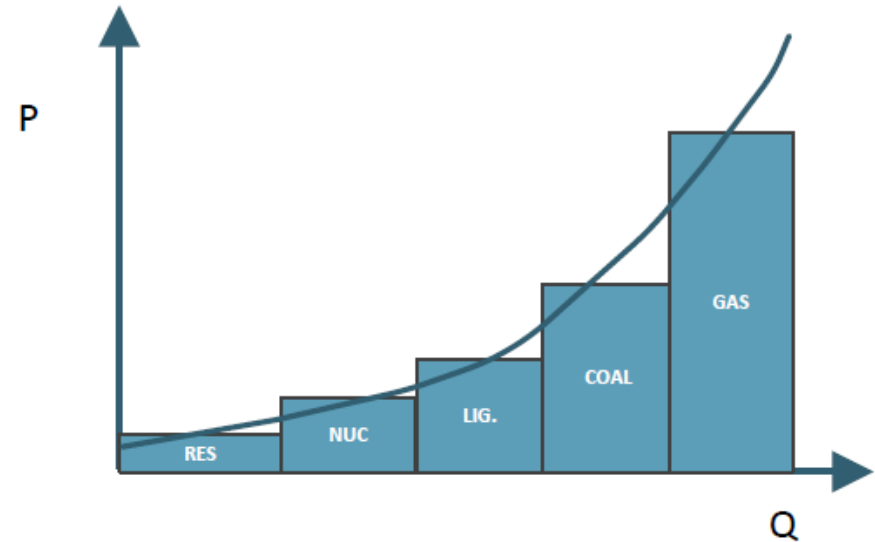
- **Consumption within a country represents demand**, and is influenced by a variety of factors
- In the short term, especially on day-ahead, **the demand (consumption) is mostly inelastic (non-responsive) to price and depends significantly on fundamental factors** such as:
 - Behavioural patterns (work/leisure, ...)
 - Weather (winter/summer, ...)
- The combination thereof means that demand differs from hour to hour in a given day, i.e. **each hour has a specific demand curve which can and does vary significantly between peak and off-peak**



Fundamental Analysis and Price Formation

Production as Supply

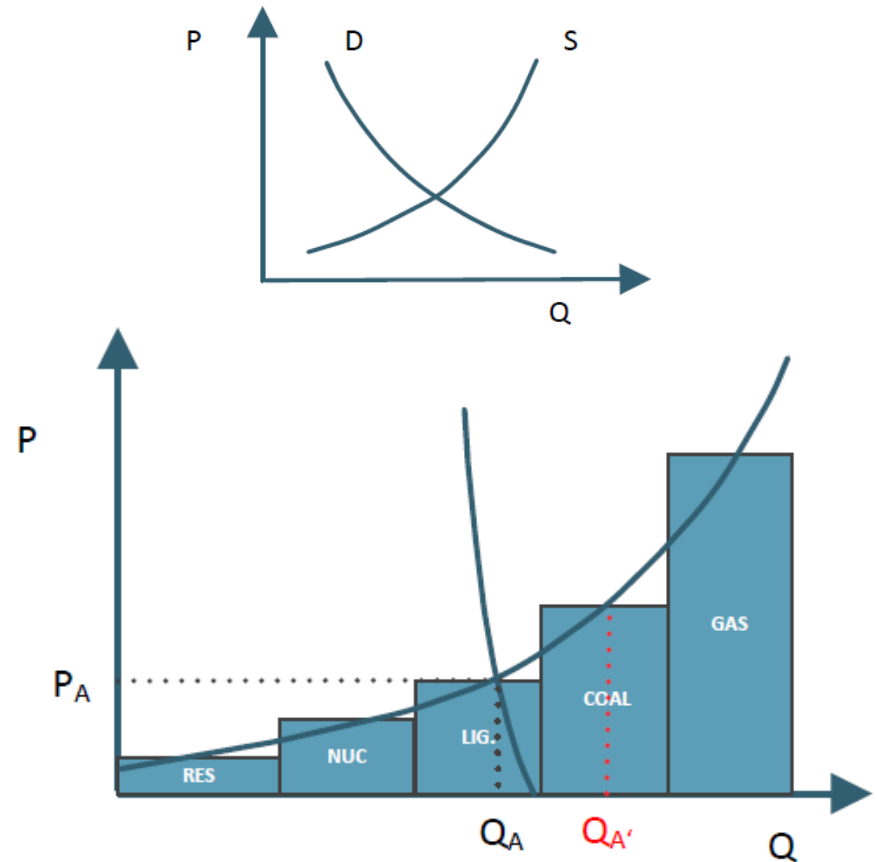
- **Production within a country represents supply, and is formed through the merit-order curve, which ranks production technologies by their marginal cost**
- **In the short term, especially on day-ahead levels, the supply (production) is more elastic (responsive) to price than demand is, but this depends on flexibility of production technology (e.g. nuclear very inflexible compared to pumped hydro storage)**
- **Production therefore also depends significantly on fundamental factors such as:**
 - Availability and flexibility of production units
 - Fuel prices
 - Weather
- **The combination thereof means that each day has a different supply curve, but from hour-to-hour the variations depend on the country's production structure and the flexibility thereof**



Fundamental Analysis and Price Formation

Net Position

- The intersection of demand (consumption) and supply (production) determines price levels within a system (in this case within a country)
- Electrical systems must always (in the absence of sufficient storage) balance consumption and production instantaneously to keep system operation secure, but because of interconnections across borders, individual countries are not closed systems → production does not have to strictly follow consumption within a single country
- Therefore, for each hour, a country can have a net position which is either long ($P > C$) or short ($C > P$) and which results in flows across neighbouring countries
- The maximum of cross-border flows is limited by the availability of cross-border transmission capacity, i.e. NTCs are the optimization constraint

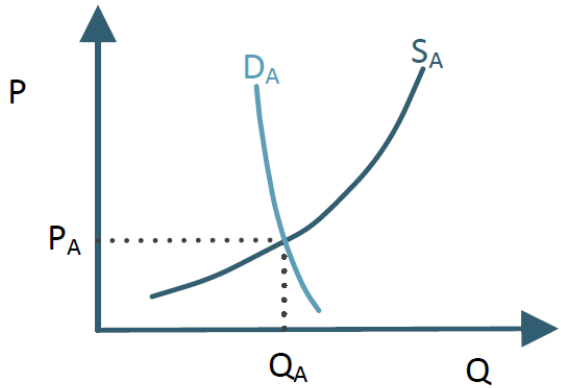


Country A above has for hour H a domestic equilibrium of demand and supply at P_A and Q_A however, production for hour H could be $Q_{A'}$ if the price were higher → the net position of country A is LONG and the excess quantities could be exported, if sufficient NTCs available and the price in the neighbouring country is high enough

Fundamental Analysis and Price Formation

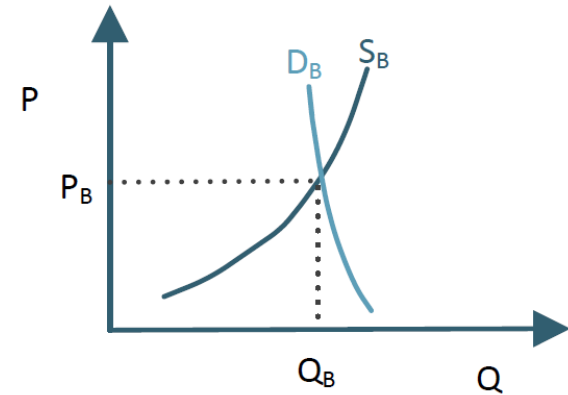
Net Positions, NTCs, and Cross-Border Flows

- If NTCs are available between Country A (LONG) and Country B (SHORT), then **flows from Country A to Country B will occur as long as there is available transfer capacity** and as long as the price of this transfer capacity is equal to or below the price difference between Country A and Country B:

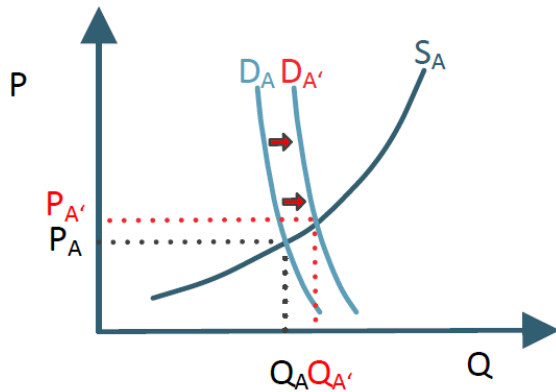


$$P_A < P_B$$

$$NTC = \infty$$

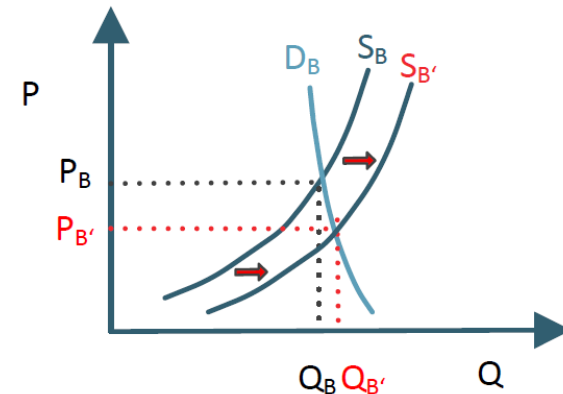


- In a theoretical example with infinite NTCs (alternatively the absence of any congestion), **power will flow from Country A to Country B until the price in both countries will be equal:**



$$P_{A'} = P_{B'}$$

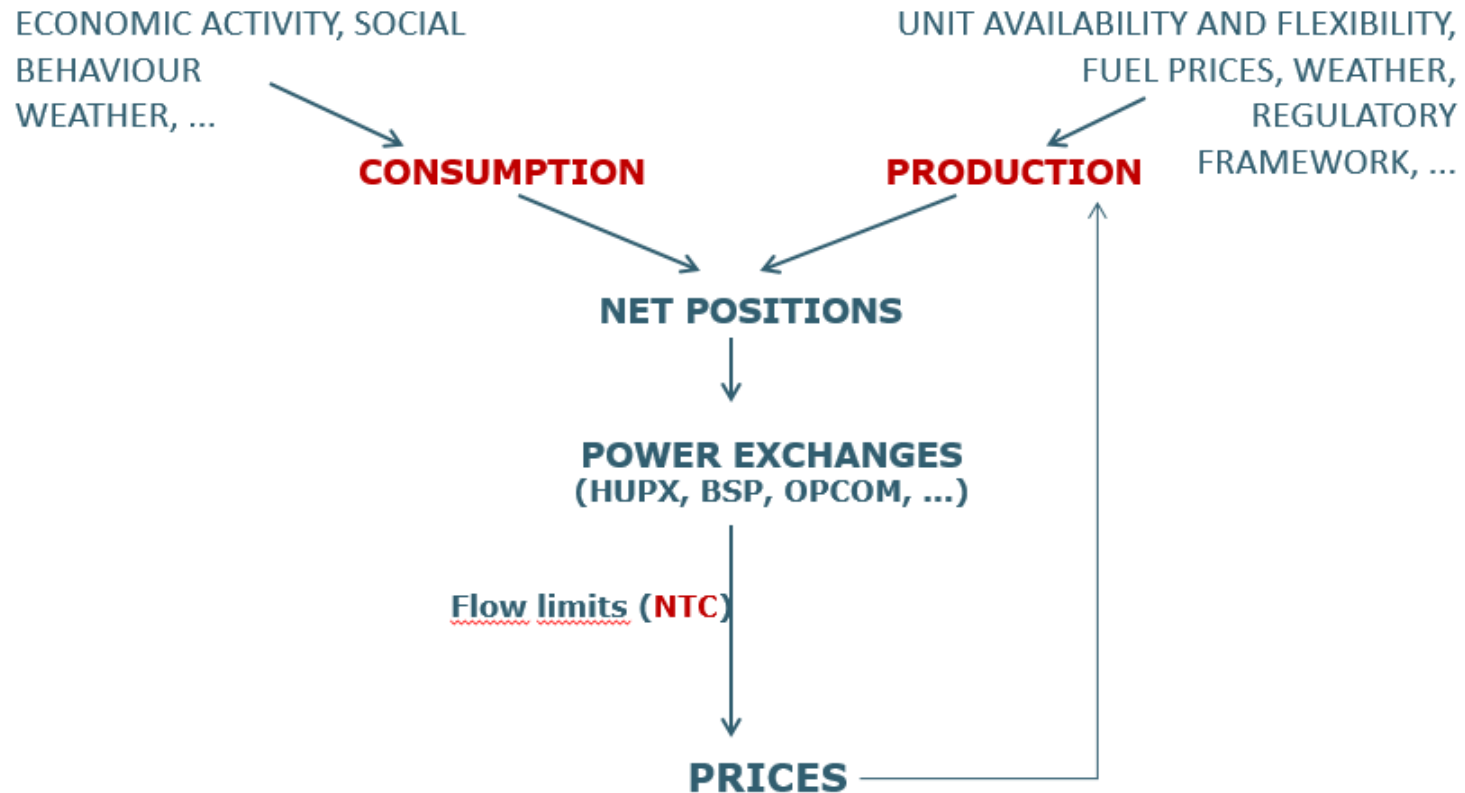
$$NTC = \infty$$



- In Country A, demand increases due to the **demand for export** and in Country B, the supply increases due to **supply of import**; in Country A, producer surplus increases whereas in Country B, consumer surplus increases → **in both Country A and Country B, overall social welfare increases!**

Fundamental Analysis and Price Formation

The Fundamental Model



The fundamental model analyses interdependency between fundamental data in order to evaluate countries' net positions and optimise cross-border flows given NTC constraints, i.e. covering a system's load at the lowest cost to maximise social welfare and economic surplus of market participants
→ **the basis for price formation**

Use of Data and Importance of Transparency

Market Participant Analytics

- Market participants use **fundamental data as key inputs** for:
 - **Model development and calibration** (*ex-post based on historical data*)
 - **Price forecasting and scenario simulations** (*ex-ante data on production/consumption unit and NTC availability → fundamental model price forecasting and flow optimization across markets*)
- **Transparency in data is key**, since availability of accurate data enables a level-playing field among market participants, resulting in improved optimisation of flows and consequently improved social welfare:
 - Data regarding weather, economic activity, etc. is obtained from a number of sources and **proprietary analyses**, including for example **meteorological services** as well as other **data/forecast providers**
 - Data regarding availability of production units as well as for significant consumption units is obtained from **Transparency Platforms** and provided by respective **TSOs, Production Units**, as well as **dedicated REMIT websites**
- Of critical importance are not just transparency and publication of essential data but also the **quality of data** and **ease of access** (usability)!

Use of Data and Importance of Transparency

Efficient Price Formation – Theoretical Examples



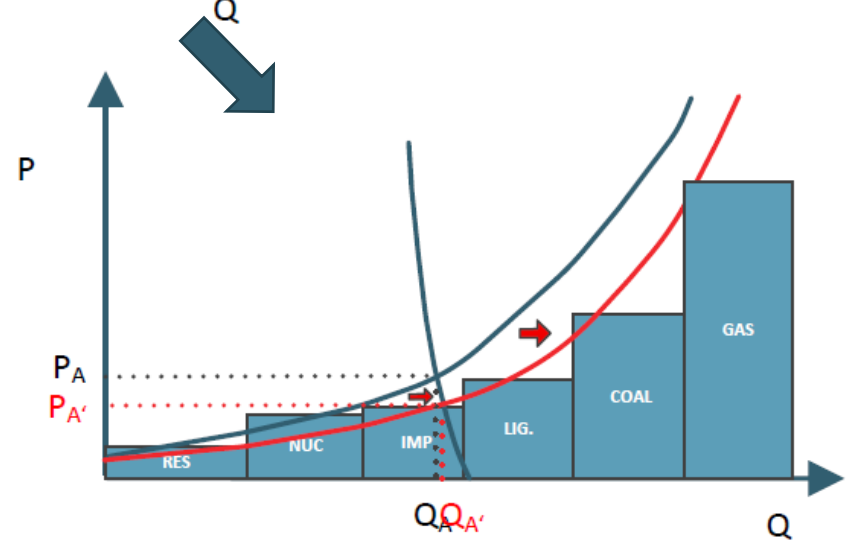
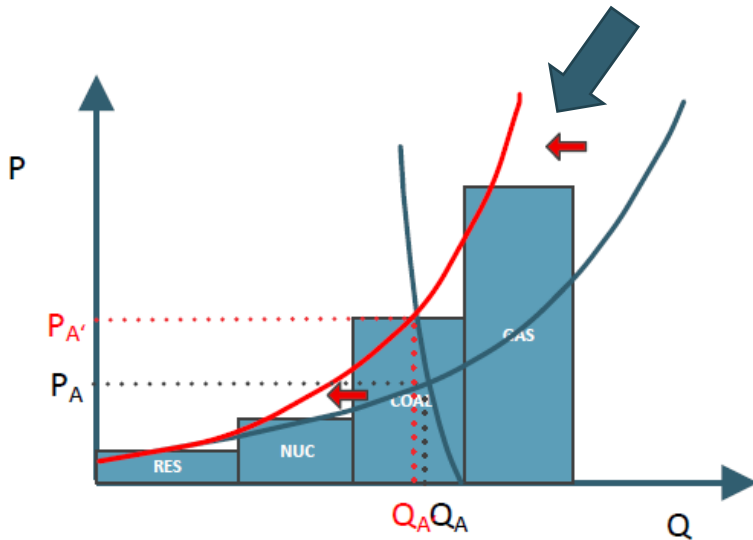
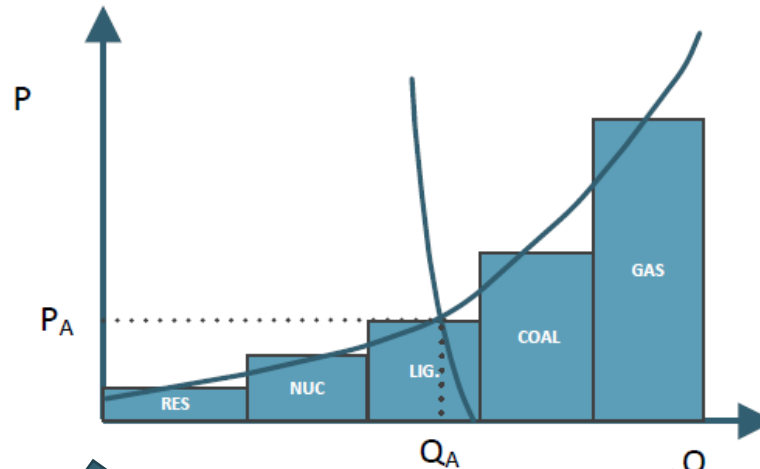
Central collection and publication of electricity generation, transportation and consumption data and information for the pan-European market.

Unavailability of Production and Generation Units ?

A change in the availability of production units suggests decreased supply, with impact on prices (*ceteris paribus*):

Forecasted Transfer Capacities - Day Ahead ?

A change in net transfer capacity changes flows from low price to high price regions, with impact on price (*ceteris paribus*):



The interplay of multiple simultaneous changes in multiple factors has a vast spectrum of results
 → accuracy and flexibility of individual market participant modelling comes into play!

Use of Data and Importance of Transparency

Practical Importance and Implications

- **Efficient price formation means that market participants formulate strategies based on all available information**
- **If information is not available to all market participants in a transparent and non-discriminatory way, or if the information is provided to market participants transparently but the information itself is not accurate, there is significant potential for abuse and consequently loss of social welfare through value destruction**
- **Examples:**
 - announcement of a power plant outage when in fact the power plant is functioning means market participants will expect a higher price and therefore adapt their bidding strategies accordingly (while the plant will be able to sell all of its output at the higher price)
 - announcement of a power plant outage to selected participants in advance means those participants will be able to benefit by anticipating the resulting price spike (e.g. by buying at lower prices before the announcement, and selling after at higher prices)
- **Prevention and sanctioning of such market manipulations and abuses as the key consequences of lack of transparency is the goal of Regulation (EU) No. 1227/2011 on wholesale market integrity and transparency – REMIT:**
 - Prohibition of insider trading and obligation to publish inside information
 - Prohibition of market manipulation (false and misleading signals; securing prices at artificial levels)

Conclusions and Key Messages

- Price formation depends on accurate and transparent fundamental data...
- ...transparency of quality data which is easy to access provides a level-playing field for market participants...
- ...better data means improved optimisation, which leads to increased social welfare!

Thank you for your attention!

