DEVELOPMENTS IN ELECTRIFICATION AND IMPLICATIONS FOR THE EUROPEAN ELECTRIC INDUSTRY – EU PERSPECTIVE

Challenges in Electricity Decarbonisation

EPRI – IEA workshop

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DG ENER unit B2: Wholesale markets
Target Model

Coordination of ATCs (Flow Based and/or NTC)

Explicit Auctions
Physical and/or Financial Transmission Rights
Futures on Y+1

Day-Ahead capacity

Flow Based where more efficient

Harmonised GCT

Intraday Allocation Implicit Continuous Trading and/or Implicit Auction

Day-Ahead Implicit Allocation Price Coupling

Balancing, Real Time

„Forward“ market

„Physical“ market

Flow Based where more efficient

Flow Based where more efficient
Day-ahead market coupling status in October 2017

<table>
<thead>
<tr>
<th>REGIONAL DAY AHEAD IMPLICIT AUCTIONS</th>
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<tbody>
<tr>
<td>North West Europe (NWE)</td>
<td>Price coupling</td>
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<tr>
<td>Poland</td>
<td>PL coupled with NWE through SwePol (and LitPol Dec. 2017)</td>
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<tr>
<td>Ireland and Northern Ireland</td>
<td>All Island market, single price zone</td>
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<tr>
<td>Czech – Slovak – Hungary-Romania</td>
<td>Price coupling</td>
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Source: APX, updated by Matti Supponen
"In essence the new package is about tapping our green growth potential across the board"

Commissioner Miguel Arias Cañete (2016)
General decrease in energy consumption and penetration of renewable energy forms

- General decrease in gross inland consumption, in line with energy efficiency objectives
- Renewable energy forms increase in absolute and relative terms
- Natural gas consumption only slightly decreases
- Oil remains the main energy carrier, notably due to demand in transport sector

Gross inland energy consumption (Mtoe)

Source: PRIMES modelling, NTUA, E3M-Lab
The EU power generation mix changes, in favour of renewables

- Significant development of renewable energy (mostly solar and wind)
- Decline of electricity generation from solid fuels (mostly coal)
- Gas-fired generation decreases until 2020, but increases thereafter
- Nuclear energy decreases slightly

Source: PRIMES modelling, NTUA, E3M-Lab
Customer in the middle
## Market versus regulation

### Regulation
- Unbundling
- Regulated prices
- Energy efficiency targets
- RES targets
- Subsidies
- Capacity payments
- Priority dispatch
- Redispachting
- Mandatory ancillary services
- Tariff structures
- Regional Operational Centers (ROCs)

### Regulation/Market
- Emissions trading
- Trading of green certificates
- RES auctions

### Market
- Competition
- Free price formation
- Markets for ancillary services
- Right to self-produce/-consume and store electricity
- Right to be aggregated

### Legend:
- No major change
- Abolish
- Improve
- To the market
Storage in cartoons

- Steam Pressure Storage
- Water Pressure Storage
- Chemical Energy Storage

Kinetic Energy

- 50.2 Hz
- 50.1 Hz
- 50 Hz
- 49.9 Hz
- 49.8 Hz

- Solar Energy
- Wind Energy
BACKGROUND – UNLOCKING THE UNTAPPED DEMAND-RESPONSE POTENTIAL

- 16 Member States maintain some form of energy price regulation for households.
- In most Member States demand response is limited due to market entry barriers towards new service providers, such as independent aggregators (which aggregate individual flexibility).
- Unlike transmission system operators, distribution system operators cannot manage their network in a flexible manner to reduce costs for the consumer.

WAY FORWARD

- **Phase-out regulated prices**, only duly justified exemptions allowed.
- Ensure **fair market access for independent aggregators** and other new service providers.
- Allow **flexible management of distribution networks** through curtailment of renewables and demand response solutions.
- Set clear principles for DSOs to ensure neutrality.

Competition within the retail energy market is key for unlocking efficient consumer behaviour and keeping the cost of the energy transition at check.
Smart meters and grids
Aggregators

- Commercially active
- Partial opening
- Preliminary development
- Closed
- Not assessed

Source: SEDC 2017
New relations between players

Data for public purposes (monitoring, research, planning, etc.)

- **DSO**
  - Right to measurement data on the own network

- **TSO**
  - Right to measurement data on balance responsible parties and balance service providers

- **Independent Data Manager**
  - Obligation to collect measurement data and give access to it

- **Supplier**
  - Right to customer data on own clients

- **Service provider**
  - Right to serve customer
  - Right to aggregate
  - Right to customer data on own clients

- **End customer systems** (generators, industrial customers, home automation systems)

- **End customer**
  - Right to consume, produce and store electricity

- **TSO balancing and DSO congestion management coordination system**

**Flow:** Measurement data, Private data, Control signals
DSO tariff reform

Figure 29. The total price of electricity for Nordic consumers

Source: Thema report on capacity adequacy for the Nordic Council of Ministers
Regional TSO coordination

= Regional Operations Centre (ROC)

= Sub Centre of a Regional Operations Centre

= Border between Regional Operations Centres

<table>
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<tr>
<th>Functions for ROCs</th>
<th>Current functions, based on voluntary action or legislation in force</th>
<th>Agreed, implementation by 2020</th>
<th>Proposed in the Winter package, implementation by 2030</th>
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<tr>
<td>• Operational Security Analyses</td>
<td>• Short-term Adequacy Analyses</td>
<td>• Role in sizing and procurement of balancing reserves</td>
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<tr>
<td>• Common Grid Model</td>
<td>• Outage Coordination</td>
<td>• Emergency &amp; restoration coordination</td>
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<tr>
<td>• Capacity Calculation</td>
<td>• Support on assessment of emergency and restoration plans</td>
<td>• Training and certification</td>
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Thank you for your Attention!