Electricity Market Integration 2.0 in Central and South East Europe

Changes in European Energy Market Landscape

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ENTSO-E: Implementing the 3rd Package

European Network Codes
Growing complexity into Energy System Flexibility Management

Large Scale Interconnections ▸

Distributed Energy Resources Integration

September 2016 in Denmark, one week
(source Energinet.dk)
Where are we today?

**Sustainability**
- 260 GW of RES connected
- 25 GW in 2016
- >10 GW of EU demand side response

**Competitiveness & Social Welfare**
- 23 states and 85% of European consumption market coupled
- 10 million data files made available yearly for 2500 daily users of ENTSO-E transparency platform

**Security of supply**
- NO multi-state interruptions recent years
- Up to 300 coordinated tasks/day in a RSC
- Hundreds trained employees in TSCnet and Coreso programs
Striving for Pan European Grid & Market Operation harmonisation

MARKET CODES
Wider market integration
Allow more competition, new entrants, and enhance resources optimisation

OPERATIONAL CODES
Reinforced security of supply
Plan, operate & monitor a grid with new challenges and new technologies

CONNECTION CODES
Greener power, smarter consumption
Connect new actors to the grid and enable them to play an efficient role
Case #1: Promote wholesale markets

**DAY-AHEAD MARKETS**
- 1 B€ in social welfare
- ~100 M€/year of benefits from flow-based in CWE
- 84% efficient use of capacity given to the market
- 1500 TWh (~50% of consumption) traded on exchanges

**INTRADAY MARKETS**
- 120 TWh traded on main power exchanges in 2016
- 3.6% average annual volume growth last 5 years

**DERIVATIVES MARKETS**

- Efficient day-ahead markets
- Market trust
- Efficient planning
- Liquid derivatives
- Efficient hedging

**STATES WITH INTRADAYMARKETS**
- Continuous trading
- Auctions
- Interim solutions before EXBID

**Graphs**
- 2008-2016: Spot-volume growth (TWh/yr). EPEX and NordPool combined
- 2008-2016: Derivative-volumes picking up (TWh/yr). EEX and NasdaqOMX combined
Case #2: Update and integrate balancing markets

Replacement reserves in the Nordics since 2003

Pilot on imbalance netting within and around Germany (IGCC)

Pilot on replacement reserves across the Continent (TERRE)

Annual benefits:

~ 220 M€

~ 260 M€

~ 80 M€

~ 120 M€

Theoretical benefits of full integration of balancing markets

Up to 3 Bn€
Case #3: Secure operations with regional cooperation

Regional Security Coordinators:

1. Capacity calculation
2. Security analysis
3. Common grid model
4. Adequacy forecast
5. Outage planning

- X7 potentially critical situations detected by CORESO with proposed solutions
- 4000 remedial actions proposed/implemented/year in Coreso
New Strategic investments towards Digital

Energy Data Hubs & App Stores

New Generation Flow Based real-time markets

Reference Grid Architecture Model to support next Network Code deployments
What’s after 2020? The Clean Energy Package

27% renewables by 2030 = +/- 45% for the power system

Sector Coupling:
- Power
- Gas
- Transport

Illustration of main RES potential across Europe towards 2030
New Digital Energy Value Chain federation

**Traditional electricity value chain**
- Power generation and trading
- Power transmission
- Power distribution
- Energy services (retail)
- Electric devices and appliances
- End-use customers

**Emerging electricity value chain**
- Distributed resources (generation, storage, electric vehicles)
- Power generation and trading
- Power transmission
- Power distribution
- Energy services (retail)
- Electric devices and appliances
- End-use customers

Source: IBM Institute for Business Value.

*Figure 1: Traditional and emerging electricity value chain.*
A new framework to address next European 4th Industrial Revolution

- Active customer
- Scarcity pricing
- Removal of price caps
- Easier supplier switching
- Risk preparedness framework
- European resource adequacy
- Ambitious Regional Cooperation

FUTURE?

- Smart, data-centric system
- Electrification of transport
- Engaged prosumers
Prosumer value proposition becoming mainstream

Security of Supply

Lower bills

Climate protection

Interactive
New sector coupling

- Power with Gas / Combined Heat & Power
- Mobility with Power & Gas & Emission Trading
- TSO-DSO coupling
- Microgrid coupling at Gridedge through #Blockchain
THANK YOU FOR YOUR ATTENTION

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