



## **Innovation and exnovation in energy transitions – The role of policy makers between promoting renewables and phasing-out nuclear and coal power generation**

**Workshop III: “Accelerating Technological Sustainability Transitions by Overcoming Adoption and Diffusion Barriers in Energy Transitions”**

**Spring Campus, Berlin, April 9-13, 2018**

Matti Supponen

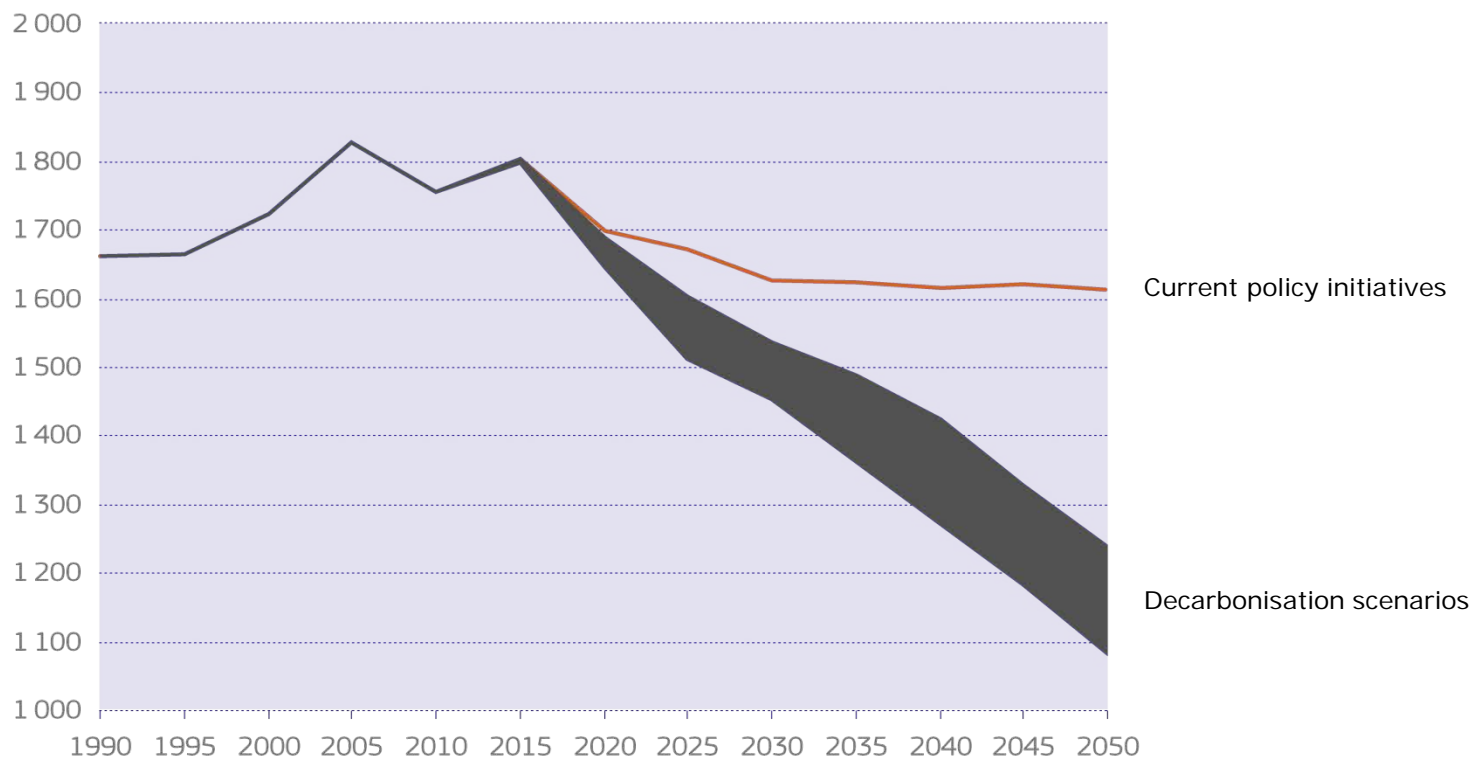
**DG ENER unit B2: Wholesale markets**

# Content

- **EU energy policy in a nutshell**
- **EU electricity market**
- **Promoting innovation through the Clean Energy Package**
- **Exnovation measures at the European level**

● *Energy savings throughout the system are crucial*

Gross energy consumption (in Mtoe)



## CHALLENGES AND OPPORTUNITIES



**Modernise our economy** by bringing down greenhouse gas emissions while creating jobs and growth

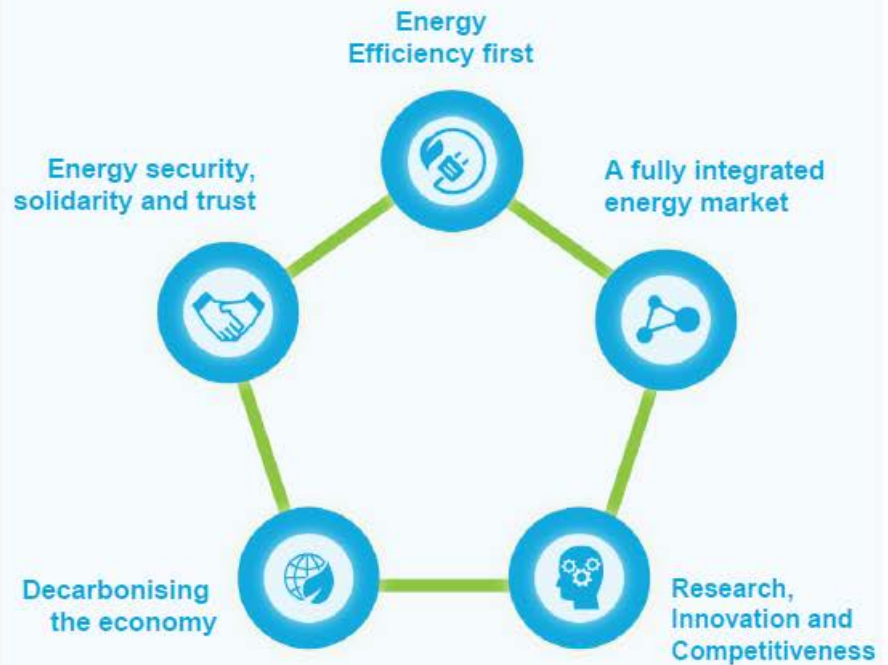


The EU as the world leader on **renewable energy and placing energy efficiency first** based on new technologies and industrial leadership



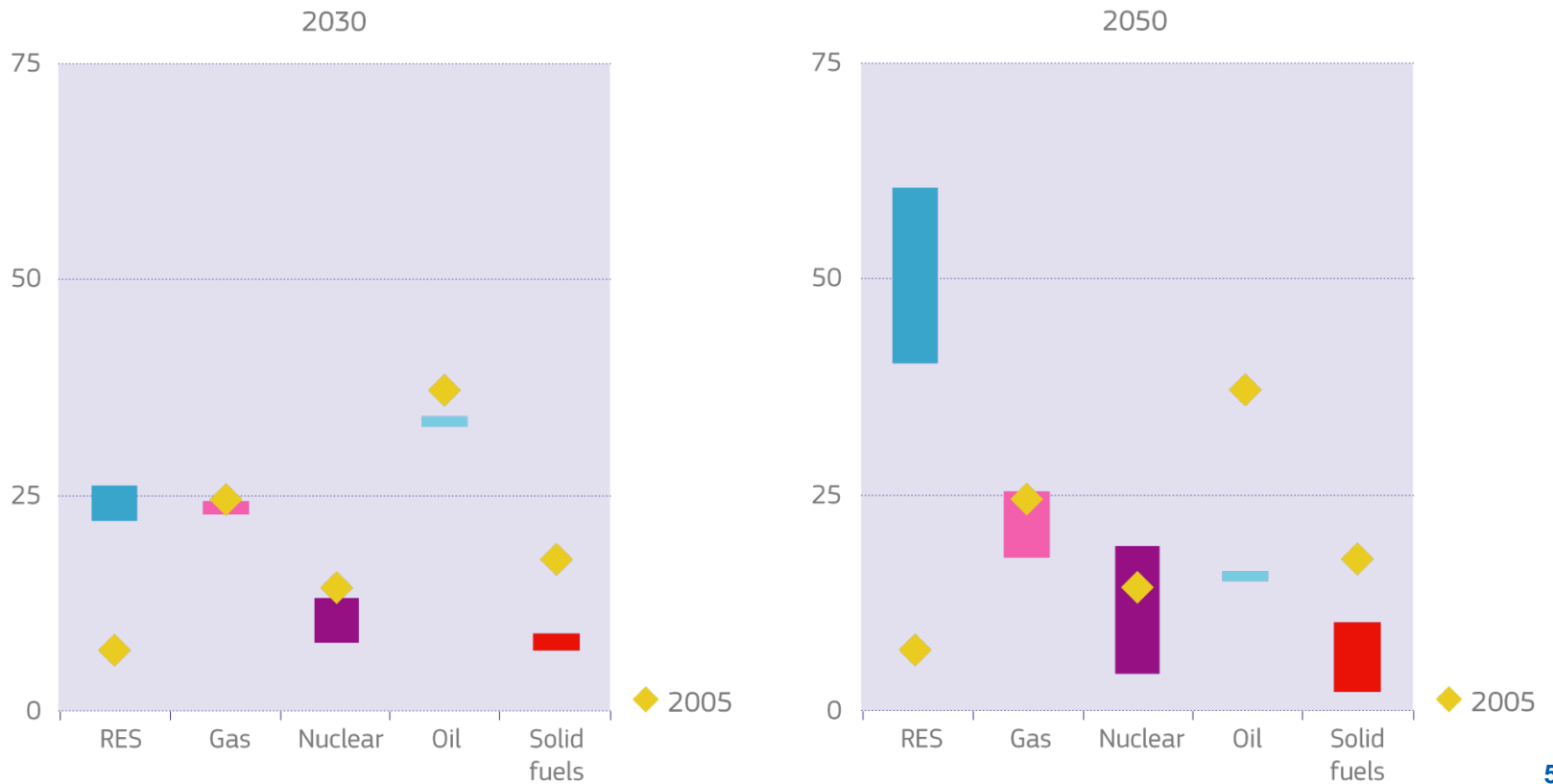
**Ensure a socially fair transition** where regions, cities and consumers play an active role

### ENERGY UNION STRATEGY

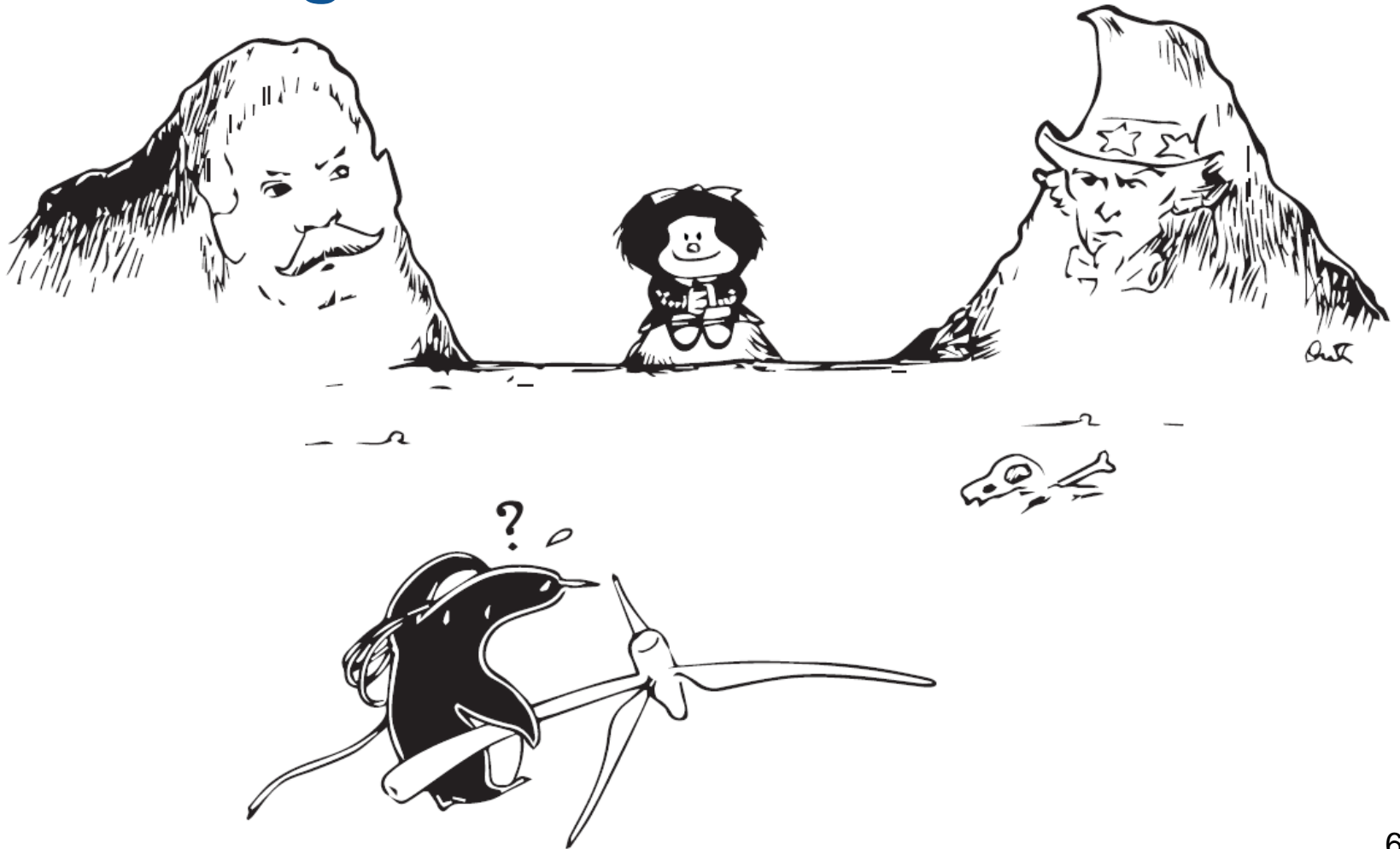


● *Renewables move centre stage – but all fuels can contribute in the long-run*

Decarbonisation scenarios - fuel ranges (primary energy consumption in %)



# Regulation versus market



# Regulation versus market

## Regulation

- Grid tariffs
- Regulated prices
- Capacity mechanisms
- RES targets
- Subsidies
- Energy efficiency targets
- Mandatory ancillary services
- Priority dispatch
- Emission standards

## Regulation/Market

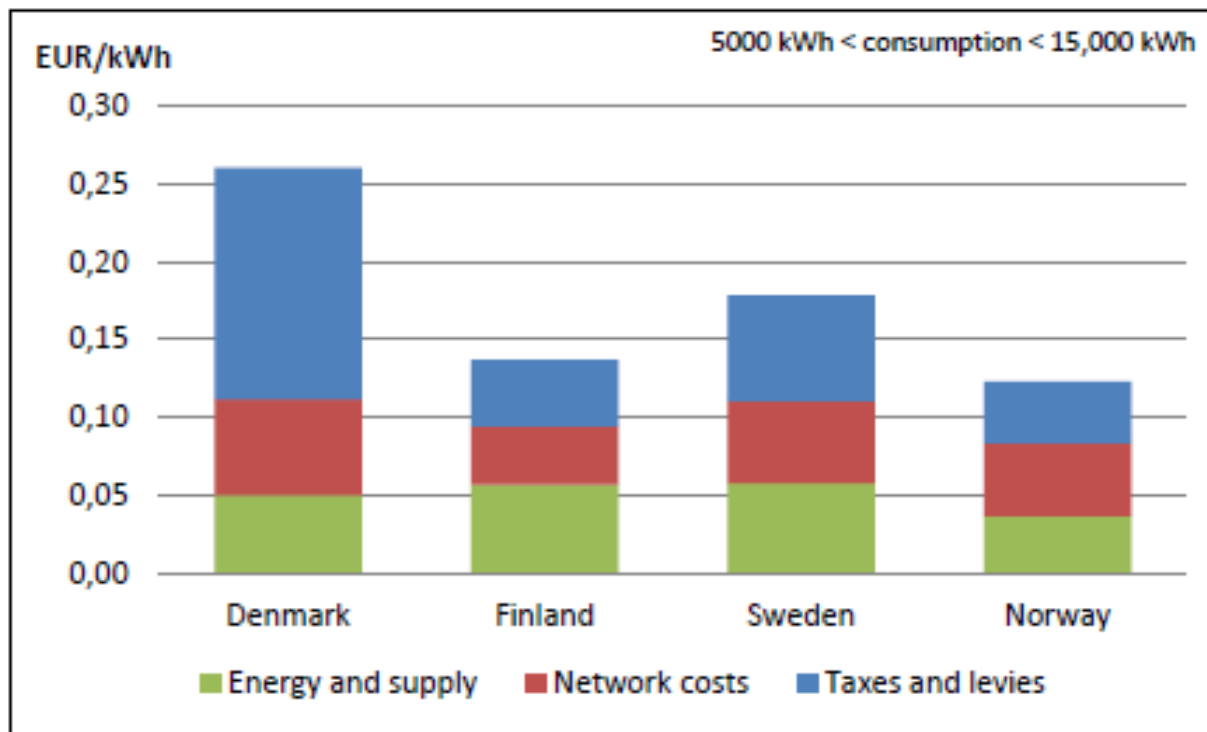
- Emissions trading
- Trading of green certificates
- Auctions for generation capacity

## Market

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

# Electricity tariffs

Figure 29. The total price of electricity for Nordic consumers



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



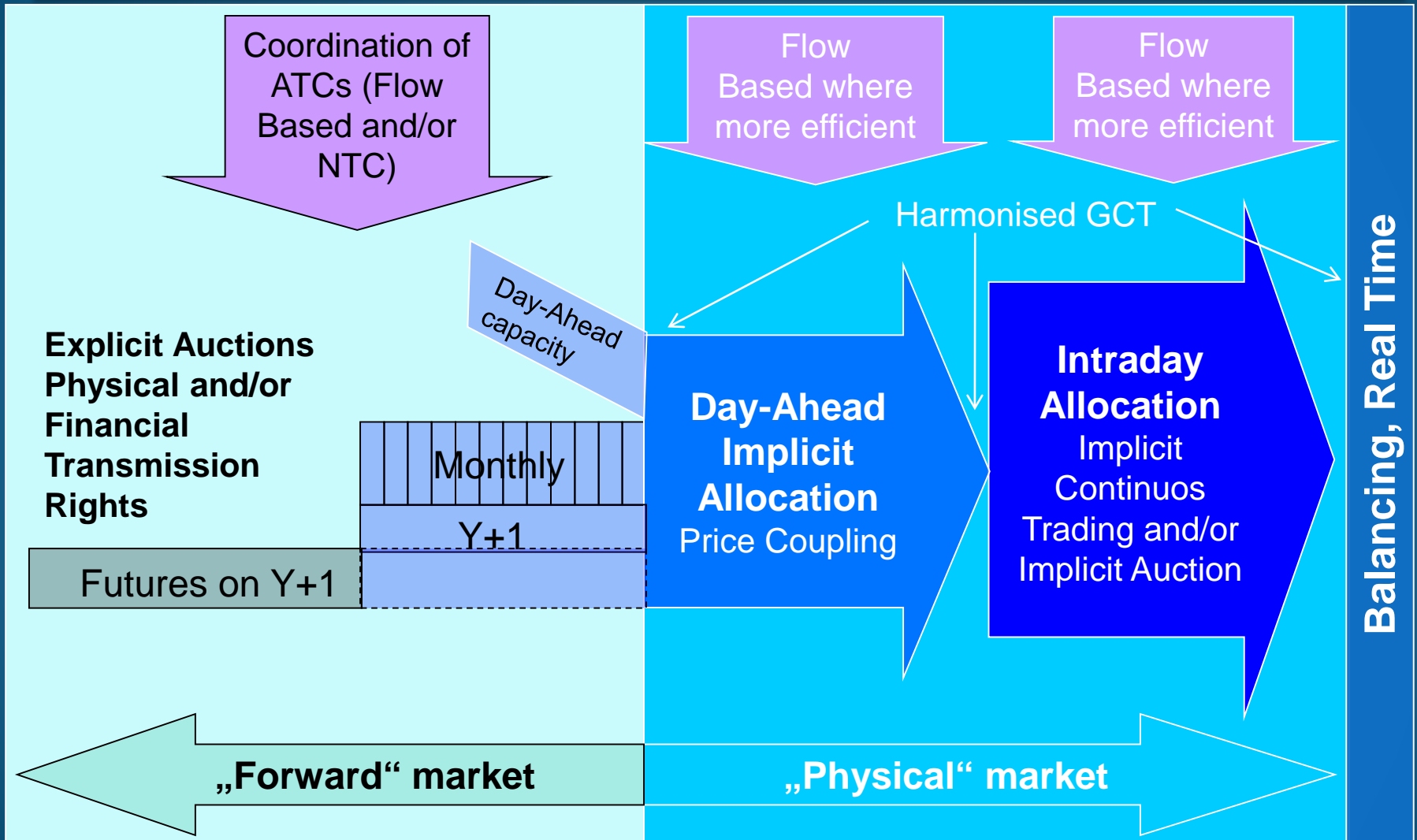
# European electricity market basics

- Liberalisation at the European level started in 1999
- Third internal energy market package from 2009 provides the current legal framework
- National Regulatory Authorities (NRAs)
- Agency for Co-operation of Energy Regulators (ACER)
- Ownership unbundling of Transmission System Operators (TSOs), with some exceptions
- Electricity market is based on zonal pricing
- System size is about 1000 GW and 3000TWh
- One main synchronous system in the Central and Southern Europe (former UCTE)
- Other synchronous systems: Nordic, Great-Britain, Ireland, Baltic states (with Russia), numerous islands

# Selected electricity markets in the world

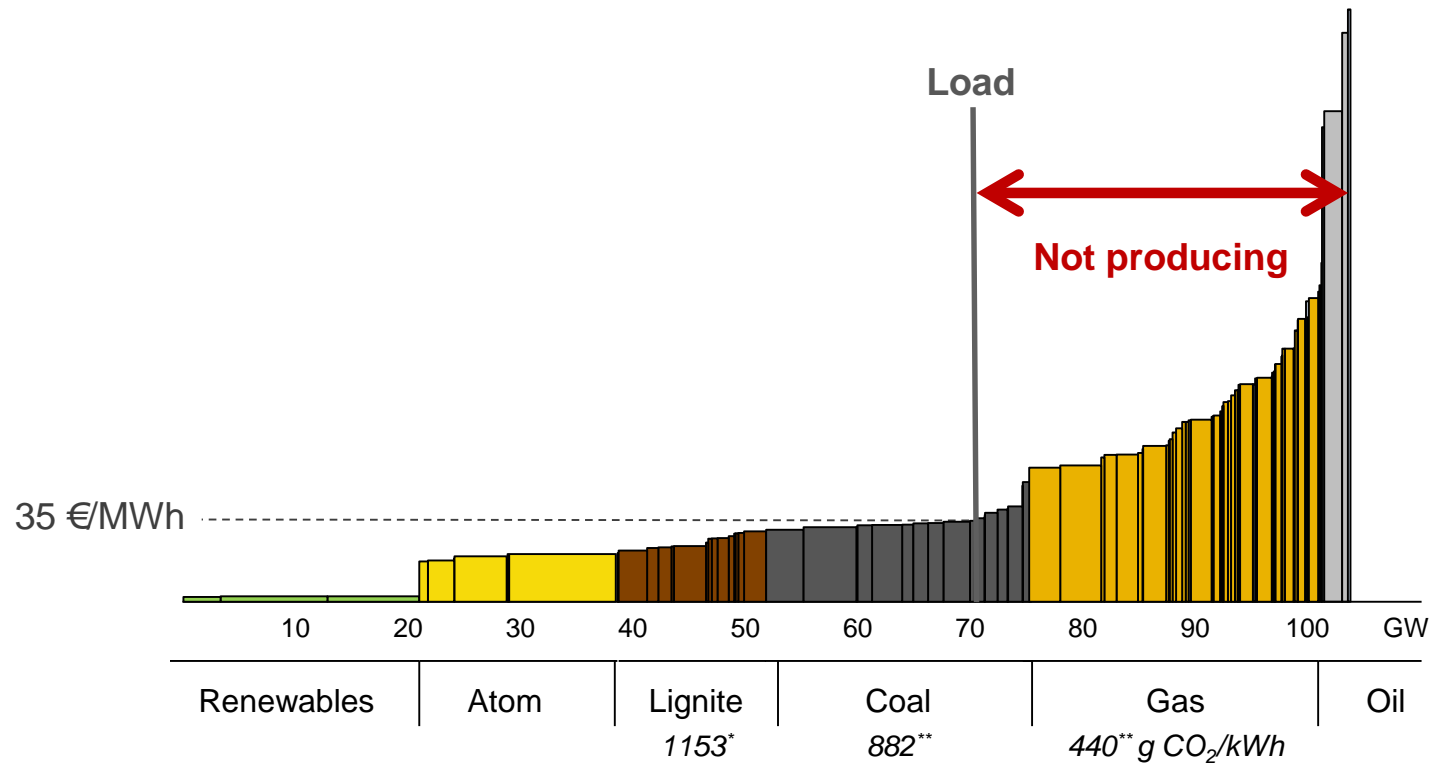
- **North America**
  - Main synchronous systems are Eastern interconnection (including PJM), Western interconnection (including California) and Texas.
  - Some parts of Canada are interconnected with the United States
  - Mixture of open markets with competition and non-liberalised fully regulated markets.
  - Where markets are open, nodal pricing widely used.
- **Australia**
  - Zonal pricing like in Europe
  - Gross pool (central dispatch of all generators)
- **Europe**
  - Zonal pricing
  - Mainly self-dispatch by generators, some countries have central dispatch (Poland, Italy, Hungary, Ireland)

# Target Model



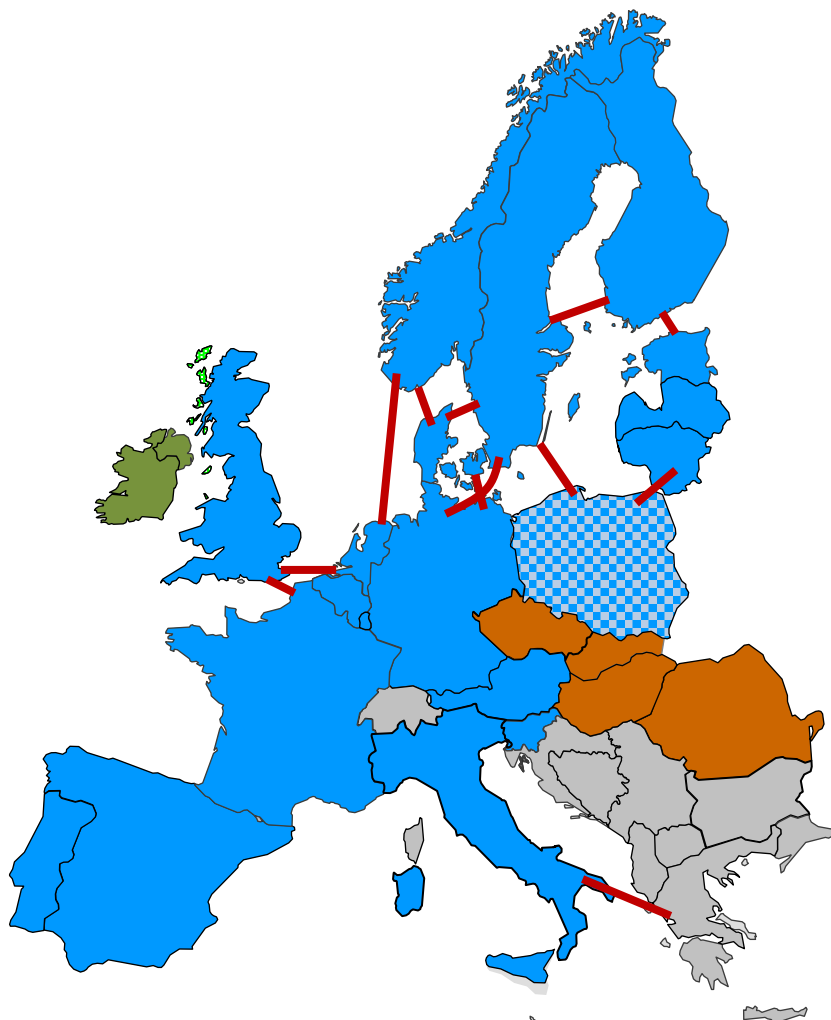
# Merit order

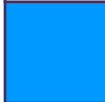
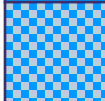


Merit Order Austria/Germany 2014



Source: Verbund

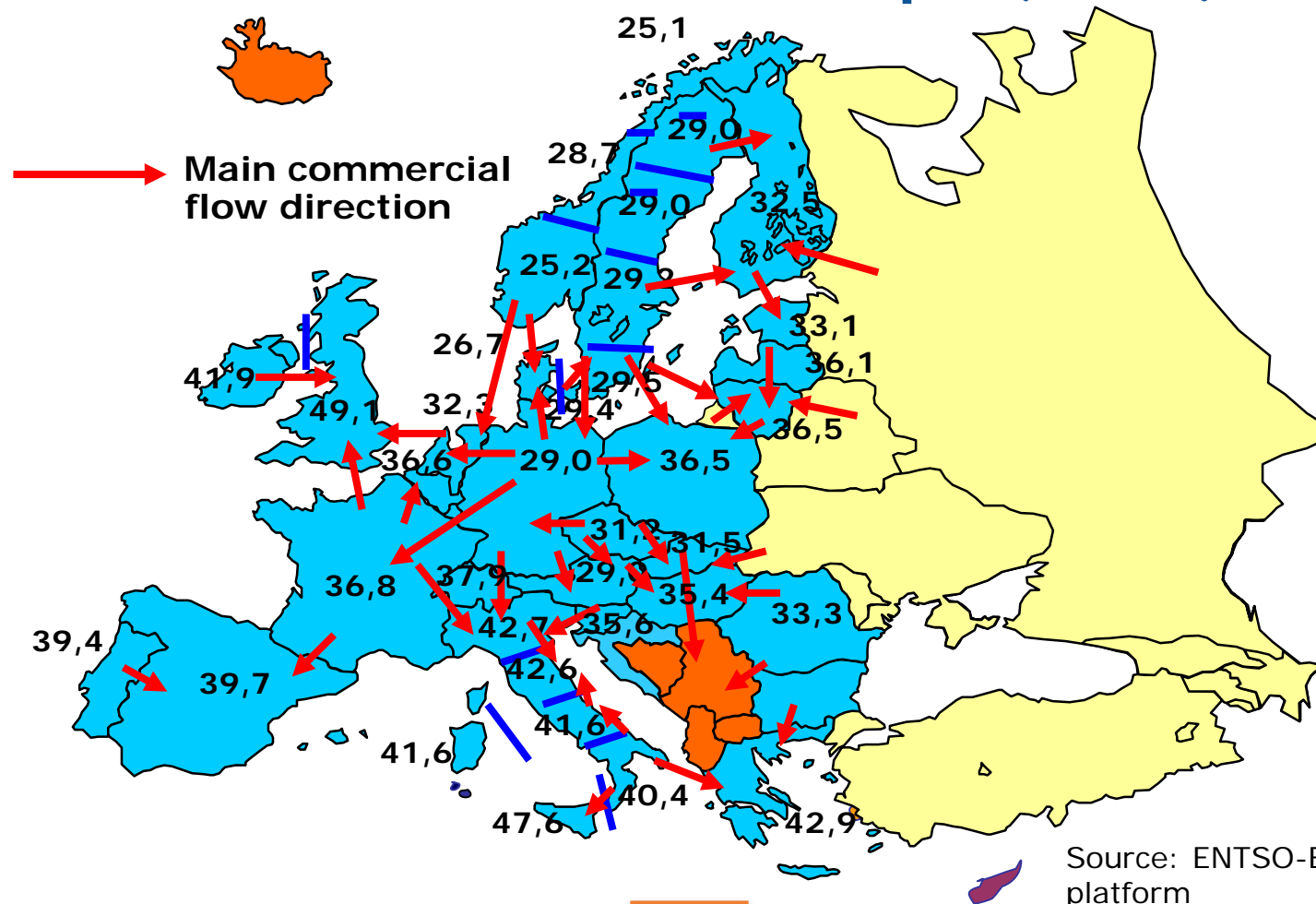
## Day-ahead market coupling status in April 2018



REGIONAL DAY AHEAD IMPLICIT AUCTIONS		
	<b>North West Europe (NWE)</b>	Price coupling
	<b>Poland</b>	Poland coupled within NWE through SwePol- and LitPol -link
	<b>Ireland and Northern Ireland</b>	All Island market, single price zone
	<b>Czech – Slovak – Hungary-Romania</b>	Price coupling

Source: APX, updated by Matti Supponen

# Average spot prices (€) and electricity cross-border trade in Europe (2016)



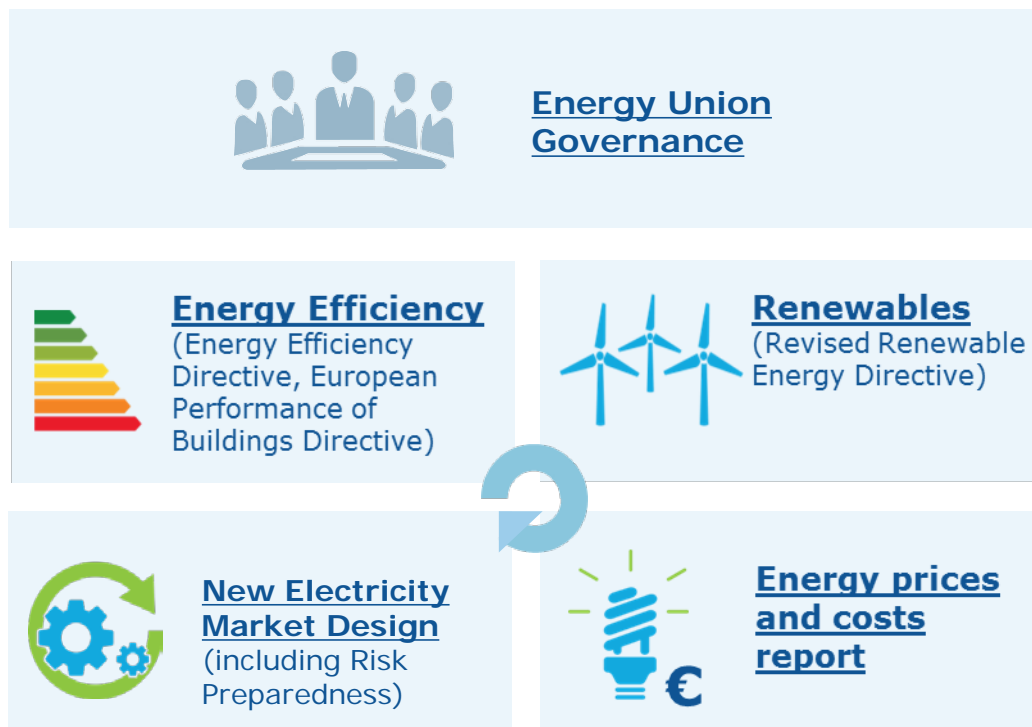
Source: ENTSO-E Transparency platform

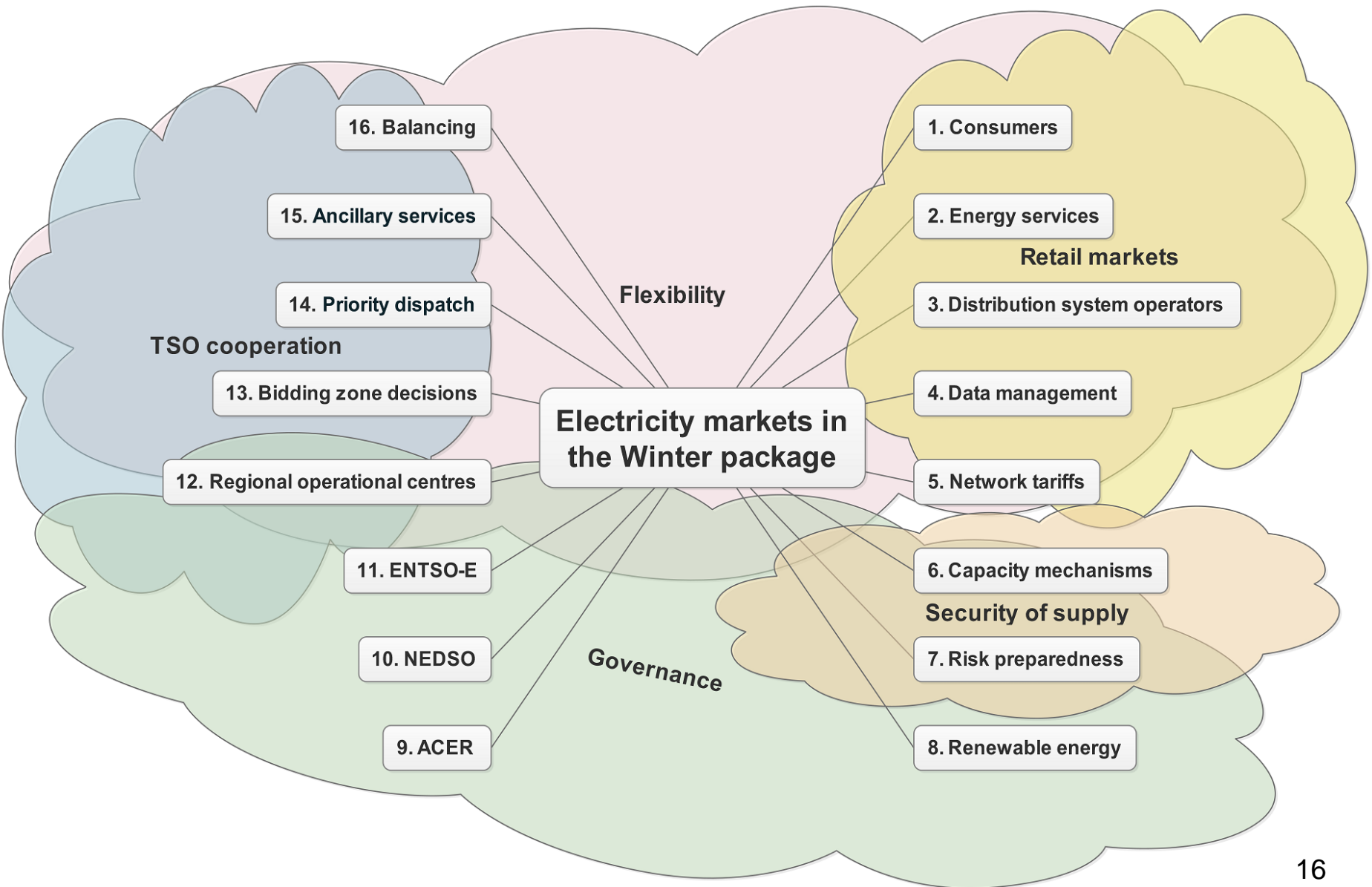
## ELEMENTS OF THE PACKAGE

### A SET OF COHERENT MEASURES

*" In essence the new package is about tapping our green growth potential across the board"*

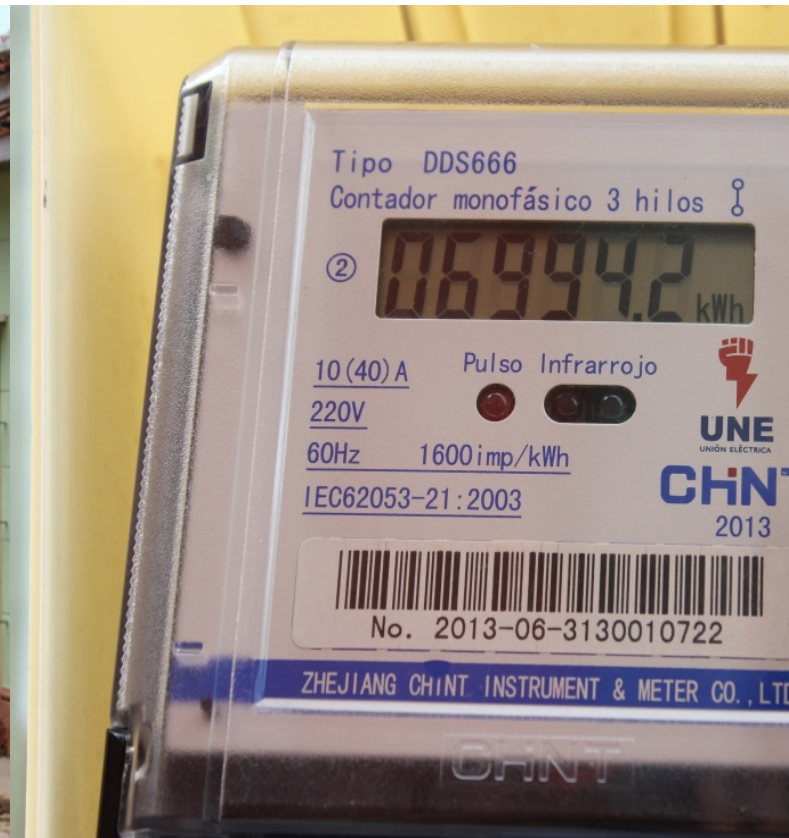
*Commissioner Miguel Arias Cañete (2016)*



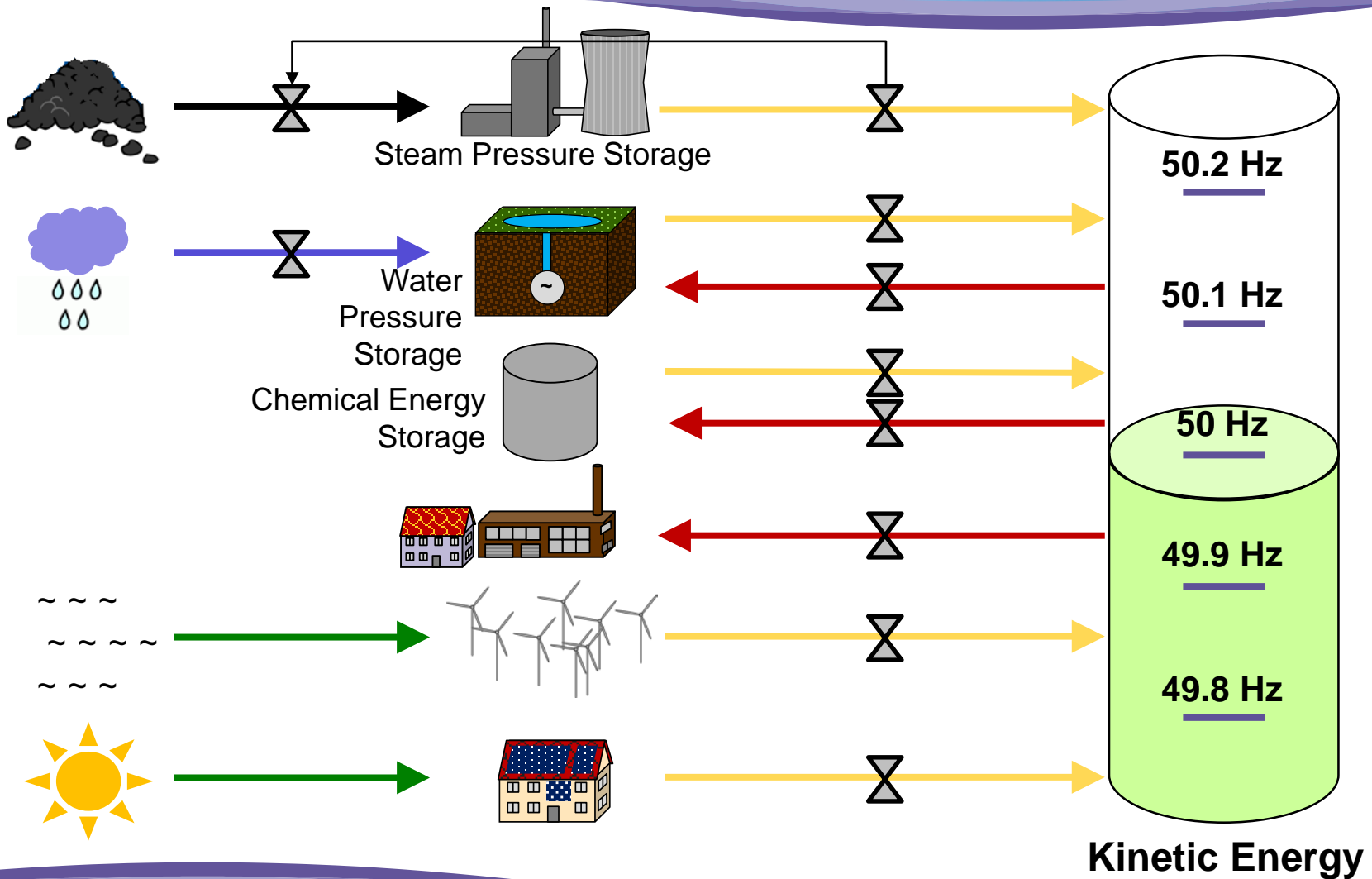




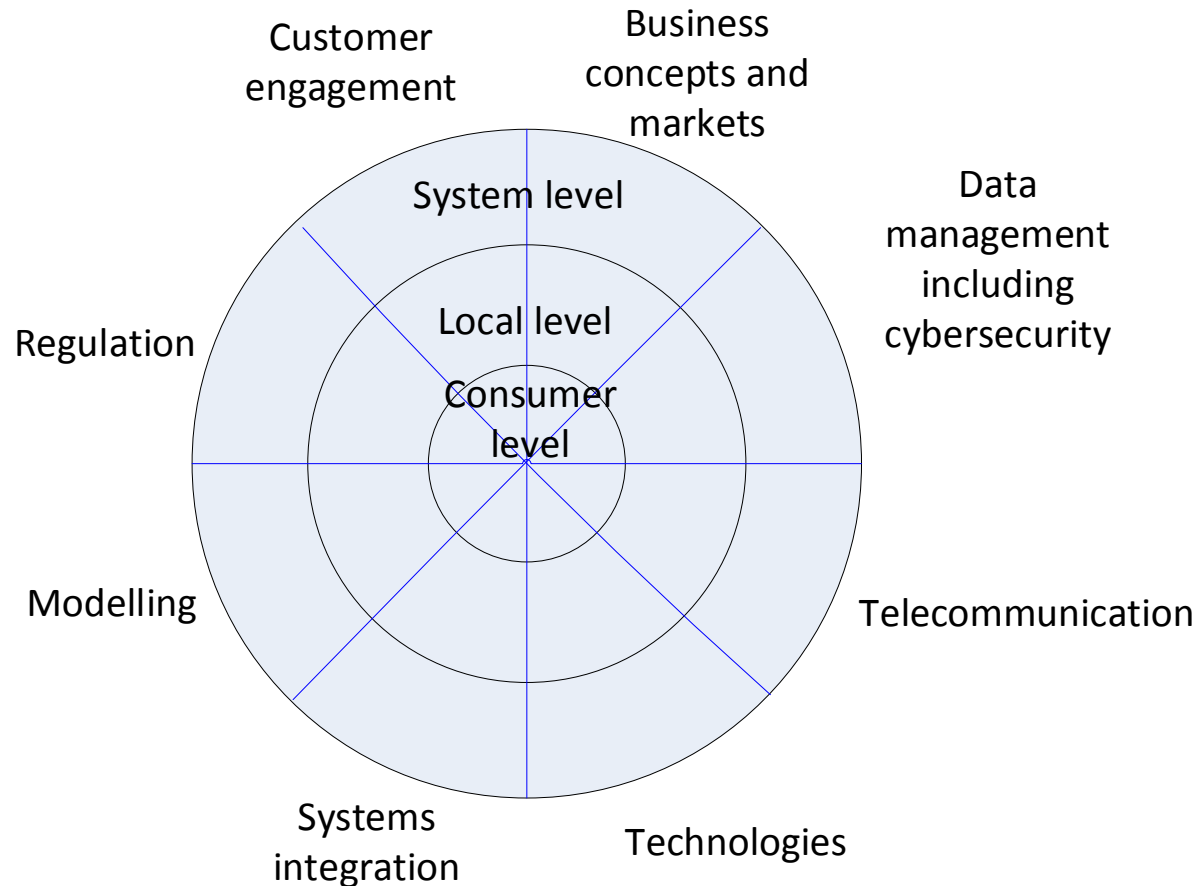
# End customer focus



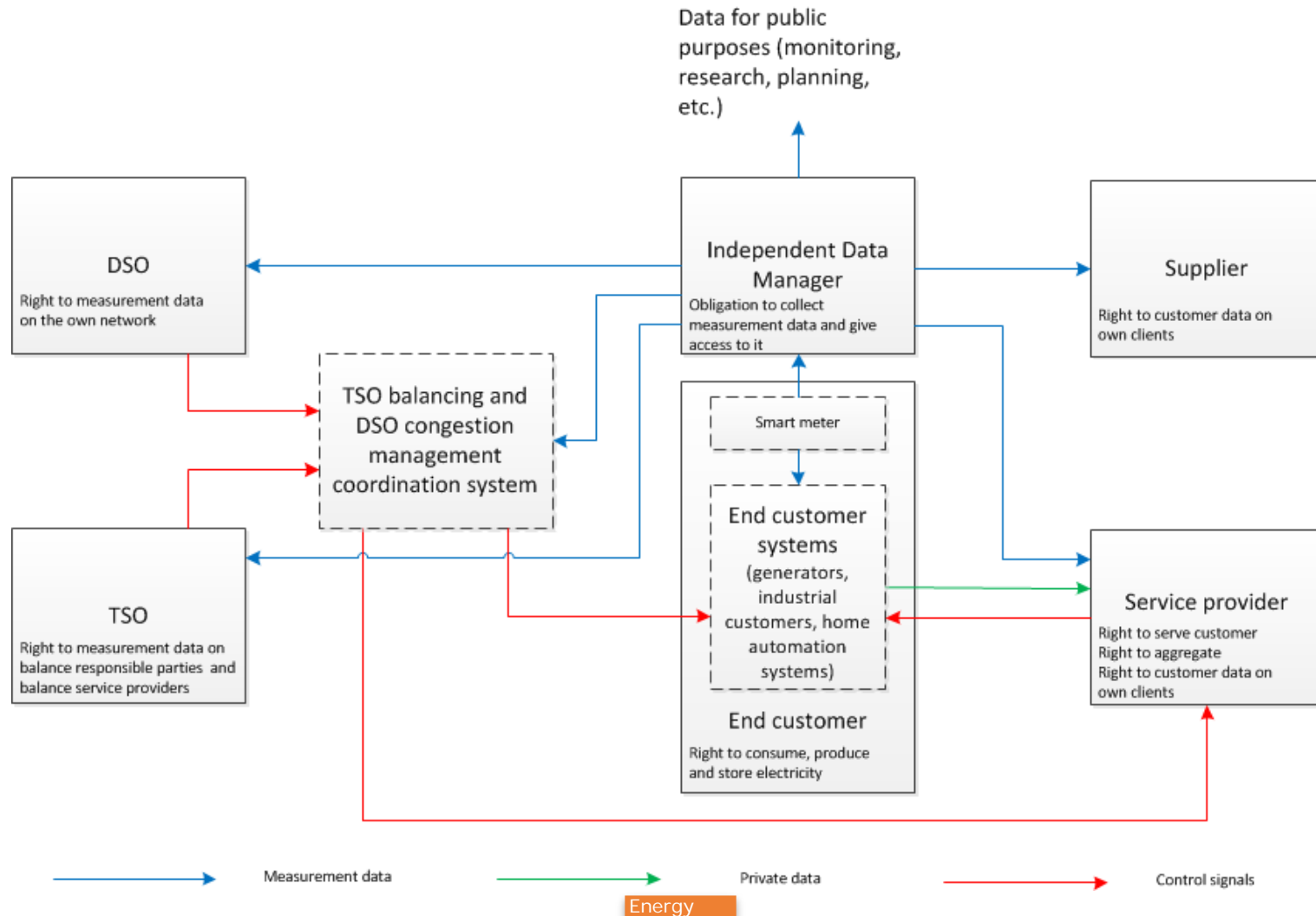
# New sources of flexibility



## Digitalisation and energy

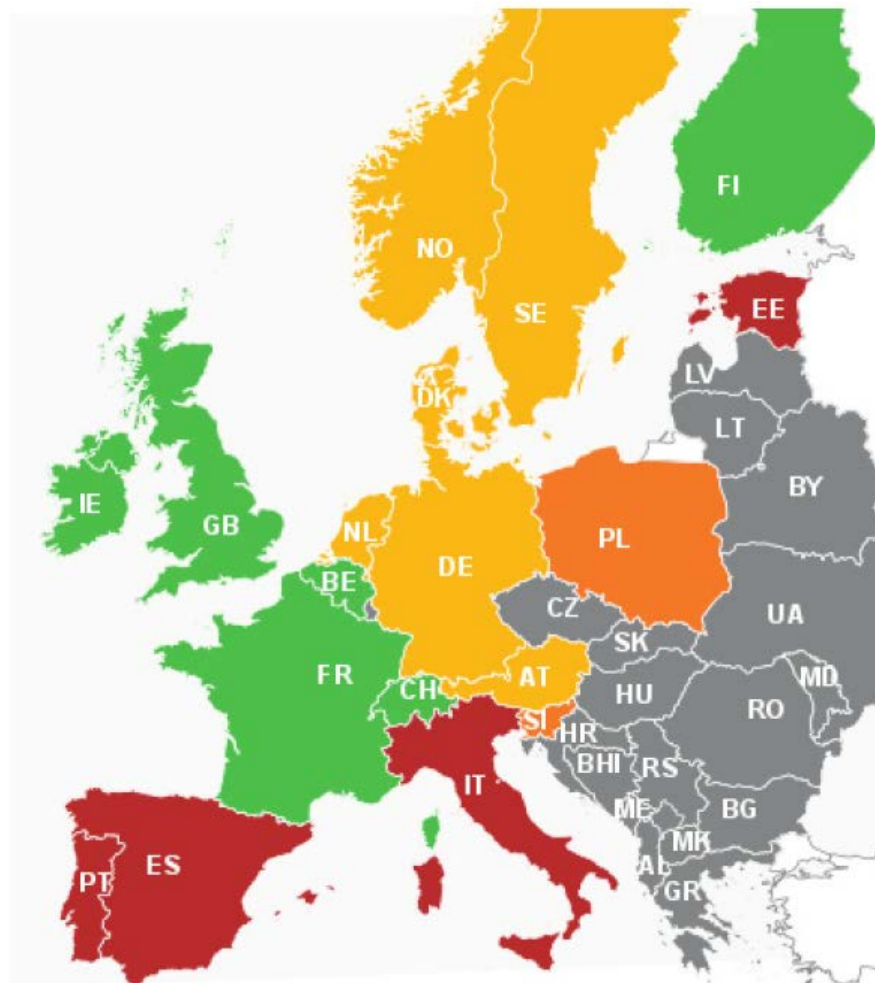


# New relations between players



# Aggregators

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



Source: SEDC 2017

# Future issues regarding electricity markets

- **Design issues**
  - Capacity mechanisms
  - New forms of trading (for example peer-to-peer)
  - Local markets (including DSO congestion management)
  - Role of DSOs vs. TSOs
  - Concepts for demand response
- **Digitalisation**
  - Cybersecurity, Internet of Things, Big data
  - Who will manage data platforms?
  - More active control of assets for balancing
- **Sector coupling**
  - Power to gas, power to liquids, interplay between electricity and heat, electrification of transport, etc.)

# Capacity mechanisms



# Exnovation

- **Energy mix is a Member State competence**
- **Carbon price**
- **Best available technologies (BREFs)**
- **Subsidising (RES) promotes exnovation regarding non-subsidised technologies**





European  
Commission



Thank you for your

**Attention!**

Energy