

Challenges for System Adequacy and Various Market Designs
in Europe - a Question of National Solo Actions or a Common
Transnational Task


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Overview



Background



Market design debate in an internal market and interconnected system



Coordination of different Market Designs

Background

Current developments in the European electricity market

- > continuous progression of the European internal electricity market
- > increasing share of renewables energy sources (RES)
- > persistent effects of financial and economic crisis on demand, CO2-prices, ...

- > expected de-commissioning of conventional power plants
- > concerns on system adequacy → debate on future market design

Key options for the future

- > Reform and improvement of current market design: Energy Only Market (EOM)
- > Implementation of a capacity remunerations mechanisms (CRM)

- > debate on these options still mostly on national level
- > national assessment of options can led to nationally different answers
- > assessment of system adequacy is one element for finding an answer and can be an important step towards a transnational co-ordinated answer (→ if well done)

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Coordination of Different Market Designs

Status Quo of assessment of system adequacy in Europe

Geographical scope mostly national, indicators mostly deterministic

- > Approach in most European countries is based on a national (isolated) view on system adequacy
 - » neglects internal electricity market (IEM)
 - » cross-border exchanges in IEM can in principle increase as well as decrease actual level of system adequacy compared to the level calculated from national view

- > ENTSO-E evaluates system adequacy from a national perspective, complemented by a simplified regional analysis

- > TSOs' report about assessment of system adequacy (PLEF++) is a valuable first step
 - » probabilistic assessment for whole years
 - » probabilistic indicators
 - » application of market simulation methods to deal with interconnection

> Adequate assessment of system adequacy requires transnational view and probabilistic assessment methodology

New methods for adequacy assessment needed

Key facts for adequacy assessment

- > Assess likelihood that adequacy is maintained
 - » no black or white classification possible
- > Challenges include
 - » dealing with rarely occurring events
 - » taking into account stochastic characteristic and weather dependency of intermittent generation and load
 - » observing limits to cross-border exchange imposed by transmission system capacity

Aim of our new developed method and its first application

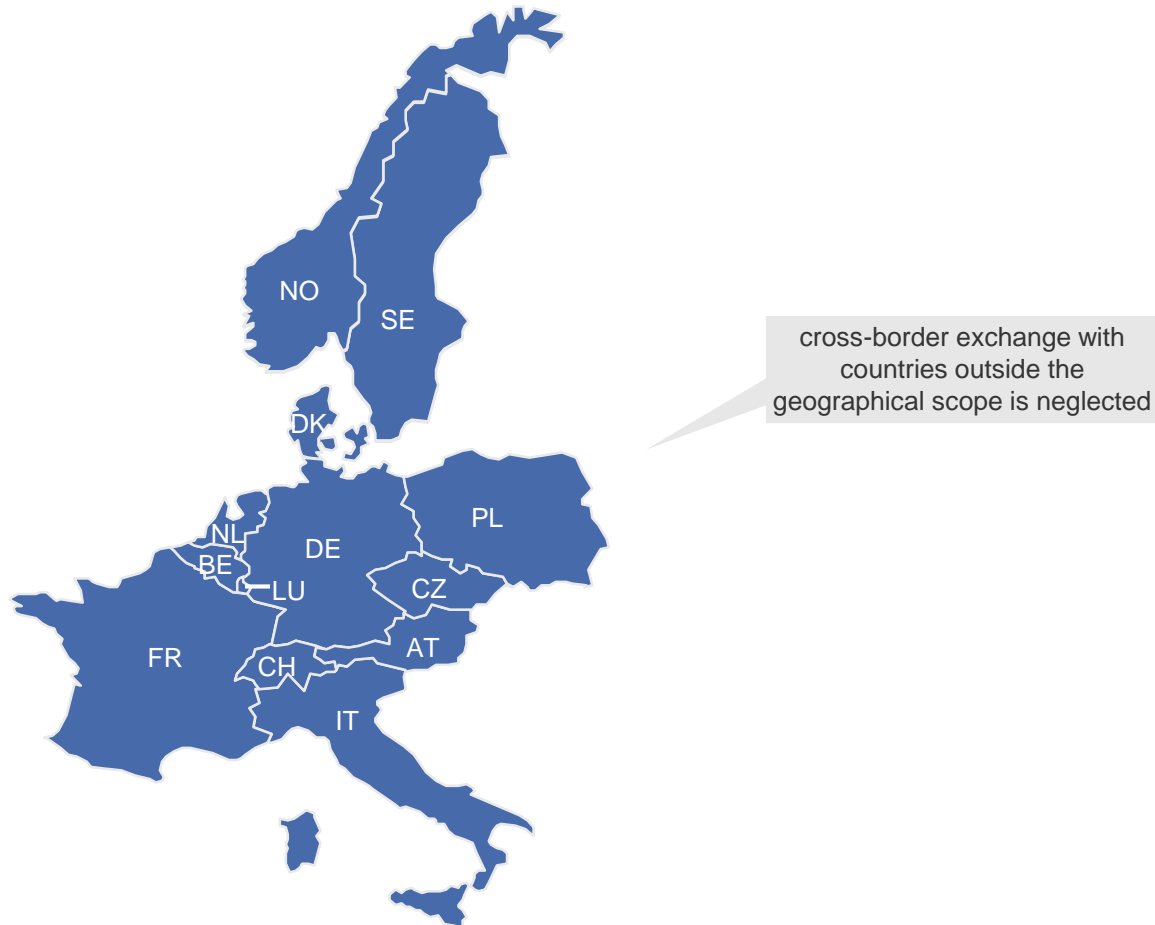
- > Get a first grasp of the benefits of a transnational approach
- No definitive assessment, but starting point for discussion

Measurement of system adequacy

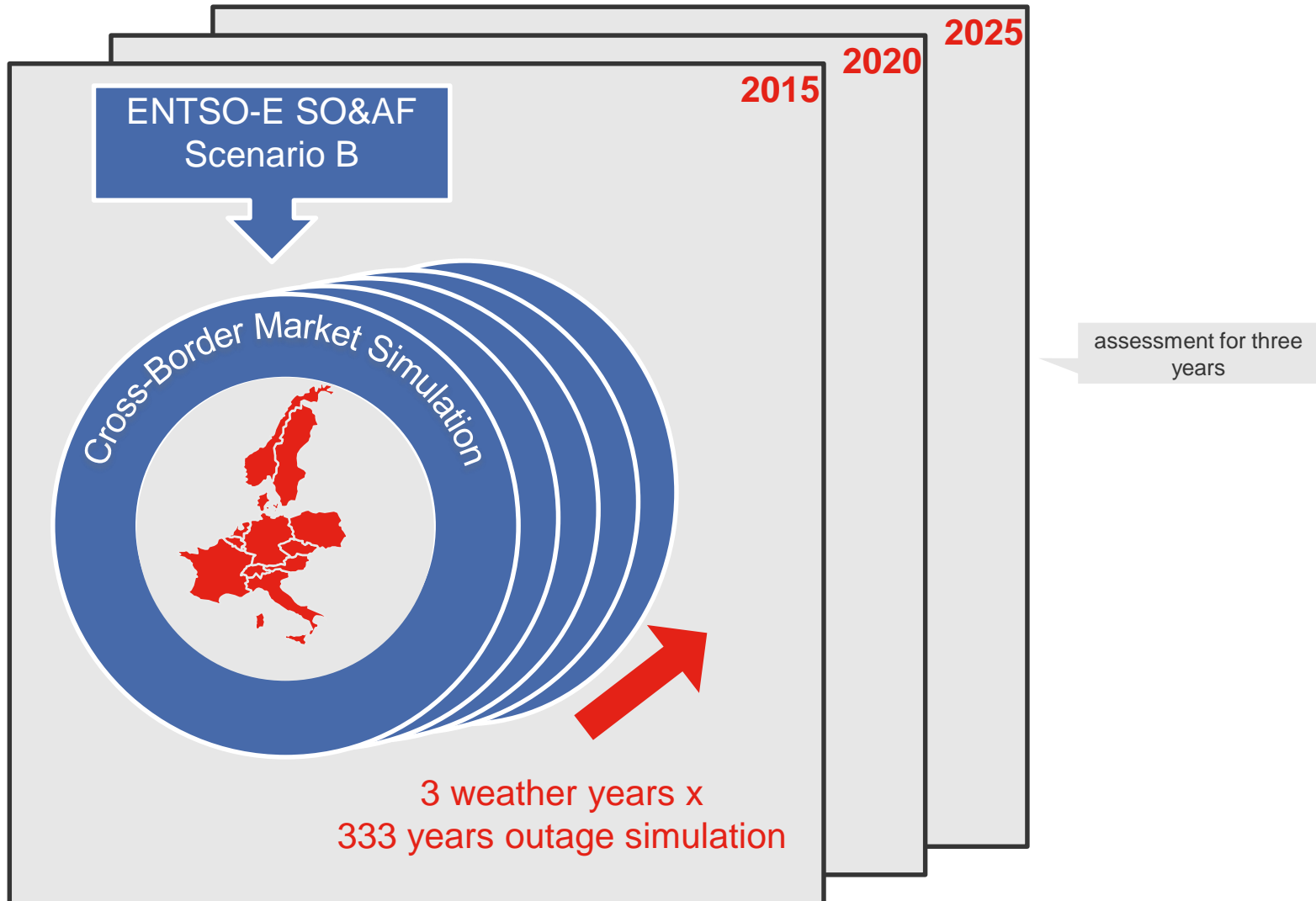
- > Indicator: Load Balancing Probability (LBP)
 - » indicates probability that adequacy is maintained
 - » closely related to “LOLE”

LOLE describes the expected number of hours per year in which load cannot be fully covered

Geographical scope for exemplary application

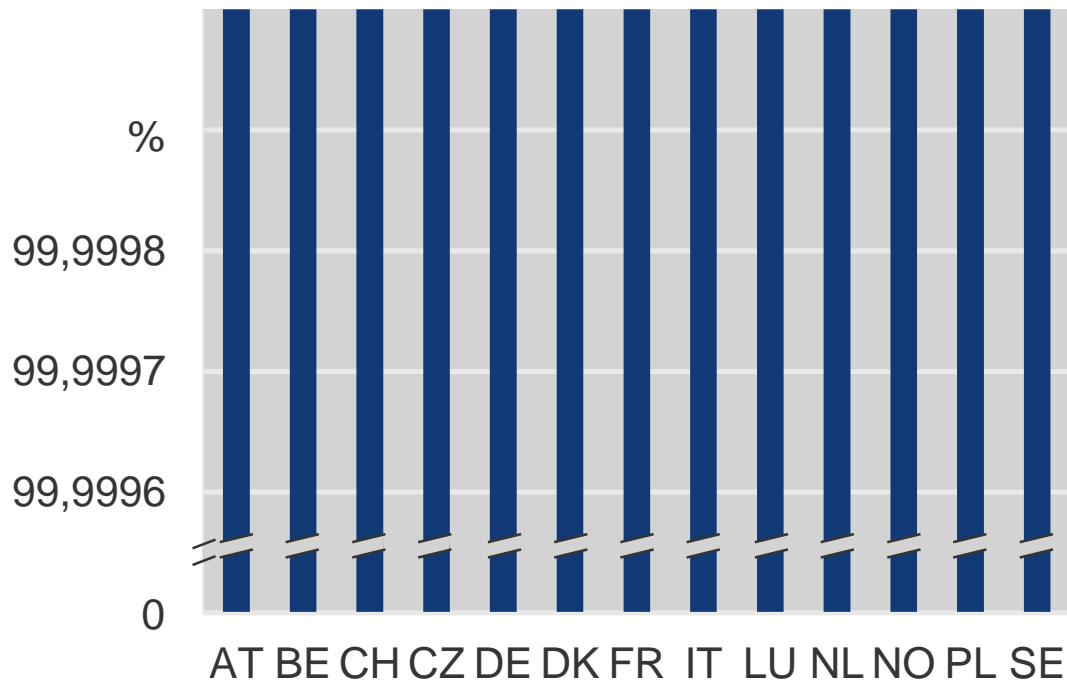


Methodical Approach: Stochastic Simulation



Results (1/2)

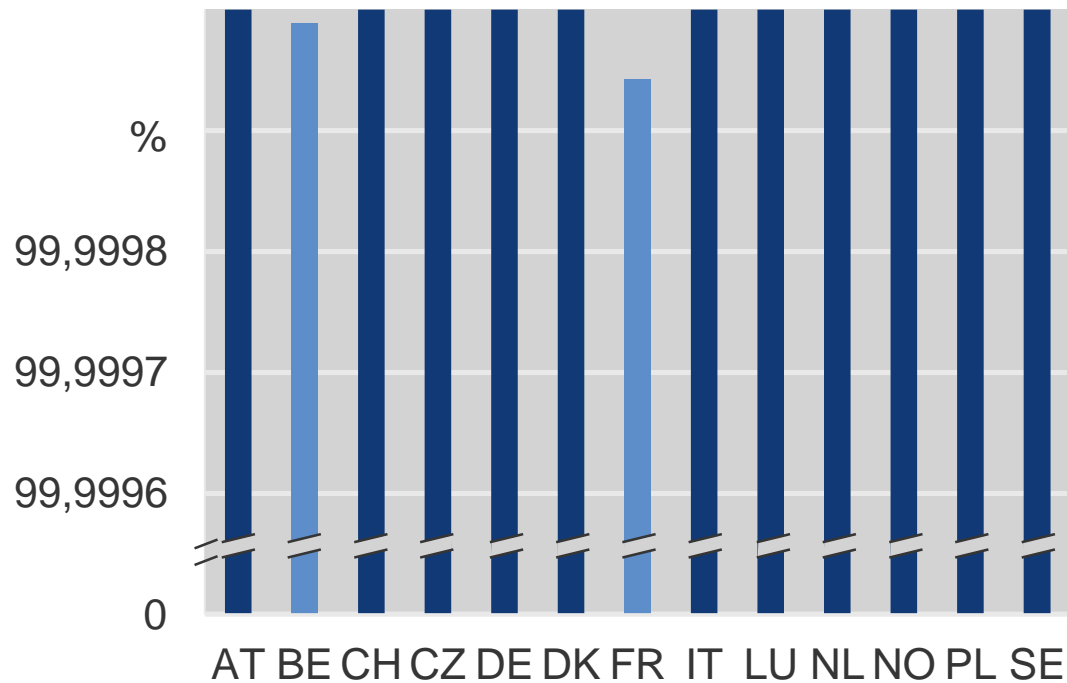
Probability for system adequacy (LBP) 2015 & 2020



> Load was covered in each hour of the 999 scenarios and in the whole region → no adequacy issues

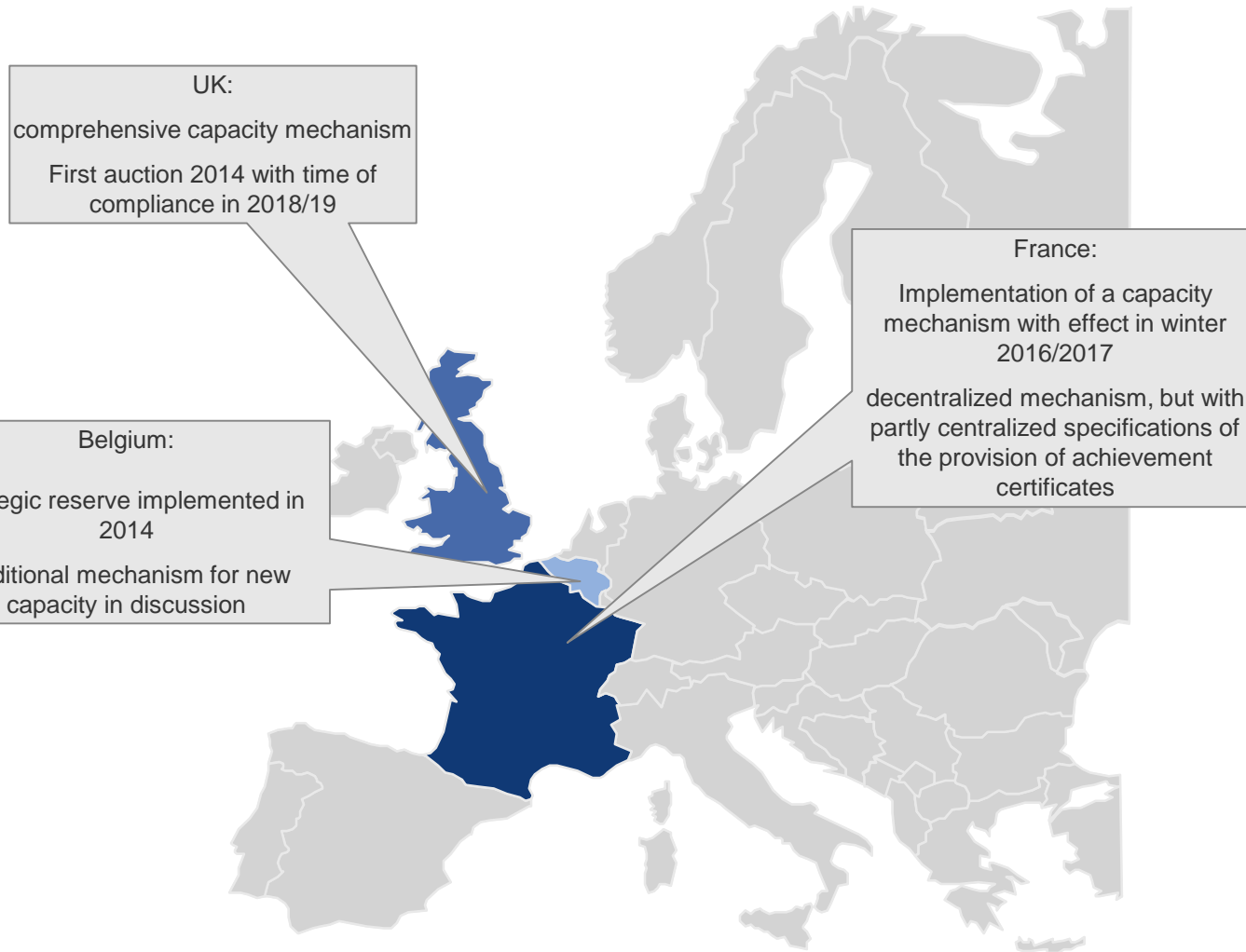
Results (2/2)

Probability for system adequacy (LBP) 2025



> Load was covered in each hour of the 999 scenarios in all countries, except FR and BE, where (very few) issues occur

Nevertheless: Implementation of CRM in several European member states on going



> At least a coordination of various market designs necessary

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Coordination of various market designs

Implementation of capacity mechanism requires European coordination and possibly harmonization

National market design decisions lead to potentially politically critical distribution effects

- > National consumers bear the costs of CRM within their country, but neighboring countries are able to benefit of its implementation (“free-rider”)
- > Decreasing rents for producers in neighboring countries because of the wholesale price effects
- > Participation of foreign producers → EU guidelines on state aid

Implementation of national CRM in an internal market

- > Cross-border exchange in EOM has to be still possible in the case of scarcity
→ otherwise autarky is necessary

- > Different market design approaches need coordination
- > Coordination also required cross-border participation in national CRM

Cross-border participation in national CRM (1/2)

Implicit participation

- > Consideration of foreign generation capacity at the level of determination of the national capacity demand
- > No payments on foreign producer for their contributions
- > Example: French capacity mechanism considers implicit contributions of approximately 7 GW of imports in critical situations

- > Implementation within the capacity mechanism comparatively simple
- > The challenge is to determine implicit contributions
- > Problem of double counting requires coordination
- > No level-playing-field for all generation capacities

Explicit participation

- > Explicit participation of foreign producer on the capacity auctions
 - » payments for capacity provision to foreign producer
- > Competition between internal and external capacities → in principle preferable
- > Requires coordination with limited cross-border capacity → physical transmission rights necessary

Cross-border participation in national CRM (2/2)

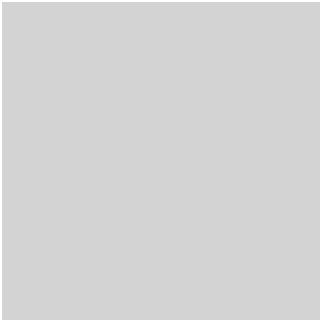
Both approaches still not fully convincing

- > Implicit participation can mitigate efficiency disadvantages of national CRM
 - » but significant coordination issues and parameterization risks
 - » distribution effects of different market designs remain
- > Explicit participation requires coordination of cross-border capacities which is difficult under current framework of physical transmission rights, etc.

Market designs differ in terms of difficulties of transnational coordination

- > EOM enables a perfect coordination in the internal electricity market
- > CRM are more problematic

> National solo actions lead to inefficiencies within an internal market
→ System adequacy as well as various market designs require a transnational view to face the challenges of the future European electricity system



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