

Regulatory challenges towards increased regional cross-border cooperation: the FARCROSS project perspective

Bridge Regulatory WG – Knowledge sharing session #1

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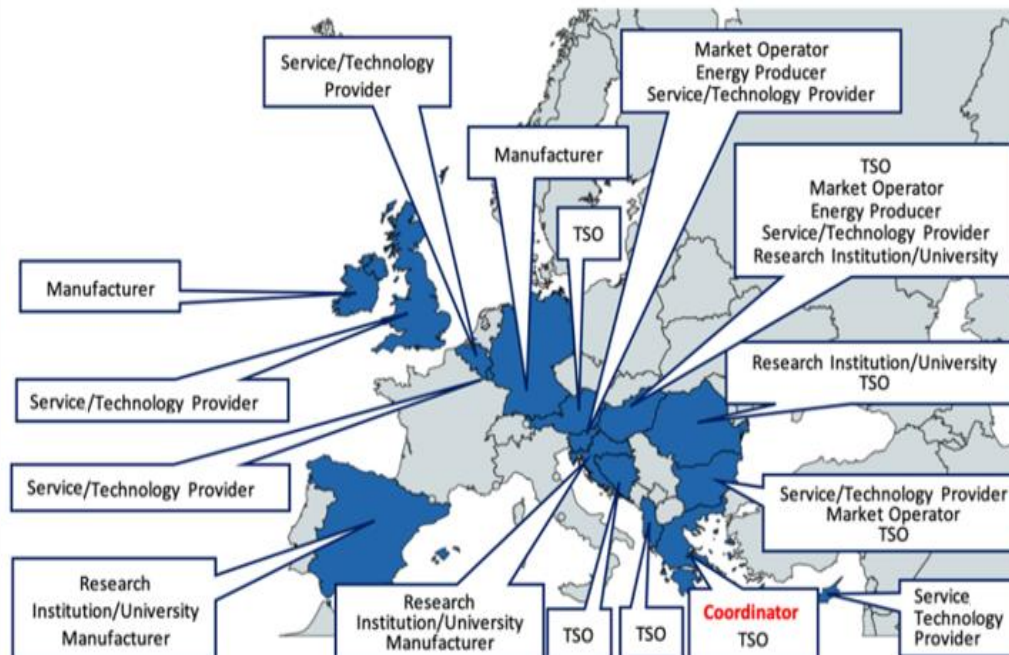


FARCROSS

FARCROSS in a nutshell

FARCROSS aims to connect major stakeholders of the energy value chain around Europe and demonstrate integrated hardware and software solutions that will facilitate “unlocking” of the resources for the **cross-border electricity flows** and **regional cooperation**.



Start date: October 2019
End date: September 2023



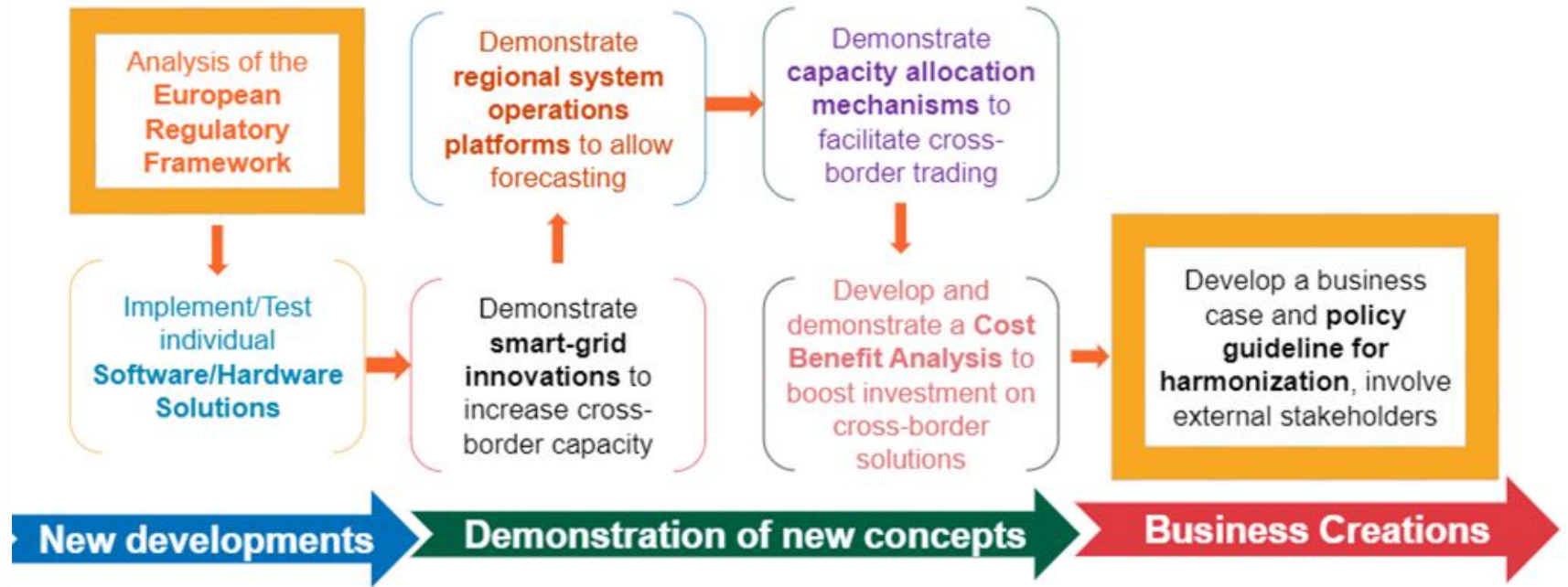
FARCROSS objectives & impact

- To test the state-of-the-art digital technologies, installed on the power grid and communication infrastructure, such as **power flow controllers**, **dynamic line rating sensing systems** and **wide-area monitoring systems**, for optimally exploiting and maximising the capacity and security of transmission corridors.
- To develop and introduce advance software solutions, including **capacity allocation and reserve optimisation tools** and an **advanced forecasting of energy production and demand response platform**, to increase the cross-border capacity and the potential of cross-border grid services.

-  Competition in the European Energy Markets
-  Supporting the Clean Energy Package ambitions
-  Enhancing regional cooperation in transmission grid

-  Creating Impact beyond the project lifecycle
-  Improving system security in the renewable energy context

FARCROSS project approach



Cross-zonal capacity challenges in EU region

Insufficient cross-zonal capacity is one of the main barriers to the integration of electricity markets.

Building more capacity approach

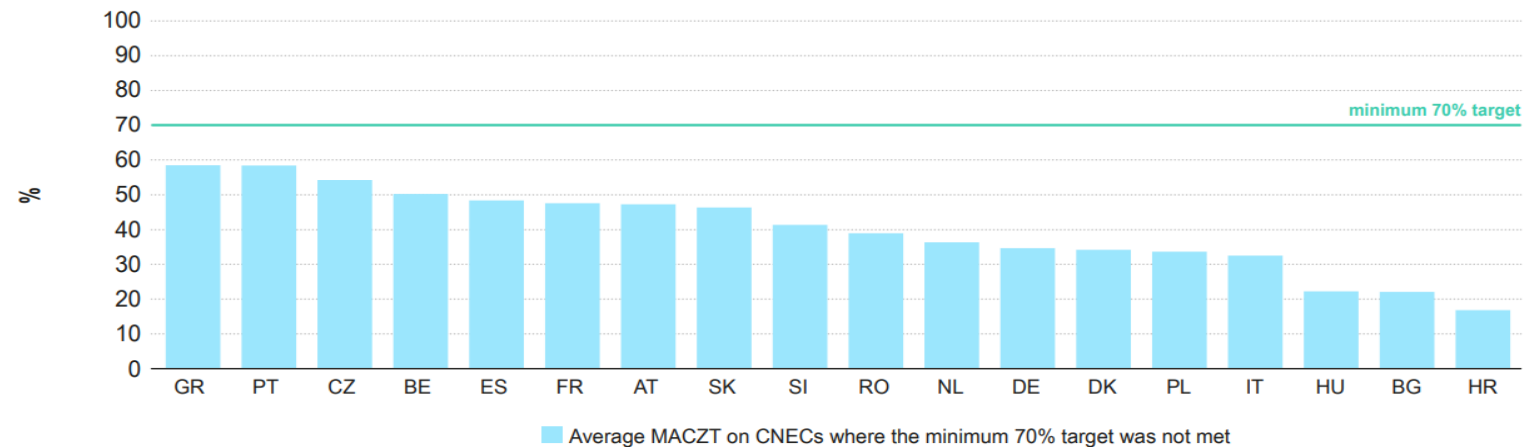
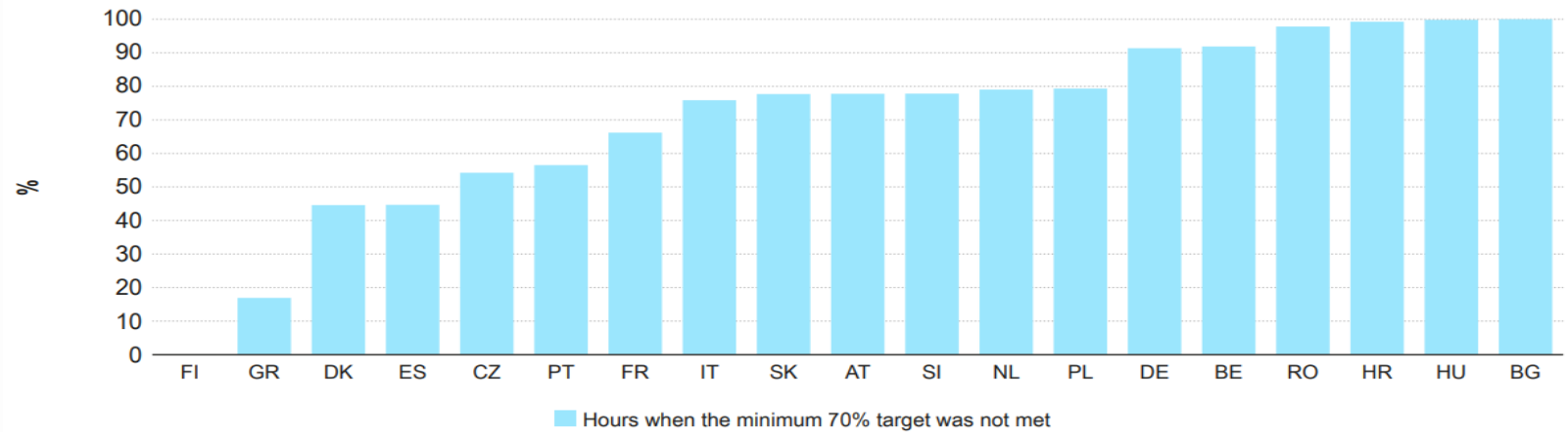
- 93GW cross-border capacity increases needed by 2040 identified by ENTSO-E (in “Completing the map Power system needs in 2030 and 2040”)
- Other solutions such as storage, hybrid offshore infrastructure, smart grids, Power-to-X conversion technologies should be integrated in order to facilitate a Pan-European efficient electricity market.

Increase capacity allocation approach

- 70% rule: Capacity made available to market parties per cross-border connection to be higher than 70% of the technical capacity, after controlling for a reliability margin to deal with loop flows and emergency conditions
- ACER states that the amount of cross-border capacity available for trade among Member States remains insufficient to meet the minimum EU target of 70%.

Current status of cross-zonal trading

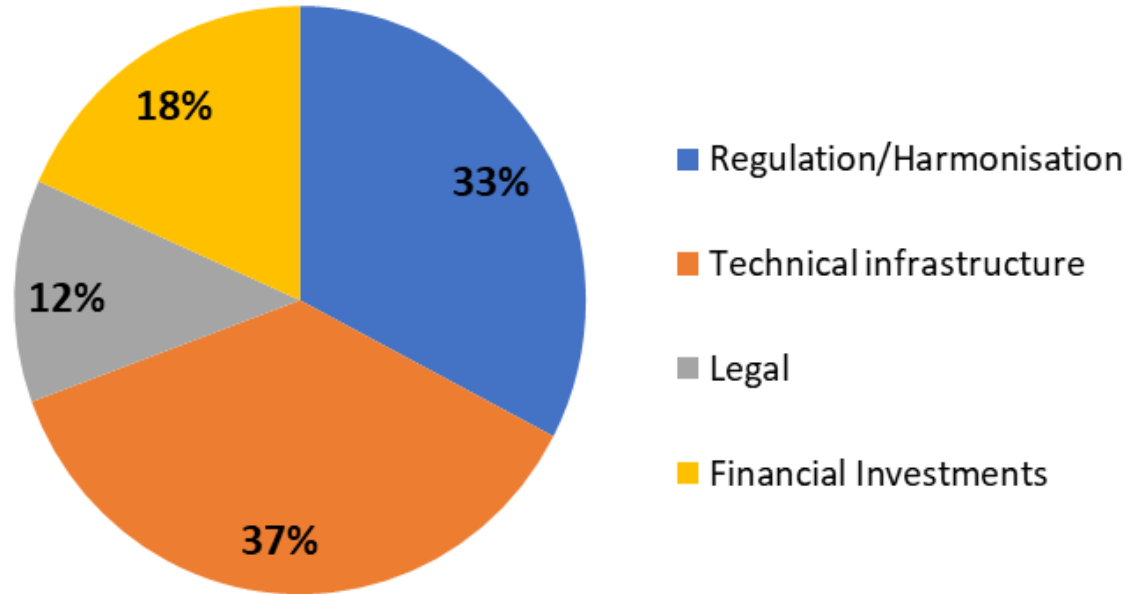
- The Core TSOs, Italy, Bulgaria and Romania need to make the biggest effort to meet the minimum 70 % target.
- The regions and countries presenting the best results are the SWE region, the Nordic region, Greece and the Czech Republic, for which the target was reached more than half of the time in 2020.



Source: ACER Market Monitoring Report 2020

Challenges emerging due to increased cross-border electricity flows and transactions

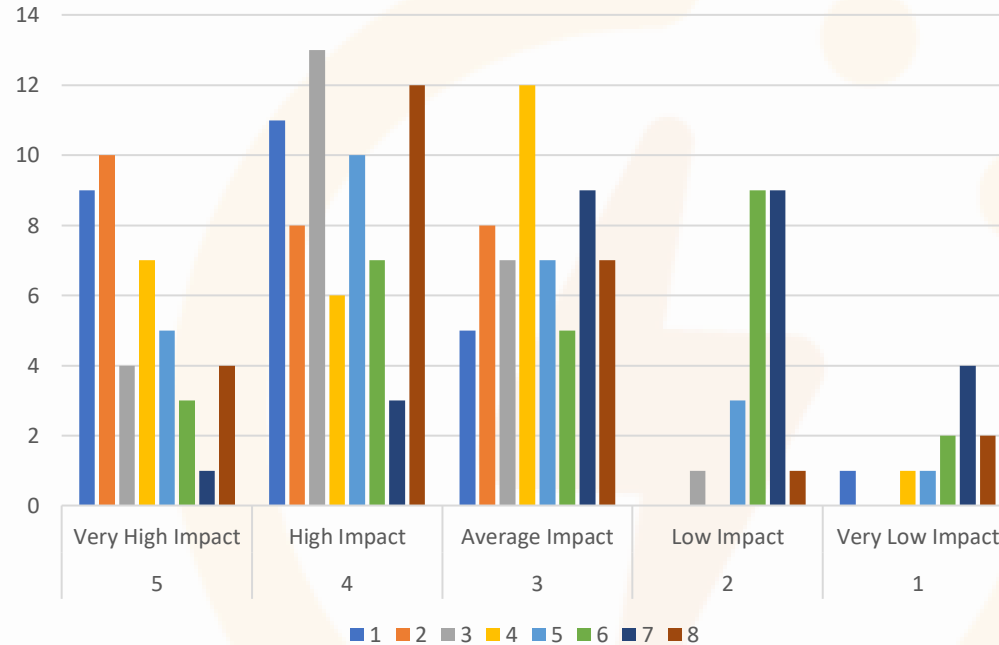
Challenges to cross border cooperation



Respondents stressed that **investments in innovative technologies should be encouraged/incentivized**, as well as projects and cross-border infrastructure, to overcome the national limitations to cross-border electricity flows.

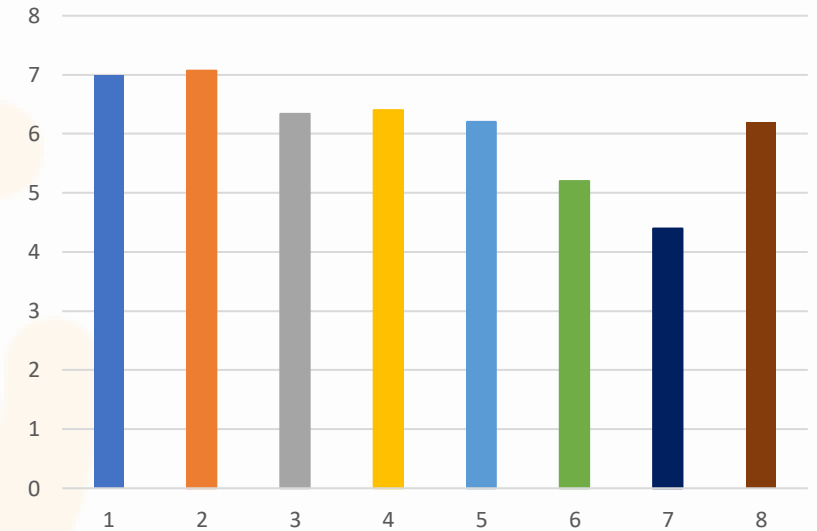
Target areas of the European Green Deal hosting the highest number of innovations

Target areas of the European Green Deal hosting the highest number of innovations in the following 5 years



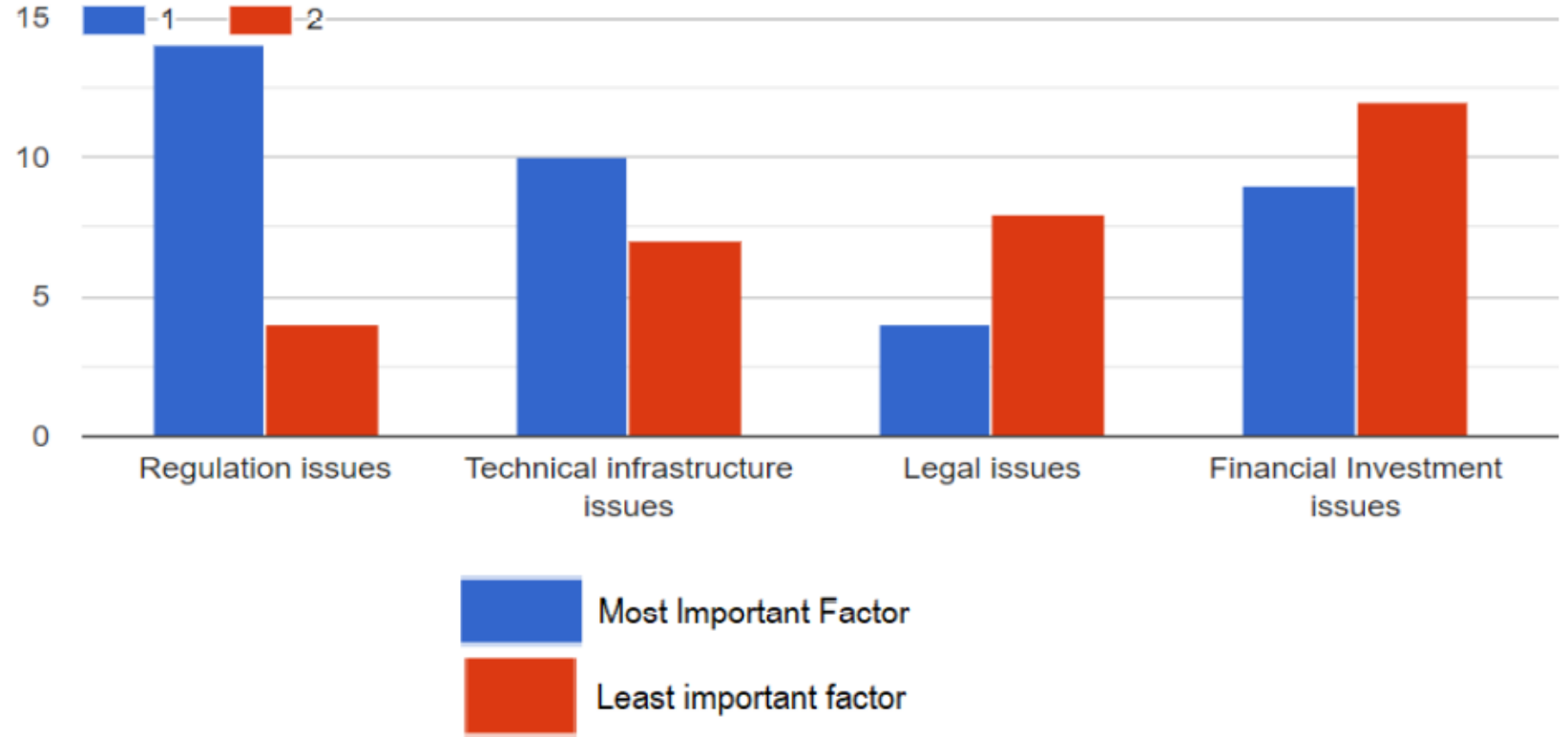
- 1 Increasing the EU's climate ambition for 2030 and 2050
- 2 Supplying clean, affordable and secure energy
- 3 Mobilising industry for clean and circular economy
- 4 Building and renovating in an energy and resource efficient way

Target areas of the European Green Deal hosting the highest number of innovations in the following 5 years (Weighted average)



- 5 A zero-pollution ambition for a toxic free environment
- 6 From Farm to Fork: a fair, healthy and environmentally friendly food system
- 7 Preparing and restoring ecosystems and biodiversity
- 8 Accelerating the shift to sustainable and smart mobility

Challenges the innovation projects face

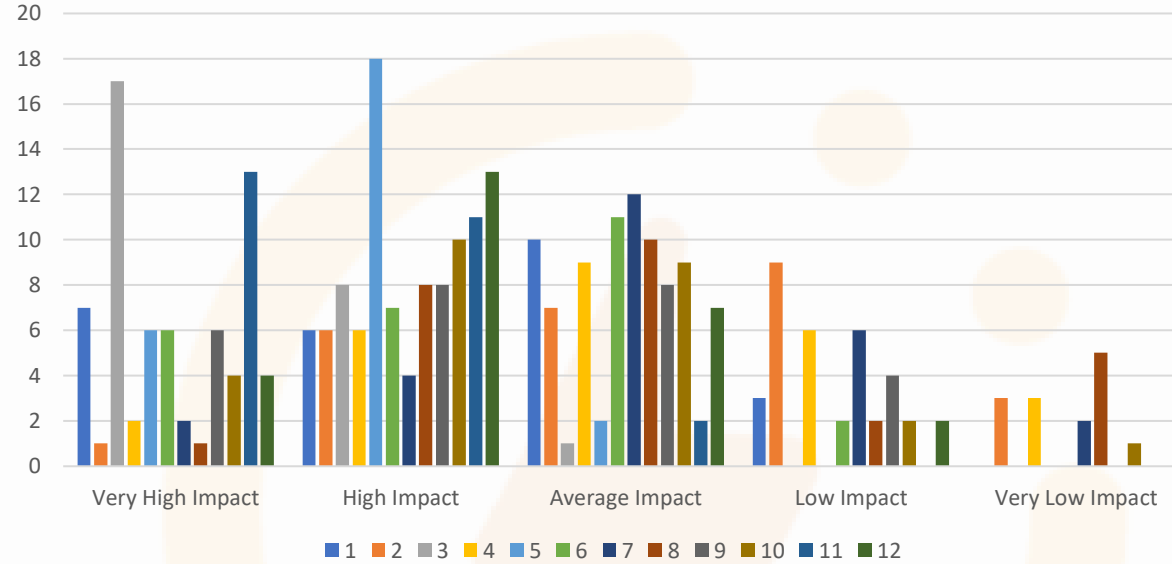


Challenges in fostering innovation

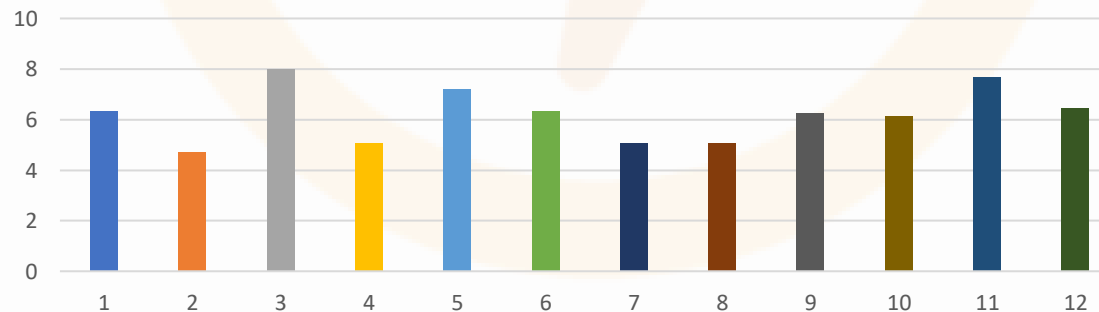
- Socially beneficial but (for the TSO) not viable projects are not sufficiently incentivised
- Bias towards CAPEX based solutions instead of operational expenditures (OPEX-solutions)
- No specific provision related to innovation (e.g., allowances, duties, etc.)
- TSOs are deterred from risky investments due to perceived high project risk and strict penalties for not meeting deadlines
- Smart grid technologies reducing need for physical investments lower TSOs' financial return, creating a disincentive to invest for TSOs

Innovations with the highest and lowest impacts on cross-border cooperation

Innovations with the highest and lowest impacts on cross-border cooperation



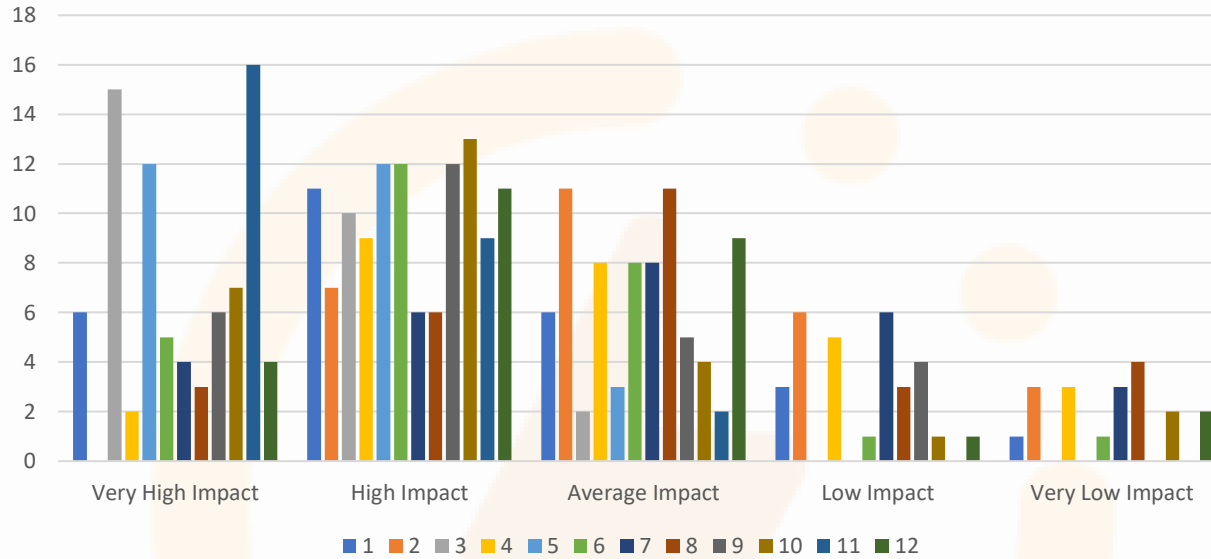
Innovations with the highest and lowest impacts on cross-border cooperation (Weighted average)



- 1 Smart meters
- 2 Smart Buildings
- 3 Integrated Balancing and Congestion management markets
- 4 IoT appliances
- 5 Digital platforms for grid services
- 6 Demand response - dynamic pricing
- 7 5G telecommunications
- 8 Electric mobility
- 9 Improved AI algorithms- Big Data Analytics
- 10 Sector coupling
- 11 Market coupling
- 12 Flexibility provision by DERs

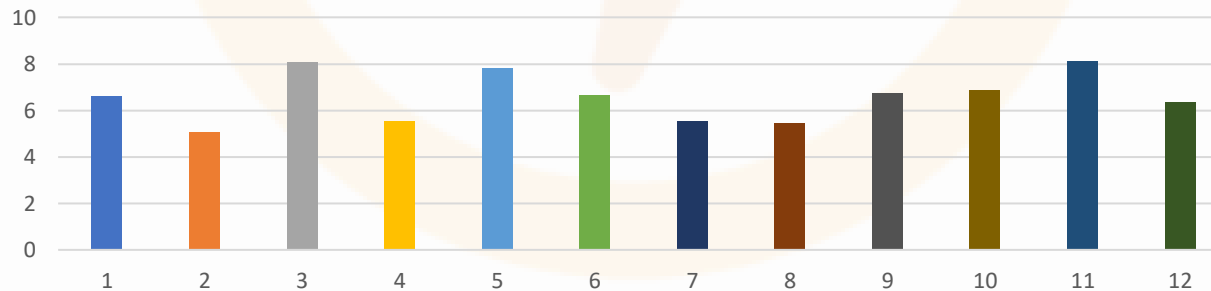
Innovations with the highest and lowest impacts on integration of the European electricity markets

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Innovations with the highest and lowest impacts on integration of the European electricity markets (Weighted average)



Other innovation areas with significant impact on cross- border cooperation and integration of European electricity markets

Improved technology in the field must be accompanied by **innovation in business models, policies, processes, and market design.**

Innovations that could have an impact on cross-border cooperation and integration of the European electricity markets are:

- Developments that introduce **new applications in the power sector**, changing the boundaries and dynamics of industry and contributing to the **automation of more processes related to the operation of the electricity system**;
- **New services and tools that enhance electricity system flexibility**, such as advanced renewable resource forecasting, facilitating demand-side response and providing flexibility through interconnections;
- **Innovative technologies facilitating the integration of renewable energy**; and
- **Innovative technologies that enable sector coupling** and new markets for renewable generation.

FARCROSS Analysis Conclusions (1)

- Implementation of all **three relevant NCs** (FCA, CACM and EBGL) by the EU countries is **facilitating greatly cross border cooperation**. Additional network codes, acceleration of market coupling, and flow-based market approach would surely improve cross border flows and cooperation
- European platforms for the **exchange of balancing energy**, that are currently being developed and implemented through the MARI, TERRE, PICASSO projects, will surely **improve cross-border cooperation and integration of EU markets** through efficient coordination of resources
- Necessity for **maximum use of cross-border exchange capacities and the existing cross-border infrastructure**, using efficient smart grid technology and algorithms.
- Need for **more cooperation between national grid operators on the shared use of interconnectors**, development and improvement of cross-border electricity grid in order to deal with pressure on the grids, as a result of the cross-border trade in electricity, fulfilling **the 70% capacity target** set by EC

FARCROSS Analysis Conclusions (2)

- **Fostering innovation** not only in terms of hardware or software-based solutions, but also in respect with **the business models, market designs and products**
- Ensuring **wider national participation in innovation projects**
- Adapting the national legislations towards creating a **secure investment framework** for innovation projects
- **Increasing the integration of innovative solutions** by raising awareness about their benefits, stressing the importance of innovation integration
- **Smart grid PCIs and cross-border RES projects** under CEF funding can play an important role in promoting innovation in cross-border projects

FARCROSS solutions



Smart grid innovations to increase cross-border capacity



- ❖ Unlocking cross-border capacity with **modular power flow control solutions**
- ❖ **Complex grid management technology** for handling cross-border transmission line capacity-related issues
- ❖ Implementation of a **wide-area protection, automation and control system**



Regional system operations platforms development



Pan-European **deep modelling framework** for improved system operation planning/forecasting



Capacity allocation for regional cross-border trading



Co-optimized **cross-border capacity auction algorithm**

FARCROSS solutions

Demo	High level Scope/ Description	Demonstration Countries
Smart Grid Innovations to increase cross-border capacity		
1	Unlocking Cross-Border Capacity with Modular Power Flow Control Solutions	Greece
2	Complex grid management technology for handling cross-border transmission line capacity-related issues	Croatia, Greece, Hungary
3	Implementation of a Wide-Area Protection, Automation and Control system (WAMPAC) applied to Cross-Border Transmission Systems	Greece
Regional System Operations platforms development		
B	Pan-European Deep Modelling Framework for improved system operation planning/forecasting and analysis on the inter-TSO level	Greece, Romania, Bulgaria
Capacity allocation for regional cross-border trading		
C	Co-optimized cross-border capacity auction algorithm	Croatia, Hungary, Romania



Demonstration countries

Thank you for
your attention!

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