DATA EXCHANGE AND ICT- REQUIREMENTS FOR TSO-DSO INTERACTION

An international best practice analysis

ISGAN Annex 6

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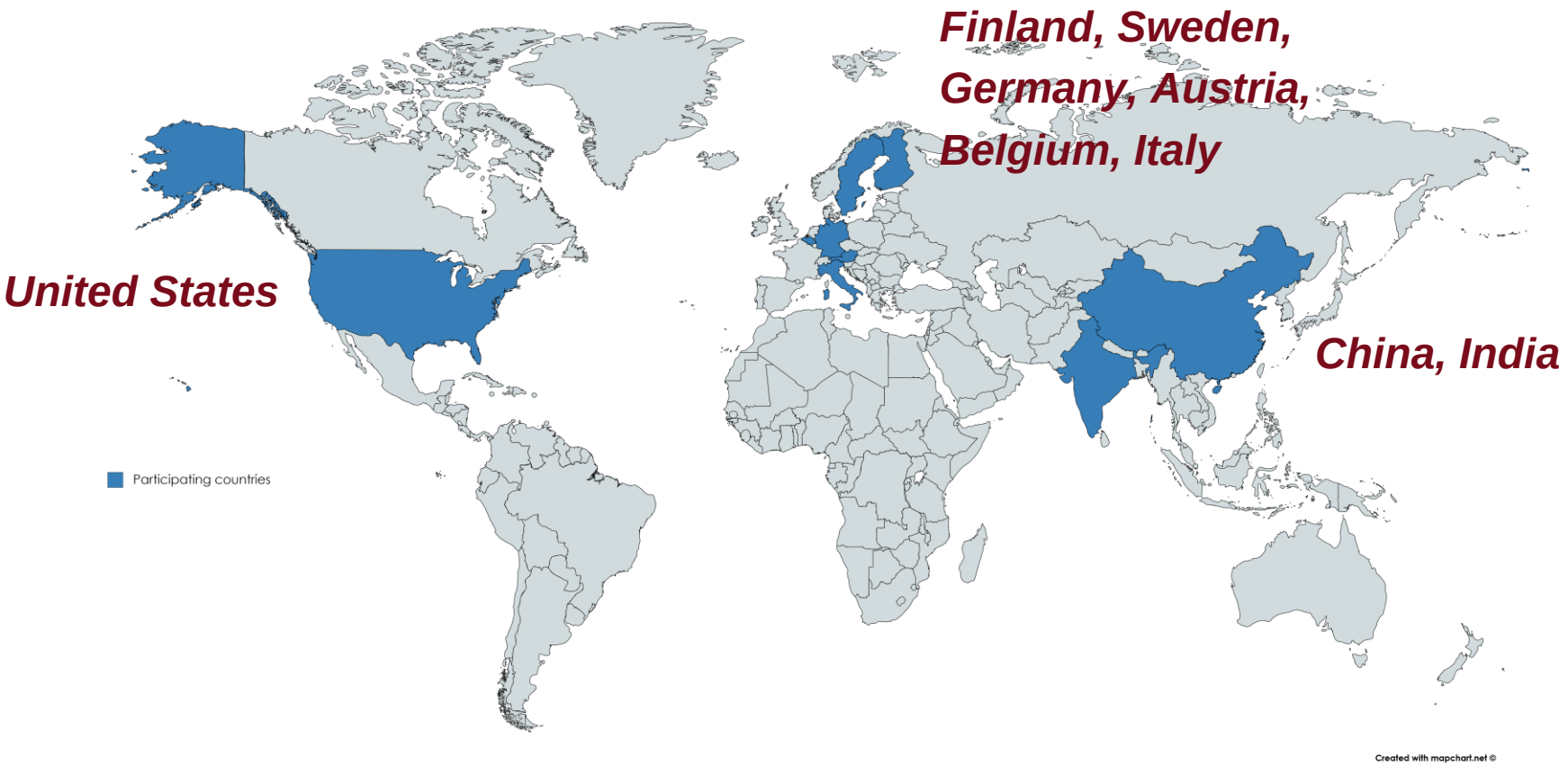
INTRODUCTION

- ISGAN Annex 6, Task 5 (Power Transmission & Distribution)
- Investigation of ICT aspects of TSO and DSO
- Questionnaire to Annex 6 members



QUESTIONNAIRE

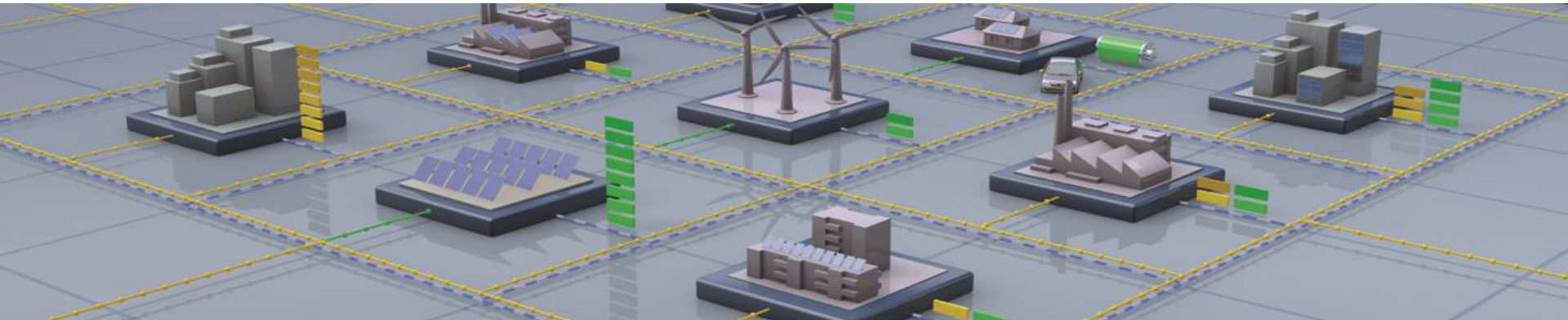
- Technical connection points between DSO & TSO
- Main interaction schemes
- Main drivers for implemenation
- Main barriers
- Expected benefits
- Best practice projects
- Lessons learned

WHY DO WE NEED TSO-DSO INTERACTION

- Increasing number of renewable distributed energy sources
- Mainly connected at the distribution grid
- Higher need for flexibility services for network operators (TSOs and DSOs)

- Flexibility needed to counteract the high volatility of energy sources
- Controlling frequency and/or voltage
- Providing congestion management

- Activating flexibility by TSO and DSO simultaneously
- Interaction between TSO and DSO needed



TSO-DSO INTERACTION SCHEMES

- Congestion management
- Balancing, load shedding, curtailment of generation
- Planning (grid, generation, consumption) and operation purposes (transformer tap)
- Market clearing
- Trading

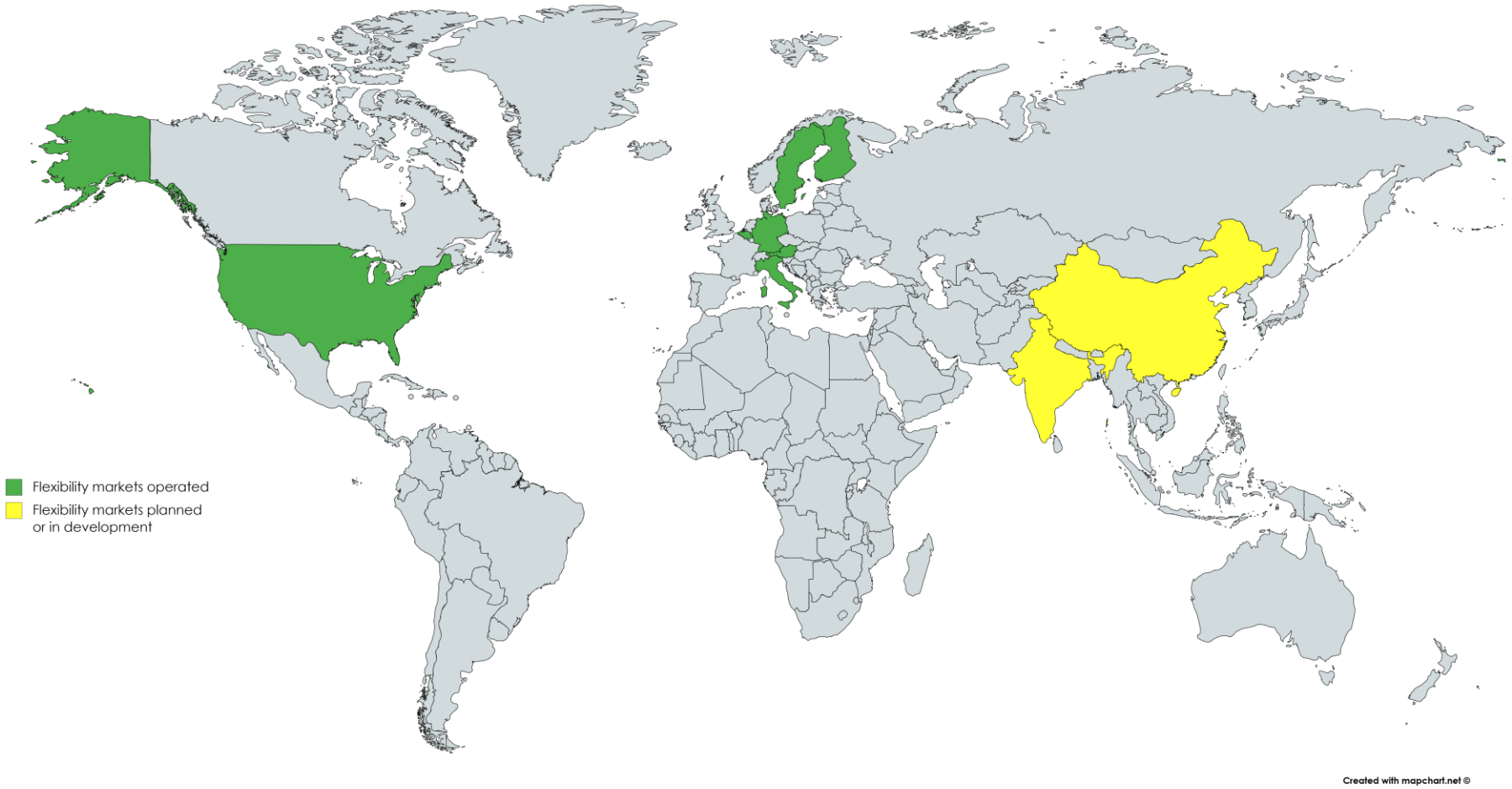
NUMBER OF TSOs AND DSOs

Country	# TSOs	# DSOs
Germany	4	900
Belgium	1	19
Italy	1	152
Sweden	1	199
Finland	1	76
Austria	1	122

China: 2 companies representing both TSOs and DSOs of different regions

India: 2 TSOs and other state transmission companies, DSO role played by stated owned distribution companies

FLEXIBILITY MARKETS FOR TSO AND DSO



TECHNICAL CONNECTION POINTS

- European power grid: 3-phase alternating current grid operated at a frequency of 50 Hertz at different voltage levels:
  - Extra-High Voltage (EHV)
  - High Voltage (HV)
  - Medium Voltage (MV)
    Low Voltage (LV)

- Technical connection points occur between transmission and distribution level at primary substations for all participating countries
  (e.g. 380 kV/110 kV)

MAIN DRIVERS AND BARRIERS

- **Renewable energy sources**
- **Market mechanisms and connected flexibility**
- **Legal aspects**
- **Technical barriers and risks**
- **Organizational issues**

EXPECTED BENEFITS AND REQUIREMENTS

- Increased use of flexibility in the grid
- Enabling market participation
- Optimized grid operation (e.g. real-time grid data with finer granularity)

- Harmonization and standardization of ICT requirements and interfaces
- TSOs & DSOs: Choose/develop suitable ICT technologies and services
- Practical guidance for data analytics
- Implementation of data and service platform
- Organizational changes

COST FACTOR

- Issue:
  - Costs for implementing TSO-DSO interaction can become a substantial factor

- Benefits:
  - Telecommunication and information services
  - Increasing safety, robustness, and reliability
  - Reduction of grid operation costs

PROJECTS AND ACTIVITIES

- Belgium: **Flexibility datahub** (metering data from TSO and DSO)
- Germany (BDEW coordinates project groups): **Roadmaps, technical papers**, and in **close contact with regulator**, research projects
- Italy: **SmartNet** – ICT requirements and implications of different TSO-DSO coordination schemes ***("SmartNetProject - TSO and DSO coordination for the provision of ancillary services",*** Gianluigi Migliavacca)
- Austria: **HybridVPP4DSO** – flexibility supporting distribution network operation while providing balancing services to TSO.
- Further **research projects** and ongoing **activities**

LESSONS LEARNED FROM PREVIOUS ACTIVITIES

- Close and intensive cooperation between TSO, DSO, market participants, and regulators important
- Mutual understanding of needs and concerns of different parties
- Investment costs need to be reduced
- Actions from regulators necessary

(Funded) research projects can be a good opportunity for working together (industry, research institutions, universities, operators, …)

CONCLUSION

- Integration of renewable energy sources ➔ increasing importance
- New market mechanisms and connected flexibilities
- ICT aspects already analyzed in projects and activities around the world
- Benefits (Increased use of flexibility, market participation, optimized grid operation)
- Barriers and risks (congestions when activating flexibilities, mathematical models, IT-security) and organizational matters (resistance well-established patterns, infrastructure costs)
- Activities from regulators necessary & close cooperation of participating parties

THANK YOU!

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